FOR CONTRACT NO.: 12-071624

INFORMATION HANDOUT

WATER QUALITY

CRWQCB WATER QUALITY CONTROL CERTIFICATION NO. 401

PERMITS

UNITED STATES ARMY CORP OF ENGINEERS NATIONWIDE PERMIT

ENCROACHMENT PERMITS

ORANGE COUNTY FLOOD CONTROL DISTRICT ENCROACHMENT PERMIT.

MATERIALS INFORMATION

GEOTECHNICAL DESIGN REPORT, JANUARY 27, 2009.
MATERIALS REPORT, OCTOBER 24, 2008
FINAL FOUNDATION REPORT FOR RETAINING WALLS NO. 1299 AND NO. 1300, APRIL 30, 2009
FINAL FOUNDATION REPORT FOR RETAINING WALLS NO. 1325 AND NO. 1326, APRIL 17, 2009
FINAL FOUNDATION REPORT FOR RETAINING WALLS NO. 3319 AND NO. 3320, APRIL 20, 2009
VIBRATION MONITORING, ADDENDUM NO. 1, JUNE 26, 2009.
ENVIRONMENTAL SITE INVESTIGATION REPORT, JANUARY 30, 2009.
AERIALLY DEPOSITED LEAD ASSESSMENT REPORT, MARCH 30, 2009.
LEAD BASED PAINT INSPECTION REPORT, FREEWAY STRIPING, MARCH 30, 2009.
FINAL FOUNDATION REPORT FOR 405-22 HOV CONNECTOR SEPARATION, BRIDGE NO. 55-1103E, APRIL 13, 2009.
FINAL FOUNDATION REPORT FOR S405-E22 CONNECTOR SEPARATION, BRIDGE NO. 55-1101F, APRIL 10, 2009
FINAL FOUNDATION REPORT FOR BOLSA CHICA ROAD OVERCROSSING, BRIDGE NO. 55-1102, APRIL 16, 2009
FINAL FOUNDATION REPORT FOR OVERHEAD SIGNS, APRIL 24, 2009
PILE DRIVEABILITY STUDIES AND LOAD TEST REPORT, FEBRUARY 5, 2009.

ROUTE: 12-Ora-22,405-R0.7/R2.9,20.4/22.3

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adnms
Secretary *for*
Environmental Protection

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Arnold Schwarzenegger
Governor

August 4, 2009

Lisa Alviso
Department of Transportation ("Caltrans")
3337 Michelson Drive, Suite 380
Irvine, CA 92612

CLEAN WATER ACT SECTION 401 WATER QUALITY STANDARDS CERTIFICATION FOR THE STATE ROUTE 22/WEST ORANGE COUNTY CONNECTION PROJECT, PHASE 2 – EAST SEGMENT, CITIES OF WESTMINSTER AND GARDEN GROVE, ORANGE COUNTY (CORPS FILE NO. NOT AVAILABLE)

Dear Ms. Alviso:

On May 28, 2009, we received an application for Clean Water Act Section 401 Water Quality Standards Certification ("Certification"), for the proposed State Route 22/West Orange County Connection Project, Phase 2, in the City of Westminster and Garden Grove, Orange County. This letter responds to your request for certification that the proposed project, described in the application and summarized below, will comply with State water quality standards outlined in the Water Quality Control Plan for the Santa Ana River Basin (1995) and subsequent Basin Plan amendments ("Basin Plan"):

Project Description: Widening of High-Occupancy Vehicle lanes on Interstate 405, from the Interstate 405/State Route 22 interchange, near Valley View Street, to east of Seal Beach Boulevard. The project will include the construction of separate HOV connectors between Interstate 405 and State Route 22. The freeway improvements will include modifications to several local concrete drainage channels located within the interchange. The modifications will involve placing the drainage within underground culverts or widening the channels. The project is located within Section 33 of Township 4 South and Range 11 West of the U.S. Geological Survey Los *Alamitos,* California, 7.5-minute topographic quadrangle map (33 deg. 46 min. 27 sec. N/-118 deg. 02 min. 20 sec. W).

Receiving Waters:	Three un-named, concrete-lined channels, tributary to the Bolsa Chica Channel.
Fill Area:	0.03 acre of permanent impact to ephemeral drainages (505 total linear feet).
Dredge Volume:	Not applicable.
Federal Permits:	US Army Corps of Engineers Nationwide Permit No. 14.

This certification addresses impacts to water quality standards associated with the dredging or filling of waters of the United States. Construction and post-construction impacts resulting from the project and use of the roadways are addressed by waste discharge requirements issued to the Department of Transportation by the State Water Resources Control Board in Order No. 99-06 DWQ. These requirements include the development and implementation of appropriate Best Management Practices for the purpose of removing construction-related and transportation-related pollutants from discharges from Caltrans' rights-of-way and easements.

The proposed project is subject to a nationwide permit from the U.S. Army Corps of Engineers in compliance with Section 404 of the Clean Water Act. The California Department of Fish and Game has determined that the project is not subject to a Streambed Alteration Agreement under Fish and Game Code Section 1600 et seq. Pursuant to the California Environmental Quality Act ("CEQA"), Caltrans certified an environmental impact report for the larger 13-mile long State Route 22/West Orange County Connector Project on March 26, 2003 (State Clearinghouse No. 98064001). Subsequent environmental analysis was provided in an Addendum, dated July 2,2008 (State Clearinghouse No. 89010410), for the segment that is the subject of this Certification. Pursuant to California Code of Regulations, Title 14, Section 15096, subdivision (9, the Regional Board must consider the environmental effects of the project as shown in the associated environmental documents prior to reaching a decision on the project. The Regional Board has considered Caltrans' environmental documents in the issuance of this Certification and finds that changes or alterations have been required, or incorporated into the proposed project, which avoid impacts to water quality or mitigates them to a less than significant level.

This 401 Certification is contingent upon the execution of the following conditions:

1 A copy of this Certification and any subsequent amendments must be maintained on site as a denoted element of the project Storm Water Pollution Prevention Plan(s) ("SWPPP").

2) The discharger must comply with the conditions and provisions of the U.S. Army Corps of Engineer's permit(s).

Under California Water Code, Section 1058, and Pursuant to 23 CCR §3860, the following shall be included as conditions of all water quality certification actions:

(a) Every certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to **Section** §13330 of the Water Code and Article 6 (commencing with Section 3867) of this Chapter.

(b) Certification is not intended and shall not be construed to apply to any activity involving a hydroelectric facility and requiring a FERC license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to Subsection §3855(b) of this Chapter and that application specifically identified that a FERC license or amendment to a **FERC** license for a hydroelectric facility was being sought.

(c) Certification is conditioned upon total payment of any fee required under this Chapter and owed by the applicant.

If the above stated conditions are **changed,** any **of** the criteria or conditions as previously described are not met, or new information becomes available that indicates a water quality problem, the Regional Board may require the applicant to **submit** a report of waste discharge and obtain **Waste** Discharge Requirements.

In the event of any violation or threatened violation of the conditions of this certification, the holder of any permit or license subject to this certification shall be subject to any remedies, penalties, process or sanctions as provided for under state law. For purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation **necessary** to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification. Violations of the conditions of **this** certification may **subject** the applicant to civil liability pursuant to Water Code section 13350 and/or 13385.

This letter constitutes a Water Quality Standards Certification issued pursuant to Clean Water Act Section 401. I hereby issue an order certifying that any discharge from the referenced project will comply with the applicable provisions of Sections 301 {Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003-0017-DWQ (Order No. 2003-0017-DWQ), "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received Water Quality Certification" which requires compliance with all conditions of this Water Quality Standards Certification. Order No. 200-0017-DWQ is available at:
www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo 2003-0017.pdf

Should there be any questions, please contact Adam Fischer at (951) 320-6363, or Mark Adelson at (951) 782-3234.

Sincerely,

for GERARD J. THIBEAULT
Executive Officer

cc (via electronic message):
U. S. Army Corps of Engineers, Los Angeles Office – Stephanie Hall
State Water Resources Control Board, OCC – David Rice
State Water Resources Control Board, DWQ – Water Quality Certification Unit
California Department of Fish and Game, Ontario Office – Erinn Wilson
U.S. EPA – Supervisor of the Wetlands Regulatory Office WTR- 8

APF: 401/certifications/SR22-west OC connector 302009-19

U S Army Corps of Engineers
Sacramento District

Nationwide Permit Summary

33 CFR Part 330; Issuance of Nationwide Permits – March 19, 2007 includes corrections of May 8, 2007 and addition of regional conditions December 2007

14. Linear Transportation Projects. Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 27.) (Sections 10 and 404)

Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4)

A. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

☐ **1. Navigation.**

☐ (a) No activity may cause more than a minimal adverse effect on navigation.

☐ (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

☐ (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

☐ **2. Aquatic Life Movements**. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

☐ **3 Spawning Areas.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized**.**

☐ **4. Migratory Bird Breeding Areas.** Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

☐ **5. Shellfish Beds**. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.

☐ **6. Suitable Material**. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

☐ **7. Water Supply Intakes**. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

☐ **8. Adverse Effects From Impoundments**. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or

restricting its flow must be minimized to the maximum extent practicable.

☐ **9. Management of Water Flows**. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

☐ **10. Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

☐ **11. Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

☐ **12. Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

☐ **13. Removal of Temporary Fills**. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

☐ **14. Proper Maintenance**. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.

☐ **15. Wild and Scenic Rivers**. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

☐ **16. Tribal Rights**. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

☐ **17. Endangered Species**.

☐ (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

☐ (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

☐ (c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.

☐ (d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

☐ (e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide Web pages at http://www.fws.gov/ and http://www.noaa.gov/fisheries.html respectively.

☐ **18. Historic Properties**.

☐ (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

☐ (b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

☐ (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

☐ (d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed.

☐ (e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

☐ **19. Designated Critical Resource Waters.** Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.

☐ (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

☐ (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

☐ **20 Mitigation.** The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

☐ (a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

☐ (b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

☐ (c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the

aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

☐ (d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

☐ (e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

☐ (f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

☐ (g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

☐ (h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

☐ **21. Water Quality.** Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

☐ **22. Coastal Zone Management**. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

☐ **23. Regional and Case-By-Case Conditions**. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

☐ **24. Use of Multiple Nationwide Permits**. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

☐ **25. Transfer of Nationwide Permit Verifications**. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

(Transferee)

(Date)

☐ **26. Compliance Certification**. Each permittee who received an NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

☐ (a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

☐ (b) A statement that any required mitigation was completed in accordance with the permit conditions; and

☐ (c) The signature of the permittee certifying the completion of the work and mitigation.

☐ **27. Pre-Construction Notification.**

☐ (a) **Timing**.. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, as a general rule, will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

☐ (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

☐ (2) Forty-five calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 17 that listed species or critical habitat might affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 18 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) is completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee cannot begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

☐ (b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

☐ (1) Name, address and telephone numbers of the prospective permittee;

☐ (2) Location of the proposed project;

☐ (3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided result in a quicker decision.);

☐ (4) The PCN must include a delineation of special aquatic sites and other waters of the United States on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the United States, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, where appropriate;

☐ (5) If the proposed activity will result in the loss of greater than 1/10 acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

☐ (6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

☐ (7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic

property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

☐ (c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

☐ (d) Agency Coordination:

☐ (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

☐ (2) For all NWP 48 activities requiring pre-construction notification and for other NWP activities requiring pre-construction notification to the district engineer that result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy of the PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

☐ (3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

☐ (4) Applicants are encouraged to provide the Corps multiple copies of pre-construction notifications to expedite agency coordination.

☐ (5) For NWP 48 activities that require reporting, the district engineer will provide a copy of each report within 10 calendar days of receipt to the appropriate regional office of the NMFS.

☐ (e) In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If the proposed activity requires a PCN and will result in a loss of greater than 1/10 acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any conditions the district engineer deems necessary. The district engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP.

If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant

submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

☐ **(a) 28. Single and Complete Project.** The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

B. Regional Conditions:

I. Sacramento District (All States, except Colorado)

1. When pre-construction notification (PCN) is required, the prospective permittee shall notify the Sacramento District in accordance with General Condition 27 using either the South Pacific Division Preconstruction Notification (PCN) Checklist or a completed application form (ENG Form 4345). In addition, the PCN shall include:

a. A written statement explaining how the activity has been designed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States;

b. Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity. The drawings shall contain a title block, legend and scale, amount (in cubic yards) and size (in acreage) of fill in Corps jurisdiction, including both permanent and temporary fills/structures. The ordinary high water mark or, if tidal waters, the high tide line should be shown (in feet), based on National Geodetic Vertical Datum (NGVD) or other appropriate referenced elevation; and

c. Pre-project color photographs of the project site taken from designatedlocations documented on the plan drawing.

2. The permittee shall complete compensatory mitigation required by special conditions of the NWP verification before or concurrent with construction of the authorized activity, except when specifically determined to be impracticable by the Sacramento District. When project mitigation involves use of a mitigation bank or in-lieu fee program, payment shall be made before commencing construction.

3. The permittee shall record the NWP verification with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records of title to or interest in real property against areas (1) designated to be preserved as part of mitigation for authorized impacts, including any associated covenants or restrictions, or (2) where structures such as boat ramps or docks, marinas, piers, and permanently moored vessels will be constructed in or adjacent to navigable waters (Section 10 and Section 404). The recordation shall also include a map showing the surveyed location of the authorized structure and any associated areas preserved to minimize or compensate for project impacts.

4. The permittee shall place wetlands, other aquatic areas, and any vegetative buffers preserved as part of mitigation for impacts into a separate “preserve” parcel prior to discharging dredged or fill material into waters of the United States, except where specifically determined to be impracticable by the Sacramento District. Permanent legal protection shall be established for all preserve parcels, following Sacramento District approval of the legal instrument.

5. The permittee shall allow Corps representatives to inspect the authorized activity and any mitigation areas at any time deemed necessary to determine compliance with the terms and conditions of the NWP verification. The permittee will be notified in advance of an inspection.

6. For NWPs 29, 39, 40, 42, 43, 44, and 46, requests to waive the 300 linear foot limitation for intermittent or ephemeral waters of the U.S. shall include an evaluation of functions and services provided by the waterbody taking into account the watershed, measures to be implemented to avoid and minimize impacts, other measures to avoid and minimize that were found to be impracticable, and a mitigation plan for offsetting impacts.

7. Road crossings shall be designed to ensure fish passage, especially for anadromous fisheries. Permittees shall employ bridge designs that span the stream or river, utilize pier or pile supported structures, or involve large bottomless culverts with a natural streambed, where the substrate and streamflow conditions approximate existing channel conditions. Approach fills in waters of the United States below the ordinary high water mark are not authorized under the NWPs, except where avoidance has specifically been determined to be impracticable by the Sacramento District.

8. For NWP 12, clay blocks, bentonite, or other suitable material shall be used to seal the trench to prevent the utility line from draining waters of the United States, including wetlands.

9. For NWP 13, bank stabilization shall include the use of vegetation or other biotechnical design to the maximum extent practicable. Activities involving hard-armoring of the bank toe or slope requires submission of a PCN per General Condition 27.

10. For NWP 23, the PCN shall include a copy of the signed Categorical Exclusion document and final agency determinations regarding compliance with Section 7 of the Endangered Species Act, Essential Fish Habitat under the Magnussen-Stevens Act, and Section 106 of the National Historic Preservation Act.

11. For NWP 44, the discharge shall not cause the loss of more than 300 linear feet of streambed. For intermittent and ephemeral streams, the 300 linear foot limit may be waived in writing by the Sacramento District. This NWP does not authorize discharges in waters of the United States supporting anadromous fisheries.

12. For NWPs 29 and 39, channelization or relocation of intermittent or perennial drainage, is not authorized, except when, as determined by the Sacramento District, the relocation would result in a net increase in functions of the aquatic ecosystem within the watershed.

13. For NWP 33, temporary fills for construction access in waters of the United States supporting fisheries shall be accomplished with clean, washed spawning quality gravels where practicable as determined by the Sacramento District, in consultation with appropriate federal and state wildlife agencies.

14. For NWP 46, the discharge shall not cause the loss of greater than 0.5 acres of waters of the United States or the loss of more than 300 linear feet of ditch, unless this 300 foot linear foot limit is waived in writing by the Sacramento District.

15. For NWPs 29, 39, 40, 42, and 43, upland vegetated buffers shall be established and maintained in perpetuity, to the maximum extent practicable, next to all preserved open waters, streams and wetlands including created, restored, enhanced or preserved waters of the U.S., consistent with General Condition 20. Except in unusual circumstances, vegetated buffers shall be at least 50 feet in width.

16. All NWPs except 3, 6, 20, 27, 32, 38, and 47, are revoked for activities in histosols and fens and in wetlands contiguous with fens. Fens are defined as slope wetlands with a histic epipedon that are hydrologically supported by groundwater. Fens are normally saturated throughout the growing season, although they may not be during drought conditions. For NWPs 3, 6, 20, 27, 32, and 38, prospective permittees shall submit a PCN to the Sacramento District in accordance with General Condition 27.

17. For all NWPs, when activities are proposed within 100 feet of the point of groundwater discharge of a natural spring, prospective permittees shall submit a PCN to the Sacramento District in accordance with General Condition 27. A spring source is defined as any location where ground water emanates from a point in the ground. For purposes of this condition, springs do not include seeps or other discharges which lack a defined channel.

II. California Only

1. In the Lake Tahoe Basin, all NWPs are revoked. Activities in this area shall be authorized under Regional General Permit 16 or through an individual permit.

2. In the Primary and Secondary Zones of the Legal Delta, NWPs 29 and 39 are revoked. New development activities in the Legal Delta will be reviewed through the Corps' standard permit process.

III. Nevada Only

1. In the Lake Tahoe Basin, all NWPs are revoked. Activities in this area shall be authorized under Regional General Permit 16 or through an individual permit.

IV. Utah Only

1. For all NWPs, except NWP 47, prospective permittees shall submit a PCN in accordance with General Condition 27 for any activity, in waters of the United States, below 4217 feet mean sea level (msl) adjacent to the Great Salt Lake and below 4500 feet msl adjacent to Utah Lake.

2. A PCN is required for all bank stabilization activities in a perennial stream that would affect more than 100 linear feet of stream

3. For NWP 27, facilities for controlling stormwater runoff, construction of water parks such as kayak courses, and use of grout or concrete to construct in-stream structures are not authorized. A PCN is required for all projects exceeding 1500 linear feet as measured on the stream thalweg, using in stream structures exceeding 50 cubic yards per structure and/or incorporating grade control structures exceeding 1 foot vertical drop. For any stream restoration project, the post project stream sinuosity shall be appropriate to the geomorphology of the surrounding area and shall be equal to, or greater than, pre project sinuosity. Sinuosity is defined as the ratio of stream length to project reach length. Structures shall allow the passage of aquatic organisms, recreational water craft or other navigational activities unless specifically waived in writing by the District Engineer.

V. Colorado Only

1. Final Regional Conditions Applicable to Specific Nationwide Permits within Colorado.

a. Nationwide Permit Nos. 12 and 14, Utility Line Activities and Linear Transportation Projects. In the Colorado River Basin, utility line and road activities crossing perennial water or special aquatic sites require notification to the District Engineer in accordance with General Condition 27 (Pre-Construction Notification).

b. Nationwide Permit No. 13 Bank Stabilization. In Colorado, bank stabilization activities necessary for erosion prevention in streams that average less than 20 feet in width (measured between the ordinary high water marks) are limited to the placement of no more than 1/4 cubic yard of suitable fill* material per running foot below the plane of the ordinary high water mark. Activities greater than 1/4 cubic yard may be authorized if the permittee notifies the District Engineer in accordance with General Condition 27 (Pre-Construction Notification) and the Corps determines the adverse environmental effects are minimal. [* See (g) for definition of Suitable Fill]

c. Nationwide Permit No. 27 Aquatic Habitat Restoration, Establishment, and Enhancement Activities.

(1) For activities that include a fishery enhancement component, the Corps will send the Pre-Construction Notification to the Colorado Division of Wildlife (CDOW) for review. In accordance with General Condition 27 (Pre-Construction Notification), CDOW will have 10 days from the receipt of Corps notification to indicate that they will be commenting on the proposed project. CDOW will then have an additional 15 days after the initial 10-day period to provide those comments. If CDOW raises concerns, the applicant may either modify their plan, in coordination with CDOW, or apply for a standard individual permit.

(2) For activities involving the length of a stream, the post-project stream sinuosity will not be significantly reduced, unless it is demonstrated that the reduction in sinuosity is consistent with the natural morphological evolution of the stream (sinuosity is the ratio of stream length to project reach length).

(3) Structures will allow the upstream and downstream passage of aquatic organisms, including fish native to the reach, as well as recreational water craft or other navigational activities, unless specifically waived in writing by the District Engineer. The use of grout and/or concrete in

building structures is not authorized by this nationwide permit.

(4) The construction of water parks (i.e., kayak courses) and flood control projects are not authorized by this nationwide permit.

d. Nationwide Permits Nos. 29 and 39; Residential Developments and Commercial and Institutional Developments. A copy of the existing FEMA/locally-approved floodplain map must be submitted with the Pre-Construction Notification. When reviewing proposed developments, the Corps will utilize the most accurate and reliable FEMA/locally-approved pre-project floodplain mapping, not post-project floodplain mapping based on a CLOMR or LOMR. However, the Corps will accept revisions to existing floodplain mapping if the revisions resolve inaccuracies in the original floodplain mapping and if the revisions accurately reflect pre-project conditions.

2. Final Regional Conditions Applicable to All Nationwide Permits within Colorado

e. Removal of Temporary Fills. General Condition 13 (Removal of Temporary Fills) is amended by adding the following: When temporary fills are placed in wetlands in Colorado, a horizontal marker (i.e. fabric, certified weed-free straw, etc.) must be used to delineate the existing ground elevation of wetlands that will be temporarily filled during construction.

f. Spawning Areas. General Condition 3 (Spawning Areas) is amended by adding the following: In Colorado, all Designated Critical Resource Waters (see enclosure 1) are considered important spawning areas. Therefore, In accordance with General Condition 19 (Designated Critical Resource Waters), the discharge of dredged or fill material in not authorized by the following nationwide permits in these waters: NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50. In addition, in accordance with General Condition 27 (Pre-Construction Notification), notification to the District Engineer is required for use of the following nationwide permits in these waters: NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37 and 38".

g. Suitable Fill. In Colorado, use of broken concrete as fill material requires notification to the District Engineer in accordance with General Condition 27 (Pre-Construction Notification). Permittees must demonstrate that soft engineering methods utilizing native or non-manmade materials are not practicable (with respect to cost, existing technology, and logistics), before broken concrete is allowed as suitable fill. Use of broken concrete with exposed rebar is prohibited in perennial waters and special aquatic sites.

h. Invasive Aquatic Species. General Condition 11 is amended by adding the following condition for work in perennial or intermittent waters of the United States: If heavy equipment is used for the subject project that was previously working in another stream, river, lake, pond, or wetland within 10 days of initiating work, one the following procedures is necessary to prevent the spread of New Zealand Mud Snails and other aquatic hitchhikers:

(1) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and keep the equipment dry for 10 days. OR

(2) Remove all mud and debris from Equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with either a 1:1 solution of Formula 409 Household Cleaner and water, or a solution of Sparquat 256 (5 ounces Sparquat per gallon of water). Treated equipment must be kept moist for at least 10 minutes. OR

(3) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with water greater than 120 degrees F for at least 10 minutes.

3. Final Regional Conditions for Revocation/Special Notification Specific to Certain Geographic Areas

i. Fens: All Nationwide permits, except permit Nos. 3, 6, 20, 27, 32, 38 and 47, are revoked in fens and wetlands adjacent to fens. Use of nationwide permit Nos. 3, 20, 27 and 38, requires notification to the District Engineer, in accordance with General Condition 27 (Pre-Construction Notification), and the permittee may not begin the activity until the Corps determines the adverse environmental effects are minimal. The following defines a fen:

Fen soils (histosols) are normally saturated throughout the growing season, although they may not be during drought conditions. The primary source of hydrology for fens is groundwater. Histosols are defined in accordance with the U.S. Department of Agriculture, Natural Resources Conservation Service publications on Keys to Soil Taxonomy and Field Indicators of Hydric Soils in the United States (http://soils.usda.gov/technical/classification/taxonomy).

j. Springs: Within the state of Colorado, all NWPs, except permit 47 (original 'C'), require preconstruction notification pursuant to General Condition 27 for discharges of dredged or fill material within 100 feet of the point of groundwater discharge of natural springs. A spring source is defined as any location where groundwater emanates from a point in the ground. For purposes of this regional condition, springs do not include seeps or other discharges which do not have a defined channel.

4. Additional Information

The following provides additional information regarding minimization of impacts and compliance with existing general Conditions:

a. Permittees are reminded of the existing General Condition No. 6 which prohibits the use of unsuitable material. Organic debris, building waste, asphalt, car bodies, and trash are not suitable material. Also, General Condition 12 requires appropriate erosion and sediment controls (i.e. all fills must be permanently stabilized to

prevent erosion and siltation into waters and wetlands at the earliest practicable date). Streambed material or other small aggregate material placed along a bank as stabilization will not meet General Condition 12. Also, use of erosion control mates that contain plastic netting may not meet General Condition 12 if deemed harmful to wildlife.

b. Designated Critical Resource Waters in Colorado. In Colorado, a list of designated Critical Resource Waters has been published in accordance with General Condition 19 (Designated Critical Resource Waters). This list will be published on the Albuquerque District Regulatory home page (http://www.spa.usace.army.mil/reg/)

c. Federally-Listed Threatened and Endangered Species. General condition 17 requires that nod-federal permittees notify the District Engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project. Information on such species, to include occurrence by county in Colorado, may be found at the following U.S. Fish and Wildlife Service website: http://www.fws.gov/mountain%2Dprairie/endspp/name_county_search.htm

C. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project.

D. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration, establishment (creation), enhancement, or preservation of aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands

contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects waterbodies with their adjacent uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 20.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete project: The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete project must have independent utility (see definition). For linear projects, a "single and complete project" is all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal

interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States that, during a year with normal patterns of precipitation, has water flowing or standing above ground to the extent that an ordinary high water mark (OHWM) or other indicators of jurisdiction can be determined, as well as any wetland area (see 33 CFR 328.3(b)). If a jurisdictional wetland is adjacent--meaning bordering, contiguous, or neighboring--to a jurisdictional waterbody displaying an OHWM or other indicators of jurisdiction, that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of “waterbodies” include streams, rivers, lakes, ponds, and wetlands.

COUNTY PROPERTY PERMIT

8/31/2009

2008-01915

Ngo, Andy 3:43:16 PM
INSPECTION PHONE

714-567-7804

Inspection office shall be notified at least TWO (2) WORK DAYS PRIOR to commencing permitted use. FAILURE TO OBTAIN INSPECTION SHALL VOID THIS PERMIT

ENCROACHMENT PERMIT

COUNTY OF ORANGE
OC Public Works
County Property Permits
Main Office: 300 North Flower Street,
Santa Ana, California 92703-5001
or P.O. Box 4048, Santa Ana, California 92702-4048
(714) 834-3474 or (714) 834-5529
Fax: (714) 835-7425

Permit No: **2008-01915**
Effective Date: 8/3112009 12:00 AM
Expiration Date: 2/28/2010 12:00 AM

PERMITTEE

California Department of Transportation
District 12
3355 Michelson Drive
Irvine, CA 92612-1692
949-724-2177

Contact Person Lisa Alviso
Telephone No. 949-279-8845

FACILITY

Type	Facility Name	Number
	BOLSA CHICA CHANNEL	C02

PERMITTED USE: User of County property is hereby authorized as follows, subject to provisions attached hereto:

To remove an existing bridge footing and abutment and to construct and maintain (2) column bridge footings as part of S405-E22 Connector Separation (Br# 55-1101F) and S405-E22 High Occupancy Vehicle (HOV) Connector Separation (Br# 55-1103E) project to accommodate the ultimate interstate road widening within Orange County Flood Control District's Bolsa Chica Channel (C02) right-of-way, per attached plans and provisions and to the satisfaction of County inspection personnel.

PERMIT NOT EFFECTIVE UNTIL PERMITTED USE APPROVED BY ASSIGNED INSPECTOR.

THIS PERMIT IS NOT VALID UNTIL THE PERMITTEE FIRST OBTAINS A RIDER TO THIS PERMIT TO ADD THE SELECTED CONTRACTOR, PAY PERMIT FEES OF $1757.00 AND THE CONTRACTOR SUBMITS A VALID CERTIFICATE OF LIABILITY INSURANCE THAT MEETS COUNTY INSURANCE REQUIREMENTS.

*****THIS PERMIT IS NOT VALID UNTIL THE PERMITTEE'S SELECTED CONTRACTOR FIRST OBTAINS A RIDER TO THE PERMIT TO SUBMIT THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) FOR REVIEW AND ACCEPTANCE BY THE COUNTY BEFORE ANY WORK CAN BEGIN IN COUNTY RIGHT-OF-WAY*****

****CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) IS LEAD INSPECTION AGENCY FOR CONSTRUCTION, COUNTY INSPECTION WILL BE SECONDARY FOR ACCESS ONLY*****

CEQA Code 1 SWPPP: Yes

LOCATION OF WORK:

Bolsa Chica Channel (C02) at S405/E-22

PERMITTEE'S ACCEPTANCE:

ANH VU

8/31/09

COUNTY APPROVAL:

Capalety, Dean 8/3112009

PERMIT AND APPROVED PLANS SHALL BE MAINTAINED ON JOB SITE. PERMITTEE SHALL COMPLY WITH REGULATIONS PRINTED ON REVERSE SIDE OF PERMIT AND ATTACHMENTS. ALL UNDERGROUND WORK REQUIRES PRIOR 'UNDERGROUND SERVICE ALERT' COMPLIANCE. THIS PERMIT IS NON-TRANSFERABLE.

Note: Surety will not be refunded until Final Inspection is performed and submitted to County Property Permits.

ENCROACHMENT PERMIT

Dimension/Type: (2) bridge column (Temp access) Thomas Brother: 797; D6 Area: Westminster

CONSIDERATION:

Types	PWO#	Permit Fees	Surety	Penalty	Total	Total Fees: 100.00
FC	EF68210	100.00 (2061)	0.00 (2091)	0.00	100.00	

Payment	Trust	Check	Receipt	Date	Amount	Total Payment:	100.00
Check		3276	R0813656	11/17/2008	100.00		

Surety Paid By: TUF Invoice Paid By:

Contractor:

Engineer: Parsons 2201 Dupoint Dr. #200; Irvine, CA 92612; Mohesn Mohesni 949-333-4515; Fax 949-263-1225 mohsen.s.mohseni@,parsons.com

Inspection: Subdivision & Permits Inspection CC: Operations & Maintenance

PERMIT INSPECTORS REPORT:

DATE WORK COMPLETED:_____

The permitted work was completed in satisfactory manner per instructions and/or the as-built plans and inspectors report submitted herewith for county files

Remarks:

Inspector:

Date

Permit Superintendent:

Date

Refund Recommended By:

Date

Refund Approved By:

Date:

County Property Permits

ORANGE COUNTY PublicWorks
Our Community. Our Commitment.

300 N. Flower Street
Santa Ana, CA
92703
Telephone: (714) 834-3474
Fax: (714) 835-7425

Permit No.
2008-01915

Special Provision Attachment

By acceptance of this permit, permittee agrees to the following:

1. All Orange County Flood Control District (hereinafter "District") improvements disturbed, damaged, vandalized or removed as a result of Permittee's activities within, upon, under or over District Right-of-way (ROW) shall be repaired, restored or replaced at Permittee's expense in conformance with Orange County Public Works (hereinafter "OCPW) Standard Plans and to the satisfaction of the Director of OCPW or his designee (hereinafter "Director") within sixty (60) calendar days of the issuance of written notice by Director. If Permittee fails to repair, restore or replace District's improvements within 60 calendar days, Director may, in his sole and absolute discretion, cause the repair, restoration or replacement of District's improvements to be completed by District personnel or outside contractors and Permittee shall be solely responsible for these costs and expenses. Permittee agrees that in an emergency situation which threatens the public's health, safety or welfare as determined by Director in his sole and absolute discretion, Director shall be permitted to cause the repair, replacement or restoration of District's improvements without prior notice to Permittee and Permittee shall be solely responsible for the cost of such repair, restoration or replacement in accordance with the procedures described above.

2. Permittee agrees that if any of Permittee's improvements are disturbed, damaged or removed by District during the course of District's operating, maintaining, repairing, improving, restoring, or enlarging District's improvements within, upon, over or under District's ROW Permittee shall be responsible for replacing, repairing, restoring or removing Permittee's improvements to the satisfaction of Director solely at Permittee's expense within sixty (60) calendar days of receiving written notice from Director.

3. Permittee's activities within District ROW allowed by this permit shall be performed during the NON-STORM-SEASON (May 1st through September 30th). No work shall be performed between October 1st and April 30th without prior authorization and approval obtained from the assigned County inspector.

4. Permittee, its assigns or successors shall be solely responsible for the operation, maintenance, repair and/or replacement of Permittee's improvements within District ROW.

5. Permittee agrees that it shall indemnify, defend with counsel approved in writing by District, and hold District, the County of Orange, their elected and appointed officials, officers, employees agents and contractors (hereinafter "District/County Indemnitees") harmless from any and all liability for injury or damage to third persons or property arising from Permittee's activities and/or improvements placed within, upon, under or over District's ROW unless such injury or damage is caused by the gross negligence or willful misconduct of District, County or the District/County Indemnitees.

6. Permittee shall maintain 90% relative compaction within District ROW.

7. Any chain link fencing including gates that are damaged during the approved permit activities are to be restored, repaired or replaced by Permittee to satisfaction of Director and in compliance with OCPW Standard Plan 600-0-OC.

8. Permittee acknowledges that the improvements installed within District ROW approved under the provisions of the permit are non-transferable. Therefore, the Permittee agrees that upon sale or transfer of the subject property the Permittee shall be required to remove improvements installed within the District's ROW and restore the District's ROW to an acceptable pre-existing condition meeting the satisfaction of the assigned District inspector. If the Permittee's assign and/or successor desires to continue to operate and maintain the approved permit improvements, the assign and/or successor will be required to obtain a new approved encroachment permit from OCPW/Construction and Permit Services/County Property Permits.

9. Pertinent sections of the encroachment permit special provisions and other relevant documents will be recorded by the County Clerk – Recorder. Notice is hereby given to future assigns or successors that the above captioned encroachment permit is non-transferable (OCCO Sec. 9-2-80). Permittee acknowledges Permittee's responsibility to remove the encroachment permit improvements installed within the District's ROW and restore the ROW to an acceptable pre-existing condition meeting the satisfaction of the assigned District inspector. Upon Permittee's successful completion of removing the encroachment permit improvements from District ROW to the satisfaction of the assigned District inspector the Permittee may request the County Clerk - Recorder remove the encroachment permit special provisions and other relevant documents from the Permittee's property title pending receiving the District's written concurrence. In such cases, the Permittee will be financially responsible for any costs incurred by the County Clerk – Recorder for clearing the Permittee's property title.
   IF PERMITTEE'S ASSIGN OR SUCCESSOR DESIRES TO CONTINUE TO OPERATE AND MAINTAIN THE PERMIT IMPROVEMENTS WITHIN THE DISTRICT'S ROW REFERENCED IN THE ABOVE CAPTIONED ENCROACHMENT PERMIT, PRIOR TO THE TRANSFER OF PROPERTY PERMITTEE'S ASSIGN OR SUCCESSOR SHALL BE REQUIRED TO OBTAIN A NEW ENCROACHMENT PERMIT FOR THE IMPROVEMENTS AND SATISFY THE DISTRICT'S CURRENT ENCROACHMENT PERMIT CRITERION.
10. If at anytime, District intends to modify, enlarge, reconstruct, repair and/or replace District facilities, Permittee agrees to remove and/or relocate interfering portions of Permittee's improvements within sixty (60) calendar days of the date of District's

written notification to Permittee. Upon receipt of written notification from District, Permittee shall obtain an encroachment permit from District covering Permittee's plans to remove and relocate Permittee's interfering improvements. District agrees to expedite review of Permittee's encroachment permit application. Permittee shall be responsible for all financial charges associated with satisfying this permit special provision. If Permittee fails to remove its interfering improvements within the time period required, Director, in his sole and absolute discretion, may cause the removal of Permittee's interfering improvement to be completed by District staff or by outside contractor. Permittee agrees that it shall be solely responsible for the cost of such removal and shall reimburse District for all of its costs and expenses within sixty (60) calendar days of the mailing of an invoice by Director.

11. Nothing in this Permit is intended nor shall anything in this permit be construed to transfer to District or its successors and assigns or to relieve Permittee or their successors and assigns or predecessors in title of any responsibility or liability Permittee now has, has had, or comes to have with respect to human health or the environment, including, but not limited to responsibility or liability related to hazardous or toxic substances or materials (as such terms as those used in this sentence are defined by statute, ordinance, case law, governmental regulation other provision of the law). Furthermore, District may exercise its right under law to bring action, if necessary, to recover clean up costs and penalties paid, if any, from Permittee or any others who are ultimately determined to have responsibility for said toxic or hazardous materials.

12. No construction materials are to be stored in a way that impedes and/or interferes with bikeway use, channel inspection or maintenance operations.\

13. **PERMITTEE ACKNOWLEDGES THAT IT SHALL BE RESPONSIBLE FOR OBTAINING ALL APPLICABLE REGULATORY PERMIT AGREEMENTS AND SATISFYING ALL RESOURCE AGENCY REQUIREMENTS. FURTHERMORE, PERMITTEE ACKNOWLEDGES THAT NEITHER THE COUNTY OF ORANGE NOR THE DISTRICT SHALL BE CO-NAMED IN ANY REGULATORY PERMIT AGREEMENTS OR OBLIGATED TO SATISFY ANY OF THE TERMS, CONDITIONS, PROVISIONS, MITIGATION, OR MONITORING REQUIRED BY THE RESOURCE AGENCIES VIA THE REGULATORY PERMIT AGREEMENTS. PERMITTEE SHALL PROVIDE OCPW/PUBLIC WORKS/COUNTY PROPERTY PERMITS WITH COPIES OF ALL REGULATORY PERMIT AGREEMENTS AND CONDITIONS AND MAINTAIN COPIES AT THE JOB SITE FOR INSPECTION PURPOSES.**

14. In the event of an emergency, the Permittee acknowledges that the District retains the right at the District's sole and absolute discretion to remove sediment and debris, perform channel repairs or conduct other maintenance activities within the approved permit area. In such cases, Permittee acknowledges that the District will not be required to restore the Permittee's approved improvements within the District's ROW, nor will the District be obligated to satisfy any of the Permittee's regulatory permit agreement terms, conditions or mitigation requirements.

15. Permittee shall provide emergency access to Police, Fire and District personnel during permit period.

16. District access gates are to be immediately locked upon entering or exiting District channel ROW.

17. Vehicular speeds on District access roads shall not exceed a maximum of 10 MPH.

18. Permittee shall be required to yield the right-of-way to recreational users in cases where the District access road is also designated as a bikeway or riding/hiking trail. In such cases, the Permittee shall drive vehicles off to the right side of the access road/bikeway/trail improvement, stop, and allow the recreational user to pass by prior to commencing to the Permittee's desired location.

19. Permittee acknowledges that the use of earthen District access roads is prohibited during rainstorm conditions or when the District's earthen access roads are wet. When District's earthen access roads are wet the Permittee's access will be limited to pedestrian access only. IN CASES WHEN THE EARTHEN ACCESS ROAD BECOMES WET, AUTHORIZED VEHICULAR ACCESS SHALL NOT BE COMMENCED PRIOR TO THE EARTHEN ACCESS ROAD DRYING SUFFICIENTLY TO THE SATISFACTION OF THE ASSIGNED DISTRICT INSPECTOR. ANY DAMAGE TO DISTRICT EARTHEN ACCESS ROADS CAUSED BY PERMITTEE'S MISUSE OF SUCH ROADS SHALL BE REPAIRED PROMPTLY BY PERMITTEE AT ITS SOLE EXPENSE. IF PERMITTEE FAILS TO PROMPTLY REPAIR DISTRICT'S EARTHEN ACCESS ROADS, DIRECTOR, IN HIS SOLE AND ABSOLUTE DISCRETION, MAY CAUSE THE REPAIR OF THE DISTRICT'S EARTHEN ACCESS ROAD TO BE COMPLETED BY DISTRICT STAFF OR BY OUTSIDE CONTRACTOR. PERMITTEE AGREES THAT IT SHALL BE SOLELY RESPONSIBLE FOR THE COST OF SUCH REPAIR AND SHALL REIMBURSE DISTRICT FOR ALL OF ITS COSTS AND EXPENSES WITHIN **SIXTY** (60) CALENDAR DAYS OF THE MAILING OF AN INVOICE BY DIRECTOR.

20. Any violation of the permit provisions by Permittee shall be adequate cause for immediate revocation of the permit by District.

21. Permittee shall comply with the requirements of State, County, and City Water Quality Ordinances and shall implement Best Management Practices (BMP's) to prevent all materials, including debris associated with the proposed project, from entering into the channel and/or District maintained areas.

Acknowledgement:

Signature	ANH VU	8/31/09
	Print Name	Date

STANDARD PROVISIONS

TO **BE** ATTACHED TO AND MADE A PART OF PERMIT NO. **2008-01915**

1. Permits issued by this Department are pursuant to the authority vested by the Board of Supervisors for the County of Orange, Orange County Flood Control District, any one or all of which are hereinafter referred to as County.

2. Permittee agrees to save County, its agencies, districts, etc., including its officers, agents or employees, harmless from any and all penalties, liabilities or loss resulting from claims or court actions, arising directly out of any damage or injury to persons or property by reason of the acts or omissions of Permittee, its agents, employees or independent contractors in exercising any of the privileges herein granted or in consequence thereof.

   The Permittee shall file a written accident report with the County of Orange for any property damage, death or injuries on project site within 48 hours after such incident occurs. The accident report shall include, but is not limited to, the following information, if available: time and date, location, nature of accident, names of people injured, description of property damage, police report number, and description of job site condition at the time of accident.

   Failure to file an accident report shall be considered a violation of the permit provisions and may cause revocation of this permit.

   Accident report shall be filed with the Inspection section assigned to the project. Contact can be made at the following telephone numbers:

   Permits Inspection (714) 567-7804
   1152 E. Fruit Street
   Santa Ana, CA 92702

   Operations Inspection (714) 955-0213
   2301 Glassell
   Orange, Ca 92865

3. Should any damage or injury to County works occur during initial use and/or as a result of this permitted use, either through the acts of agents, servants, or employees of Permittee or by any independent contractor of Permittee in the exercise of the rights herein granted, Permittee shall immediately, upon the written demand of County, restore such works to the condition of same on the date of the occurrence of said damage or injury at Permittee's cost or expense. The question as to whether or not any such damage or injury has been caused to the works shall be determined by the Director of OC Public Works (OCPW) and his determination shall be final. In the event repair by County is necessary, Permittee shall pay County the cost of such repairs.

4. County reserves the right unto itself to perform any work, upon any portion or all of the area covered by this permit, or to do any other work necessary at any time. Such work may be performed without incurring any liability of any nature whatsoever to the Permittee. It is further understood and agreed that County reserves unto itself the rights of ingress over all or any portion of the subject area.

5. Neither this permit nor any of the rights herein granted shall be assigned without the prior written approval of the County.

6. By acceptance of this permit, Permittee acknowledges and assumes all responsibility for compliance with requirements of other regulatory governing agencies including, but not limited to, zoning regulations, applicable ordinances and laws, etc., of the County of Orange, the State of California, or others having regulatory control over the use granted herein.

7. A copy of this permit and approved plans, if applicable, shall be maintained at the site of work and be shown to any authorized representative of the County or other regulatory governing agency upon request.

8. No access or work shall be performed within County rights of way without the full knowledge of County's inspector, who shall be given not less than two work days' advance notice of the initiation of permitted use. Failure of Permittee to obtain inspection shall void this permit and necessitate reapplication by Permittee.

9. This permit may be immediately revoked for reasons in the best interest of the County, including violation of permit provisions or other applicable rules and regulations or for the creation of a nuisance upon notice given by the Director of OC Public Works or authorized representative. In the event of such revocation, Permittee shall immediately cease all operations and restore County right of way as directed by County's inspector.

10. Any construction performed within County properties shall be in accordance with OC Public Works (OCPW) Standard Plans and established criteria. Any deviation must be specifically detailed and highlighted on plans in a manner meeting the approval of County Property Permits.

    No uses other than that as stated on this permit shall be exercised. Public right of way shall not be used for administrative operations or storage of equipment, materials, supplies, etc.

ADDITIONAL STANDARD PROVISIONS

(Codified Ordinances, Title 6, Section 6-1-1, et seq., of the County of Orange)

TO BE ATTACHED TO AND MADE A PART OF PERMIT NO. 2008-01915

11. RIGHT OF WAY RESERVATIONS: The permission granted hereby extends only to those which the County of Orange has in the real property and no warranty of any kind is made hereby that the said County possessed any or all of the rights of title necessary for Permittee to accomplish work under this permit, and Permittee is cautioned to satisfy itself that it has obtained all necessary rights or permits prior to commencement of work. This permit shall not constitute a grant of any interest in or to real property belonging to the County of Orange or any other person or entity. References to Director signify the Director, OC Public Works (OCPW), or his assignees.

12. WORKING HOURS: All work shall be performed within working hours of Orange County Public Works (OCPW) permit inspection group, unless prior arrangements have been made with the inspection group.

13. SURVEY MONUMENTS: It is imperative that Permittees NOTIFY THE SURVEY OFFICE, telephone 714-834-3102, of OC Public Works at least 48 hours prior to removing or replacing any Survey monuments. All monuments shall be replaced at Permittee's expense and MUST be replaced in kind within 0.01 feet of their original horizontal and vertical location, unless otherwise specified in writing.

CONSTRUCTION REQUIREMENTS

14. RESURFACING BY PERMITTEE OR COUNTY SPECIFICATIONS: Temporary patching of trench is required on lateral cuts in surfaced streets immediately after backfilling. Permanent pavement shall be placed within thirty (30) working days after completion of backfilling operations. All excavations shall be backfilled or covered or otherwise protected, in a manner meeting the approval of the inspector, at the end of each work day. The inspector may require any pavement removal to be patched with temporary AC immediately after backfilling.

    Where pavement or surfacing has been removed by acceptable method, as determined by inspector, and trench edges sawed, Permittee shall replace it with a structural section the same as that removed plus an additional one inch (1") of AC. In no case shall the replacement structural section be less than 5" AC/NS or 3 AC/6" PMB per Standard Plans. The inspector shall approve all structural sections prior to placement. Where Portland Cement Concrete pavement is removed or damaged, it shall first be sawed at excavation limits, providing distance to the next joint is more than five (5) feet away; if not, then it shall be removed to next joint without damaging adjacent pavement and subsequently replaced with Portland Cement Concrete.

15. LOCATION OF PIPES AND CONDUITS: All pipes and conduits laid parallel to the roadway at least five (5) feet from edge of the pavement or graded traveled roadway, unless otherwise authorized in writing by the Director.

16. MINIMUM COVER: The uppermost portion of any pipeline or other facility shall be installed NOT LESS THAN thirty (30) inches below the lowest portion of the roadway surface or ditch, unless otherwise authorized in writing by the Director.

17. STANDARD SPECIFICATIONS: Unless otherwise indicated on permit, all work shall be done in accordance with OC Public Works (OCPW) Department Standard Plans and the Standard Specifications for Public Works Construction latest issues.

18. COUNTY PROJECTS: This permit DOES NOT give Permittee permission to delay or interfere with the construction of County projects. Installation shall be subject to the approval of and at the convenience of County's contractor. Prior to any excavation, written permission must be obtained from said contractor and presented to resident engineer, stating that installation will NOT DELAY or interfere with said contractor's operation. If permission is DENIED, then work shall be delayed until completion of said contract.

19. TUNNELING OR BORING: All improved streets, as shown on Master Plan of Arterial Highways, MUST be bored or tunneled. All boring, tunneling and placing conduits, casing and pipelines shall be done in such a manner that the existing driving lanes will NOT be disturbed. If a casing is installed to receive conduit or pipeline, all voids between casing and conduit shall be filled with grout or sand. Bore pit shall not encroach within five (5) feet from edge of pavement.

20. OPEN CUT METHOD: Open cutting of local streets may be permitted. NOT more than one-half (112) of the width of a traveled way shall be disturbed at one time and the remaining width shall be kept open to traffic. Two-way traffic shall be maintained on pavement at all times.

    A. Minimum clearance of two (2) feet adjacent to any surface obstruction and a five (5) foot clearance between excavation and traveled way shall be maintained.

    B. Backfill material shall be subject to OCPW inspector's approval prior to placement. OCPW inspector may require 2-sack cement slurry backfill. PERMANENT A.C. PATCH shall be placed within thirty (30) working days after completion of backfilling operations.

21. COMPACTION: All backfill replaced in excavation within road right of way shall be compacted until relative compaction is NOT LESS than ninety percent (90%), as determined by the Relative Compaction Test as specified in the OC Public Works (OCPW) Department Standard Plans. PMB (aggregate base) shall be compacted to a relative compaction of NOT LESS than ninety-five percent (95%).

    After completion of backfill and compaction operations and before permanent paving is replaced, contractor shall call for compaction tests

to be performed and shall provide for test holes at locations and as directed by the inspector. In lieu of test holes as specified above, contractor may elect to call for compaction tests in successive lifts of backfill not to exceed two (2) feet vertically in time each lift of backfill is placed and compacted.

22. REPLACING ENTIRE DRIVING AND/OR BIKE LANE: If surfacing or pavement within driving lanes of a highway, as shown on the Master Plan of Arterial Highways or within a bikeway, is removed or damaged by Permittee's operation, existing surfacing or pavement for width of the driving or bike lane and for the length of the damaged surfacing shall be removed and replaced to a distance of not less than one hundred (100) feet. Such removal and replacement shall be to the satisfaction of the Director.

23. OIL-MIXED SHOULDERS: Improved oil-mixed shoulders are to be remixed to minimum depth of four (4) inches with an approved oil-mixing machine using approximately ½ gallon to 2% gallons of SC 800 per square yard as determined by the Director. In lieu of the former, the entire width of the shoulder may be removed to a minimum depth of two (2) inches and replaced with a minimum of two (2) inches of AC.

24. CONCRETE SIDEWALK OR CURB: All concrete sidewalks or curbs shall be saw-cut to the nearest control joint and replaced in conformance with applicable provisions of the OC Public Works (OCPW) Department Standard Plans and Standard Specifications for Public Works Construction. Sidewalk removal and replacement shall be to the satisfaction of the Inspector.

25. CARE OF DRAINAGE: If the work herein contemplated shall interfere with established drainage, ample provision shall be made by the Permittee to provide for it, as may be required by the Director.

    All roadside drainage ditches shall be restored to original grades, and inlet and outlet ends of all culverts shall be left free and clear.

26. COMPLIANCE WITH TERMS OF PERMIT: Permittee shall not make or cause to be made any excavation, or construct, place upon, maintain, or leave any obstruction or impediment to travel, or pile or place any material in or upon any highway, under the surface of any highway, at any location or in any manner other than that described in application as approved by the Director, or contrary to terms of permit or of any provision of the Ordinance hereinbefore referenced.

    Permittee agrees that if installation of any nature or kind placed in the excavation, fill or obstruction, for which permit is issued, which shall at any time in the future interfere with use, repair, improvements, widening or change of grade of highway, Permittee or his successors or assigns, with ten (10) days after receipt of written notice from the Director to do so, at his own expense, either remove such installation or relocate to a site which may be designated by the Director.

    Permittee hereby agrees to do all work and otherwise comply with provisions of Orange County Codified Ordinances Title 6, Section 6-1-1, et seq., as amended, terms and conditions of this permit, and all applicable rules and regulations of the County of Orange. All work shall be performed in accordance with provisions of this Ordinance and of all applicable laws, rules and regulations of Orange County and to the satisfaction of the Director.

    After work has been completed, all debris and excess material from excavation and backfill operations shall be removed from right of way and the roadway left in a neat and orderly condition. All approaches to private driveways and intersecting highways and streets shall be kept open to traffic at all times. Excess materials which adhere to roadway surfacing, as a result of construction operations, shall be removed by approved methods to the satisfaction of the Director.

    TRAFFIC

27. ARTERIAL HIGHWAY TRAFFIC LANES: Two-way traffic shall be maintained at all times. At no time between the hours of 7:00 a.m. and 8:30 a.m. and between the hours of 4:00 p.m. and 6:00 p.m., Monday through Friday (excluding legal holidays), shall there be any obstruction of an arterial highway traffic lane. Said restriction shall apply to vehicles, equipment, material, traffic control devices, excavation, stockpile or any other form of obstruction. Any exceptions must be approved specifically by a traffic control plan and by County-designated Supervising Construction Inspector.

28. PROTECTION OF TRAVELING PUBLIC: Permittee shall take adequate precautions for protection of the traveling public. Barricades, flashing amber lights and warning signs, together with flagmen, where necessary, shall be placed and maintained in accordance with the State of California Manual of Traffic Controls, For Construction and Maintenance Work Zones until the excavation is refilled, the obstruction removed, and roadway is safe for use of traveling public. The Director may specify, as a condition of the issuance of the permit, safety devices or measures to be used by Permittee, but failure of Director to so specify the devices or measures to be used shall not relieve Permittee of his obligation hereunder.

    Trenching for installation across any intersecting roadway open to traffic shall be progressive. NOT more than one-half (1/2) of the width of a traveled way shall be disturbed at one time, and the remaining width shall be kept open to traffic by bridging or backfilling.

29. SIGNALIZED INTERSECTION: Permittee shall notify OC Public Works/Traffic Section at 714-834-5961, at least 72 hours in advance of any excavation within one hundred (100) feet of a signalized intersection. Permittee and/or his contractor shall assume cost and responsibility for maintaining existing and temporary electrical systems or any other item or portion of work, as may be deemed necessary or advisable for protection of highway and traveling public and payment of all costs incurred by the County of Orange in repairing facilities damaged during construction. Applicant shall immediately repair or replace any damaged traffic control devices and/or striping facilities.

PERMITTEE'S OBLIGATION

30. RESTORATION: APPLICANT SHALL RESTORE THE ROADWAY TO ITS ORIGINAL OR BETTER CONDITION AND CAUSE ANY PERMANENT PAVING TO BE COMPLETED AS SOON AS POSSIBLE. Immediately upon completion of the work necessitating the excavation or obstruction authorized by any permit issued pursuant to the aforementioned Ordinance, Permittee shall promptly, and in a workmanlike manner, refill the excavation or remove the obstruction to the satisfaction of the Director.

    If Permittee fails or refuses to refill any excavation which he has made or remove any obstruction which he has placed on any highway, the Director may do so and Permittee shall promptly reimburse County the cost thereof. If any anytime subsequent to first repair of a surface of a highway damaged or destroyed by any excavation or obstruction in such highway, it becomes necessary again to repair such surface due to settlement or any other cause directly attributable to such excavation or obstruction, Permittee shall pay to County the cost of such additional repairs made by the Director. Cost shall be computed by the Director as provided in Section 6-3-47 or Section 6-3-49 of the aforementioned Ordinance, whichever, in the judgment of the Director, will most fairly compensate County for expenses incurred by it.

31. PERMITTEE TO PAY DEFICIENCY. If any deposit is insufficient to pay all fees and costs herein provided, Permittee shall, upon demand, pay to the Director an amount equal to the deficiency.

32. EFFECT OF FAILURE TO PAY COSTS OF DEFICIENCY: If Permittee, upon demand, fails to pay any deficiency as provided in Section 6-3-77 of the aforementioned Ordinance, or shall fail to pay any other costs due County hereunder for which no deposit has been made, County may recover same by an action in any court or competent jurisdiction. Until such deficiency or costs are paid in full, a permit hereunder shall not thereafter be issued to Permittee.

33. TAXABLE POSSESSORY INTEREST: Permittee acknowledges that a taxable possessory interest may have been created by this permit and that Permittee may be subject to payment of property taxes levied on such interest. (Reference is made to California Revenue and Taxation Code, Sections 107, 107.4 and 107.6.)

34. ADDITIONAL COST: Any additional cost incurred by Permittee incidental to this work NOT shown on the face of the permit, shall be borne by Permittee.

35. COMPLIANCE: Any CONDITIONS shown in regulations, attachments, and/or provisions of Codified Ordinance and all applicable laws, rules and/or regulations of Orange County or any other regulatory governing agency pertinent to work on the face of this permit MUST be complied with.

    Section 6424 of the California Labor Code requires contractors planning excavation or trench work to obtain a permit for such work from the State of California, Department of Industrial Relations, DIVISION OF INDUSTRIAL SAFETY.

    CONDITION: OC PUBLIC WORKS DOES NOT PERFORM ANY INSPECTION UNDER THIS PERMIT PERTAINING TO THE PROTECTION AND SAFETY OF PERSONNEL OR EQUIPMENT. THIS IS THE RESPONSIBILITY OF PERMITTEE.

    The Director may, either at the time of the issuance of the permit or at any time thereafter until completion of the work, prescribe such additional conditions as he may deem reasonably necessary for the protection of the highway or for the prevention of undue interference with traffic or to assure the safety of persons using the highway.

    The Permittee shall make proper arrangements satisfactory to the Director for and bear the cost of relocating any structure, public utility, tree or shrub where such relocation is made necessary by the proposed work for which a permit is issued. Permittee is aware of Ordinance No. 2717 concerning the registration and disclosure of lobbyists

GEOTECHNICAL DESIGN REPORT
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-405/22-PM 20.4/22.3 (405) R0.7/R2.9 (22)
CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
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Irvine, CA 92612

Prepared By:

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GDC Project No. I-436
January 27, 2009
Revised March 11, 2009
Revised May 4, 2009

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Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

January 27, 2009
Revised March 11, 2009
Revised May 4, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
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Attention: Carlos Cadena

Subject: Geotechnical Design Repot
West County Connector Project
I-405/SR-22 HOV Connector Segment
12-ORA-405/22-PM 20.4/22.3 (405) R0.7/R2.9 (22)
CU 12235, EA 07163, Orange County, California
GDC Project No. I-436

Dear Carlos:

Transmitted with this letter is our Geotechnical Design Report (GDR) for the subject project, updated to incorporate Caltrans comments (see Appendix G). This report defines the geotechnical conditions as evaluated from field and laboratory test data and used in the development of the geotechnical design. It provides recommendations and specifications for project design and construction. Structure Foundation Reports for bridges, walls, and overhead signs, and a Materials Report are submitted separately. We appreciate the opportunity to provide our services on this project.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

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GEOTECHNICAL DESIGN REPORT
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-405/22-PM 20.5/22.2 (405) 0.7/1.2 (22)
CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

1.1 Project Description

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The proposed project has been divided into 2 segments, and the overall project name is "West County Connector Project." The easterly segment is named "I-405/SR-22 HOV Connector Segment," which extends along SR-22 and I-405 from just east of Valley View Street to just east of Seal Beach Boulevard and the westerly segment is named "I-405/I-605 HOV Connector Segment," which extends from just east of Seal Beach Boulevard through the I-605 interchange. This report addresses the easterly segment of the project. The project vicinity is shown in Figure 1.

The length of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges, and construct a new HOV Connector bridge;
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls;
- Pre-cast Lightweight Fill (PCLW) Retaining Walls;
- Drainage improvements; and
- Lighting, roadside signs, and overhead signs.

1.2 Purpose and Scope of Work

1.2.1 Purpose

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria for the roadway portions of the project. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. This report is intended for use by the project design engineer, construction personnel, bidders and contractors.

1.2.2 Scope of Work

Our scope of work included:

- Review of available topographic and improvement plans, and published geologic and geotechnical literature;
- Site reconnaissance and observation of existing conditions;
- Drilling hollow-stem auger borings, rotary wash borings, hand auger borings, and performing Cone Penetration Tests (CPTs) along the alignment (see Appendix A);
- Performing laboratory testing on selected soil samples (see Appendix B);
- Characterizing the subsurface conditions, groundwater conditions, and engineering properties of soils based on field and laboratory data;
- Performing engineering analyses to develop geotechnical recommendations for project design and construction;
- Documenting the results of our investigation and our recommendations in this report.

The design and construction of the project will be performed in accordance with current Caltrans Standard Plans, Specifications, and Design Criteria. This report is structured in general accordance with Caltrans "Guidelines for Preparing Geotechnical Design Reports," Version 1.3, December, 2006.

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

Existing facilities and proposed improvements are shown on the key map and topographic site plans in Figures 2A through 2N. Generalized cross-sections through key portions of the project are shown in Figures 3A through 3D. More detailed geotechnical cross-sections are also illustrated in Figures 3E through 3M. Profile Grade Sheets and Contour Grading Sheets illustrating the profile and proposed grading are included in Appendices C and D, respectively. Selected Site Photographs are included as Appendix E. Refer to these figures and photographs when reading the following descriptions.

2.1 Geometric Baseline

The project alignment is defined by the following station lines, as shown in overview in Figure 2A:

- **"B" Line**: SR-22 centerline on east end of the project (Figs. 2B,C);
- **"VV" Line**: Valley View Street and Bolsa Chica Road (Figs. 2D,E,F);
- **"VV3" Line**: NB Valley View St. to WB SR-22 On-Ramp (Figs. 2C,D,F);
- **"VV4" Line**: SB Valley View St. to WB SR-22 On-Ramp (Figs. 2D,F);
- **"VV5" Line**: EB SR-22 to Garden Grove Blvd. Off-Ramp (Figs. 2C,D);
- **"W" Line**: WB SR-22 (Figs. 2C,D,G,H);
- **"H" Line**: 40-22 HOV Connector Separation Line (Figs. 2C,D,G,H,I);
- **"E" Line**: S405-E22 Connector Separation Line (Figs. 2C,D,G,H,I);
- **"BC1" Line**: SB I-405 to Bolsa Chica Road off-ramp (Figs. 2E,G,H);
- **"NB405" Line:** NB I-405 (Figs. 2E,G,H,I,J);
- **"SB405" Line:** SB I-405 (Figs. 2E,G,H,I,J); and
- **"A" Line:** I-405 centerline on west end of project (Figs. 2I through 2N).

The east end of the project on I-405 is at approximately Sta. "SB405" 301+10 (Figure 2E), and on SR-22 is at approximately Sta. "B" 285+80 (Figure 2B). The west end of the project alignment is on I-405 freeway at Sta. "A" 395+50 (Figure 2N). Sign Foundations are also required east of the project area on SR-22.

Profile Grade Sheets illustrating existing and proposed grades along each station line are provided in Appendix C, and contour grading plans showing existing and proposed grades are presented in Appendix D.

2.2 Existing Facilities

2.2.1 Existing Bridges

There are 3 existing bridges in the project area, briefly described as follows:

- Valley View Street over I-405, a.k.a. Bolsa Chica Road OC, Bridge No. 55-0276 (Fig. 2E):
  - Existing overcrossing not to be modified as part of project;
  - Top of approach embankments at El. + 45 to 54 feet;
  - I-405 Freeway El. + 27 to 31 feet;
- Valley View Street over SR-22, a.k.a. Bolsa Chica Road OC, Bridge No. 55-0332 (Figure 2D):
  - Existing bridge is 4-span overcrossing, to be demolished and replaced in 2 stages as part of project;
  - Top of approach embankments at El. + 48 to 54 feet;
  - SR-22 Freeway near El. + 26 to 32 feet;
- Route 22/405 Separation, Bridge No. 55-0331R (Fig. 2G):
  - Existing 4-span bridge carrying SB I-405 traffic over I-405 to EB SR-22, to be demolished and replaced as part of project;
  - Top of approach embankments at El. + 48 to 56 feet;
  - I-405 Freeway El. + 25 to 30 feet.

2.2.2 Existing Roadways

At the east end of project SR-22 consists of 3 westbound and 3 eastbound travel lanes plus eastbound HOV lane, left and right asphalt concrete (AC) shoulders and a paved AC median with concrete barrier. West of Valley View Street, westbound SR-22 merges with I-405, which has 6 travel lanes plus 1 HOV lane in each direction, left and right shoulders and a concrete median barrier. Travel and HOV Lanes are Portland Cement Concrete (PCC), and shoulders are AC. The Route 22/405 Separation has 3 PCC lanes with outboard AC shoulders. South of the SR-22 interchange, I-405 has 4 PCC travel lanes plus 1 PCC paved HOV lane in each direction, and AC shoulders. All on-ramps / off-ramps and local roads have AC pavements.

2.2.3 Existing Cut and Fill Slopes

The original site was a fairly level alluvial plain with no significant natural slopes. There are no significant cut slopes present. Existing slopes consist of minor roadway fill slopes, and abutment approach fill slopes with maximum heights on the order of 30 feet. Abutment approach fills are present at each end of the 3 existing bridges. Existing fill slope inclinations are generally between 1.5h: 1v and 2h: 1v. No signs of excessive erosion or slope instability were observed in our site reconnaissance. Most slopes are covered in iceplant, and portions of the fill slopes are heavily vegetated with large trees. The existing fill slope contours are shown on the topographic plans (Figures 2A through 2N).

2.2.4 Existing Development

The existing land-use along and immediately adjacent to the proposed improvement generally includes residential, commercial, and military properties. Seal Beach Naval Weapon Station is located just south of the I-405 freeway.

2.2.5 Existing Utilities

Numerous buried and overhead utilities are present in the project area. These may include, but are not limited to, buried culverts and sewer lines, buried and overhead electric lines, gas lines, and telecommunications facilities. Existing utilities conflicting with construction activities will require protection or relocation during construction. The contractor should verify the location of all utilities and take the necessary precautions.

2.3 Proposed Improvements

2.3.1 Summary

The proposed HOV Connector Segment project involves the following primary elements:

- Widen and re-align I-405 and SR-22;
- Realign the I-405 South Bolsa Chica Road off-ramp to go under the new S405-E22 Connector;
- Re-align loop on-ramps and off-ramps to/from Bolsa Chica Road / Valley View Street / Garden Grove Blvd;

- Demolish and replace Bolsa Chica Road OC (Bridge No. 55-0332);
- Demolish and replace Route 22/405 Separation (Bridge No. 55-331R);
- Construct a new 405-22 HOV Connector Separation (Bridge No. 1103E) to provide a direct connection in both directions between HOV lanes on I-405 and SR-22;
- Construct new pavements for main lines, connectors, shoulders, and on-/off-ramps, remove portions of existing AC and PCC pavements, salvage portions of existing pavements (pavements are addressed in the project materials report);
- Construct Precast Lightweight Weight (PCLW) cellular concrete retaining walls on both sides of the west abutment approach to S405-E22 Connector Separation, and on both sides of the east and west abutment approaches to the new 405-22 HOV Connector Separation (separate foundation reports);
- Construct Type 1 Retaining Walls on both sides of the east abutment approach to S405-E22 Connector Separation;
- Place embankment fills on both approaches to Bolsa Chica Road OC / SR-22, S405-E22 Connector Separation and 405-22 HOV Connector Separation. Portions of the fills will be lightweight cellular concrete to mitigate low bearing capacity and long-term settlements; and
- Construct new overhead signs and other appurtenant facilities.

Recommendations for bridges and special design walls are provided in separate foundation reports (see Section 13). Recommendations for roadway construction and Standard Plan walls (Type 1) are addressed in this report. Standard Plan overhead sign post foundations are addressed briefly herein, but at Caltrans request will be presented separately in a Foundation Report. Initial Site Assessment and Phase 1 environmental investigations are addressed in separate reports.

2.3.2 Grading

Cut and fill mass grading will be performed, primarily where cuts are made into existing abutment approach embankments, or where grades are raised for the new abutment approaches. Minor fills will be placed on both sides of I-405 west of the SR-22 interchange and along entrance / exit ramps. Contour grading plans are shown in Appendix D.

2.3.2.1 Fill

Proposed fill slopes will generally be 2h: 1v or flatter, except below the abutments of Bolsa Chica Road OC, where the slopes will be 1.5h: 1v paved slopes. Selected fill and wall locations will use Lightweight Cellular Concrete Fills to mitigate low bearing capacity (for higher walls) and long-term settlements (where grade increases are large). Project grading will result in grade increases at the following locations:

- **North and South Abutments of SR-22 Bolsa Chica Road OC (a.k.a "Valley View")**: To widen Valley View Street and Garden Grove Blvd. Ramp, the existing embankments will raised by 2 to 4 feet and additional fill will be placed on the slopes east and west of the existing approach embankments, with maximum 2h: 1v fill slope heights of about 25 to 30 feet, and grades on Valley View Street (Sta. "VV" 39+00 to 50+00, Figures 2D through 2F, Figure 3A and 3E);
- **East Abutment Approach to 405-22 HOV Connector (Retaining Wall RW1300)**: from Valley View Street to the East abutment (Sta. "H" 1302+50 to 1313+00, Figures 2D and 2G, Figures 3B and 3F) substantial embankment will be constructed with grade increase of up to about 45 feet and vertical lightweight fill retaining wall height of up to about 29 feet (RW1300 and 1299). The wall and bridge abutment will be on a 2h: 1v slope with a maximum height of about 25 feet;
- **East Abutment Approach to S405-E22 Connector Separation**: Substantial embankment fill (generally 4h:1v) with up to about 35 feet grade increase with vertical Type 1 retaining walls (RW3311 and 3312) up to about 25 feet is proposed (Sta. "E" 3307+00 to 3312+00, Figures 2D and 2G, Figures 3B, 3G, and 3H);
- **East Abutment Approach between the 405-22 HOV Connector and S405-E22 Connector Separation:** The area between connectors above the existing connector ramp will be raised up to about 8 feet (Stations "E" 3306+00 to 3312+00, Figures 2D and 2G, Figures 3B, 3G, 3H);
- **West Abutment Approach to S405-E22 Connector Separation:** On the south side of the connector ramp (Sta. "E" 3319+50 to 3324+00, Figures 2G and 2H, Figures 3C, 3I) grades will be raised by up to about 15 feet with a vertical retaining wall (RW3319);
- **West Abutment Approach to 405-22 HOV Connector:** Grades will be raised in the I-405 median by up to about 24 feet with vertical retaining walls (RW1325 and 1326) on both sides (Sta. "H" 1324+00 to 1335+00, Figures 2H and 2I, Figures 3D, 3M);

- **North and South Sides of I-405**: West of about Sta. "H" 1325+00 to the end of project ("A" 395+50) minor fill slopes less than 10 feet high, but typically less than 5 feet, are proposed to widen the outboard sides of the freeway (Figures 2H through 2N).

2.3.2.2 Cut

Proposed cut slopes will be made within existing compacted fills and inclined at 2h: 1v or flatter (except at abutments of existing Bolsa Chica Road OC, where 1.5h: 1v paved cut slopes will be used). Project grading will result in excavation and grade decrease at the following locations:

- **SR-22/Bolsa Chica Rd OC (Figure 2D, Figures 3A, 3E)**: The bridge will be lengthened, and a portion of the existing embankment at both abutments will be cut back at the same slope inclination;
- **East Abutment of 405-22 HOV Connector and S405-E22 Connector Separation (Figure 2G, Figures 3F, 3G, 3H, 3I, 3J)**: The existing Route 22/405 Separation abutment slope will be cut back as part of the grading of the 405-22 HOV Connector and S405-E22 Connector Separation Abutments to allow for future I-405 widening;
- **I-405S/Bolsa Chica Road Off-Ramp and S405-E22 Connector Separation west Abutment**: The north side of existing embankment and below the bridge abutment will be excavated between Sta. "E" 3317+50 and 3325+00 (Figures 2G and 2H, 3K and 3L) to allow for the new off-ramp alignment. A vertical retaining wall (RW3320) will be constructed in the cut area. A portion of the existing Bolsa Chica off-ramp embankment will also be removed ("BC1" 16+00 to 10+00).

2.3.3 Retaining Walls

The following retaining walls are proposed:

- **RW1300 (Figure 2F and 2G, 3I)**
  - Precast Wall with Lightweight Fill (Cellular Concrete);
  - 39.5' R of "H" 1302+56 –> 29.5' R of "H" 1312+68;
  - Length = 1015 ft, Max Height = 29 ft

- **RW1299 (Figures 2G, 3I)**
  - Precast Wall with Lightweight Fill (Cellular Concrete);
  - 29.6' L of "H" 1312+02 –> 29.5' L of "H" 1312+68;
  - Length = 65 ft, Max Height = 14 ft
- **RW3311 (Figure 2F and 2G, 3J)**
  - Type 1 Standard Wall
  - 47.5' L of "E" 3310+28 –> 47.5' L of "E" 3311+19;
  - Length = 89 ft, Max Height = 24 ft
- **RW3312 (Figures 2G, 3J)**
  - Type 1 Standard Wall
  - 11.5' R of "E" 3311+51 –> 11.5' R of "E" 3311+81
  - Length = 30 ft, Max Height = 14 ft
- **RW3319 (Figure 2G and 2H, 3K and 3L)**
  - Precast Wall with Lightweight Fill (Cellular Concrete);
  - 47.5' L of "E" 3319+11 –> 47.5' L of "E" 3323+33;
  - Length = 430 ft, Max Height = 28 ft
- **RW3320 (Figure 2G and 2H, 3K and 3L)**
  - Precast Wall with Lightweight Fill (Cellular Concrete);
  - 11.5' R of "E" 3319+75 –> 11.5' R of "E" 3322+62;
  - Length = 285 ft, Max Height = 28 ft
- **RW1325 (Figure 2H and 2I, 3D and 3M)**
  - Precast Wall with Lightweight Fill (Cellular Concrete);
  - 29.5'L of "H" 1324+22 –> 29.5'L of "H" 1331+57;
  - Length = 750 ft, Max Height = 27 ft
- **RW1326 (Figure 2H and 2I, 3D and 3M)**
  - Precast Wall with Lightweight Fill (Cellular Concrete);
  - 29.5'R of "H" 1324+22 –> 29.5'R of "H" 1330+57;
  - Length = 635 ft, Max Height = 26 ft.

3.0 PERTINENT REPORTS AND INVESTIGATIONS

Our understanding of this project is based on discussions with project designers, our review of available reports, and as-built plans and design plans for the existing and proposed improvement project and associated structures. In addition, we have acquired and reviewed geologic maps, topographic maps, and aerial photographs of the project site. GDC has also prepared a Materials Report, 3 bridge foundation reports, 3 wall foundation reports, and an overhead sign foundation report for the project. A complete list of references is provided in Section 13.0 of this report.

4.0 PHYSICAL SETTING

4.1 Climate

The project site is located in the Los Angeles Basin. The climate in this area is considered semi-arid. Climate data is available from nearby Long Beach station WSCMO (045085) and shown in Table 1. These records, which date from 04/01/1958 to 06/30/2007, indicate that average rainfall is about 11.96 inches per year. More than 90% of the annual precipitation occurs between the months of November and April.

The average monthly high temperature ranges from 67°F in December to 84°F in August. Average monthly low temperatures ranges from 45.3°F in December to 65°F in August. No snowfall was recorded at the Long Beach WSCMO Station. From the available climate data, soil freeze/thaw conditions are not expected to exist within the project area.

4.2 Topography and Drainage

The following sections describe the topography, drainage, and vegetation conditions along the roadway alignment.

4.2.1 Topography

Figures 2B through 2N show the site topographic plan, with elevations listed as Mean Sea Level (MSL). The original grades at the site were relatively level, and current freeway grades are within several feet of the original grades. Embankments up to about 30 feet above freeway grades were placed for the abutment approaches to facilitate grade separations at the overcrossings.

Over the alignment length of approximately 2.1 miles the freeway elevation drops gradually from about El. +34 feet at the east end on SR-22 (Figure 2B), and from El. +29 feet on I-405 (Figure 2E), to a low point near El. +18 feet at the west end (Figure 2N). The highest elevation in the project area is at El. +56 feet at the east abutment of existing Route 22/405 Separation Bridge (Figure 2G). The next highest elevation is at El. +54 feet at the south abutment of SR-22/Bolsa Chica OC Bridge (Figure 2D). The invert of Bolsa Chica Channel, the main drainage feature in the area is at El. +12.5 feet south of the alignment (Sta. "E" 3318+00, Figure 2G).

Due to realignment of the I-405 and SR-22 freeways and ramps, and addition of the new 405-22 HOV connector, a significant amount of cut and fill and retaining walls are proposed for this project. New abutment approaches will generally result in maximum site grades 4 to 10 feet higher than the current maximum grades at abutments.

4.2.2 Drainage

Drainage in the project area is generally by sheet flow to storm drains. Numerous small open drainage channels are present in the shoulders and median areas adjacent to the freeway and these generally feed other buried storm drains and ultimately into the Bolsa Chica Channel. The Bolsa Chica Channel runs north to south and crosses the freeway in a Triple 12'x10' Reinforced Concrete Box Culvert. Bolsa Chica Channel continues south, discharging to the Pacific Ocean.

4.2.3 Vegetation

Vegetation in the unpaved areas of the project typically consists of abundant ice plant (especially on the slopes) and a variable cover of grasses and weeds, with scattered small to large trees. Substantial removals of existing vegetation, including ground cover, large Eucalyptus trees, and other trees and shrubs will be required.

4.3 Features of Engineering and Construction Significance

The following man-made or natural features of engineering and construction significance are present within or closely adjacent to the construction site.

- Existing freeways and surface streets (requires extensive stage construction and traffic handling considerations)

- Route 22/405 Separation Bridge (traffic will be maintained while the replacement bridge is constructed, traffic will be shifted, and the old bridge will be demolished)
- Bolsa Chica Road OC (a.k.a "Valley View") Bridge at SR-22 (requires demolition and replacement in 2 stages while maintaining traffic flow)
- Bolsa Chica Open Channel and Triple 12'x10' Reinforced Concrete Box Culvert (protect in place during construction, plans for future jack and bore widening of box culvert)
- Significant large trees and vegetation (requires removal for grading)
- Embankment fills for bridges and ramps (temporary excavation and shoring)
- Sound walls and retaining walls along the north side of the Route 22 westbound and 405 northbound (protect in place)
- Existing retaining wall on south side below proposed wall RW3319 (protect in place)
- Surrounding residential and commercial developments (noise impacts, community concerns)
- Various buried and overhead utilities (protect or relocate)
- Seal Beach Naval Weapon Station on the south side of the 405 freeway (temporary easements)

4.4 Regional Geology and Seismicity

4.4.1 Geology

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County flatlands of the southern portion of the Central Block of the Los Angeles Basin. The basin is infilled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of unconsolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Fill, where present, is underlain by alluvium. High historical groundwater is generally at a depth of 10 to 15 feet below the freeway grades (see Figure 4).

4.4.2 Seismicity

An Alquist-Priolo Earthquake Fault Zone is not delineated through the project study area. Major faults and the seismicity of the area are shown on the Caltrans 1996 Fault and PBA Map in Figure 5. Based on the map, the closest major active fault is the Los Alamitos Reverse Slip Fault, located northwest about 0.6 to 2.0-km from the project alignment with a maximum credible earthquake (MCE) magnitude of M=6.0. Los Alamitos Fault is not in the EQFAULT CGS 2002 data base, and the closest mapped fault to the site according to EQFAULT is the Newport / Inglewood Strike-Slip Fault at a distance of 3.4 to 5.2 km, with a rated maximum credible magnitude of M=7.0. San Joaquin Hills Blind Thrust Fault has MCE magnitude of 7.0 and is located at a distance of 13 to 15 km, and Puente Hills Blind Thrust is located at a distance of 18 km with a MCE magnitude of 7.25. The bridge site is located between the 0.4 and 0.5g contours, which would indicate a rounded up design PBA of 0.5g. A summary of fault parameters is presented in Table 2. Site accelerations are discussed in Section 8.1.1.

4.5 Soil Survey Mapping

Soil survey maps were not reviewed for this study.

5.0 EXPLORATION

5.1 Drilling and Sampling

Sixteen (16) exploratory hollow stem auger (A) and rotary wash (R) soil borings ranging in depth from 16.5 feet to 137 feet below ground surface (bgs), and thirty-two (32) CPTs ranging in depth between 15 and 163 feet bgs were performed from March to May 2008 by GDC to investigate the subsurface, compressibility, and liquefaction potential characteristics for pavement, retaining system, and bridge structure design and construction. In addition, on October 8th, 2008, eight (8) hand auger borings were advanced to depths of 5 feet bgs to collect supplemental near-surface samples for R-Value and index tests for pavement design. CPTs were used, in conjunction with data from the borings, to provide continuous representative profiles at the site (see Section 6.1). Boring and CPT locations are presented in Figures 2 (A-N), and the dates of exploration, stations, offsets, elevations, and encountered groundwater elevations are summarized in Table A-1 of Appendix A. Borings utilized for bridge or special design wall structures were located in plan and elevation by surveying (see Table A-2, Appendix A). Other borings were located on the topographic plan by measurement from existing landmarks and elevations were estimated from the plan contours.

All drilling companies acted as subcontractors to GDC. R & C Drilling, Inc. of Van Nuys, California drilled and sampled the hollow stem auger borings using a Mobile B-61 truck mounted drill rig. C&L Drilling, Inc. of La Habra, California drilled and sampled the rotary wash borings using $4^{7/8}$-inch drill bit and a Mayhew 1000 truck mounted drill rig. The hand auger borings were advanced by GDC personnel using a nominal 3-inch diameter hand auger. CPTs were conducted in accordance with ASTM D 5778 using an electronic cone penetrometer.

All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS) and were assigned a group name and group symbol, as described in Caltrans' "Soil and Rock Logging Classification Manual". Bulk samples of the near-surface soils were collected, and drive samples (SPT and California Ring) were collected from the borings generally at a typical interval of 5 to 10 feet or as time allowed. A key for soil classification, boring legend, and boring logs are presented in Appendix A.

5.2 Geologic mapping

Materials at the freeway grade are shallow fills over native alluvium. Compacted fills up to 30 feet are present at the abutment approaches. Due to the simplicity of the site geology (shallow fill over alluvium, significant fill only at abutment approaches), no geologic mapping was considered necessary for this project.

5.3 Geophysical Studies

No geophysical studies were performed as part of the investigation.

5.4 Instrumentation

Geotechnical instrumentation was not installed during this investigation.

5.5 Exploration Notes

No visible evidence of soil contamination or odors was observed in any of the explorations. The results of our environmental investigations are presented in separate reports. No borings reached shallow refusal prior to achieving the target depths. During the course of our fieldwork at the site, no adverse conditions were observed that would preclude the construction of the project as currently proposed.

6.0 GEOTECHNICAL TESTING

6.1 In Situ Testing

Standard Penetration Tests (SPT) was performed in the borings to evaluate the general density / consistency of subsurface materials. The boring logs including penetration resistance or blow counts and detailed description of the SPT testing are presented in Appendix A. Electronic Cone Penetration Tests (CPTs) were performed in accordance with ASTM D 5778 to evaluate in-situ properties of the subsurface materials. CPT logs and description of the methodology are presented in Appendix A. Boring and CPT locations are shown in Figures 2A through 2N.

6.2 Laboratory Testing

Laboratory testing of selected samples will be performed in accordance with applicable Caltrans and ASTM standards. The laboratory testing was performed by GDC and Geologic Associates of Anaheim, California. Additional R-value testing was performed by LaBelle-Marvin of Santa Ana, California. The following laboratory tests were conducted to determine the physical and engineering properties of the soil samples:

- Moisture content and dry density;
- Grain size distribution and percent passing No. 200 sieve;
- Atterberg Limits;
- Consolidation;
- Direct Shear;
- Pocket Penetrometer;
- Torvane;
- Soil Corrosivity (pH, Sulfate, Chloride, and Minimum Resistivity); and
- R-Value.

Moisture content, dry density, percent passing No. 200 sieve, and Atterberg Limits laboratory test results are presented on the boring logs in the Appendix A. Detailed descriptions of the tests performed and their results are presented in Appendix B.

7.0 GEOTECHNICAL CONDITIONS

7.1 Site Geology

7.1.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange county coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

7.1.2 Lithology

Our characterization of the subsurface conditions along the alignment is based on review of existing information and the results of our site observations, borings, and results of laboratory testing. The project alignment is underlain primarily by deep alluvial deposits, which are overlain locally by relatively shallow man-made fills. No bedrock or rock outcroppings are present in the project area.

The thickest known fills are at the Route 22/405 Separation, where abutment approach fills up to about El. + 56 feet were placed to raise SR-22 above the I-405 freeway at the location of the Separation abutments. The fills have a maximum height of about 30 feet, and are inclined at 1.5h: 1v below the abutments. Side slopes generally range from 1.5h: 1v to 2h: 1v. Freeway elevation below the Separation is between El. + 24 and 30 feet. Approach fills were also placed to raise Valley View Street above SR-22 at the location of the Bolsa Chica Road

Overcrossing. These fills have a maximum height of about 25 to 30 feet, and are inclined at 1.5h: 1v below the abutments. Side slopes generally range from 1.5h: 1v to 2h: 1v. Freeway elevation is near El. + 28 to 30 feet below Abutment 1 and near El. + 26 feet below Abutment 3.

In general, subsurface lithology is interbedded alluvium. The soil profile is divided into 5 general layers. Layer descriptions and approximate layer boundary elevations are described below, and are summarized in presented in Table 3 (sheets 1 through 4). The soil conditions along the project alignment are generally consistent with those presented in Table 3. The soils profile and general engineering characteristics of the subsurface soils are illustrated in the Geotechnical Cross-Sections in Figures 3A through 3M.

7.1.2.1 Layer 1 – Fill and Stiff Native

Road fill, abutment approach fills, and stiff native soils are present above about El. + 15 to El. + 20 feet (El. +17 feet average). The upper native alluvial material is similar to the compacted fill. These soils encountered in the test borings and CPTs consist primarily of very stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent thin layers of medium dense silty sands (SM) and clayey sands (SC).

7.1.2.2 Layer 2 – Firm to Stiff CL

This layer is mostly below the water table, and is present throughout the project area. It is typically about 11 to 14 feet thick (average 12) and is present generally between El. + 3 and +20 feet (El. + 5 to +17 feet average). The material classifies as locally firm but predominantly stiff lean clay or lean sandy clay (CL) with typical undrained shear strengths of 1.0 to 1.4 ksf based on CPT correlations and pocket penetrometer readings. Thin seams of medium dense sand to silty sand to sandy silt, as well as firm and very stiff clays, are present in this layer. Layer 2 is generally overconsolidated with respect to the freeway grades, but is close to normally consolidated where present under the 25 to 30 feet of abutment fill. Since it is fairly shallow below the freeway grades and is generally the weakest and most compressible layer at the site, it typically controls the magnitude and time rate of settlement and global stability of slopes at the site.

7.1.2.3 Layer 3 – Very Stiff CL, ML

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with thin interbeds of medium dense to dense silty sands (SM) and sandy silts (ML). The layer is 17 to 22 feet thick (average 19 feet) and is present between El. -18 and +8 feet (El. -14 to +5 average). Pocket penetrometer readings in the fine grained materials typically range from 2.0 to 4.5 ksf, and CPT correlations indicate average undrained shear strengths in this layer generally more than 3.0 ksf. These clays are over-consolidated.

7.1.2.4 Layer 4 – Dense to V. Dense SM/ML/SP

Layer 4 is a predominantly granular layer of variable thickness consisting of interbedded Sand (SP), Silty Sand (SM), and Sandy Silt (ML), with less frequent interbeds of very stiff to hard clayey silt and clay (ML, CL). In some areas the layer contains thick sequences of very dense clean sands, while in other it is siltier and highly interbedded with silts and clays. Average SPT N-Value is typically more than 30 blows per foot in the silty materials with CPT tip resistance of 100 to 160 tsf, in the clean sands it is typically more than 50 blows per foot with CPT tip resistance of 200 to more than 600 ksf, and the clayey layers typically have undrained shear strength of 3 to more than 4 ksf. Layer 4 ranges from 9 to 33 feet in thickness (average 20 feet), and is generally present between El. -13 and -47 feet (on average between El. -18 and -34 feet). The layer is generally thicker, denser, cleaner sands in the east and north, becoming more silty and interbedded toward the west and south.

7.1.2.5 Layer 5 – V. Dense SP & Hard CL/ML

This layer is older alluvium composed of alternating beds of dense to very dense sands (SP), silty sands (SM), and sandy silts (ML), interbedded with very stiff to hard clays and clayey silts. The cleaner sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 600 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf. The layer is present below El. -22 to -47 feet (El. -34 average). The upper 10 to 27 feet of this layer (Layer 5-1) is typically very stiff to hard clay and silt.

7.1.3 Geologic Structure

Since the bedrock is more than 4,000 feet deep and the site is relatively level terrain, geologic structure is not an engineering issue for design.

7.1.4 Natural Slope Stability

No significant natural slopes are present in the project vicinity.

7.2 Soil Conditions

7.2.1 General Description

Our engineering characterization of the subsurface conditions along the alignment is based on our field observations, field and laboratory data, and our local experience with the geologic units in this area.

7.2.2 Engineering Properties

The engineering properties we used for analyses were based on an analysis of the field and laboratory data from this investigation and previous studies, published correlations, and our judgment. Recommended engineering properties for design are summarized in Table 3. Field and laboratory data for the subsurface soils from the current investigation are presented in Appendix A and Appendix B, respectively.

7.2.3 Expansive Soil

The near-surface soils encountered in our investigation were generally very stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent layers of silty sands (SM) and clayey sands (SC). Clayey soils have Liquid Limits generally less than 34 and Plasticity Indices generally less than 16. Based on available correlations with dry density and Liquid Limit (Mitchell and Gardner, 1975), the near surface soils are considered to have generally low to occasionally medium expansion potential (see Figure 1 in response to comments Appendix G). A summary of expansion potential along the alignment is presented in Table 5. Considerations for use of expansive on-site materials are discussed in Section 8.3.2.

7.3 Water

7.3.1 Surface Water

Surface water generally consists of sheet flow to existing storm drainage facilities. Drainage channels run along both westbound and eastbound shoulders of the SR-22 and I-405 freeways, mostly draining to Bolsa Chica Channel. Bolsa Chica Channel runs north to south between the Route 22/405 Separation Bent 3 and Abutment 4 in a Triple 12'x10' Reinforced Concrete Box Culvert discharging to an open channel south of the project (see Figure 2G), and is the predominant drainage feature in the project area, which flows south / southwest toward the San Gabriel River and Pacific Ocean.

7.3.1.1 Scour

The project will be in a graded or paved area, and runoff is by sheet flow to storm drains that carry the flow offsite. The roadway improvements are not located within or adjacent to flood/drainage or concentrated flowing surface water bodies. The open channel portions of Bolsa Chica Channel are lined with riprap or concrete. Based on the above considerations, it is our opinion that scour potential is not a concern for the project design.

7.3.1.2 Erosion

Proposed grading will not increase the potential for erosion at the site. Proposed slopes are similar in height and gradient and existing slopes do not show excessive erosion. Much of the site area will be paved or vegetated. Proper planting and irrigation of slopes and control of surface runoff should be sufficient to mitigate potential erosion.

7.3.2 Groundwater

Based on California Geological Survey (CGS) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater is at a depth of about 10 to 15 feet as shown in Figure 4 (CDMG, 1998). In the recently completed geotechnical investigation the shallow groundwater along the study corridor was encountered at about 10 to 15 feet below the adjacent freeway grade in the area, roughly at elevations El. + 12 feet on the west end of the project, to a high of El. + 18 feet near RW1325 & 1326, to El. + 16 feet for the

HOV connector and further east. Based on this we recommend design groundwater elevation rising from El. + 12 feet on the west end of project to El. +16 feet at CPT-08-119. For Walls RW1325 & 1326, we recommend using El. +18 feet; amd East of RW 1325 we recommend El. + 16 feet, as the design groundwater.

7.4 Project Site Seismicity

7.4.1 Ground Motion

The project is located in a seismically active area. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding. The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 5. A summary of the nearby fault data, and PBA and Peak Ground Acceleration (PGA) data computed with Sadigh (1997) rock and soil attenuation relationships, respectively is presented in Table 2 and calculations are provided in Appendix F.1. Selection of the design ground motion parameters is discussed in Section 8.1.1.

7.4.2 Ground Surface Rupture

The entire project alignment is not located within any Alquist-Priolo Earthquake Fault Zones. Due to the distance from the closest faults ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed. Other geologic and seismic hazards are discussed in Section 8.1.2.

8.0 GEOTECHNICAL ANALYSIS AND DESIGN

8.1 Dynamic Analysis

The latitude and longitude of various points along the alignment are listed in Table 2, and shown on aerial maps in Appendix F.1. The site is located in an active seismic region of southern California that is subject to significant hazards from moderate to large earthquakes. We reviewed the Caltrans 1996 Seismic Hazard Map and Report, and performed deterministic calculations with Sadigh (1997) rock and soil attenuation relationships, to quantify the hazard from seismic shaking at the site. The potentially controlling faults at the site are Newport-Inglewood Rose Canyon East (NIE) and Los Alamitos (LA), with magnitudes of 7.0 and 6.0, respectively.

8.1.1 Parameter Selection

GDC performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base. Peak Ground Acceleration (PGA) was determined using Sadigh 1997 – Soil, and PBA was determined from Sadigh 1997 – Rock, as well as Caltrans 1996 Seismic Hazard Map (Figure 5). Results of the deterministic analysis are presented in Table 2 and Appendix F.1.

The deterministic PGA for a magnitude 6.0 earthquake on Los Alamitos Fault (Reverse fault) ranges from 0.48 to 0.54 in the project area and the PGAs for a magnitude 7.0 earthquake on NIE range from 0.41 to 0.47g. For seismic slope stability evaluation, we recommend using a horizontal acceleration coefficient of 1/3 of the maximum PGA or 0.16 at Bolsa Chica and 0.17 for other bridges, walls, and substantial slopes in the project area.

8.1.2 Analysis of Seismic Effects

Secondary seismic effects for any site include liquefaction, earthquake-induced settlements, slope instability, lateral spreading and tsunamis.

8.1.2.1 Liquefaction

Liquefaction involves a sudden loss in strength of a saturated, cohesionless soil (predominantly sand, low plasticity silts, or sand silt mixtures) caused by cyclic loading such as an earthquake. This results in temporary transformation of the soil to a fluid mass. Typically, liquefaction occurs in areas where groundwater is less

than about 60 feet from the surface and where the soils are composed predominantly of poorly consolidated fine sands, silty sands, and non-plastic silts.

The site is located within a State Liquefaction Hazard Zone (CDMG, 1999). Highest historical groundwater in this area based on Figure 4 is between the 10 and 20 foot depth contours. Groundwater was encountered at El. + 18 feet in CPT-08-002, which is about 7 feet below the freeway grades. Sediments below the groundwater at the site are primarily stiff to very stiff clays and dense to very dense sands, but contain localized thin interbeds of loose to medium dense sands, silty sands, and silts that may be prone to liquefaction.

We performed liquefaction calculations for all the CPTs more than 50 feet deep using a groundwater elevation as recommended in Section 7.3.2. Triggering evaluation was based on the CPT method from the NCEER 1996/1998 Workshops (Youd and Idriss, 2001). Settlements were calculated using the method of Tokimatsu and Seed (1987), and residual strengths were based on the method of Seed and Harder (1990). Calculations were carried to a maximum depth of 60 feet below existing grades. We determined that use of Magnitude 7.0 and PGA of 0.45g was more critical than using Magnitude 6.0 and PGA of 0.5g, and therefore used the higher magnitude case in our analyses.

The resulting analyses show that limited layers of silty and sandy soils below groundwater may liquefy in the design earthquake. Potentially liquefiable layers are shown on selected cross-sections in Figures 3A through 3M, primarily within generalized Layer 3, and less frequently in Layers 2 and 4. Estimated liquefaction-induced ground settlements for all CPTs range between 0 and 0.9 inches with an average value of 0.4 inches. A summary of the liquefaction settlements is included in Table 4. Liquefaction calculations are presented in Appendix F.2.

Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1,500 psf. The N1-60cs for liquefiable layers adjusted in accordance with Seed and Harder (1990) range from 17 to more than 30 blows per foot (average 27), and estimated residual shear strengths range from a minimum of 875 psf up to a limiting value of 1,500 psf (average 1400 psf).

Due to the relatively isolated thin liquefied layers, depth of liquefiable layers, small ground settlements, and relatively high residual shear strengths, it is our

conclusion that liquefaction does not have a major impact on the design of walls, bridge piles, or stability of the slopes at the site.

8.1.2.2 Seismic Compaction

Settlement ("seismic compaction") of loose to medium dense clean dry sands can occur during seismic shaking. No significant clean sands are present above the water table, and therefore seismic compaction is not an issue (see Table 4).

8.1.2.3 Seismic Slope Stability

Slope instability, in the form of landslides and mudslides, is a potential adverse impact associated with seismic shaking. There are no known landslide prone formations in the project area. Existing slopes along the alignment are globally stable under static conditions. The proposed cut and fill slopes for the alignment are anticipated to be stable under seismic shaking. Pseudostatic analyses indicate factor of at least 1.1 using K_h=0.16 to 0.17 for embankment slopes.

The site is generally level except for engineered embankment fill slopes, liquefiable soil layers are relatively deep, thin, and isolated, and residual undrained shear strengths are generally higher than the undrained shear strength of Layer 2 clays. Therefore, the impact of liquefaction on seismic slope stability is not significant; instead the slope stability is generally controlled by the undrained shear strength of Layer 2 clays. Shallow surface sloughing of embankments could occur in a major seismic event. Static and seismic stability of abutment slopes is evaluated quantitatively later in this report, and slope stability calculations are provided in Appendix F.3.

8.1.2.4 Lateral Spreading

Due to limited liquefaction potential, high residual shear strengths, and results of pseudo-static stability analyses (Appendix F.3), lateral spreading due to liquefaction or weak soils is not considered a significant hazard at the site.

8.1.2.5 Tsunamis

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the 100-

yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

8.2 Cuts and Excavations

8.2.1 General

All earthwork and grading should be performed in accordance with Sections 16 through 22 of Caltrans Standard Specifications. Cuts for the project will be at 2h: 1v (or 1.5h: 1v paved slopes below abutments) into existing clayey embankment fills. Numerous buried utilities are present at the site, and these should be identified and protected or relocated as necessary before commencing excavation. Excavations below about El. + 18 to +16 feet may encounter groundwater.

8.2.2 Stability

The proposed cut slopes will expose existing embankment fill materials, and computations indicate they will have adequate static and seismic factors of safety (Appendix F.3). Cuts should generally be at 2h: 1v or flatter, except where paved below bridge abutments they may be made as steep as 1.5h: 1v.

8.2.3 Excavatability

The fill and the surficial soils and alluvium along the alignment can be excavated with light to moderate effort using conventional heavy-duty grading equipment. No materials are present that would require rock excavation or blasting.

8.2.4 Earthwork Grading Factors

Native materials or existing fills of similar composition to the native materials will be excavated. Earthwork factors relate the in-place volume of material to be excavated to the in-place volume of the material after placing as fill. The factors are defined as in-place volume of new compacted fill divided by in-place volume of material to be excavated. We recommend the following earthwork grading factors for the project:

- On site alluvial soils excavated and placed at 90% compaction: 0.90-0.95
- On site alluvial soils excavated and placed at 95% compaction: 0.85-0.90
- On site compacted fill (from approach embankments) excavated and placed at 90% compaction: 0.95-1.0
- On site compacted fill (from approach embankments) excavated and placed at 95% compaction: 0.90-0.95
- Import fill trucked in loose condition: 0.75-0.80

Grading factors may require adjustment during construction, and should consider the processing of material, wasting of spoil, and actual rather than specified placement percent compaction. The compaction characteristics of the materials from the borrow site excavation should be tested for density control during construction.

8.2.5 Temporary Excavation and Shoring

Temporary excavations should comply with OSHA requirements. Site safety, including temporary excavation and shoring, are the responsibility of the contractor. Temporary trenches less than 5 feet in depth may be excavated near vertical, but may need to be laid back or use trench shields if caving occurs. Temporary cuts with a maximum height of 20 feet should generally be limited to 1:1 inclination. No cuts should extend below a 1:1 plane extending from the bottom of existing foundations or improvements without a properly designed shoring system. A registered engineer should design any steeper or higher slopes and any required shoring systems. Engineering properties listed in Table 3 may be used for shoring or temporary excavation design. Hydrostatic pressures should be included for excavations below El. 18 feet.

8.3 Embankment

8.3.1 General Description

Major embankment fills will be placed on approaches to HOV and 405/22 connectors. Lightweight fills are proposed on the west approach to both structures, and on the east approach to HOV connector. The east approach to 405/22 separation will be conventional fill. Surcharge fills are recommended in the vicinity of both east abutments (see Figure 6A).

8.3.2 Imported and On-Site Fill Material Specifications

In general, materials and earthwork should be in accordance with the Caltrans Standard Specifications (specifically refer to Sections 6, 16 through 22, 24 through 29, and 37 through 42), and comply with the project Materials Report.

Expansive clays and contaminated soils should not be imported for use in the project. It is recommended that all imported fill be granular low expansive soil having less than 40% passing No. 200 sieve and Plasticity Index (PI) less than 12 and maximum particle size of 3 inches. In addition, all imported fill and wall structural backfill shall be non-corrosive following Caltrans guidelines, having pH greater than 5.5, soluble sulfate less than 2000 ppm, and soluble chloride less than 500 ppm.

Suitable on site excavated materials may be re-used as compacted fill. After removal of debris, most on-site materials are expected to be suitable for use as general embankment fill, but should not be placed within 4 feet of the finished grade in pavement areas or in the expansive soil exclusion zone at abutments or on abutment approaches where EI < 50 is required. All fill placed within 4 feet of the finished grade below pavements should have an R Value of at least 41. Abutment wall and retaining wall backfill shall have Sand Equivalent greater than 20 and conform to Caltrans Standard Specifications for structural fill.

8.3.3 Site Preparation

All areas to receive fill should be stripped of existing pavements, cleared of any structures, all existing vegetation, debris, and other unsuitable materials in accordance with Section 16 of Caltrans Standard Specifications ("Clearing and Grubbing"). All construction debris and/or deleterious material encountered during the clearing operations should be removed from the site.

After clearing and stripping, the surface should generally be excavated to a minimum of one foot before placement of new fill. In all areas, the exposed surface of excavation to receive fill should be proof-rolled with loaded heavy equipment under observation of GDC. Any areas of loose or yielding soils should be overexcavated and recompacted or otherwise stabilized as directed by GDC. Use of biaxial geogrid (Tensar BX1200 or equal) and crushed rock may be an option if localized soft subgrade areas are encountered and overexcavation is impractical. Any soils that cannot be compacted or are otherwise unsuitable for the planned use should be excavated and removed off-site. After proof-rolling, the exposed surface should then be scarified and compacted to a minimum of 90

percent relative compaction. GDC may waive or reduce the one foot excavation and scarification / recompaction requirement based on observation of the subgrade and results of the proof rolling. Where fills are placed against sloping ground steeper than 5h:1v, they shall be properly benched into competent materials per the Standard Specifications.

8.3.4 Settlement of Embankments

8.3.4.1 General Considerations

Fill placement will cause settlements of underlying soils. Due to somewhat overconsolidated soils with respect to freeway grades, normal earth fills can be placed up to about El. 50 feet (about 20 feet above freeway grades) with relatively small settlements completed within about 1-2 months. Where fills cause a net loading exceeding that normal earth fill to elevations of more than El. 50 feet, the soils approach becoming normally consolidated, and larger settlements taking up to 1.5 to 2 years to complete become more likely. Where normal earth fills exceed this loading and settlement time cannot be accommodated in the project schedule, measures to reduce settlement time are required. These may include:

- Where space is available, place temporary surcharge for a period of time to elevations above the finished grade and over a larger area, so that soils are pre-loaded or overconsolidated with respect to the finished grade in a shorter time frame (surcharge is recommended as shown in Figure 6A);
- Where space for surcharge is not available:
    - Use lightweight fill (applied at east portions of RW1300, RW1325, & RW1326;
    - Overexcavate the existing soils and replace with lightweight fill so that the net increase in loading is zero (applied for RW3319 and 3320, and in between the surcharge fill areas);

Based on space available, and to minimize requirements for lightweight fill and reduce settlement time, surcharging to above finished grades is recommended as shown in Figure 6A. This will allow for:

- Use of normal embankment below wall RW1300 and reducing the height of lightweight fill between "H"1310+00 and 1312+68;
- Use of Type 1 Walls instead of lightweight fill walls at RW3311 and 3312;

- Mitigation of long term settlements of new pavement areas on the south side of S405/E22 Connector between "E"3308+00 and 3312+00;
- Pre-consolidation of abutments of both bridges to eliminate settlement effects on the abutment foundations;

Due to the need to maintain traffic on the existing connector and detours during construction, some areas are not available for surcharge:

- In existing paved areas of the connector ramp above El. +50 feet that cannot be surcharged, overexcavation and lightweight fill is recommended to eliminate any new load and long term pavement settlement;
- Areas on the existing connector below El. +50 feet may use regular fill;
- New fills between RW1300 and the existing embankment where surcharging is not possible are proposed as lightweight fill (both to mitigate long-term settlement and for bearing capacity).

8.3.4.2 Settlement Estimates and Monitoring Recommendations

Where significant embankments are placed, the magnitude and duration of settlements must be considered in the design, planning, and construction of the project. Key items to consider are the total amount of settlement, the time required to complete the settlements, and potential impacts of the settlements to existing and proposed improvements. Appropriate waiting periods will be required in key areas and settlement monitoring should be performed in these areas during construction. Settlements at walls, abutments, and surcharge areas should be monitored with settlement plates. Locations of the settlement plates for precast wall with lightweight fill are shown in the wall foundation reports, settlement plate locations for bridge abutments are shown in the bridge foundation reports, and plate locations for Type 1 Walls RW3311 and 3312 are shown in Figure 6A. Details of the settlement calculations and magnitude of settlement due to placement of embankment fill behind various walls are summarized in the appropriate wall foundation reports (GDC, 2008 (1, 2, and 3)). Supporting calculations for settlement are presented in Appendix F.4.

A summary of settlements and associated recommendations in specific areas is presented in Table 6A, and discussed below. Settlement plate locations and suggested monitoring procedure are presented in Table 6B. A settlement plate detail is shown in Figure 6B.

Bolsa Chica Road OC

- The roadway will be raised by up to about 4 feet on the north abutment to maximum El. +50 feet, and the abutment slope will be cut back.
- The roadway will be raised by up to about 2 feet with a thick asphalt overlay on the south abutment to maximum El. +56 feet, and the abutment slope will be cut back.
- Sidehill fills with maximum depth of about 13 feet will be placed on both sides of the north abutment and the south abutment, and on both sides of the Garden Grove Boulevard ramp at the south abutment.
- Settlements on the Valley View roadway of up to 1 to 2 inches may occur near the center of embankment due to placing fill, and up to 2 to 4 inches of settlement may occur under the center of the deepest portions of the sidehill embankments. Settlements near the edge of filled areas (such as adjacent to the abutments) may be on the order of ½ inch to 1 inch. Settlement near the abutments may be reduced due to the planned excavation of the abutment slope.
- A planned waiting period of 45 days is recommended prior to excavating footings and driving piles at the abutments, after which settlements of less than ½ inch are expected. The settlement period may only be reduced if justified by settlement monitoring and approved by GDC.
- Two settlement plates should be placed and monitored at the top of each abutment, and one additional plate should be placed under the deepest sidehill fill areas at each abutment prior to placing any fill.

RW1299+1300

Settlements were calculated for four areas depending on the surcharge, height of the wall, and use of light weight fill. The estimated settlements in the four areas (after surcharge, where surcharge is used) range between 0.75 to 2.5 inches. Time rate estimates indicate that settlement for Areas 1, 2, and 3 will occur within 60 to 90 days. For the surcharge area 4, adequate pre-consolidation (to match the final loads) from surcharge will be completed in an estimated 11 months.

- Area 4 should be surcharged at the west end according to Figure 6A, and the surcharge should be left in place for at least 11 months
- Settlement should be monitored with settlement plates as listed in Table 6B;

- More detailed recommendations are provided in the foundation report for RW1299+1300.

Area Between Surcharges and Above Finish Grade El. 50 feet

- About 8 feet of fill will be placed on the finish roadway area between the surcharges shown in Figure 6A, and this area cannot be surcharged since traffic will be maintained on the existing connector during the surcharge period
- Upon placing this fill, an estimated 1-2 inches of settlement may occur during fill placement, and long term settlements of 1.5 inches may occur due to consolidation;
- Therefore overexcavation and use of lightweight fill under the final roadway adjacent to backfill for wall RW1300 is recommended in this area if it is desired to avoid long term settlements. The overexcavation should be 5 feet below existing grades, extend the width of the finished roadway, and from Station "H" 1307+50 to the end of pavement near the bridge abutments. If about an inch of long term settlement can be tolerated, use of lightweight fill may not be required.
- More details are provided in the foundation report for Walls RW1299+1300

RW3311+3312

- Surcharge should be performed according to Figure 6A, and left in place for at least 6 months (adequate time to pre-consolidate the area under final loads)
- Settlement should be monitored with at least 2 settlement plates as shown in Figure 6A and summarized in Table 6B;
- Post surcharge settlements due to backfilling the walls are estimated at less than 1.0 inch.
- Additional discussion is provided in Section 8.4.4

RW3319 and 3320

- These walls are overexcavated to sufficient depth that the net load increase (removal of dirt and replacement with lightweight fill) is zero.

- The estimated settlements at the center of the embankment are less than 1.0 inch.
- Time rate estimates indicate that settlement will occur within 60 days.
- Settlement should be monitored with settlement plates as listed in Table 6B;
- More detailed recommendations are provided in the RW3319+3320 foundation report

RW1325 and 1326

- These walls are constructed entirely of lightweight fill and maximum estimated settlements for the highest walls are on the order of 1.5 inches
- Settlements should be substantially completed in 1 to 2 months

8.3.4.3 Settlement at Abutments

- Bolsa Chica Rd OC – After the recommended 45 day waiting period, settlements at the abutment locations due to backfilling are less than ½ inch.
- East abutment of HOV Connector and S405-E22 Connector – After completion of the recommended 6 to 11 month surcharge, settlement at the abutment locations due to backfilling with lightweight fill (HOV) or conventional fill (S405-E22) are less than ½ inch. A vertical joint in lightweight fill at back of footing is recommended;
- West abutment of HOV Connector – Backfill will be lightweight fill and settlement at the bridge abutment is estimated at ½ to ¾ inch, and piles driven to dense sand have reserve capacity for the small downdrag loads. No waiting period is required. A vertical joint in lightweight fill at back of footing is recommended;
- West abutment of S405-E22 Connector – Backfill will be lightweight fill with less loading than soil excavated, and settlements at the abutments will be less than ½ inch. A vertical joint in lightweight fill at back of footing is recommended

8.3.4.4 Settlement of Pavement Areas

Bolsa Chica Rd OC

No settlement that will affect new or existing pavements is anticipated for these fills.

RW1299+1300

Along the existing connector ramp adjacent to the surcharge fill, and where temporary detour pavement is proposed, an estimated 1-½ inches of settlement may occur near the edge of surcharge, decreasing to less than an inch at a distance of about 5 feet from the surcharge. The existing pavement and temporary detour pavements will be demolished and removed later in the project.

Near the toe of surcharge along SR-22, settlement of less than 1 inch near the edge of surcharge, decreasing to less than ½ inch at a horizontal distance of 5 feet, is anticipated.

For the remainder of Wall RW1300, settlements outside the wall layout line will be less than 1 inch at 5 feet and less than ½ inch at 10 feet outside the LOL.

RW3319+3320

No settlement that will affect new or existing pavements is anticipated for these walls.

RW1325+1326

Pavements may be present adjacent to the embankment, so for the highest wall (27 feet), we estimated settlements outside the embankment loaded area using the principle of superposition at distances of 1 ft, 5 ft, 10 ft, 20 ft, and 30 ft away from the wall face. It is our experience that settlement outside the loaded area will be ½ the calculated value or less. For the highest wall, our estimate of settlement (half the calculated values) at the various perpendicular distances away from the wall is summarized as follows:

Distance (ft)	1	5	10	20	30
Settlement (inch)	0.4	0.25	0.15	0.1	0.05

For shorter wall heights, these settlements will be proportionately less. Differential settlements parallel to the wall will be very small (less than 1/2500).

8.3.5 Benching and Underdrains

As a minimum, grading and benching into existing slopes should conform to Section 16 and 19 of the Standard Specifications. Where lightweight fills are placed against existing embankment, they should be benched in at a maximum 2h:1v gradient. Due to lack of upslope water sources (the only slopes are approach embankments), likelihood of seepage from slopes is low. If seepage is encountered in the field, it should be drained using geocomposite drain board discharging to a suitable drainage facility (burrito drain or storm drain).

8.3.6 Embankment Stability

Stability calculations were performed for proposed embankment slopes and walls including a traffic surcharge of 240 psf using the strength parameters recommended in Section 7.2.2 (Table 3) and pseudo-static horizontal acceleration coefficient recommended in Section 8.1.1. The results of the analysis indicate that factor of safety will meet or exceed 1.5 for static conditions and 1.1 for pseudostatic conditions. Slope stability calculations are presented in Appendix F.3.

8.4 Earth Retaining Systems (Type 1 Walls RW3311 and 3312)

Two standard plan Type 1 retaining walls (RW3311 and RW3312) are proposed for the project (see Figures 2D and 2G), with maximum design heights of 24 feet and 14 feet, respectively. The wall plans are shown in Figures 7A and 7B. The wall area will be surcharged as shown in Figure 6A to mitigate long-term settlements. After surcharge, we have determined that the walls will have adequate bearing capacity, overall stability, and acceptable settlements. Bearing capacity, earth pressure, and sliding friction calculations are presented in Appendix F.5, and overall stability calculations are in Appendix F.3.

8.4.1 Subgrade Preparation

After successful completion of surcharge, concrete footings for RW3311 and 3312 may be founded on new compacted fill or recompacted existing fills. Materials that cannot be proof-rolled or recompacted should be removed to competent material and replaced with compacted fill in accordance with Section 19-3.06 of Caltrans Standard Specifications. All foundation excavations should be observed by GDC to

confirm the foundation subgrade meets the requirements of the geotechnical report prior to placing steel or concrete.

All new embankment (including replacement of unsuitable soils) supporting Type 1 retaining walls within a zone defined by 1:1.5 planes extending down and out from lines 1 ft outside the edge of footing should be placed at a relative compaction of not less than 95 percent (Caltrans Standard Specification 19-5.03 and SSP 19-600). For walls founded below current grades in existing embankment fill, a minimum of 5 feet of removal and recompaction to 95% relative compaction below the wall foundation is recommended. Walls with bottom of footing less than 5 feet above existing grades should be overexcavated to at least 5 feet below bottom of footing and backfilled up to bottom of footing with 95% compacted fill.

8.4.2 Allowable Net Bearing Pressure and Minimum Embedment

8.4.2.1 Embedment

For walls founded on level ground (perpendicular to the wall) or 4h:1v or flatter slopes, minimum bottom of footing embedment below finish grade at face of wall should follow the standard plans, or minimum 1.5 feet of soil cover over top of footing. Walls founded on slopes up to 2h:1v (in a direction perpendicular to the wall) should have minimum bottom of footing embedment of 5 feet. Review of the plans indicates the proposed Type 1 walls meet these criteria.

8.4.2.2 Allowable Bearing Capacity

We have determined that bearing capacity will be adequate for the heights of wall proposed. We evaluated bearing capacity of the Type 1 wall footings using Brinch Hansen's method for various wall heights assuming maximum ground slope of 2h:1v using design groundwater levels and soil unit weight of 125 pcf, cohesion of 400 psf, and friction angle of 30 degrees for the compacted fill / stiff native within one footing width below the footing. A summary of the wall footing parameters and allowable bearing capacity with Factor of Safety of 3.0 is presented in the following table:

Wall No.	Wall Design Height, H (feet)	Footing Width (feet)	Bottom of Footing Elevation (feet)	Minimum Bottom-of-Footing Embedment below FG at face of wall (feet)	Toe Pressure (ksf) From Standard Plans	Hansen's Method [2:1slope] Allowable Bearing Capacity (ksf)
3311	12	7.25	44.24	>5	2.8	5.6
3312	14	8.0	45.63	3	3.3	4.9
3311	16	9.0	40.07	>5	3.5	5.5
3311	20	11.0	36.07	>5	4.3	5.5
3311	24	13.25	31.74	5	4.9	5.4

The allowable bearing capacity exceeds the maximum toe pressure and is acceptable. Bearing capacity calculations are presented in Appendix F.5.

8.4.3 Lateral Resistance of Retaining Wall Foundations

In general, resistance to lateral loads is provided by a combination of frictional sliding resistance at the foundation-soil interface and passive soil resistance on the side of the embedded portion of the footing.

Ultimate sliding friction coefficient between concrete and soil may be taken as 0.45. For walls with a key, an ultimate soil-soil friction coefficient of 0.65 may be used. For passive resistance of footings poured against competent existing soils or new compacted fill an equivalent fluid pressure of 350 pcf may be used on level ground, and 175 pcf may be used for sloping ground up to 2h:1v. The passive pressures have been reduced to less than ½ of the theoretical ultimate values to correspond to ½ inch or less movement. Supporting calculations are presented in Appendix F.

A minimum static sliding factor of safety of 1.5 is required. For seismic loading, a minimum sliding factor of safety of 1.1 is required. Overturning factor of safety is acceptable if the resultant on the base of the foundation falls within the middle 1/3 of the footing.

8.4.4 Settlement of Wall Footings

Since the wall areas will be surcharged and preconsolidated to more than the final loads, and will be founded in 95% compacted fill, settlement on backfill will generally be small, and is estimated at 1 inch or less. Differential settlement may be taken as ½ inch over 50 feet.

8.4.5 Lateral Earth Pressures

8.4.5.1 Static Wall Pressures

For walls constructed and backfilled with compacted structure backfill in accordance with the Standard Plans and Specifications, a unit weight of 125 pcf and a friction angle of 34 degrees may be assumed. Using Coulomb's equation, the following active lateral pressure coefficients (Ka) and equivalent fluid pressures may be used:

- Level Backfill: Ka=0.29, equivalent fluid pressure 36 pcf
- 2h:1v Sloping Bacfill: Ka=0.40, equivalent fluid pressure 50 pcf

Lateral pressure due to areal surcharge loads for level backfill may be taken as 0.29 times the vertical pressure. For normal traffic loading a vertical surcharge of 240 psf and a uniform lateral pressure of 70 psf may be used.

Supporting calculations are provided in Appendix F.

8.4.5.2 Seismic Wall Pressures

Caltrans does not specifically require design of Standard Plan walls for seismic earth pressure loading, and walls designed for static loads have generally performed acceptably in past earthquakes. If design for seismic pressure is desired, seismic earth pressures may be determined by the Mononabe-Okabe method. For the project site, 125 pcf unit weight, and 0.17g pseudo-static effective acceleration, this gives a seismic increment of 13 pcf equivalent fluid. The resultant should be added to the static pressures and applied at a height of 0.6 times wall height above the base of wall. Supporting calculations are provided in Appendix F.

8.4.6 Wall Drainage

All of the above recommendations assume that the wall has adequate drainage provisions to prevent the buildup of hydrostatic pressures in the soil backfill. The drainage system for Type 1 walls should be designed in accordance with Caltrans Standard Plan BO-3, Detail 3-1.

8.5 Culvert Foundations

Improvements to the alignment may include construction of culverts. The following general guidelines can be used for the design of culverts:

- Field data indicate that the foundation soils above the water table, in general, will have adequate bearing capacity to support culverts.
- In some areas, removal and recompaction of loose, uncompacted, or other unsuitable soils may be required to minimize post-construction settlements. If loose, soft, wet soils, or otherwise unstable subgrade is encountered at the bottom of the trench, overexcavation and replacement with biaxial geogrid (Tensar BX 1100 or equivalent) and 0.3 to 0.6 meters of crushed rock may be used to stabilize the base prior to backfilling.
- Culverts should be designed to support the weight of the overburden and traffic surcharge. The overburden pressure on the pipe can be calculated by multiplying the unit weight of the soil cover by the thickness of this cover. For design purposes, a soil unit weight of 125 pcf may be used.
- Caltrans Standard Plans and Section 19 of Caltrans Standard Specifications should be followed in the preparation of foundation soils, bedding, and backfill for the placement of culverts.
- Corrosion characteristics of the site soils and abrasion characteristics of the flow should be considered in selection of the type of pipe in accordance with the Highway Design Manual. Corrosion and culvert material recommendations were provided in the project Materials report.

8.6 Minor Structure Foundations

No sound walls are proposed in this project. Minor structures include overhead sign structures. Standard overhead sign Cast-in-Drilled-Hole (CIDH) pile foundations are considered suitable for the project site. Drilling of CIDH foundations will be below groundwater and require wet (slurry method). Detailed recommendations for overhead sign structures will be provided in a separate foundation report.

8.7 Structural Pavement Sections

Pavements are addressed in the project materials report.

8.8 Corrosion Investigation

Caltrans Corrosion Guidelines (version 1.0, Sep 2003) define a corrosive area as "an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates or has a pH of less than 5.5."

Representative samples of the fill and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests performed are summarized as:

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-101	B-1	1-5	SC	2000	8.5	100	30
A-08-105	R-2	10-11.5	CL	NA	9.3	74	218
A-08-112	B-1	1.5-5	SC	<500	8.2	3900	626
A-08-116	S-3	10-11.5	CL	NA	8.3	4720	388
A-08-119	R-5	20-21.5	CL	NA	7.9	1140	96
A-08-122	B-1	1.2-5	SC	2750	8.3	132	163
R-08-004	B-1	1.5-3.5	CL	1350	9.1	465	604
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20-21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35-36.5	ML	NA	8.8	576	255
R-08-019	S-7	35-36.5	SM	NA	8.5	538	336
R-08-023	S-4	20-21.5	CL	NA	7.8	2432	2897
R-08-023	S-6	30-31.5	CL	NA	8.0	490	25

The on-site soils tested generally classify as corrosive in accordance with Caltrans criteria. The corrosion characteristics of the soil should be considered in the design of any buried or grade supported structures in contact with the soils in accordance with Caltrans Corrosion Guidelines. Any imported soils should be evaluated for corrosion characteristics if they will be in contact with buried or at-grade structures and appropriate mitigative measures should be included in the

structure design in accordance with current Caltrans Corrosion Guidelines, Bridge Design Specifications, and Memo to Designers. More detailed corrosion recommendations are provided in the project Materials Report.

9.0 MATERIAL SOURCES

Material sources for the project will consist of locally excavated soil materials, and imported materials. On-site excavations will consist mostly of alluvium and existing fills. After removal of vegetation and other unsuitable materials, most of these materials generated in excavations will be suitable as general embankment fill. Debris fills containing rubbish, concrete, asphalt, wood, or other unsuitable materials should be properly disposed of off-site.

In order to evaluate suitability for the intended use (such as pavement subgrade) and to develop more precise earthwork factors for grading, testing of soils from all prospective borrow sites should be performed. The testing may include the following:

- In-place density and moisture at the borrow site
- Compacted density at 90% and 95% relative compaction
- Optimum moisture content
- R-Value
- Grain size distribution
- Plasticity (Atterberg Limits)
- Expansion Index
- Sand Equivalent

Off-site borrow sources were not evaluated in this study. Consideration may be given to use of recycled materials such as old concrete structures and rigid or flexible pavements.

10.0 MATERIAL DISPOSAL

Vegetation, organic matter, trash, construction debris, or other materials unsuitable for use in compacted fills should be removed from the site at the direction of the Geotechnical Engineer.

No off-site disposal areas were evaluated for this study.

11.0 CONSTRUCTION CONSIDERATIONS

11.1 Construction Advisories

All earthwork and grading should be performed in accordance with Sections 16 through 22 of Caltrans Standard Specifications. Numerous buried and overhead utilities are or may be present, and the contractor should take all necessary precautions to identify, protect, or relocate utilities that could be affected by the construction. Construction staging, traffic control, and contractors operation should take into account the surrounding land use and daily traffic on the freeway and surrounding roadways. Care should be taken during excavation to avoid removing support for any existing improvements, such as foundations, pavements and buried utilities. For excavations below about El. +18 feet, or 10 feet below freeway grade, groundwater may be encountered and dewatering may be required.

11.1.1 Excavation and Embankment Construction

Excavated soils will consist of mainly low plasticity clays, sandy clays, clayey sands, and silty sands/sandy silts. All soils should be excavatable with light to moderate using heavy-duty grading equipment such as scrapers, dozers, and backhoes. Pavement areas will require overexcavation and replacement with select materials as recommended in the project Materials Report.

11.1.2 Utilities

Buried and overhead utilities are present in the project area. The contractor should research utility locations and take the necessary precautions to protect-in-place or relocate utilities prior to grading.

11.1.3 Remnants of Previous Construction

Construction of this improvement project may require the removal of existing facilities, including structures, pavements, fencing, walls, asphalt, concrete, buried utilities, and other improvements.

11.1.4 Settlement Monitoring

Settlement must be monitored by installing and surveying settlement plates at the specified locations, and following the installation and monitoring procedures, listed in Table 6B.

11.2 Hazardous Waste Considerations

We did not observe any evidence of contamination of subsurface materials in our borings. An environmental Initial Site Assessment (ISA) report was submitted separately. An environmental investigation is currently in progress.

11.3 Differing Site Conditions

Our characterization of the site is based on the results of our field explorations, engineering analyses of cross-sections, and interpolation between exploration locations. All cuts, excavations, and foundation areas should be observed continuously during construction to check that they are consistent with the recommendations and assumptions used in the design. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations.

12.0 RECOMMENDATIONS AND SPECIFICATIONS

All grading and roadway work should be performed in accordance with the Caltrans Standard Plans and Specifications, except as additionally specified herein. Recommendations not covered in the Standard Plans and Specifications should be included in the Special Provisions. The following is a summary of conclusions and recommendations presented in this report.

- The site is underlain by native alluvial soils below about El. +20 to +25 feet, and above El. +20 to +25 feet the site is underlain by roadway fill and bridge abutment approach fills. Fill and native alluvium above about El. +18 feet is mainly very stiff to hard sandy clay and clayey silt with less frequent medium dense silty and clayey sand. Between typical elevation of El. +18 and +5 is a layer of saturated firm to stiff lean sandy clay. Alluvium below this level is saturated and consists of interbedded very stiff to hard clays and silts and medium dense to very dense sands and silts. Bedrock is at great depth (refer to Sections 4.4.1, 7.1 and 7.2 for specifics);
- Design groundwater is near El. 16 feet at Bolsa Chica Road, HOV Connector, and S405-E22 Connector, near 18 feet at RW1325 and 1326, decreasing to about El. 12 feet at the west end of the project. In general, groundwater can be expected within about 10 to 15 feet below the freeway grade (see Section 7.3.2);
- The project alignment is located within 3.4 to 5.5 km of Newport Inglewood / Rose Canyon East Fault, a strike slip fault with Maximum Credible Earthquake (MCE) Magnitude 7.0, and within 0.9 to 2.0 km of Los Alamitos Fault, a reverse fault with MCE Magnitude of 6.0. Peak Bedrock Acceleration (PBA) and Peak Ground Acceleration (PGA) vary based on location in the project in accordance with Table 2. For liquefaction analysis, PGA of 0.45 and MCE Magnitude 7.0 are recommended. A pseudo-static acceleration coefficient of 0.16 to 0.17 (1/3 of PGA/g) is recommended for slope stability analyses (Section 8.1.1);
- Some layers of soil in Layers 2, 3, and 4 will liquefy in the design earthquake; however, ground settlements are less than 1 inch and embankments are seismically stable, therefore liquefaction impacts are minimal (Section 8.1.2);
- Permanent cut slopes into existing embankments should be 2h:1v or flatter (or 1.5h:1v max paved below abutments); the slopes will have adequate Factor of Safety for static and seismic stability (Section 8.2.2);
- Temporary unsupported cuts above groundwater may be made at 1h: 1v to 1.5h:1v, depending on soil conditions in the field, or cuts may be shored. Shoring at the site should be designed per Section 8.2.5;

- All site fill and alluvium are considered rippable / excavatable with conventional equipment, no materials requiring blasting or rock excavation are present; however, buried debris or obstructions could be encountered within the site fills (Section 8.2.3);
- Embankment fill slopes up to a maximum of about 30 feet are proposed; all permanent fill slopes should be inclined at 2h:1v or flatter (Section 8.3.1);
- Soils from on-site excavations may be used for general embankment fills; on-site excavations will generate clayey materials which should be placed at least 4 feet below the finished grades in pavement areas, and are not suitable in areas where low expansion (EI<50) materials are specified (Section 8.3.2);
- Imported fills are required for embankment construction. Expansive clays and contaminated soils should not be imported. All imported fills should have less than 40% passing No. 200 sieve and have Plasticity Index less than 12 and maximum particle size of 3 inches, and be non-corrosive having pH greater than 5.5, soluble sulfate less than 2000 ppm, and soluble chloride less than 500 ppm (Section 8.3.2).
- All fills and subgrade soils, on-site or imported, within 4 feet of finished grade below pavements should have a minimum R-Value of 41 (Section 8.3.2);
- GDC should observe key phases of the grading process including embankment subgrade, wall subgrade, and footing excavations;
- In areas to receive fill, the site should be cleared and grubbed, excavated one foot, and proof-rolled with loaded heavy equipment in the presence of GDC. Loose pumping or unsuitable soils should be removed or stabilized per GDC's field recommendations prior to placing new fill. Fills should be benched into existing slopes in accordance with the Standard Specifications (Section 8.3.3);
- Existing and proposed embankments have adequate slope stability Factor of Safety for both static and seismic conditions (Section 8.3.5);
- Placing embankments will cause settlement of underlying soils. Where earth fills are placed to finished elevations of El. +50 feet or less, settlements will occur relatively quickly (1 to 2 months). Earth fills placed above El. +50 feet are expected to undergo long term consolidation (1 to 2 years). To mitigate long term settlements, lightweight fills are recommended for selected walls at abutment approaches, and surcharge is recommended as shown in Figure 6A. Settlement monitoring and waiting periods should be specified as recommended in Section 8.3.4.2 and Table 6B;

- After completion of surcharge and monitoring program, Type 1 walls may be used for RW3311 and 3312. Whether in embankment or excavation, the footing should be underlain by a minimum of 5 feet of new or re-compacted fill at 95% relative compaction. Bearing capacity and overall stability are adequate. Settlement is less than 1 inch, differential settlement is less than ½ inch in 50 feet (Section 8.4);
- Pavement design should follow the project materials report (Section 8.7);
- Culvert material selection should follow the project materials report (Section 8.8).
- Saturated soil conditions requiring stabilization with geogrid and crushed rock could be encountered in low lying areas (below El. +25 or +20 feet) or other areas of the site;
- Remnants of previous construction may be encountered during excavations;
- Given the site history and surrounding land use, contaminated soils or groundwater could be encountered during excavation;
- GDC should be notified immediately if apparent differing site conditions are encountered during construction.

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TABLES

TABLE 1: Average Monthly Maximum, Minimum Temperature and Average Monthly Precipitation
(Long Beach WSCMO (045085))
Period of Record: 4/ 1/1958 to 6/30/2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.9	67.3	68.3	71.7	73.6	77.1	82.5	83.9	82.3	78	72.1	67.2	74.2
Average Min. Temperature (F)	45.5	47.3	49.7	52.3	56.8	60.3	63.7	64.9	62.8	57.9	50.4	45.3	54.8
Average Total Precipitation (in.)	2.58	2.93	1.92	0.72	0.2	0.06	0.02	0.07	0.2	0.39	1.23	1.62	11.96
Average Total Snow Fall (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.: Max. Temp.: 100% Min. Temp.: 100% Precipitation: 100% Snowfall: 90% Snow Depth: 90.4%
Western Regional Climate Center, wrcc@dri.edu

TABLE 2
SUMMARY OF NEARBY FAULTS AND SEISMICITY

Fault Name	Fault Type	Mw	LOCATION																	
			Bolsa Chica Road OC			405/22 HOV Conn. Separation			Middle RW3319 & 3320			W. End RW1325 & 1326			Closest to Los Alamitos Fault			W. End Project		
			Lat. 33.7743 Lon. 118.0380			Lat. 33.7749 Lon. 118.0427			Lat. 33.7741 Lon. 118.0441			Lat. 33.7745 Lon. 118.0475			Lat. 33.7743 Lon. 118.0587			Lat. 33.7743 Lon. 118.0681		
			Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA
Newport-Inglewood	Strike Slip	7.00	5.50	0.50	0.41	5.20	0.51	0.42	5.00	0.52	0.42	4.80	0.53	0.43	4.10	0.56	0.45	3.40	0.59	0.47
Los Alamitos	Reverse	6.00	2.00	0.57	0.48	1.70	0.59	0.50	1.60	0.60	0.50	1.20	0.63	0.52	0.90	0.65	0.54	1.90	0.58	0.49
San Joaquin Hills	Blind Thrust	7.00	13.30	0.37	0.35	13.60	0.36	0.35	13.70	0.36	0.34	13.90	0.36	0.34	14.70	0.34	0.33	15.40	0.33	0.32
Puente Hills	Blind Thrust	7.25	18.20	0.32	0.32	18.10	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.30	0.32	0.31

TABLE 3
SUMMARY OF AVERAGE ENGINEERING PROPERTIES
SOIL PROFILE
WEST COUNTY CONNECTORS SEGMENT

Layer No.	Soil Type*	El. (feet)**	Index Properties*	SPT N-Value* (blow/ft)	Drained Shear Strength Parameters*				Undrained Shear Strength* (psf)	Compressibility Parameters*				
					Peak Cohesion c' (psf)	Peak Friction Angle ϕ' (deg)	Ultimate Cohesion c' (psf)	Ultimate Friction Angle ϕ' (deg)		Modulus E (ksf)	$Cc/(1+e_0)$	$Cr/(1+e_0)$	OCR	Cv (ft^2/day)
1	Very Stiff to Hard Sandy Clay / Silt (CL, ML)	Above +17	**(-)#200**=8 to 86% (avg 51%) **LL**=26 to 47 (avg 33) **PL**=14 to 20 (avg 19) **PI**=11 to 27 (avg 15) ω_N=4 to 32% (avg 19%) γ=125 pcf (average)	**Borings:** 9 to 43 (avg 25) **CPT:** 16 to 30#	400	30	250	30	2,500	-	-	0.018	7	**Over Consolidated:** 2.3
2	Firm to Stiff Sandy Clay (CL)	+17 to +5	**(-)#200**=26 to 86% (avg 58%) **LL**=33 to 39 (avg 36) **PL**=19 to 21 (avg 20) **PI**=12 to 19 (avg 16) ω_N=18 to 46% (avg 28%) γ=121 pcf (average)	**Borings:** 3 to 50 (avg 15)	250	28	100	28	1,250	-	0.17	0.016	2.5 at Freeway 1.0 below Abuts	**Normally Consolidated:** 0.33 **Over Consolidated:** 2.1
3	Very Stiff Clay, Sandy Clay, Silty Clay and Sandy to Clayey Silt (CL, ML)	+5 to -14	**(-)#200**=11 to 97% (avg 63%) **LL**=29 **PL**=19 **PI**=10 ω_N=19 to 44% (avg 29%) γ=122 pcf (average)	**Borings:** 12 to 50+ (avg 32) **CPT:** Avg 18#	-	-	-	-	2,000	-	-	0.019	>3	**Over Consolidated:** 3.3
4	Dense to Very dense Silty Sand, Sandy Silt, Sand and Stiff to Hard Clayey Silt and Clay (SM, ML, SP & CL, ML)	-14 to -34	**(-)#200**=2 to 86% (avg 35%) ω_N=15 to 40% (avg 25%) γ=126 pcf (average)	**Borings:** 19 to 50+ (avg 50+) **CPT:** Avg 30#	-	-	-	-	-	1,000	-	-	-	-
5 clay	Very Stiff to Hard Clay and Silt (CL, ML)	Below -34	**(-200)**=27 to 96% (avg 60%) **LL**=31 **PL**=15 **PI**=16 w_N=17 to 45% (avg 28%) **g**=124 pcf (average)	**Borings:** 21 to 50+ (Avg 44)	-	-	-	-	3,000	-	-	0.017	>2	**Over Consolidated:** 3.3
5 sand	Dense to Very Dense Sand and Silty Sand (SP, SM)			**Borings:** 21 to 50+ (Avg 44) **CPT:** (Avg 42)#	0	38	-	-	-	3,000	-	-	-	-

* Average values from the overall project were used

** Average values based on CPT-08-001 through 020 (Refer Page 2 of 4 through 4 of 4 for detailed layer elevations from each CPT)

CPT N-Values are based on available correlations (Robertson et al., 1983) -see Appendix A

TABLE 3
GENERALIZED SOIL PROFILE
(Layer Elevations)

Layer No.	Top/ Bot	Exploration / Surf. El.																							
		C-1			C-2			C-3			C-6			C-8			C-7			C-9			C-13		
		24.92			25.74			27.74			42.13			48.39			27.27			29.33			30.22		
		Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick
1	Top	0	24.9	6.0	0	26	6.0	0	28	9.0	0	42.1	24.0	0	48.4	34.0	0	27.3	7.0	0	29.3	14.0	0	30.2	14.0
	Bot	6	18.9		6	20		9	19		24	18.1		34	14.4		7	20.3		14	15.3		14	16.2	
2	Top	6	18.9	15.0	6	20	11.0	9	19	11.0	24	18.1	14.0	34	14.4	11.0	7	20.3	12.0	14	15.3	12.0	14	16.2	12.0
	Bot	21	3.9		17	9		20	8		38	4.1		45	3.4		19	8.3		26	3.3		26	4.2	
3	Top	21	3.9	17.0	17	9	21.0	20	8	21.0	38	4.1	17.0	45	3.4	17.0	19	8.3	21.0	26	3.3	18.0	26	4.2	19.0
	Bot	38	-13.1		38	-12		41	-13		55	-12.9		62	-13.6		40	-12.7		44	-14.7		45	-14.8	
4	Top	38	-13.1	11.0	38	-12	12.0	41	-13	9.0	55	-12.9	18.0	62	-13.6	17.0	40	-12.7	16.0	44	-14.7	19.0	45	-14.8	25.0
	Bot	49	-24.1		50	-24		50	-22		73	-30.9		79	-30.6		56	-28.7		63	-33.7		70	-39.8	
5-1	Top	49	-24.1	19.0	50	-24	18.0	50	-22	24.0	73	-30.9	15.0	79	-30.6	20.0	56	-28.7	19.0	63	-33.7	17.0	70	-39.8	10.0
	Bot	68	-43.1		68	-42		74	-46		88	-45.9		99	-50.6		75	-47.7		80	-50.7		80	-49.8	
5-2	Top	68	-43.1		68	-42		74	-46		88	-45.9		99	-50.6		75	-47.7		80	-50.7		80	-49.8	
	Bot																								

TABLE 3
GENERALIZED SOIL PROFILE
(Layer Elevations)

Layer No.	Top/ Bot	Exploration / Surf. El.																			
		C-14/14B			C-15			C-16			C-18			C-21			C-22			C-20		
		27.94			28.57			30.72			43.59			25.97			25.20			28.35		
		Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick
1	Top	0	27.9	11.0	0	28.6	13.0	0	30.7	15.0	0	43.6	27.0	0	26.0	6.0	0	25.2	6.0	0	28.4	10.0
	Bot	11	16.9		13	15.6		15	15.7		27	16.6		6	20.0		6	19.2		10	18.4	
2	Top	11	16.9	12.0	13	15.6	12.0	15	15.7	12.0	27	16.6	13.0	6	20.0	14.0	6	19.2	14.0	10	18.4	12.0
	Bot	23	4.9		25	3.6		27	3.7		40	3.6		20	6.0		20	5.2		22	6.4	
3	Top	23	4.9	18.0	25	3.6	22.0	27	3.7	18.0	40	3.6	18.0	20	6.0	20.0	20	5.2	20.0	22	6.4	20.0
	Bot	41	-13.1		47	-18.4		45	-14.3		58	-14.4		40	-14.0		40	-14.8		42	-13.7	
4	Top	41	-13.1	15.0	47	-18.4	24.0	45	-14.3	15.0	58	-14.4	22.0	40	-14.0	30.0	40	-14.8	33.0	42	-13.7	31.0
	Bot	56	-28.1		71	-42.4		60	-29.3		80	-36.4		70	-44.0		73	-47.8		73	-44.7	
5-1	Top	56	-28.1	24.0	71	-42.4	10.0	60	-29.3	27.0				70	-44.0	17.0	73	-47.8	16.0	73	-44.7	15.0
	Bot	80	-52.1		81	-52.4		87	-56.3					87	-61.0		89	-63.8		88	-59.7	
5-2	Top	80	-52.1		81	-52.4		87	-56.3					87	-61.0		89	-63.8		88	-59.7	
	Bot																					

TABLE 3
GENERALIZED SOIL PROFILE
(Layer Elevations)

Layer No.	Top/ Bot	Summary C-1 to C-20	Depth			Elevation			Thickness		
			Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
1	Top	1-top	0	0	0	48	25	31	34	6	13
	Bot	1-bot	34	6	13	20	14	18			
2	Top	2-top	34	6	13	20	14	18	15	11	12
	Bot	2-bot	45	17	26	9	3	5			
3	Top	3-top	45	17	26	9	3	5	22	17	19
	Bot	3-bot	62	38	45	-12	-18	-14			
4	Top	4-top	62	38	45	-12	-18	-14	33	9	20
	Bot	4-bot	80	49	65	-22	-48	-34			
5-1	Top	5.1-top	79	49	64	-22	-48	-34	27	10	18
	Bot	5.1-bot	99	68	82	-42	-64	-52			
5-2	Top	5.2-top	99	68	82	-42	-64	-52			
	Bot										

TABLE 4
LIQUEFACTION SUMMARY

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Approximate Station	Offset	Design Ground Water Elevation (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-020	"W Line" 2301+43	102 Left	16	0.15	0.00	0.15
CPT-08-022	"W" Line" 2301+98	2 Right	16	0.12	0.00	0.12
CPT-08-021	"W Line" 2302+53	40 Left	16	0.33	0.01	0.34
CPT-08-018	"W Line" 2306+56	83 Left	16	0.24	0.08	0.32
CPT-08-016	1312+20	146 Left	16	0.62	0.00	0.62
CPT-08-015	1313+33	73 Right	16	0.68	0.02	0.70
CPT-08-014B	1314+25	145 Left	16	0.08	0.01	0.09
CPT-08-014	1314+34	142 Left	16	0.37	0.02	0.39
CPT-08-013	1314+50	71 Left	16	0.78	0.02	0.80
CPT-08-009	1318+62	43 Right	16	0.26	0.02	0.28
CPT-08-008	1319+18	200 Left	16	0.02	0.02	0.04
CPT-08-007	1320+67	21 Right	16	0.28	0.00	0.28
CPT-08-006	1321+35	243 Left	16	0.00	0.00	0.00
CPT-08-121	1327+42	159 Right	18	0.20	0.00	0.20
CPT-08-003	1328+35	168 Left	18	0.26	0.00	0.26
CPT-08-002	1328+67	53 Right	18	0.92	0.00	0.92
CPT-08-001	1330+95	41 Left	18	0.17	0.00	0.17
CPT-08-119	1335+56	105 Right	16	0.37	0.00	0.37
CPT-08-117	1340+34	100 Right	16	0.28	0.00	0.28
CPT-08-110	"A Line" 363+24	106 Right	14	0.69	0.00	0.69
CPT-08-107	"A Line" 371+74	90 Left	14	0.25	0.00	0.25
CPT-08-104	"A Line" 378+20	108 Right	13	0.85	0.00	0.85
CPT-08-102	"A Line" 386+73	94 Left	12	0.12	0.00	0.12

Notes:
Stationing relative to SR-22 "H" line, except where noted otherwise. Right and left offsets defined by looking along station line in direction of increasing station.

Min	**0.00**
Max	**0.92**
Average	**0.36**

TABLE 5
SUMMARY OF EXPANSION POTENTIAL OF NEAR SURFACE SOILS

Boring No.	Station No.	Boring El. (feet)	Sample No.	Sample Depth (ft)	Sample El. (feet)	% (-)200	LL	PL	PI	USCS Classification	Dry Density γ_d (pcf)	Expansion Potential[2]
A-08-101	"A"391+12	19.5	B-1	1.0	18.5	37	31	20	11	SC	110	Low
A-08-105	"A"376+62	19.8	B-1	1.2	18.6	27	28	14	14	SC		Low
A-08-112	"A"358+50	23.0	S-4	15.0	8.0	77	NP	NP	NP	ML		Low
A-08-116	"A"345+34	22.0	R-2	6.0	16.0	86	37	20	17	CL	99	Low
A-08-119	"H"1335+66	23.0	B-1	1.0	22.0	36	32	20	12	SC		Low
A-08-120	"H"1333+97	25.9	R-4	16.0	9.9	72	36	19	17	CL		Low
A-08-122	"H"1322+20	31.9	B-1	1.0	30.9	23	26	15	11	SC	108	Low
R-08-004	"H"1325+02	31.2	B-1	1.3	29.9	66	29	17	12	CL	117	Low
R-08-005	"H"1324+48	27.8	B-1	2.0	25.8	63	29	20	9	CL		Low
R-08-005	"H"1324+48	27.8	R-1	6.0	21.8	53	32	19	13	CL	108	Low
R-08-011	"H"1316+25	29.5	S-1	5.0	24.5	47	33	19	14	SC/CL		Low
R-08-012	"H"1315+94	24.1	R-1	6.0	18.1	80	47	20	27	CL	96	Medium
R-08-017	"H"1310+90	52.5	R-2	11.0	41.5	82	35	21	14	CL	89	Low
R-08-017	"H"1310+90	52.5	S-3	15.0	37.5	55	34	20	14	CL		Low
R-08-019	"VV"38+33	53.6	S-1	5.0	48.6	59	34	20	14	CL		Low
R-08-019	"VV"38+33	53.6	R-2	11.0	42.6		39	20	19	CL	114	Low/Medium
R-08-019	"VV"38+33	53.6	R-6	31.0	22.6	71	33	21	12	CL	108	Low
R-08-023	"VV"44+88	46.2	R-1	6.0	40.2	54	32	19	13	CL	116	Low
HA-08-01	"B"293+60	26.0	B-1	2.5	23.5	56	30	20	10	CL		Low
HA-08-02	"E"3299+42	27.0	B-1	2.5	24.5	55	28	19	9	CL		Low
HA-08-03	"W"2302+04	28.0	B-1	2.5	25.5	69	32	19	13	CL		Low
HA-08-04	"E"3307+28	43.0	B-1	2.5	40.5	57	30	21	9	CL		Low
HA-08-05	"NB405"310+50	24.9	B-1	2.5	22.4	56	30	17	13	CL		Low
HA-08-06	"VV"51+08	29.0	B-1	2.5	26.5	51	28	18	10	CL		Low
HA-08-07	"NB405"314+20	28.5	B-1	2.5	26	40	27	17	10	SC		Low
HA-08-08	"A"374+70	20.0	B-1	2.5	17.5	53	33	17	16	CL/SC		Low
					Max=	86	47	21	27		117	
					Min=	23	26	14	9		89	
					Avg=	57	32	19	13		107	

Notes:
1. Soils data from near surface soil samples above the water table that could be influenced by seasonal moisture variation.
2. Reference: Mitchell, J. and Gardner W. (1975),"In Situ Measurement of Volume Change Characteristics," Proceedings, In Situ Measurement of Soil Properties, Volume II, Raleigh, NC, ASCE, pp 279-345.

TABLE 6A
SETTLEMENT SUMMARY

Area	Maximum Amount of Fill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Fill Placement	Remaining Settlement after Waiting Period
Bolsa Chica Rd OC (Br. 55-1102) Abut 3 In Roadway	4	None	1-2	2	45 days before driving abutment piles	40-60	<1/2 inch
Bolsa Chica Rd OC (Br. 55-1102) Abut 3 Sidehill Fill	13	None	2-4	1	45 days before driving abutment piles	40-60	<1/2 inch
Bolsa Chica Rd OC (Br. 55-1102) Abut 1 In Roadway	2	None	1-2	2	45 days before driving abutment piles	40-60	<1/2 inch
Bolsa Chica Rd OC (Br. 55-1102) Abut 1 Sidehill Fill	13	None	2-4	1	45 days before driving abutment piles	40-60	<1/2 inch

Note: Do not excavate abutment footing or drive abutment piles until completion of settlement period. No surcharge required.

Area		Maximum Amount of Fill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Lightweight Fill Placement	Remaining Settlement (inches), Time after Lightweight Fill Completion				
								0	15	30	60	90 days
RW 1299+1300 **East Approach to HOV Conn. Bridge No. 55-1103E**	east of "H" 1305+55	4-16	None	1-2.5	0	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1305+55-1309+05	16-29	None	0.75-2.75	2	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1309+05-1311+55	25-29	None	1.5-2.5	2	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1311+55-1312+80 **Includes Abut. 1 of Bridge No. 55-1103E**	23-24	Yes, per surcharge plan	8-10 (under surcharge) 1-1.5 (post surcharge)	5	11 mos. Surcharge period before constructing lightweight fill walls or abutment pile driving	40-60	<3/4 (<1/2 at Abut)	<1/4	<1/10	<1/10	<1/10

Note: In surcharge area: do not construct lightweight fill walls, excavate abutment footing, or drive abutment piles until completion of surcharge settlement period.

Area		Maximum Amount of Fill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Lightweight Fill Placement	Remaining Settlement (inches), Time after Lightweight Fill Completion					
								0	15	30	45	60	90 days
RW 1325+1326 **West Approach to HOV Connector Bridge No. 55-1103E**	"H" 1329+22 - 1331+57	8	None	0.4-0.7	0	None	40-60	<1/2	<1/4	<1/10	<1/10	<1/10	<1/10
	"H" 1328+22 - 1329+22	12	None	0.4-0.7	0	None	40-60	<1/2	<1/4	<1/10	<1/10	<1/10	<1/10
	"H" 1326+22 - 1328+22	17	None	0.6-1.0	1	None	40-60	<3/4	<1/2	<1/5	<1/10	<1/10	<1/10
	"H" 1325+22 - 1326+22	22	None	0.75-1.25	1	None	40-60	<3/4	<1/2	<1/5	<1/10	<1/10	<1/10
	"H" 1324+10 - 1325+22 **Includes Abut. 6 Br. No. 55-1103E**	27	None	1.0-1.5	3	None	40-60	<1 (<1/2 at Abut)	<1/2	<1/5	<1/10	<1/10	<1/10

Note: No settlement period required, lightweight fill may be placed against abutment, vertical joint in LW fill at back of footing required. No surcharge required.

Area	Maximum Amount of Retaining Wall Backill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Post-Surcharge Settlement Complete After Backfill of Retaining Wall	Remaining Settlement (inches), Time after Type 1 Wall Backfill Completion				
							0	15	30	60	90 days
RW 3311+3312 **Includes Abut. 1 of Bridge No. 55-1101F**	12-24	Yes, per surcharge plan	8-10 (under surcharge) < 1 (post surcharge)	3	6 mos. Surcharge period before constructing Type 1 walls or abutment pile driving	40-60	<1/2	<1/4	<1/10	<10	<10

Note: In surcharge area: do not construct Type 1 walls, excavate abutment footing, or drive abutment piles until completion of surcharge settlement period.

Area	Maximum Amount of Fill [Lightweight fill only] (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Lightweight Fill Placement	Remaining Settlement (inches) after Lightweight Fill Completion
RW 3319+3320 **Includes Abut. 4 of Bridge No. 55-1101F**	5-16	None	0.5-1.0	2	None	60	<1/2

Note: No settlement period required, lightweight fill may be placed against abutment, vertical joint in LW fill at back of footing required. No surcharge required.

TABLE 6B
SETTLEMENT PLATE LOCATIONS AND MONITORING PROCEDURE

SETTLEMENT PLATE LOCATIONS				
Structure	**Wall or Abut**	**Station Line**	**Station**	**Offset**
RW1299 & RW1300 and North Surcharge Area **Includes Abutment 1 of Bridge No. 55-1103E**	Abut 1 Surcharge	"H"	1312+80	4 L
	RW1299+1300 Surcharge	"H"	1312+40	40 L
		"H"	1312+23	10 R
		"H"	1312+33	15 R
		"H"	1312+28	55 R
	RW1300	"H"	1310+92	10 L
		"H"	1311+00	40 R
		"H"	1307+90	20 R
		"H"	1306+00	20 R
RW 3319 & RW3320 **Includes Abut. 4 of Bridge No. 55-1101F**	RW3319	"E"	3320+85	45 L
	Abut 4	"E"	3319+75	24 L
RW1325 & RW1326 **Includes Abutment 6 of Bridge No. 55-1103E**	Abut 6	"H"	1324+10	0
	RW1325+1326	"H"	1324+55	0
		"H"	1324+87	30 L
		"H"	1325+88	30 R
		"H"	1328+20	30 L
Type 1 Wall 3311+3312 and South Surcharge Area **Includes Abut. 1 of Bridge No. 55-1101F**	Surcharge	"E"	3308+90	45 L
	Surcharge RW3311	"E"	3310+45	45 L
	Surcharge Abut 1 + RW3311+3312	"E"	3311+30	20 L
Bolsa Chica Rd OC **Abuts. 1 & 3 of Bridge No. 55-1102**	Abut 1 top	"VV"	40+25	25 L
		"VV"	40+90	65 R
	Abut 1 side fill	"VV"	41+50	115 R
	Abut 3 top	"VV"	44+60	25 L
		"VV"	45+20	65 R
	Abut 3 side fill	"VV"	46+00	110 R

Settlement Plate Installation and Monitoring Procedure

1. Install settlement plate in sand bedding on leveled area prior to placing any fill (see detail, Figure 6B).
2. Attach the first section of threaded steel pipe to the threaded fitting on plate by tightening firmly with pipe wrench.
3. Survey the top of plate elevation, top of threaded pipe elevation, and ground elevation before placing any fill, record date and time.
4. Place PVC pipe around the threaded pipe before placing any fill (Figure 6B).
5. Place fill around the settlement monument taking care not to damage or destroy.
6. Survey the top of steel pipe elevation daily as fill is placed, and weekly after fill completion, recording date, time, and elevation.
7. Each time the steel pipe is surveyed, survey the ground elevation at 4 locations, 5 ft north, south, east, and west of monument.
8. Add sections of steel pipe as needed to stay above fill. Each time a pipe section is added, do not loosen or tighten existing pipes, survey the existing top of pipe elevation, add a new section by firmly tightening with a pipe wrench, then survey the top of new section of pipe. Add additional PVC as needed to stay above the top of fill.
9. Repeat steps 5 through 8 as necessary.
10. Transmit the settlement survey data to GDC within 24 hours of completing each survey.
11. Continue monitoring until recommended by GDC.

FIGURES

The base maps are from Microsoft's Virtual Earth

GROUP DELTA CONSULTANTS

GDC Project No. I-436

West County Connector Project
I-405/SR22 HOV Conn. Segment
Orange County, California

Vicinity Map

Figure 1

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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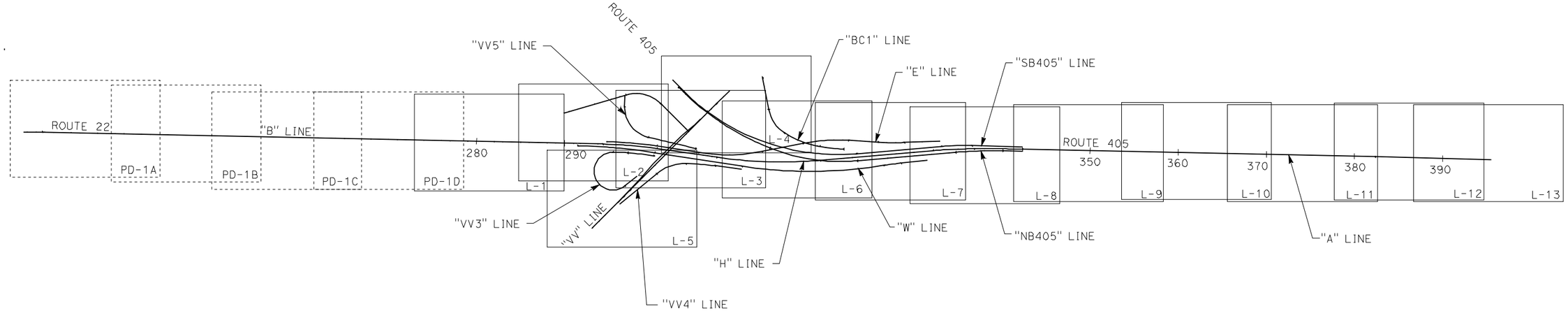

NO SCALE

LINE INDEX	DESCRIPTION
"A" LINE	I-405 CENTERLINE
"NB405" LINE	I-405 NB HOV EDGE OF TRAVELED WAY
"SB405" LINE	I-405 SB HOV EDGE OF TRAVELED WAY
"B" LINE	SR 22 CENTERLINE
"E" LINE	EB CONNECTOR STATIONLINE
"W" LINE	WB CONNECTOR STATIONLINE
"H" LINE	HOV CONNECTOR CENTERLINE
"GG" LINE	GARDEN GROVE BOULEVARD CENTERLINE
"VV" LINE	VALLEY VIEW STREET CENTERLINE
"VV1" LINE	SR-22 WB ON-RAMP FROM VALLEY VIEW STREET
"VV2" LINE	SR-22 WB OFF-RAMP TO VALLEY VIEW STREET
"VV3" LINE	SR-22 WB LOOP ON-RAMP FROM VALLEY VIEW STREET
"VV4" LINE	SR-22 WB ON-RAMP FROM VALLEY VIEW STREET
"VV5" LINE	SR-22 EB OFF-RAMP TO VALLEY VIEW STREET
"BC1" LINE	I-405 SB OFF-RAMP TO BOLSA CHICA ROAD

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

KEY MAP AND LINE INDEX LAYOUT

FIGURE 2A

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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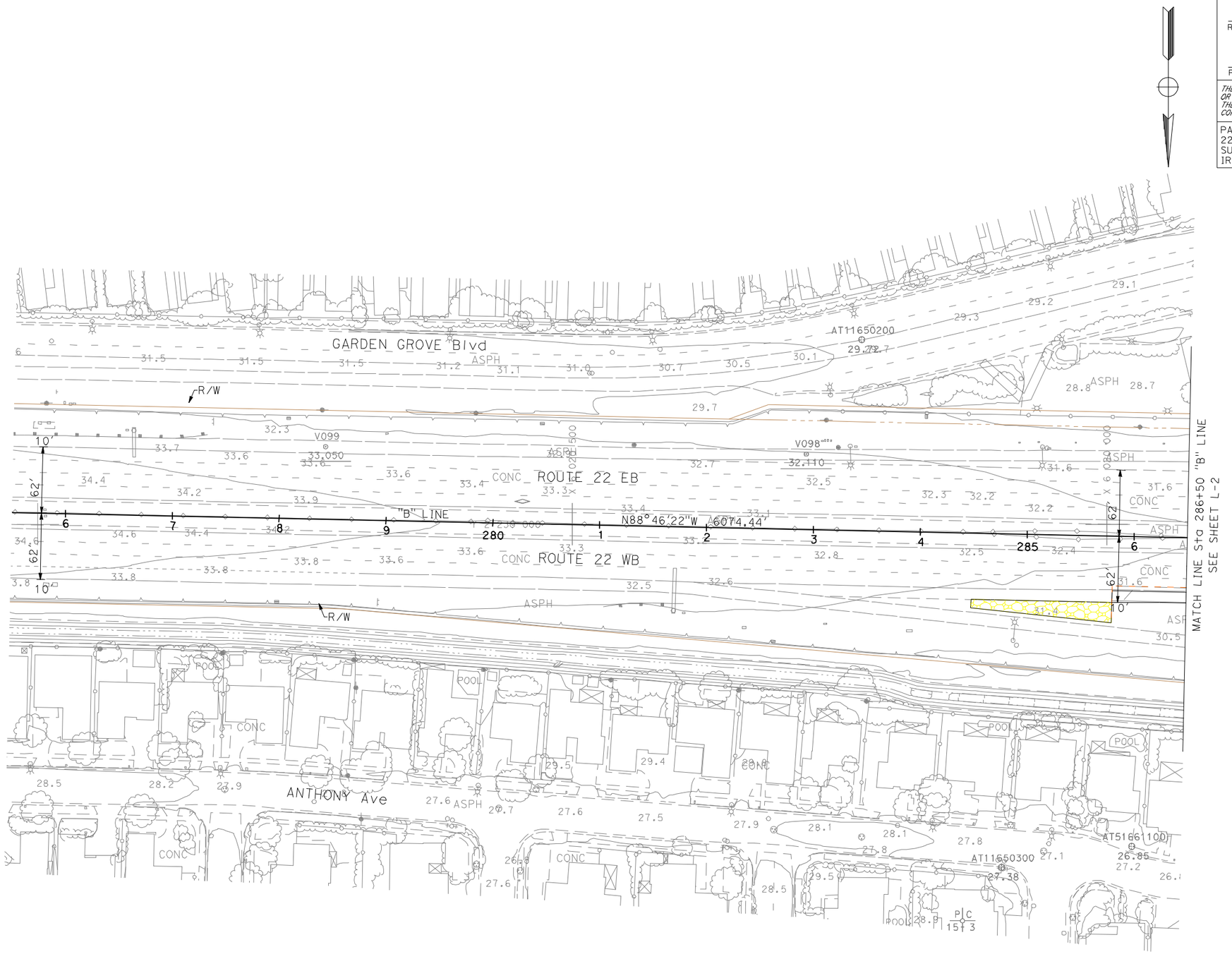

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

SCALE 1" = 50'

FIGURE 2B L-1

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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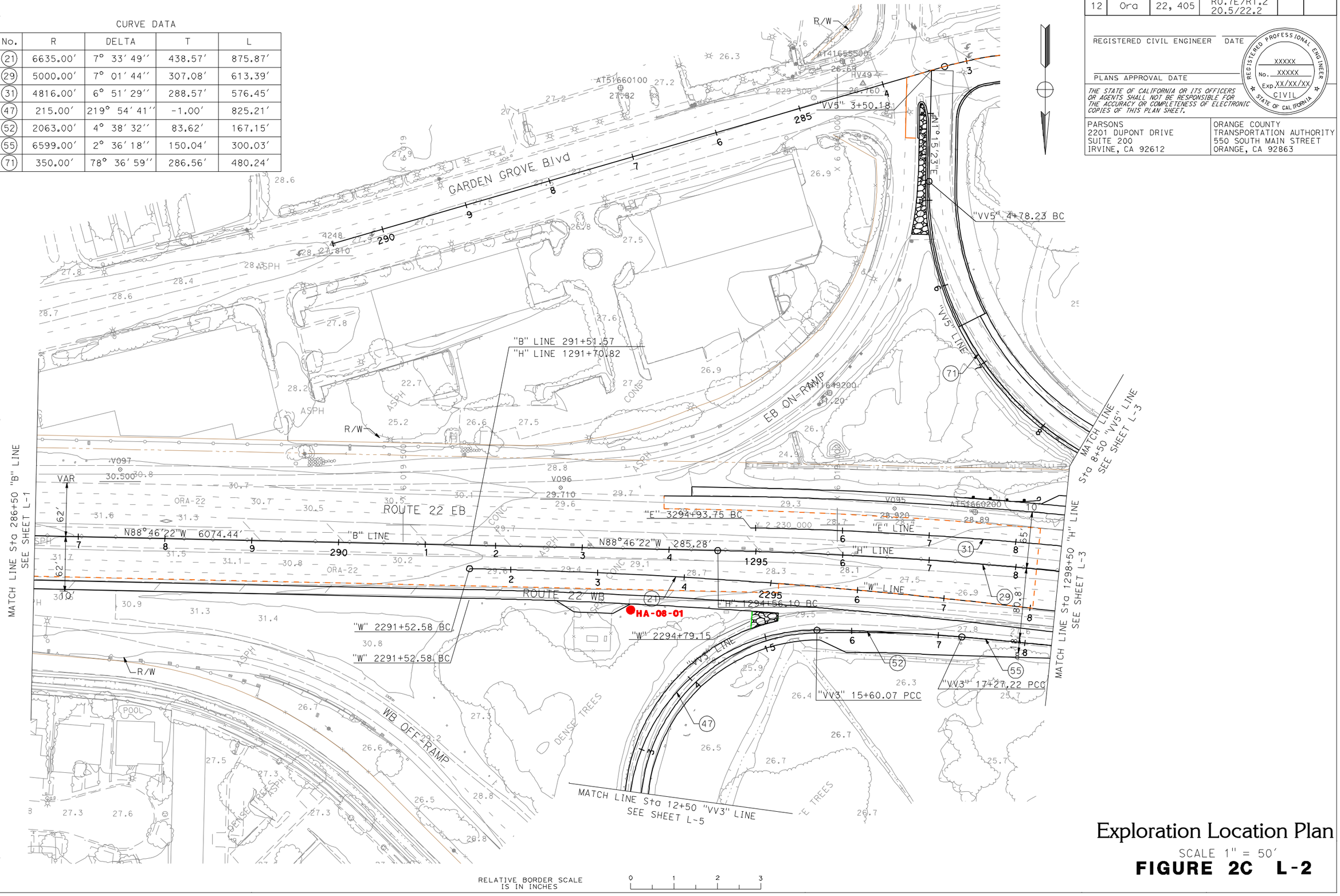
CURVE DATA

No.	R	DELTA	T	L
(21)	6635.00′	7° 33′ 49″	438.57′	875.87′
(29)	5000.00′	7° 01′ 44″	307.08′	613.39′
(31)	4816.00′	6° 51′ 29″	288.57′	576.45′
(47)	215.00′	219° 54′ 41″	-1.00′	825.21′
(52)	2063.00′	4° 38′ 32″	83.62′	167.15′
(55)	6599.00′	2° 36′ 18″	150.04′	300.03′
(71)	350.00′	78° 36′ 59″	286.56′	480.24′



RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

SCALE 1" = 50′

FIGURE 2C L-2

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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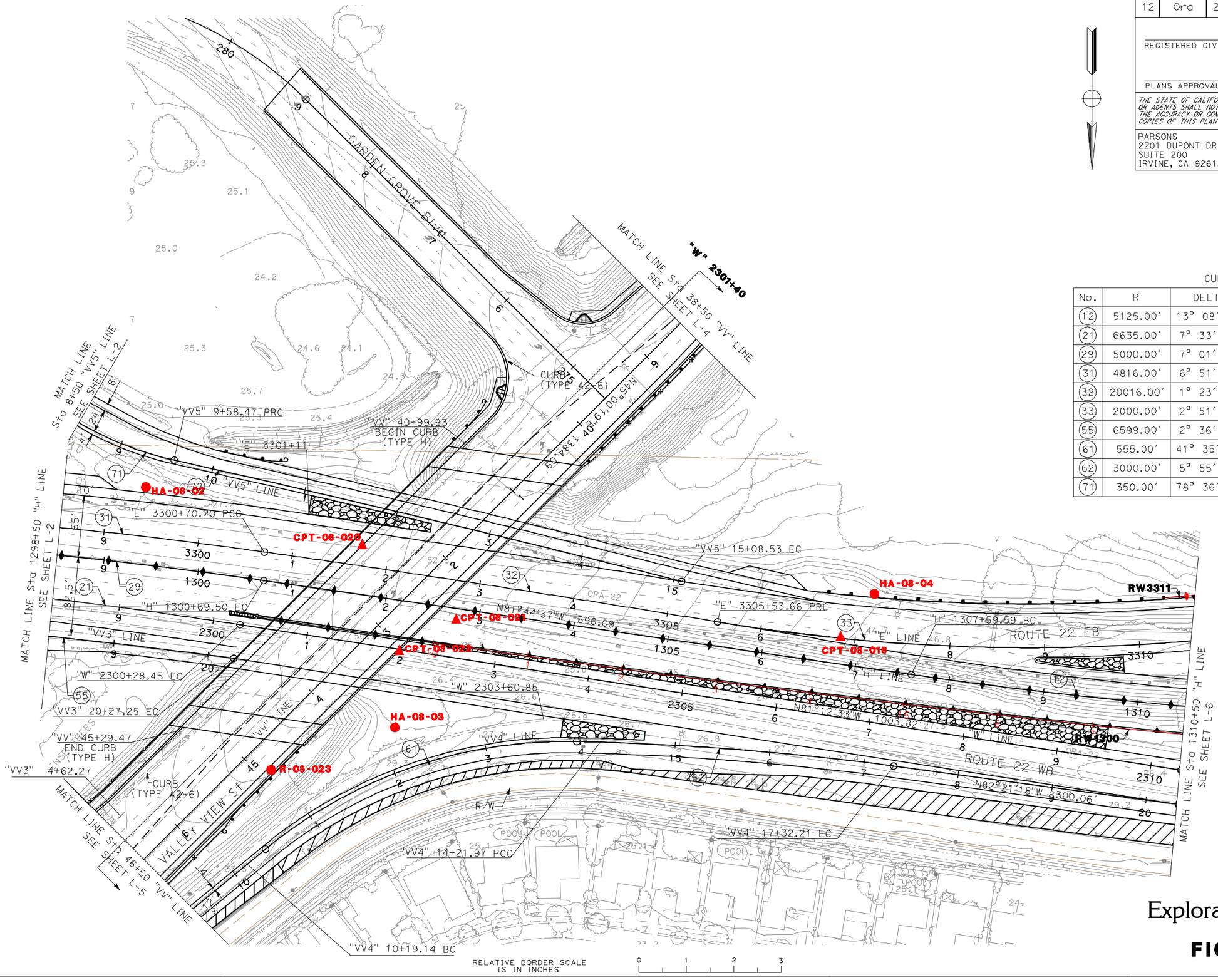
CURVE DATA

No.	R	DELTA	T	L
(12)	5125.00′	13° 08′ 50″	590.60′	1176.01′
(21)	6635.00′	7° 33′ 49″	438.57′	875.87′
(29)	5000.00′	7° 01′ 44″	307.08′	613.39′
(31)	4816.00′	6° 51′ 29″	288.57′	576.45′
(32)	20016.00′	1° 23′ 02″	241.74′	483.86′
(33)	2000.00′	2° 51′ 53″	366.14′	724.26′
(55)	6599.00′	2° 36′ 18″	150.04′	300.03′
(61)	555.00′	41° 35′ 12″	210.75′	402.83′
(62)	3000.00′	5° 55′ 30″	155.26′	310.24′
(71)	350.00′	78° 36′ 59″	286.56′	480.24′



RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

SCALE 1" = 50′

FIGURE 2D L-3

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12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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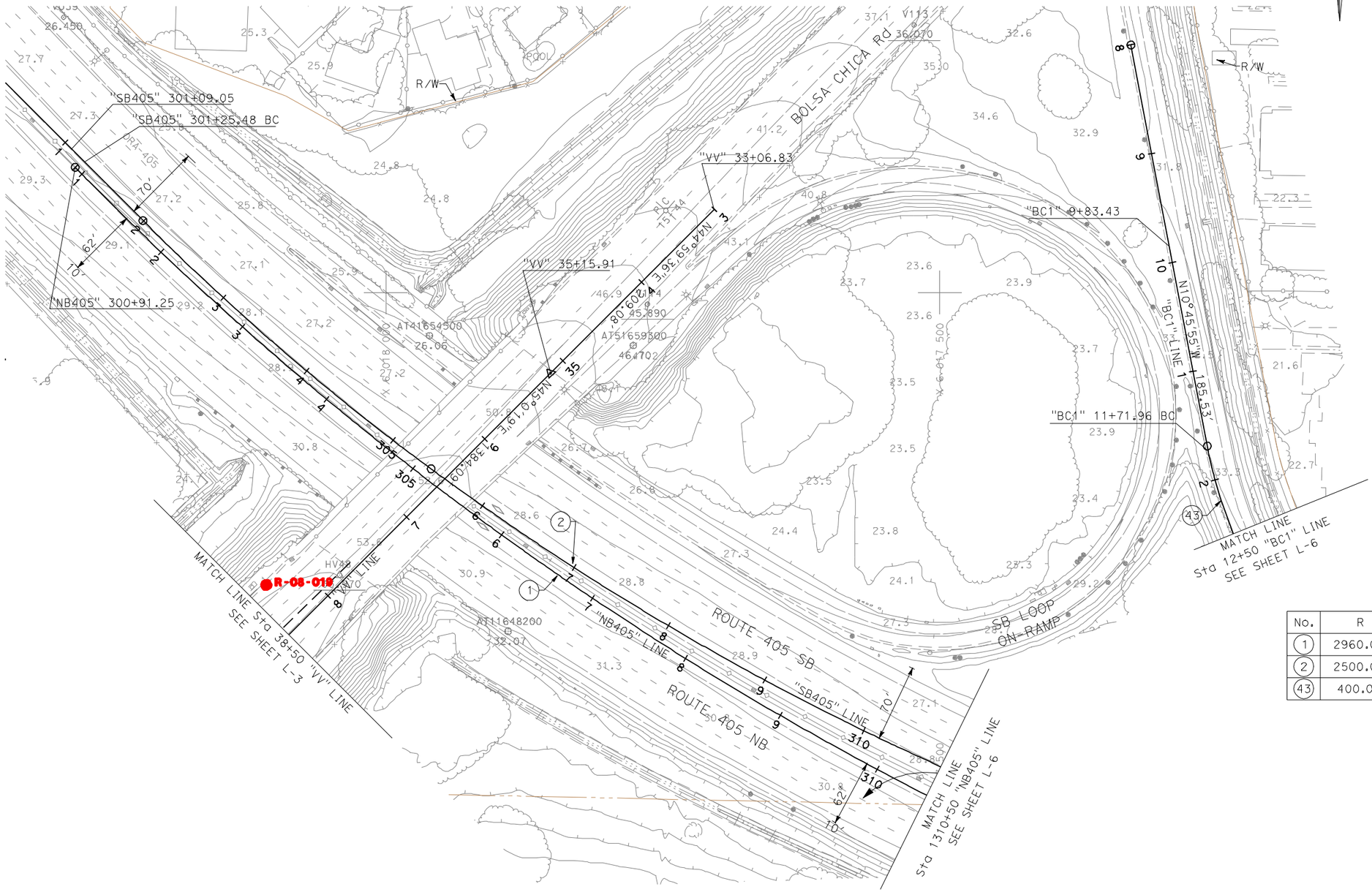

CURVE DATA

No.	R	DELTA	T	L
(1)	2960.00′	24° 16′ 57″	636.80′	1254.48′
(2)	2500.00′	50° 57′ 01″	1191.10′	2223.12′
(43)	400.00′	49° 40′ 20″	185.13′	346.78′

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

Exploration Location Plan

SCALE 1" = 50′

FIGURE 2E L-4

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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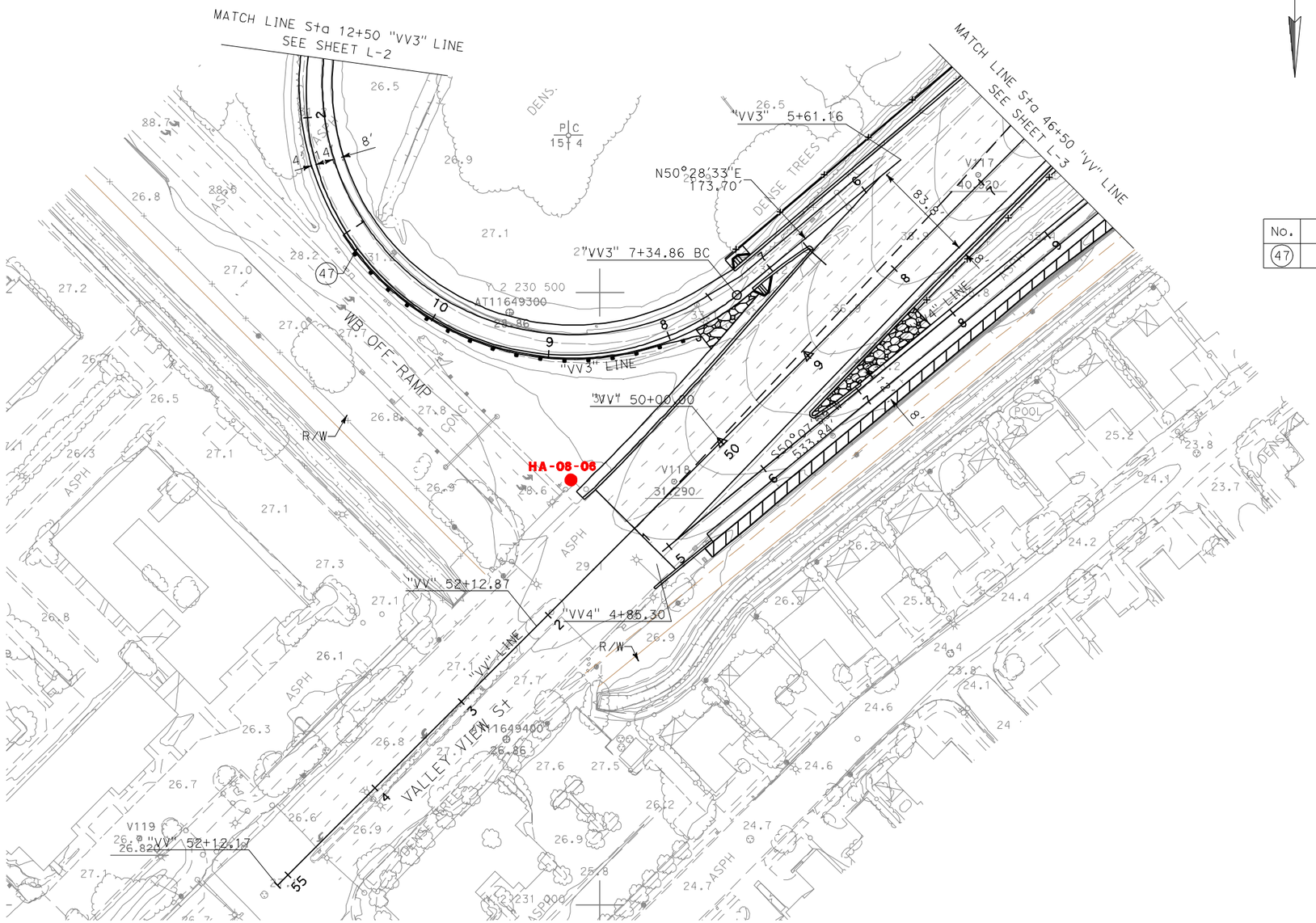

CURVE DATA

No.	R	DELTA	T	L
(47)	215.00'	219° 54' 41''	-1.00'	825.21'

RELATIVE BORDER SCALE
IS IN INCHES
0 1 2 3

Exploration Location Plan

SCALE 1" = 50'

FIGURE 2F L-5

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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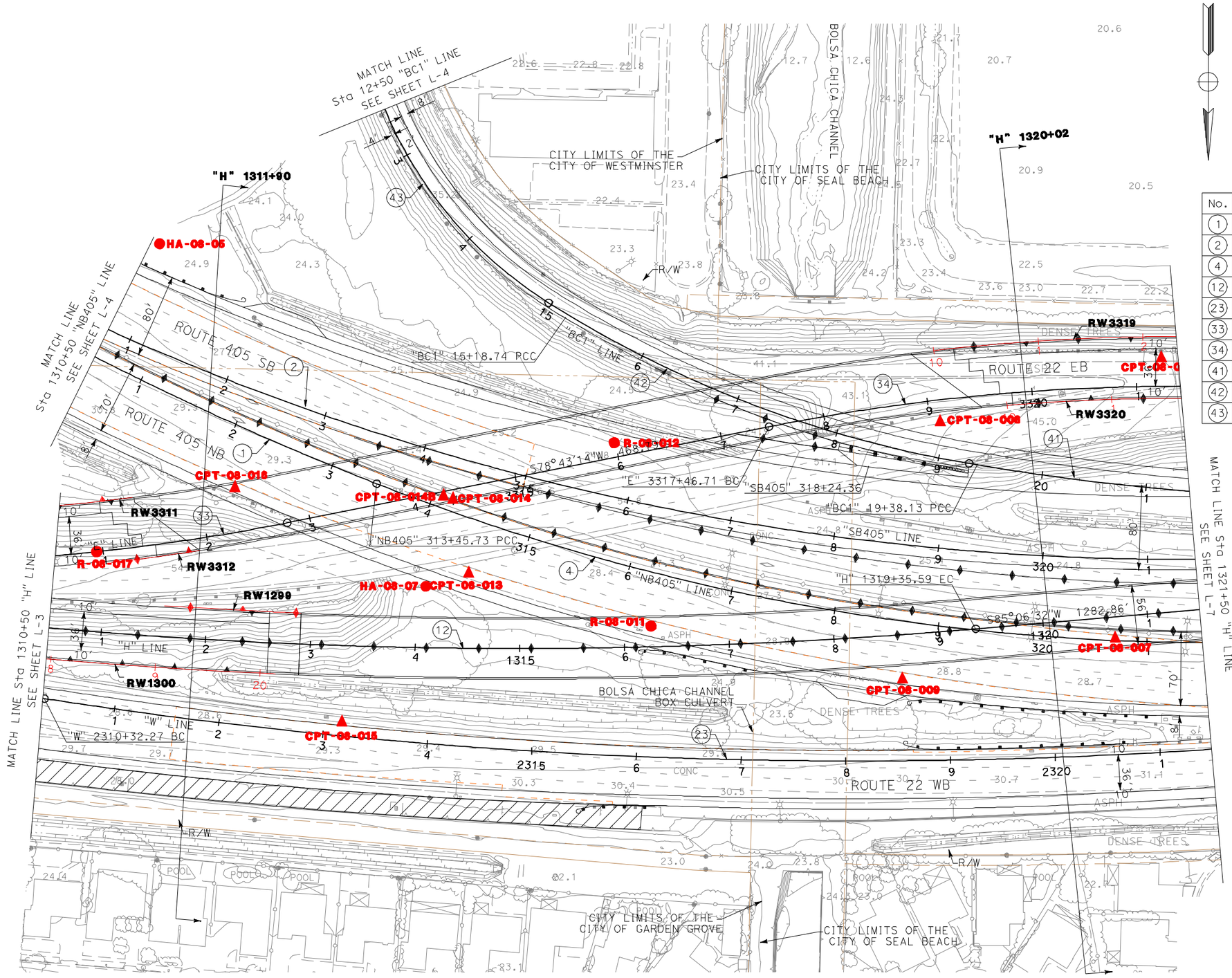
CURVE DATA

No.	R	DELTA	T	L
(1)	2960.00′	24° 16′ 57″	636.80′	1254.48′
(2)	2500.00′	50° 57′ 01″	1191.10′	2223.12′
(4)	2200.00′	26° 20′ 20″	514.77′	1011.34′
(12)	5125.00′	13° 08′ 50″	590.60′	1176.01′
(23)	5075.00′	18° 19′ 20″	818.44′	1622.90′
(33)	2000.00′	2° 51′ 53″	366.14′	724.26′
(34)	2000.00′	14° 53′ 17″	261.32′	519.70′
(41)	2440.00′	6° 21′ 41″	135.59′	270.90′
(42)	1200.00′	4° 46′ 29″	211.86′	419.40′
(43)	400.00′	49° 40′ 20″	185.13′	346.78′



RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

SCALE 1" = 50′

FIGURE 2G L-6

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12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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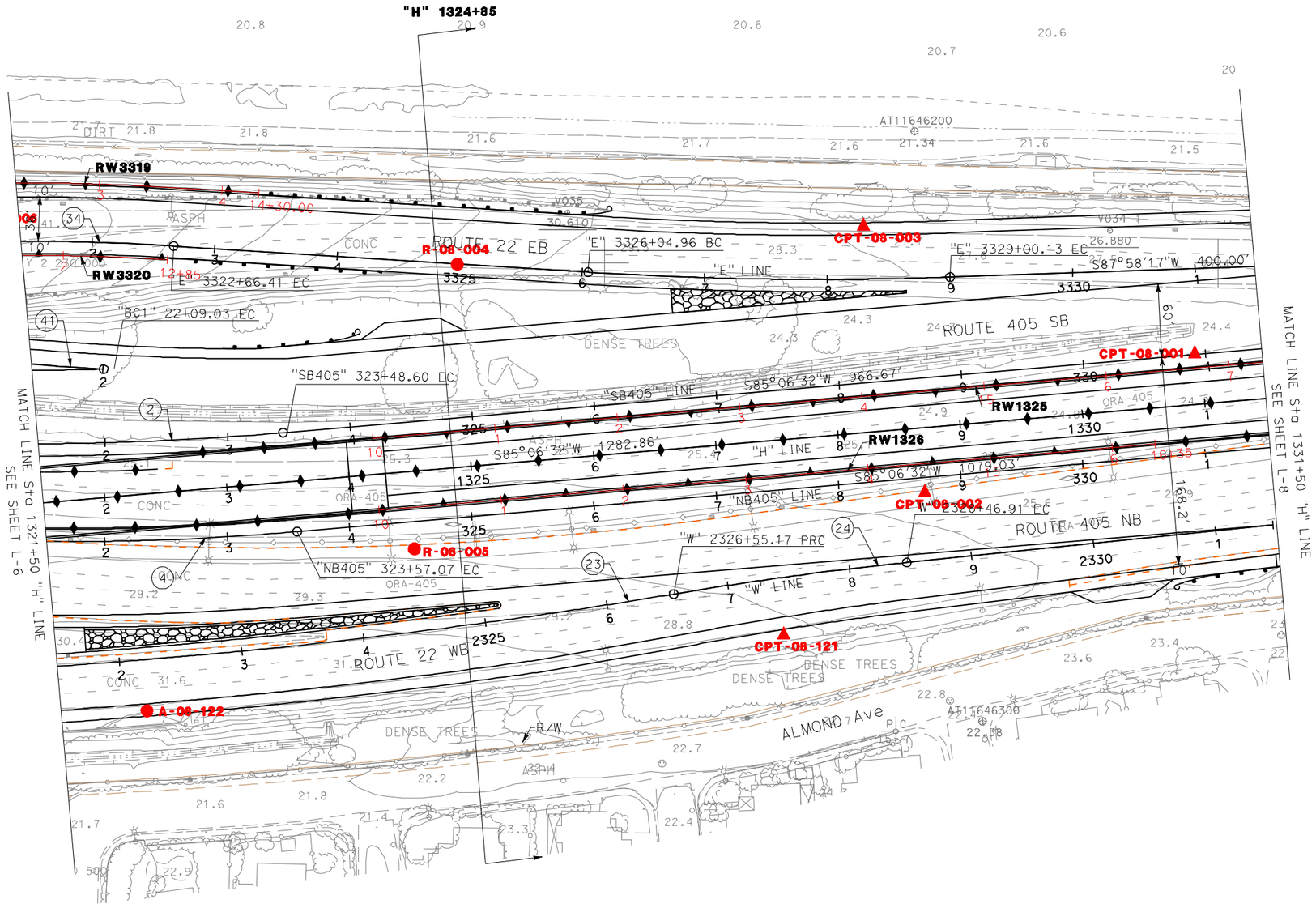

CURVE DATA

No.	R	DELTA	T	L
(2)	2500.00′	50° 57′ 01″	1191.10′	2223.12′
(4)	2200.00′	26° 20′ 20″	514.77′	1011.34′
(23)	5075.00′	18° 19′ 20″	818.44′	1622.90′
(24)	3000.00′	3° 39′ 43″	95.90′	191.74′
(34)	2000.00′	14° 53′ 17″	261.32′	519.70′
(41)	2440.00′	6° 21′ 41″	135.59′	270.90′

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

SCALE 1" = 50′

FIGURE 2H L-7

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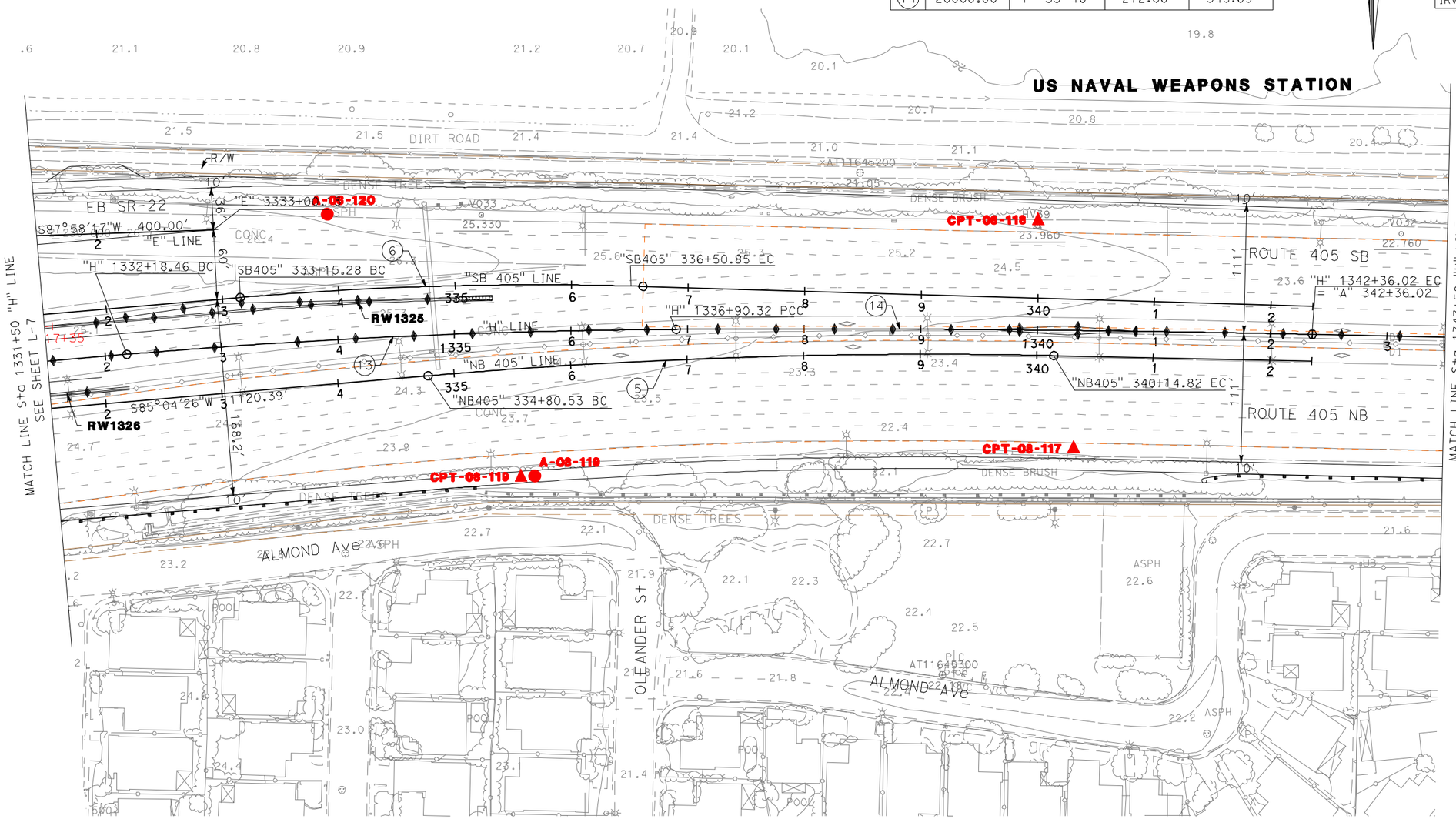
CURVE DATA

No.	R	DELTA	T	L
5	5000.00′	6° 09′ 27″	268.93′	537.35′
6	3000.00′	6° 24′ 32″	167.96′	335.57′
13	5930.00′	4° 33′ 33″	236.06′	471.87′
14	20000.00′	1° 33′ 48″	272.86′	545.69′



RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

SCALE 1" = 50′

FIGURE 21 L-8

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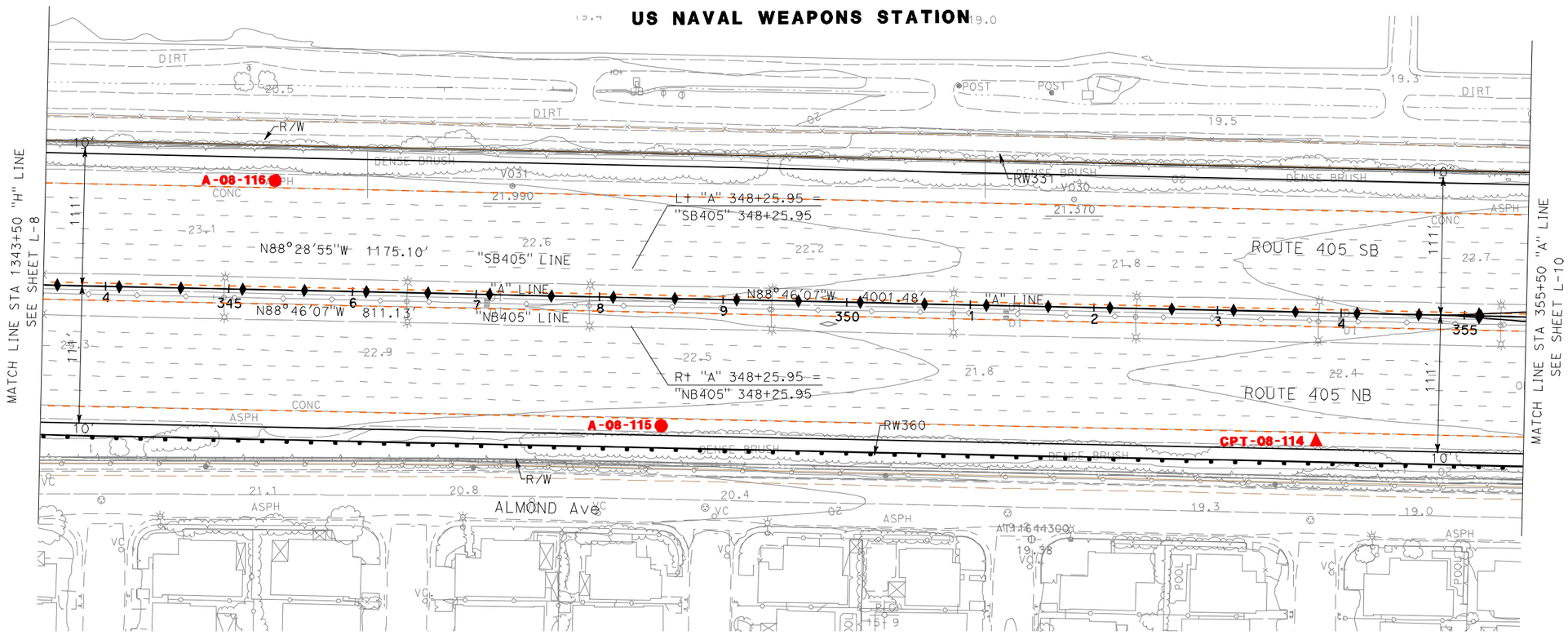

Exploration Location Plan

SCALE 1" = 50'

FIGURE 2J L-9

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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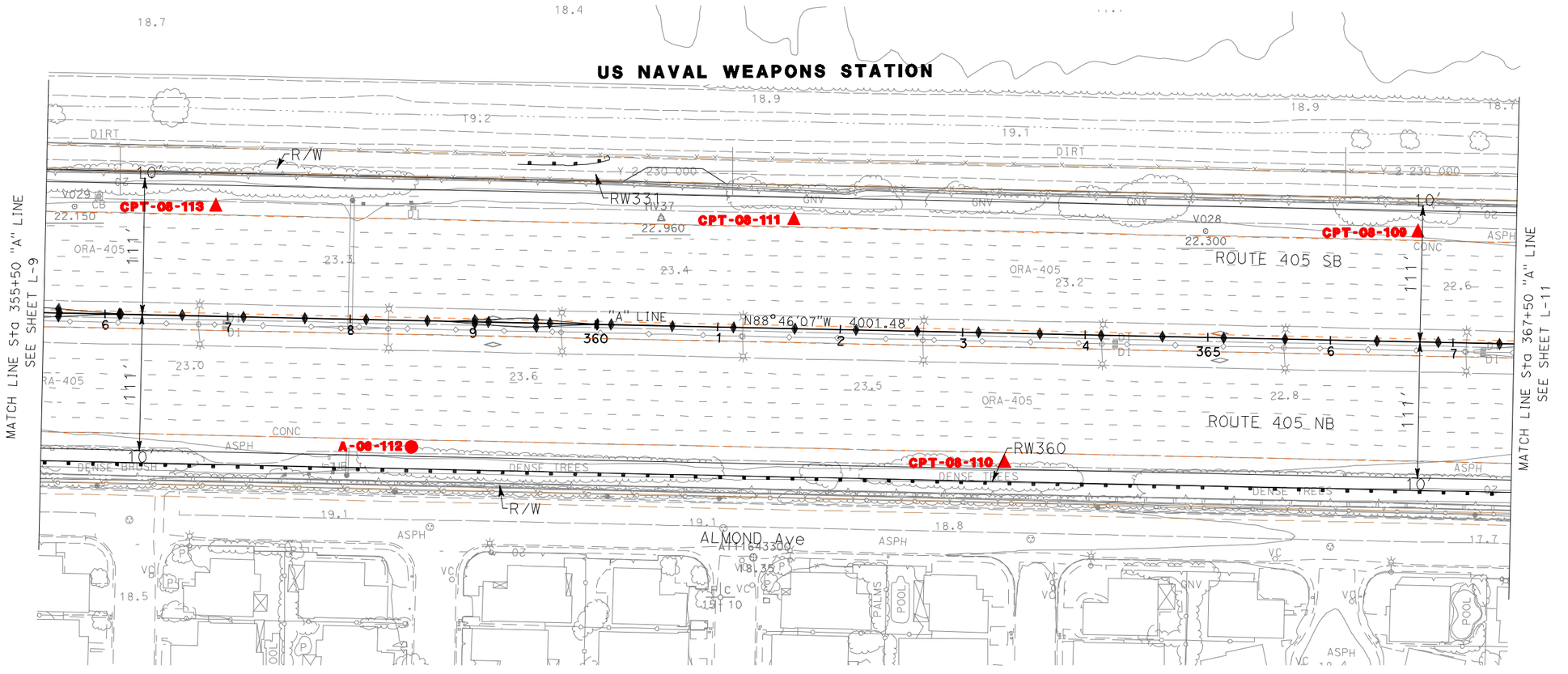

Exploration Location Plan

SCALE 1" = 50'

FIGURE 2K L-10

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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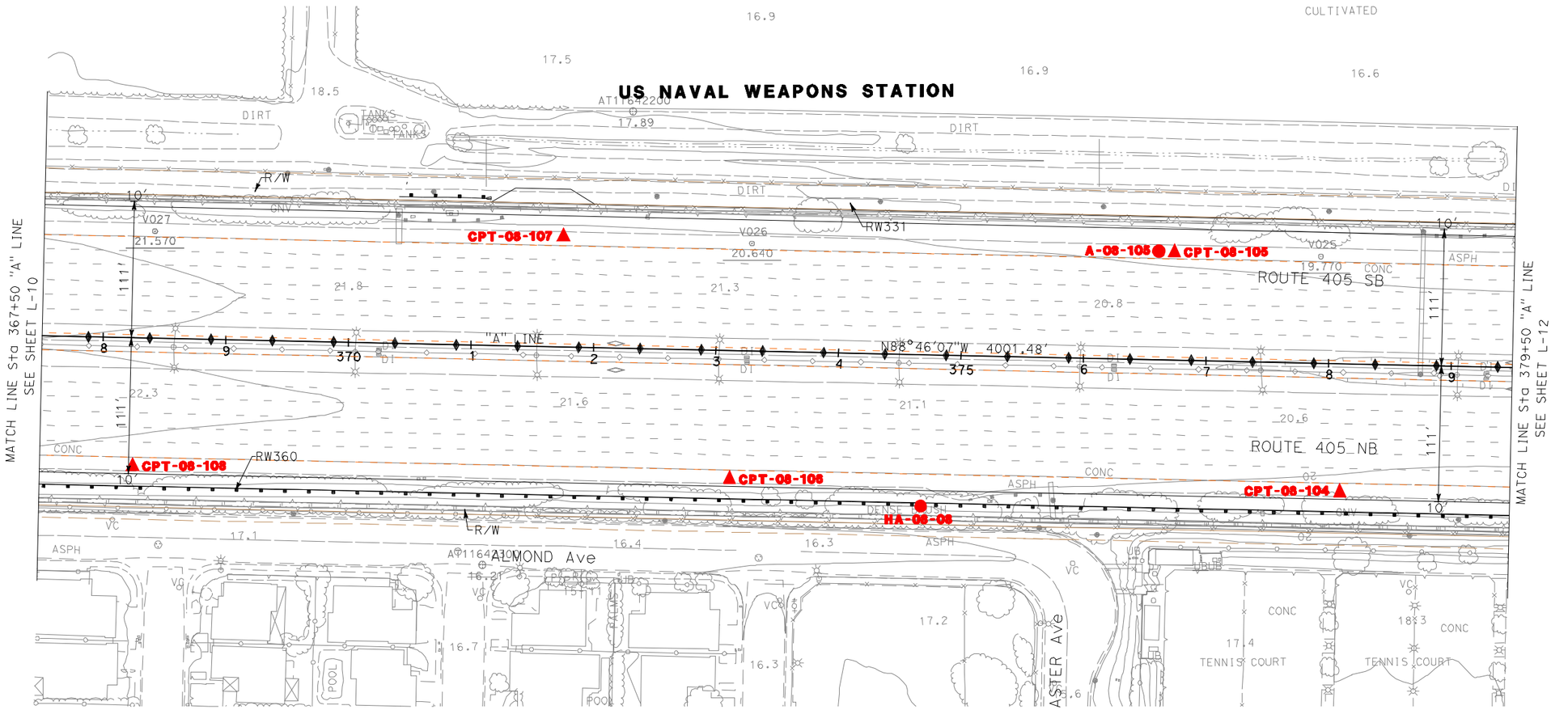

Exploration Location Plan

SCALE 1" = 50'

FIGURE 2L L-11

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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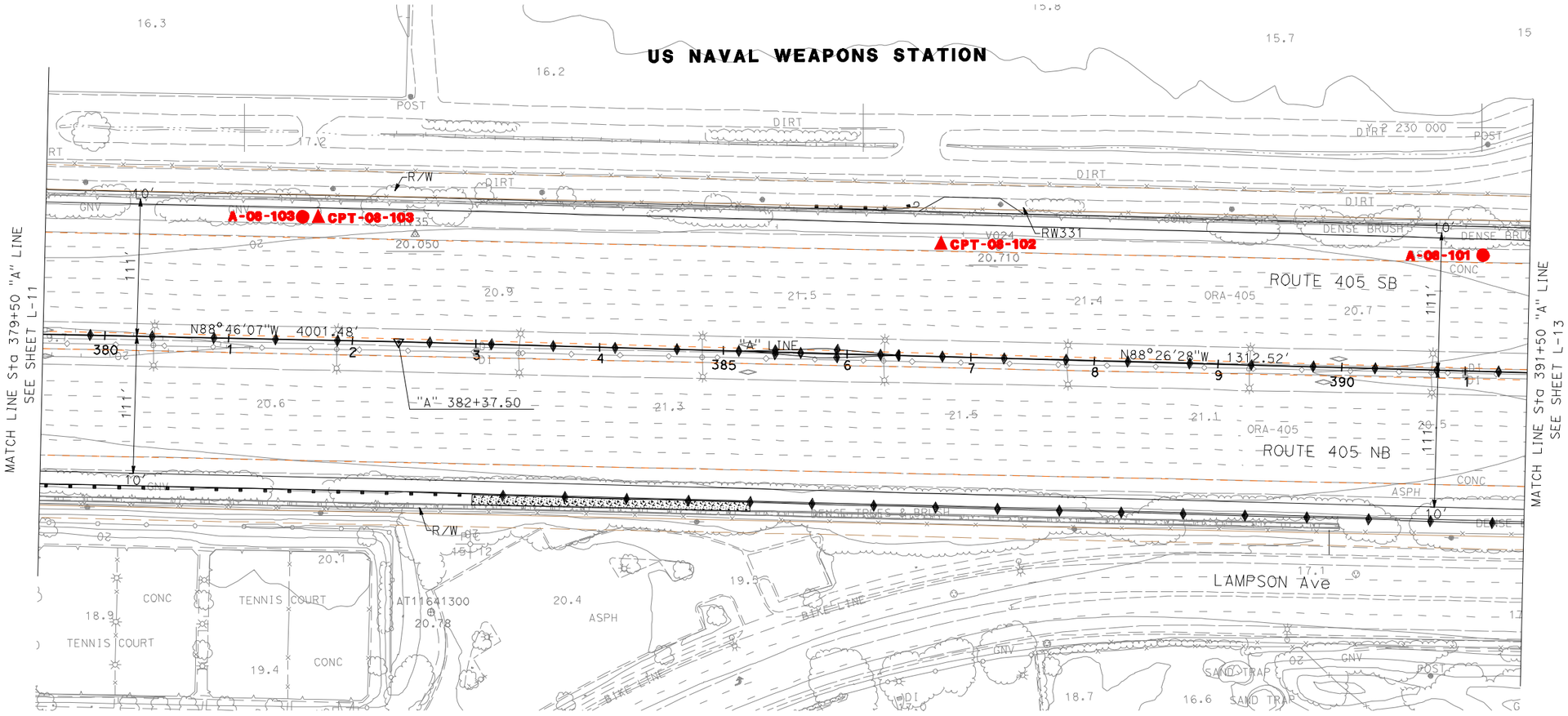

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

Exploration Location Plan

SCALE 1" = 50'

FIGURE 2M L-12

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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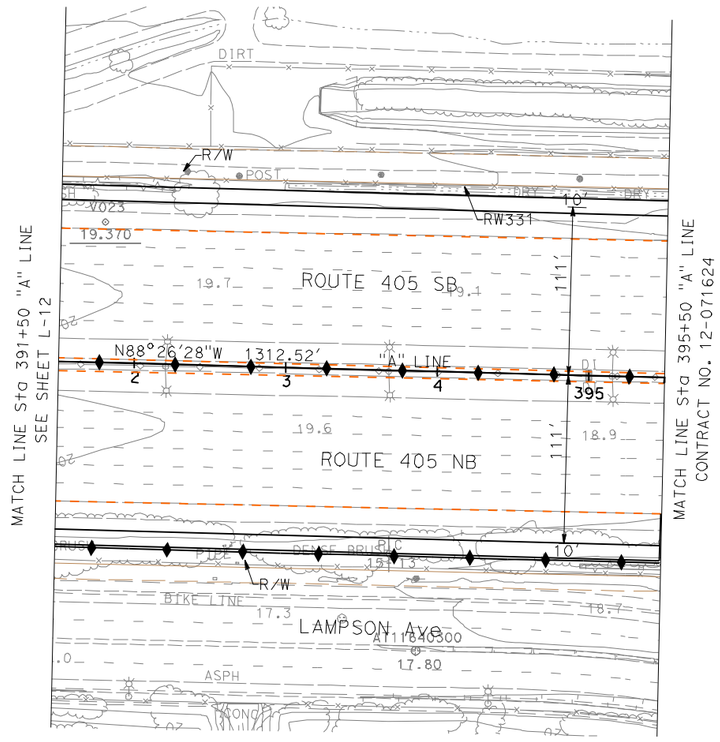

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

SCALE 1" = 50'

FIGURE 2N L-13

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SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

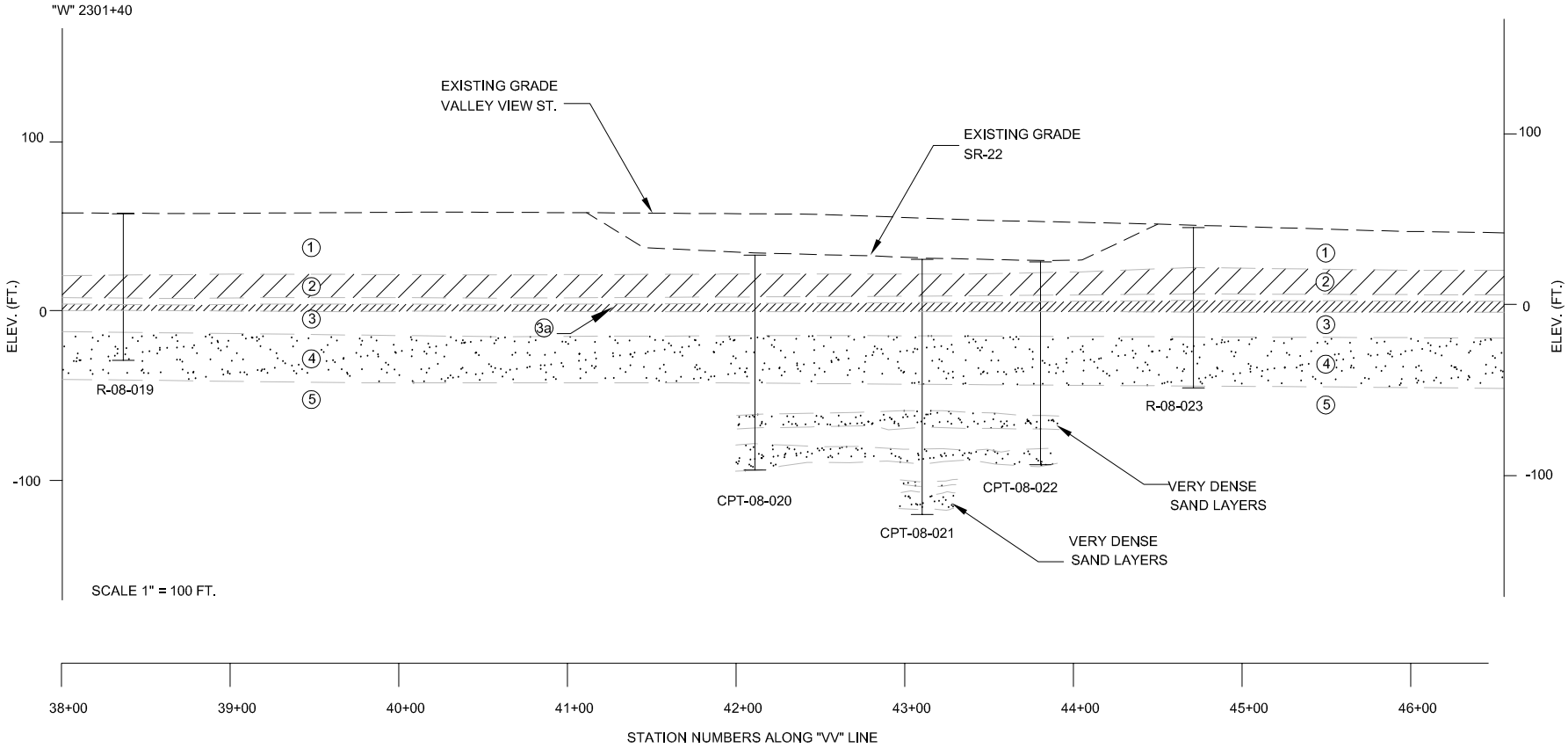
② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

③a DENSE TO VERY DENSE SAND

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM



GROUP DELTA

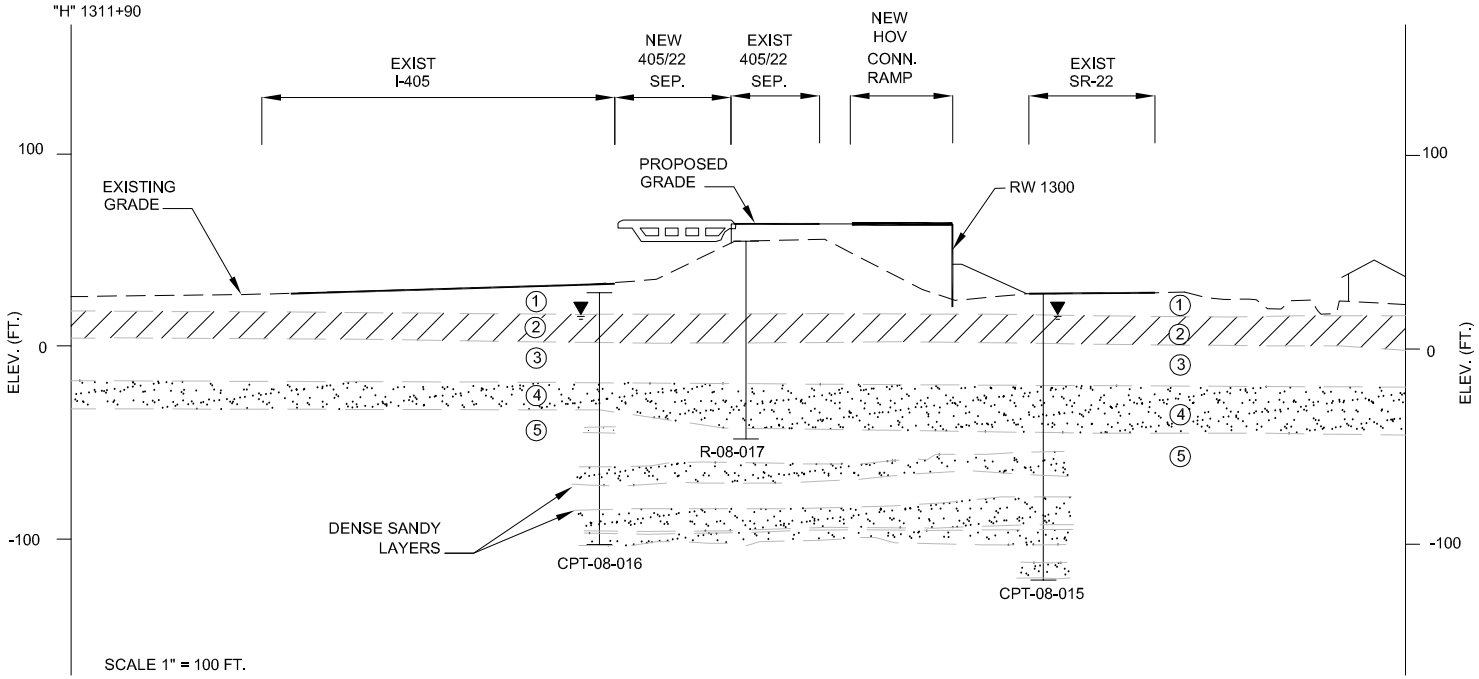
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER
3A

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

CROSS SECTION - "W" 2301+40
BOLSA CHICA RD OC



SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM

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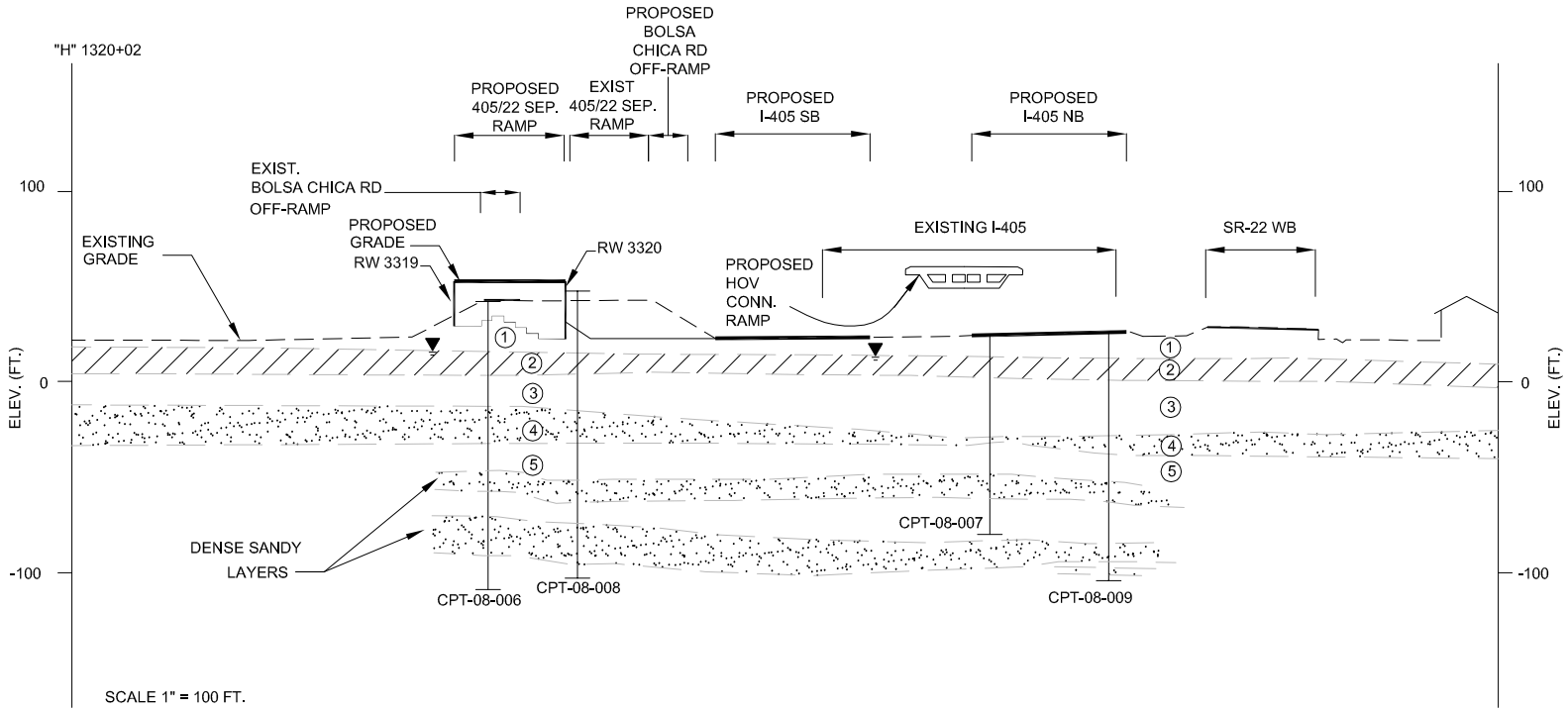
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER: 3B

PROJECT NAME: WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER: I-436

CROSS SECTION - "H" 1311+90



SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM

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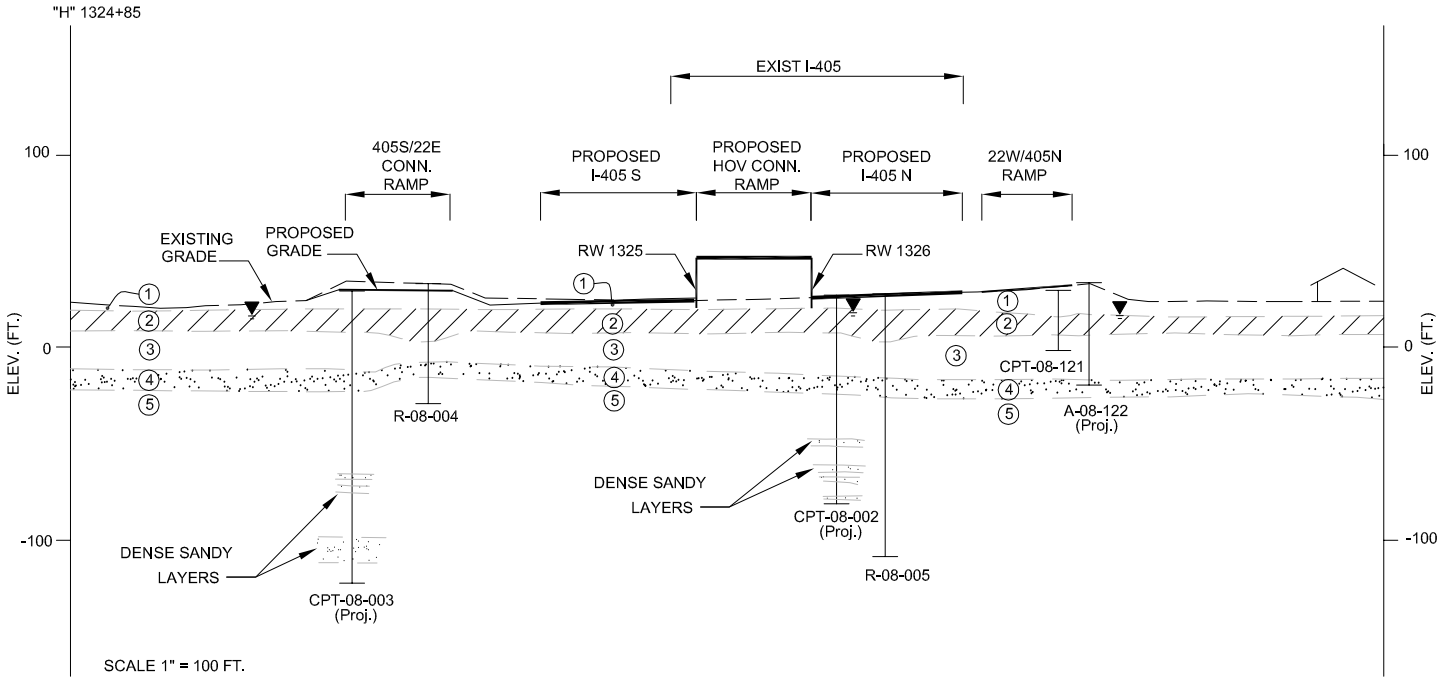
FIGURE NUMBER: 3C

PROJECT NAME: WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER: I-436

CROSS SECTION - "H" 1320+02



SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM

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FIGURE NUMBER: 3D

PROJECT NAME: WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER: I-436

CROSS SECTION - "H" 1324+85

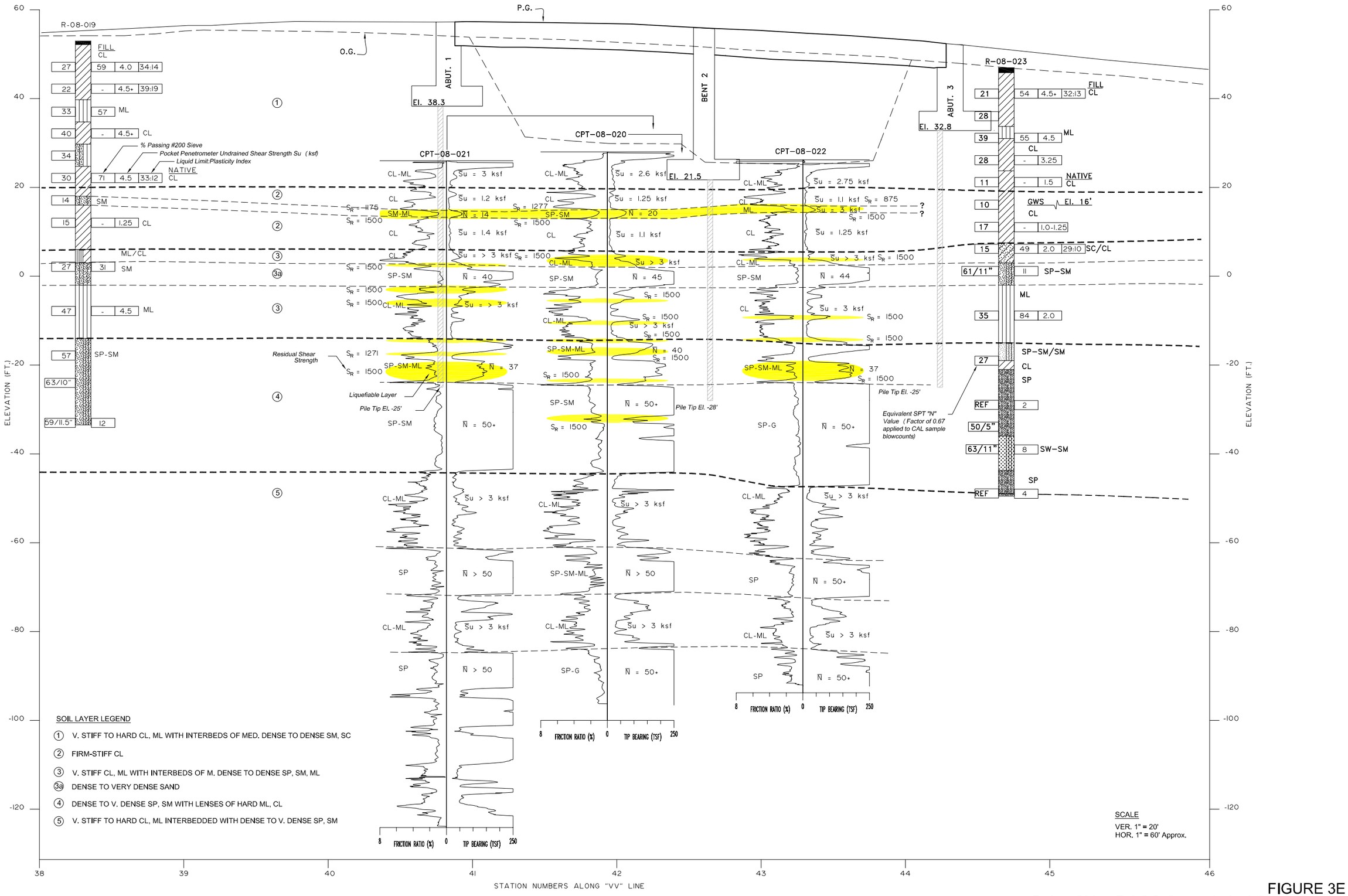


FIGURE 3E
Bolsa Chica Rd OC Geotechnical Cross Section

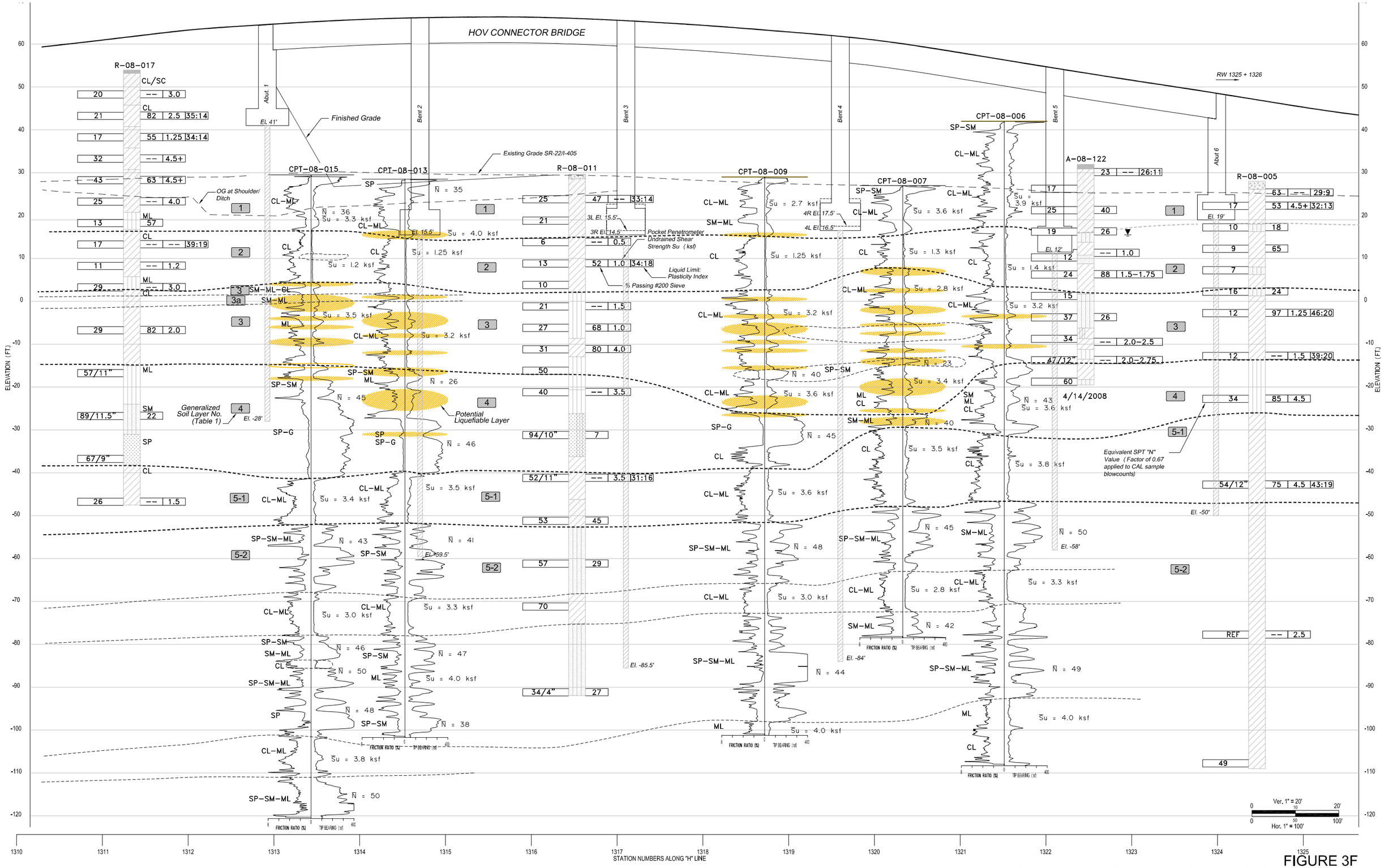


FIGURE 3F
HOV Connector Separation Geotechnical Cross Section

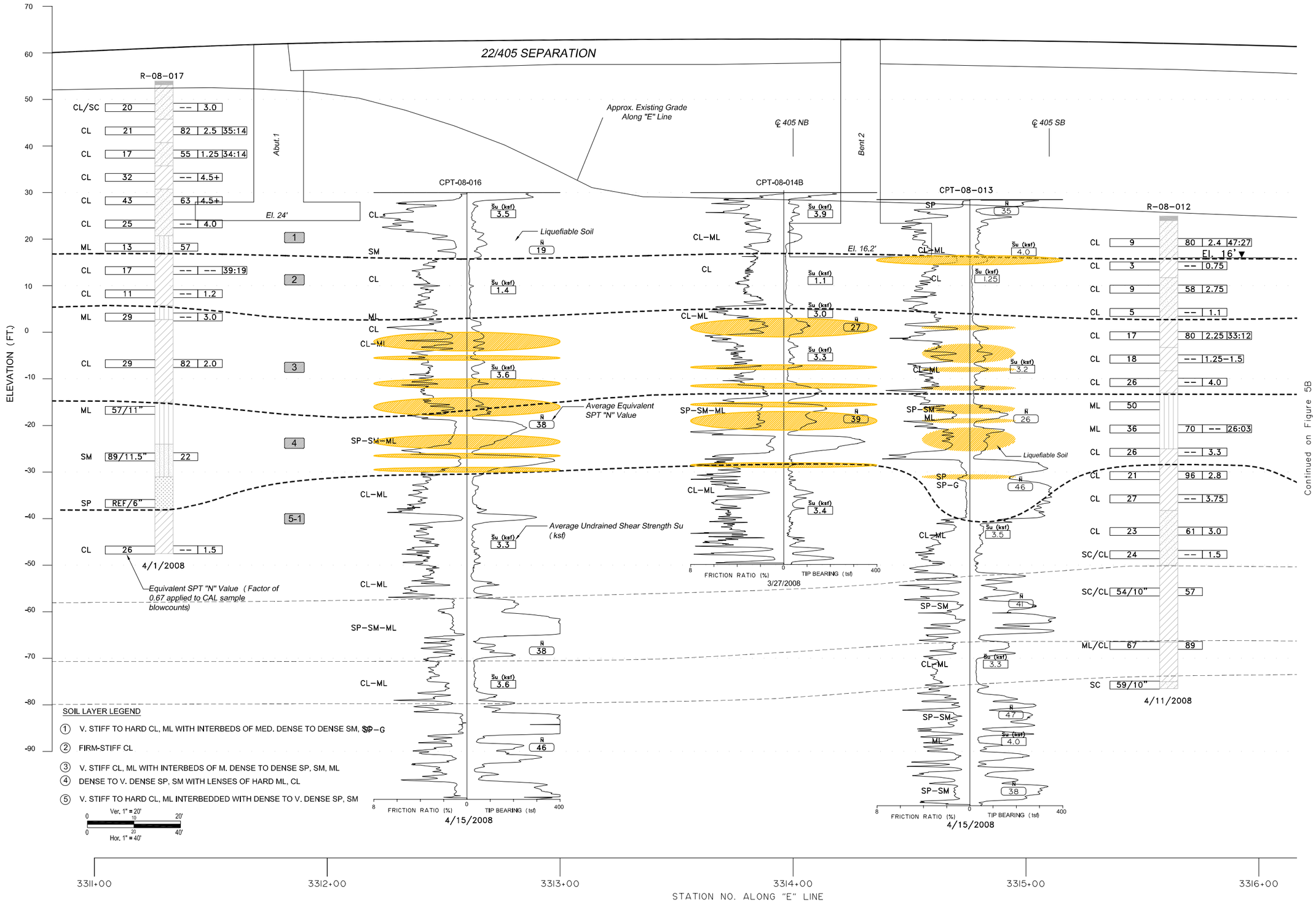


FIGURE 3G
22/405 Separation Geotechnical Cross Section

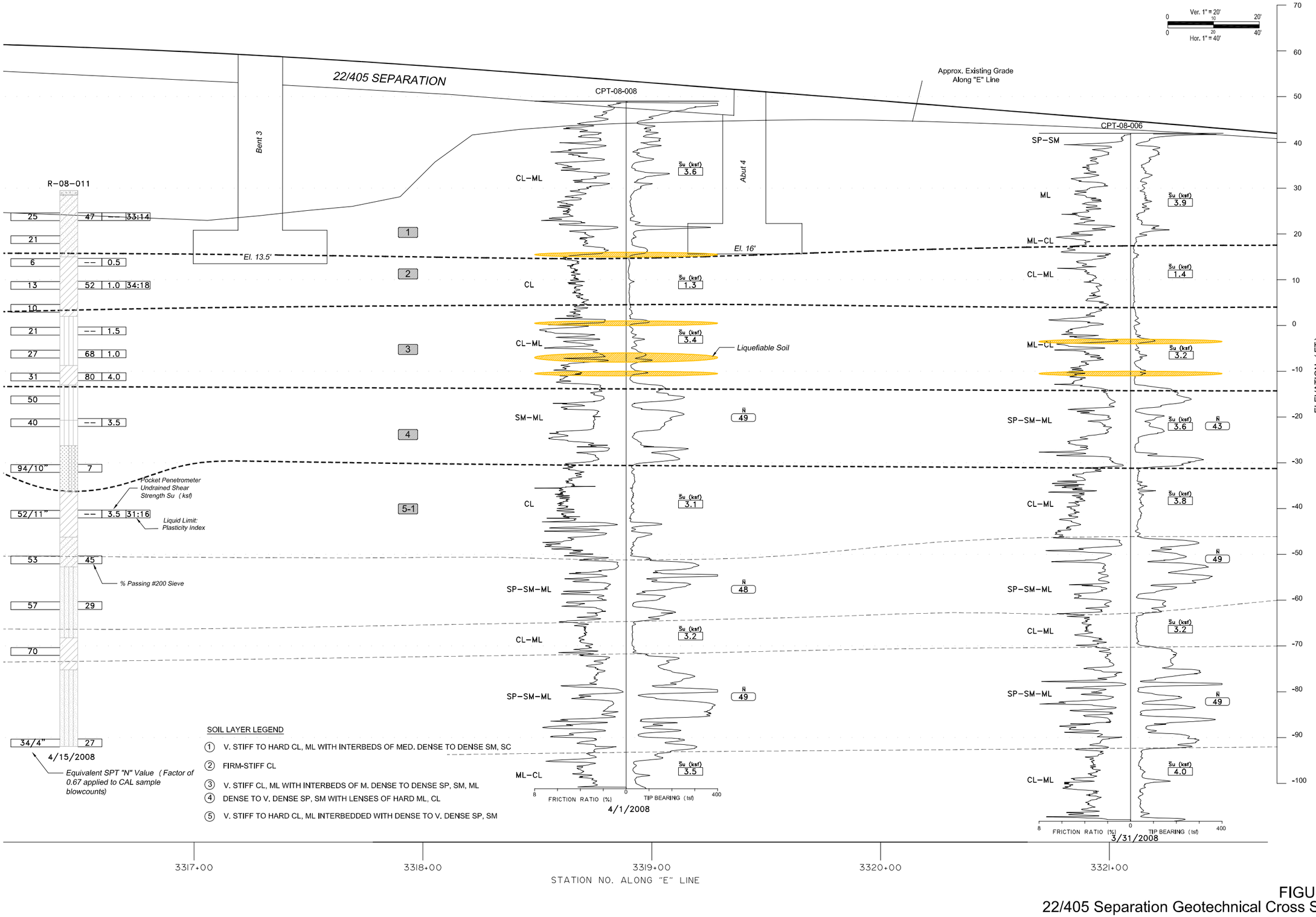


FIGURE 3H
22/405 Separation Geotechnical Cross Section

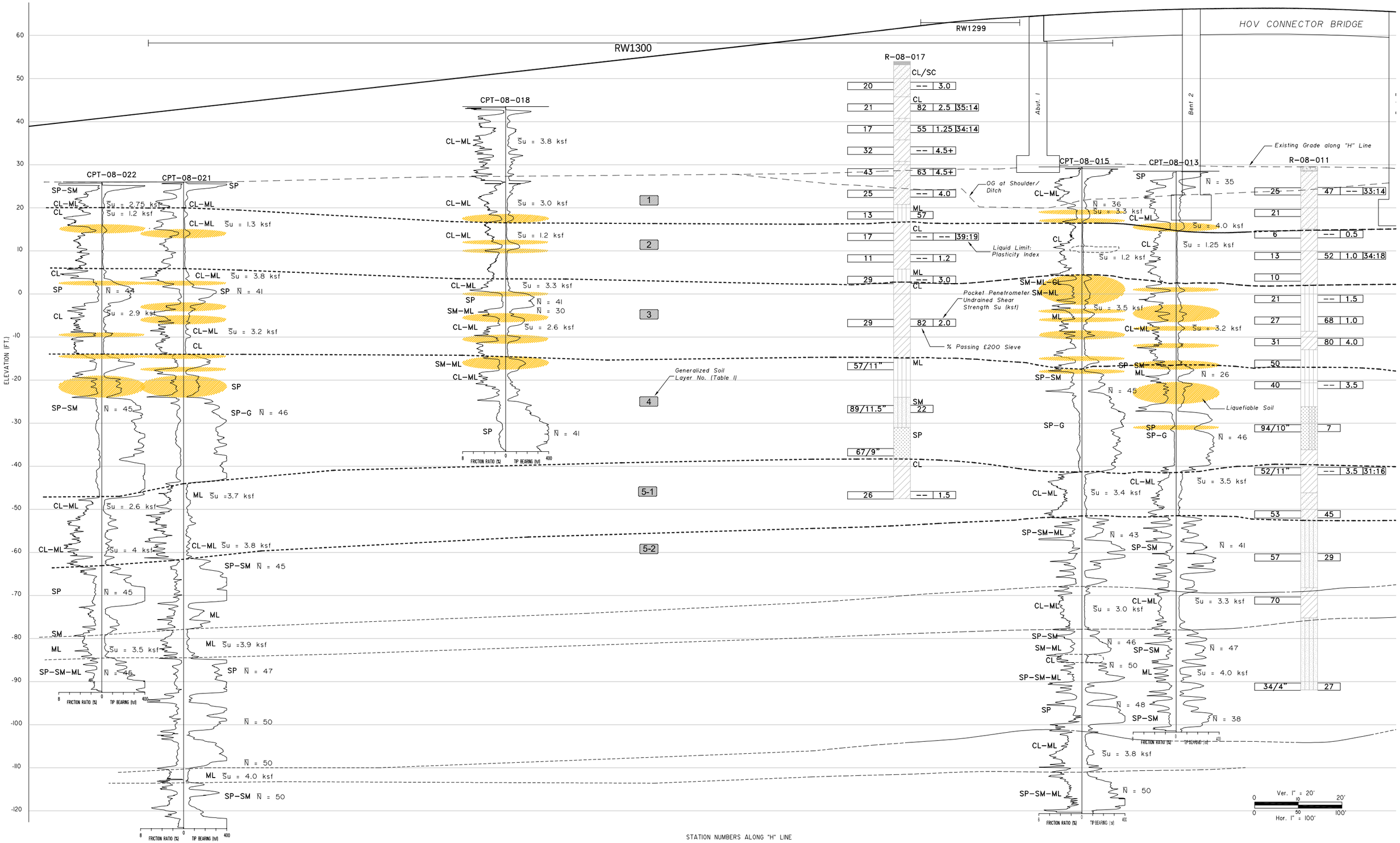


FIGURE 3I
Geotechnical Cross Section - RW1300 & RW1299

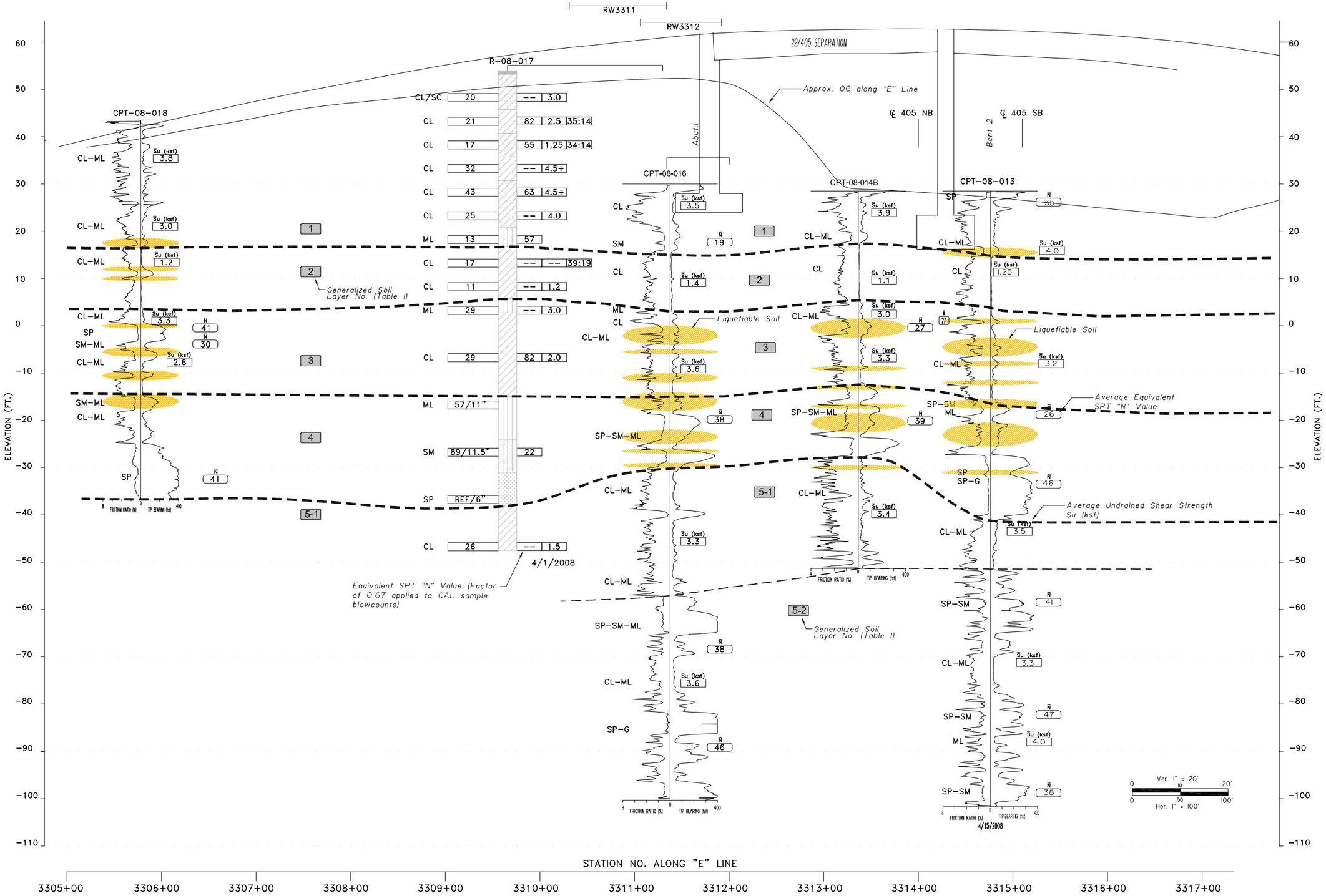


FIGURE 3J
Geotechnical Cross Section RW3311 & RW3312

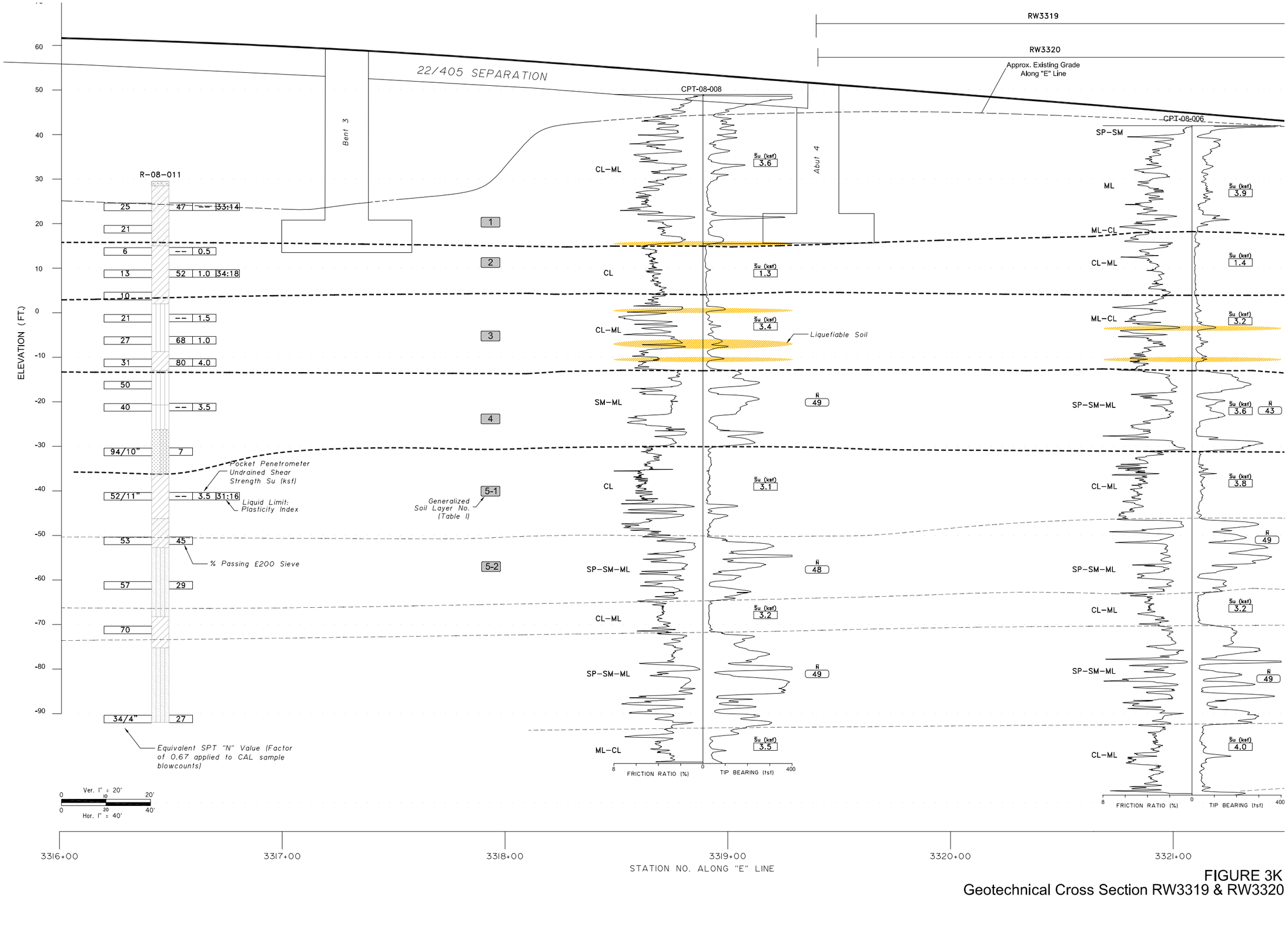


FIGURE 3K
Geotechnical Cross Section RW3319 & RW3320

RW3319

RW3320

Approx. Existing Grade Along "E" Line

R-08-004

CPT-08-003

Ver. 1" = 20'
0 10 20'
Hor. 1" = 40'
0 20 40'

37	66	4.5+	29:12
30	66	4.5+	
15	27	4.5+	
7	66	1.0	
13	–	1.4	
13	55	–	
15	–	1.75	
21	–	2.0	
43	51	4.5	
19	86	–	
32	–	4.5+	
33	55	–	

Liquid Limit: Plasticity Index

Pocket Penetrometer Undrained Shear Strength Su (ksf)

Equivalent SPT "N" Value (Factor of 0.67 applied to CAL sample blowcounts)

% Passing #200 Sieve

Generalized Soil Layer No. (Table I)

1 2 3 4 5-1 5-2

SP-SM
ML
CL-ML
ML-CL
SP-SM-ML
CL-ML
SP-SM-ML
CL-ML
SP/SM
CL-ML
ML-CL
SP-G
SP-SM
CL-ML

$\bar{S}u$ (ksf) 3.7
$\bar{S}u$ (ksf) 1.4
$\bar{S}u$ (ksf) 3.1
$\bar{N}$ 45
$\bar{S}u$ (ksf) 3.5
$\bar{N}$ 40
$\bar{S}u$ (ksf) 3.1
$\bar{N}$ 47
$\bar{S}u$ (ksf) 4.0
$\bar{N}$ 50

8 FRICTION RATIO (%) 0 400 TIP BEARING (tsf)

60 50 40 30 20 10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120
ELEVATION (FT.)

Continued from Figure 5A Sta. 3321+50

3322+00 3323+00 3324+00 3325+00 3326+00 3327+00
STATION NO. ALONG "E" LINE

FIGURE 3L
Geotechnical Cross Section RW3319 & RW3320

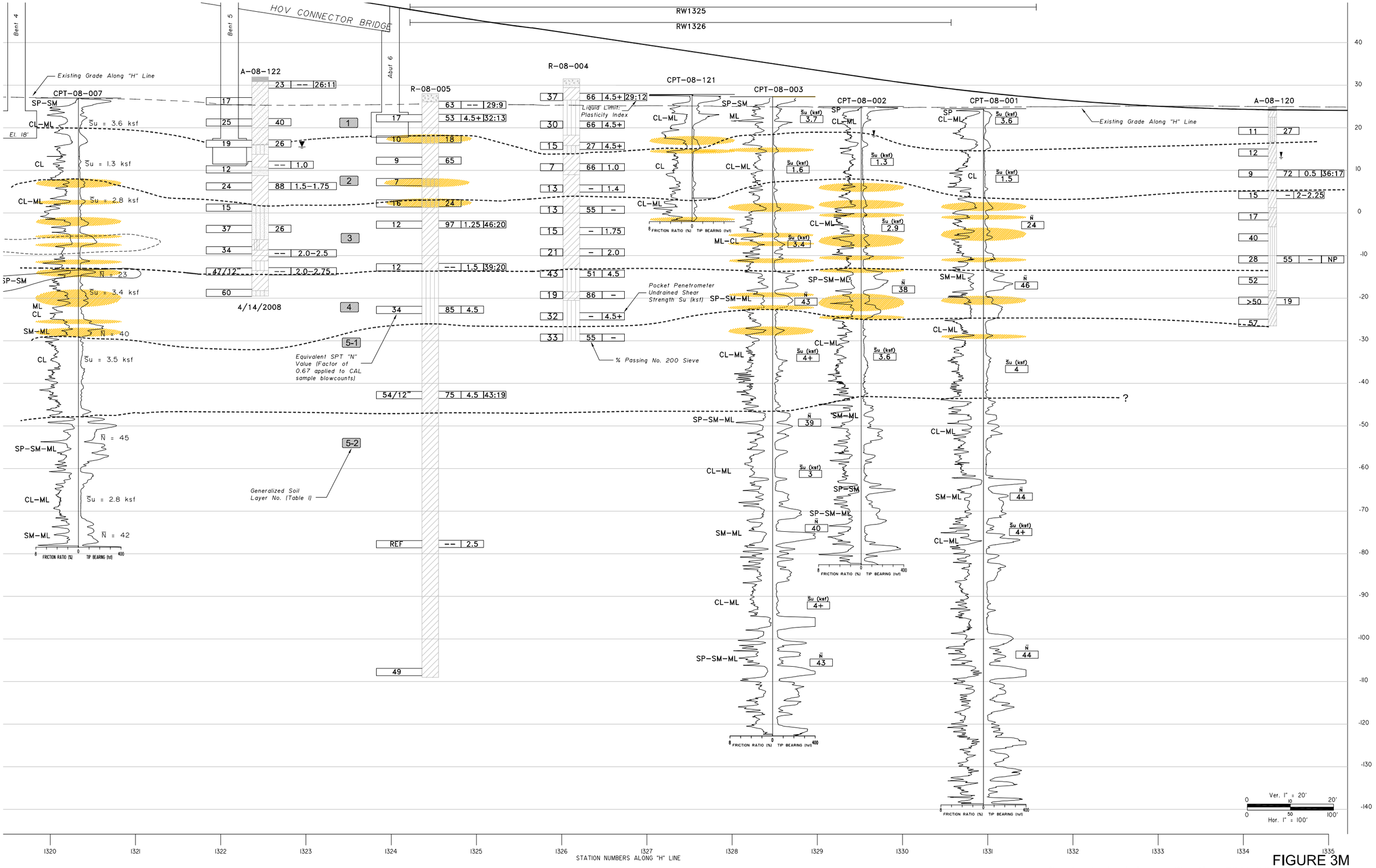


FIGURE 3M
Geotechnical Cross Section RW1325 & RW1326

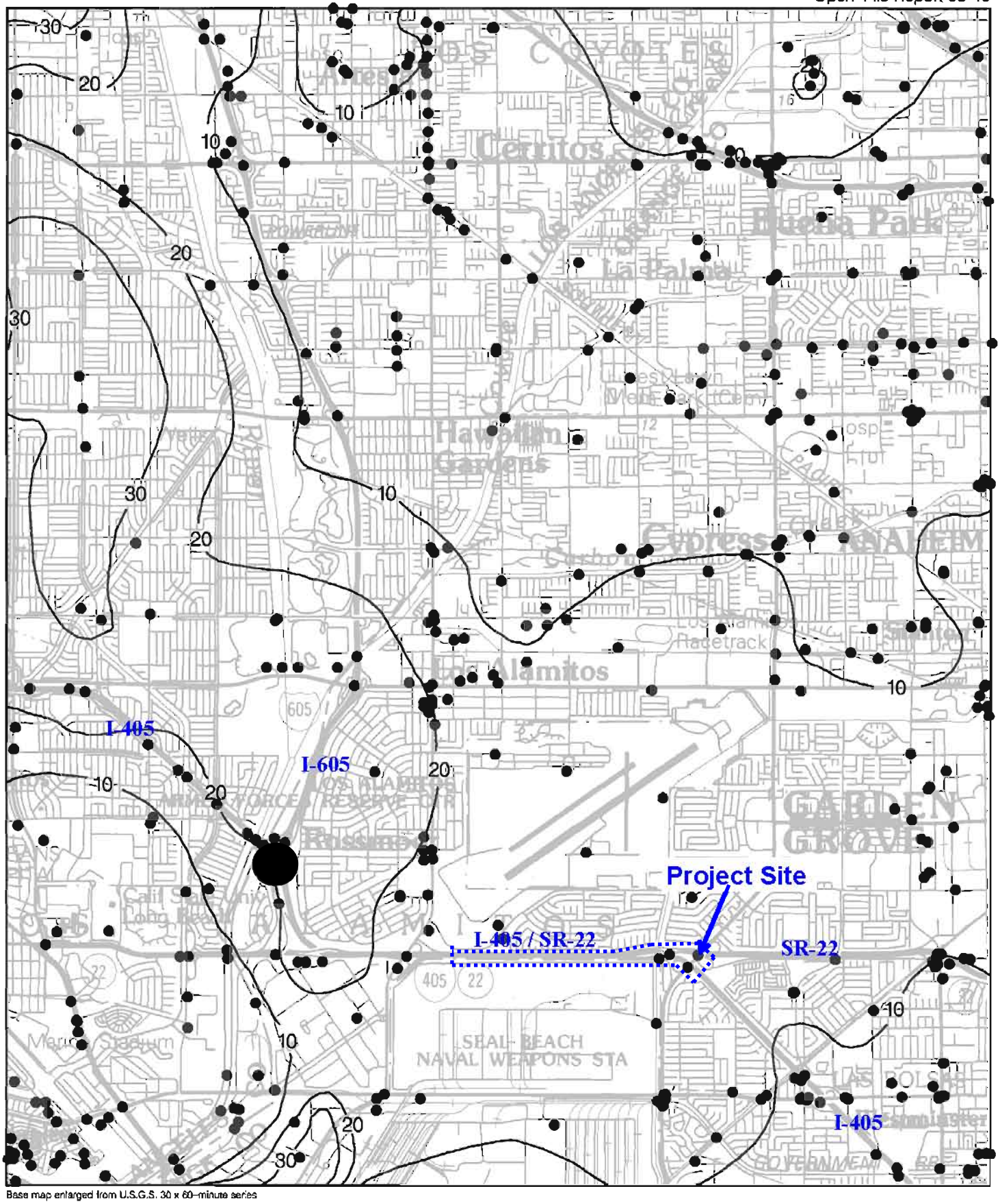


Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

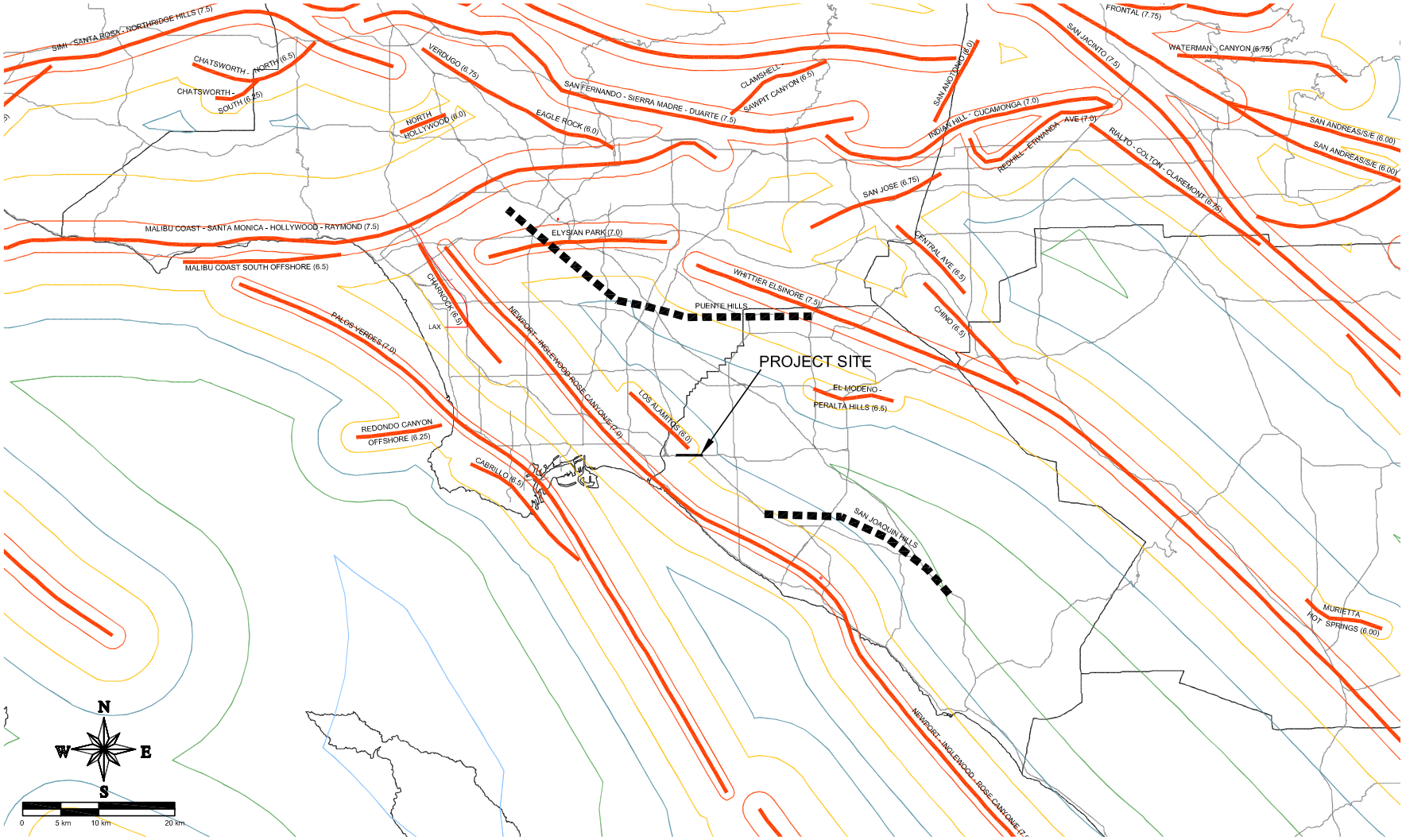
● Borehole Site

30 Depth to ground water in feet

ONE MILE

SCALE

Figure 4
Historically Highest Groundwater Map



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills fault in Orange County is currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

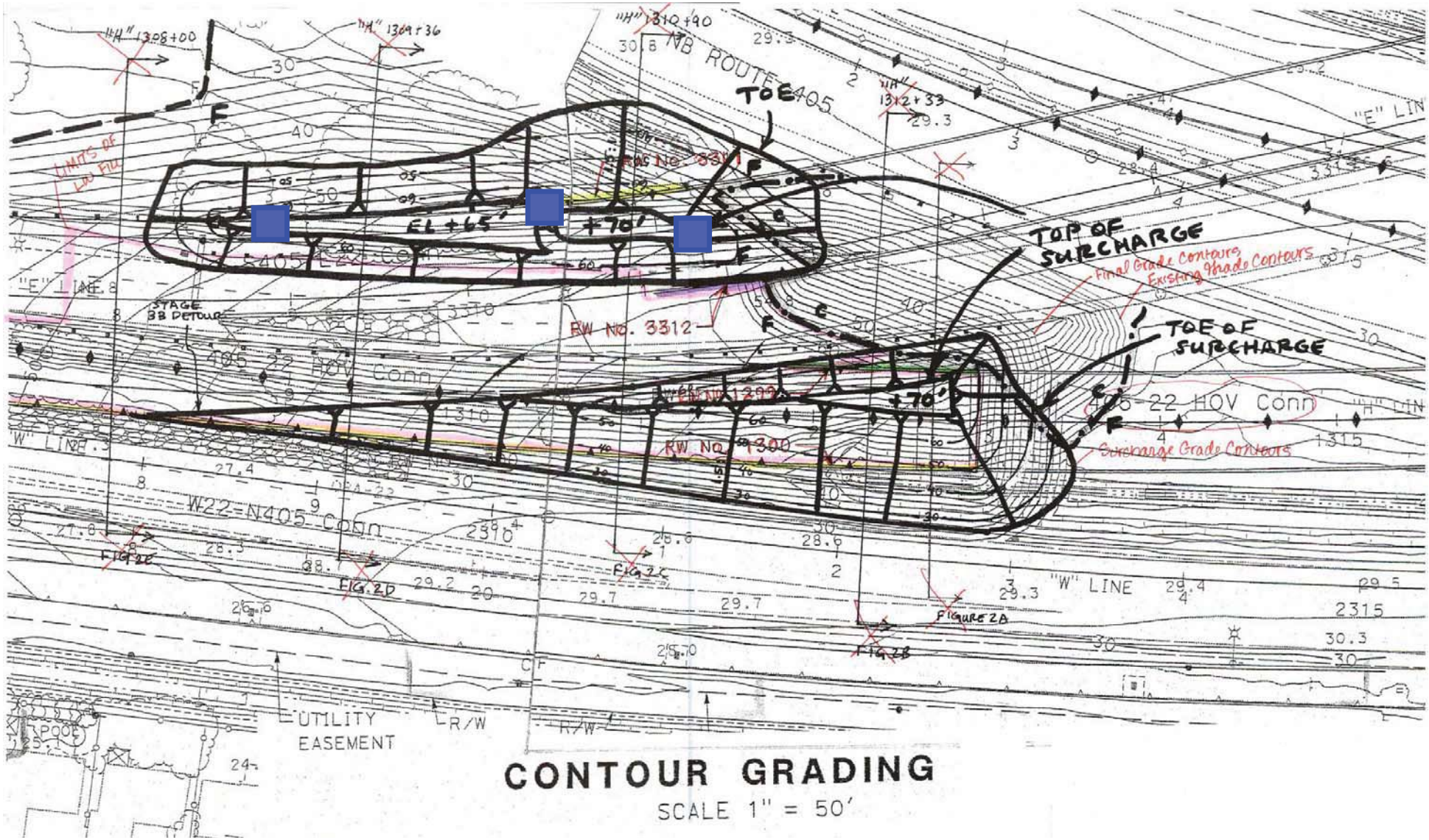
GROUP DELTA

GDC PROJECT NO. I-436

WEST COUNTY CONNECTOR PROJECT
Orange County, California

Caltrans Fault and PBA Map

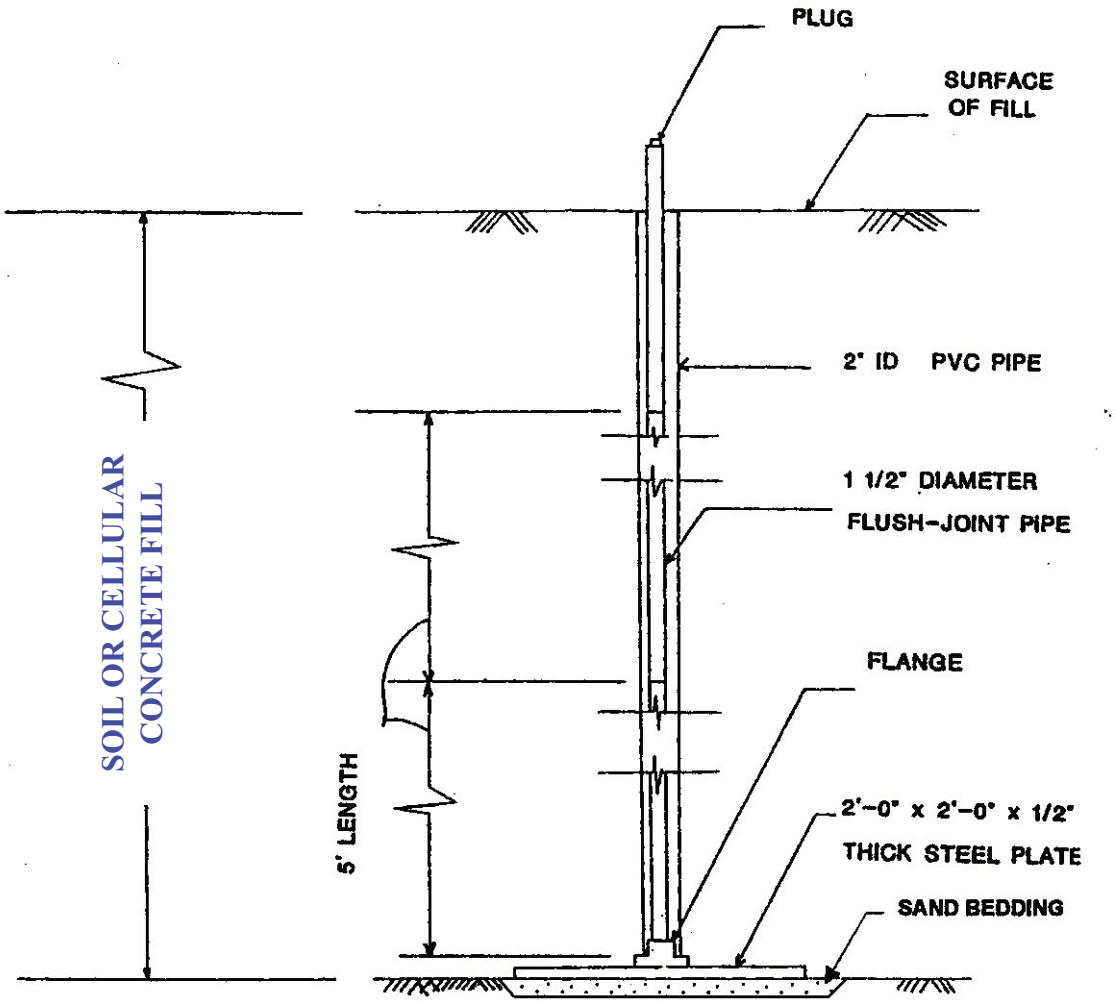
Figure 5



SETTLEMENT PLATES

Note: Settlement plate locations for north surcharge area shown in foundation report for RW1299+1300.

FIGURE 6A
SETTLEMENT PLATE LOCATION PLAN
SOUTH SURCHARGE AREA



No Scale

GROUP DELTA CONSULTANTS

GDC Project No. I-436

West County Connectors 405/22 HOV Segment
Orange County, CA

Settlement Plate Detail

FIGURE 6B

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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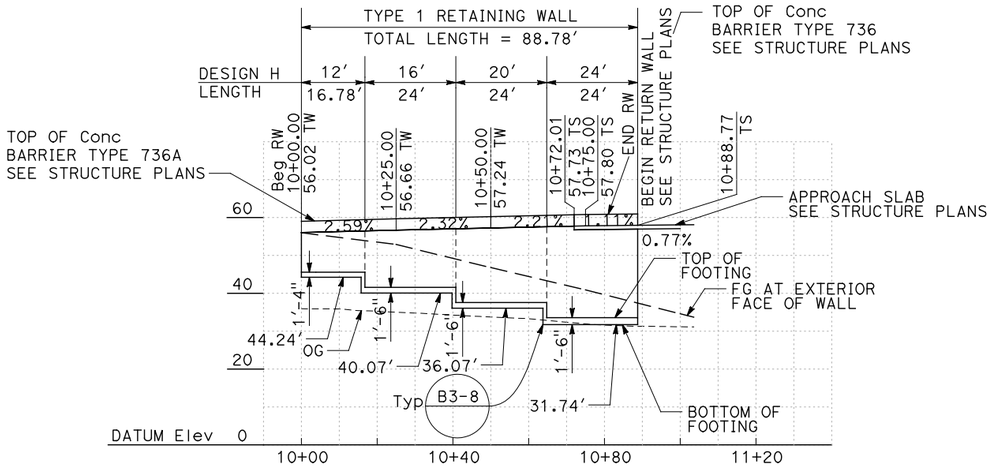
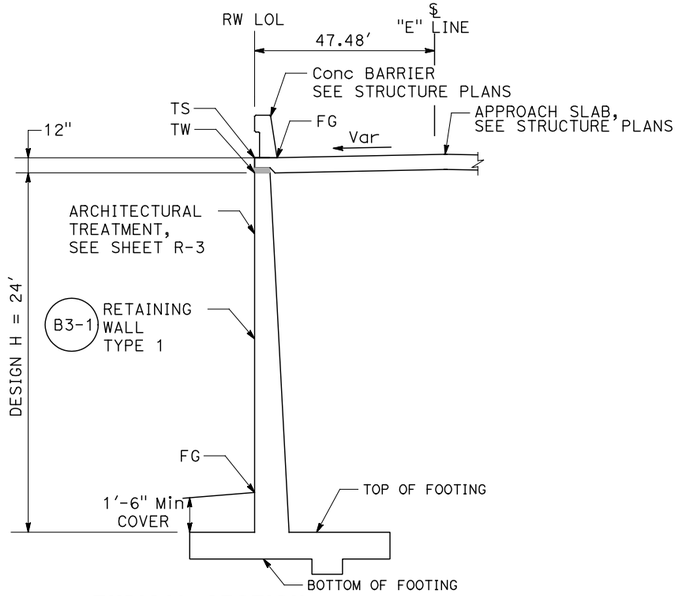
ORANGE, CA 92863

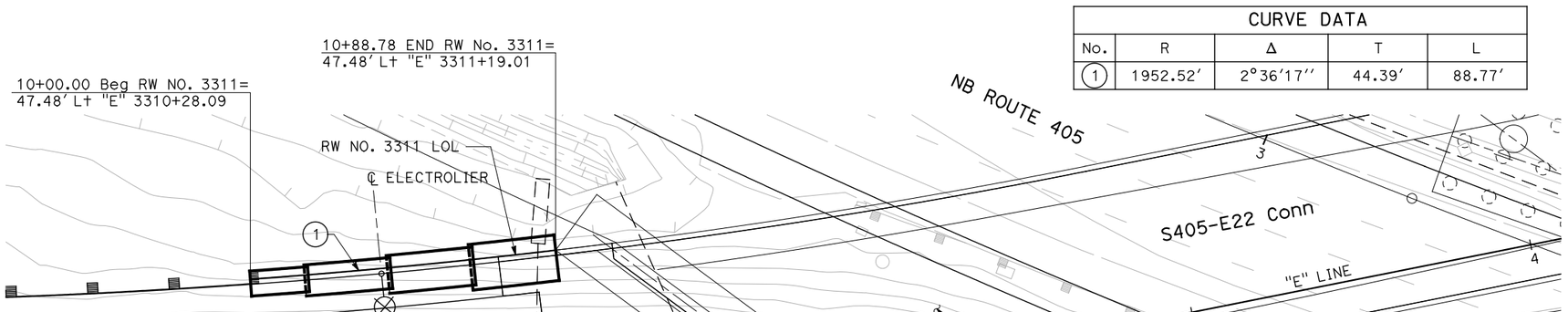


MIRROR ELEVATION
SCALE 1"=20'

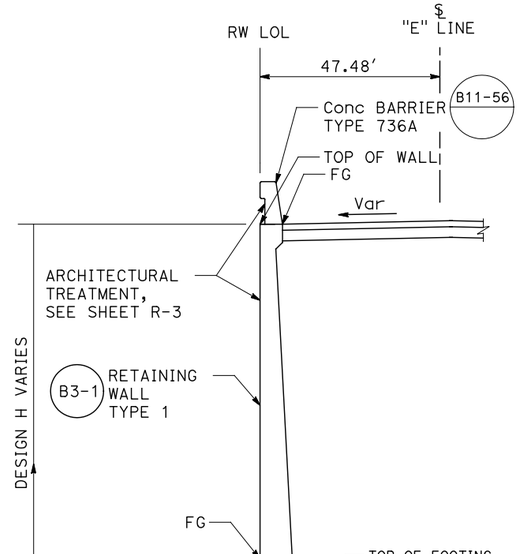


TYPICAL SECTION
NO SCALE
Sta 10+72.01 TO Sta 10+88.77

CURVE DATA				
No.	R	Δ	T	L
(1)	1952.52'	2°36'17''	44.39'	88.77'



PLAN
SCALE 1"=20'



TYPICAL SECTION
NO SCALE
Sta 10+00.00 TO STA 10+72.01

ABBREVIATIONS:

TS TOP OF SLAB
TW TOP OF WALL

NOTES:

1. WEAKENED PLANES JOINTS SHOWN AT 24'-0" MAX SPACING PER B0-3
2. FOR DRAINAGE INLET DETAILS SEE DRAINAGE PLANS.
3. ELEVATIONS ARE ALONG THE RW LOL LINE.
4. WEEP HOLES AND PERVIOUS BACKFILL NOT SHOWN, SEE B0-3

RETAINING WALL PLAN
RETAINING WALL NO. 3311

SCALE 1" = 20'

FIGURE 7A

R-1

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CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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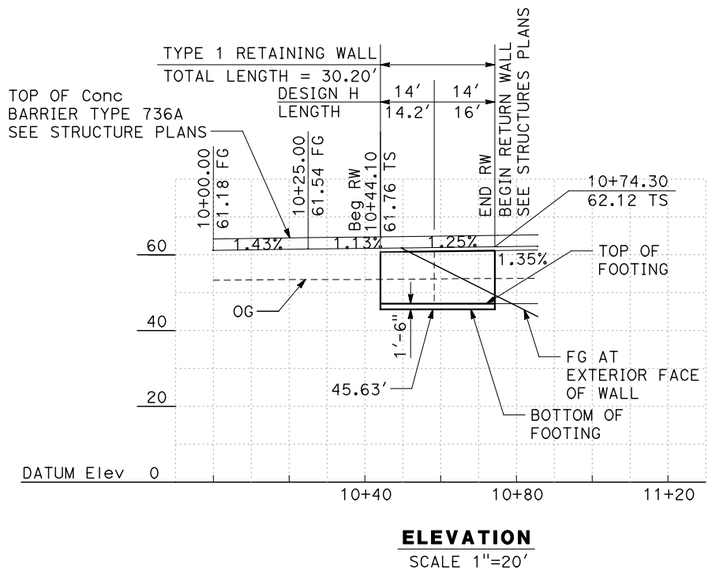
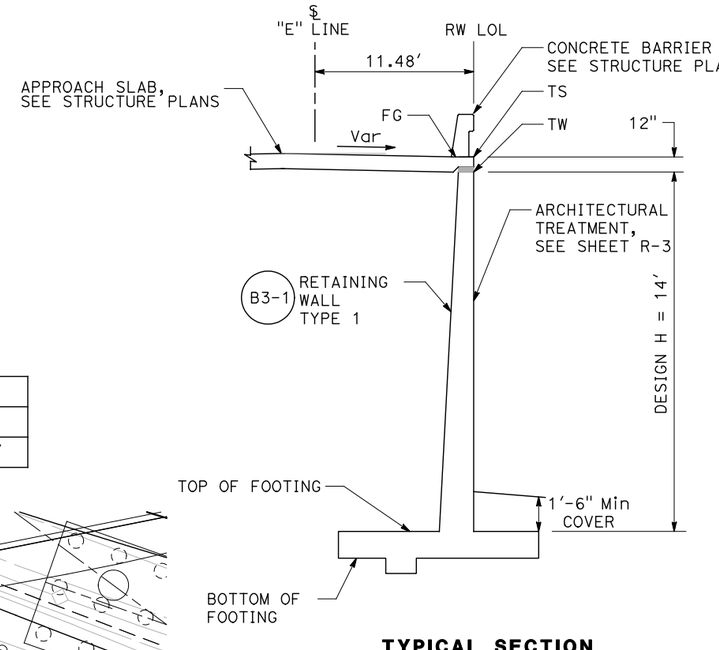
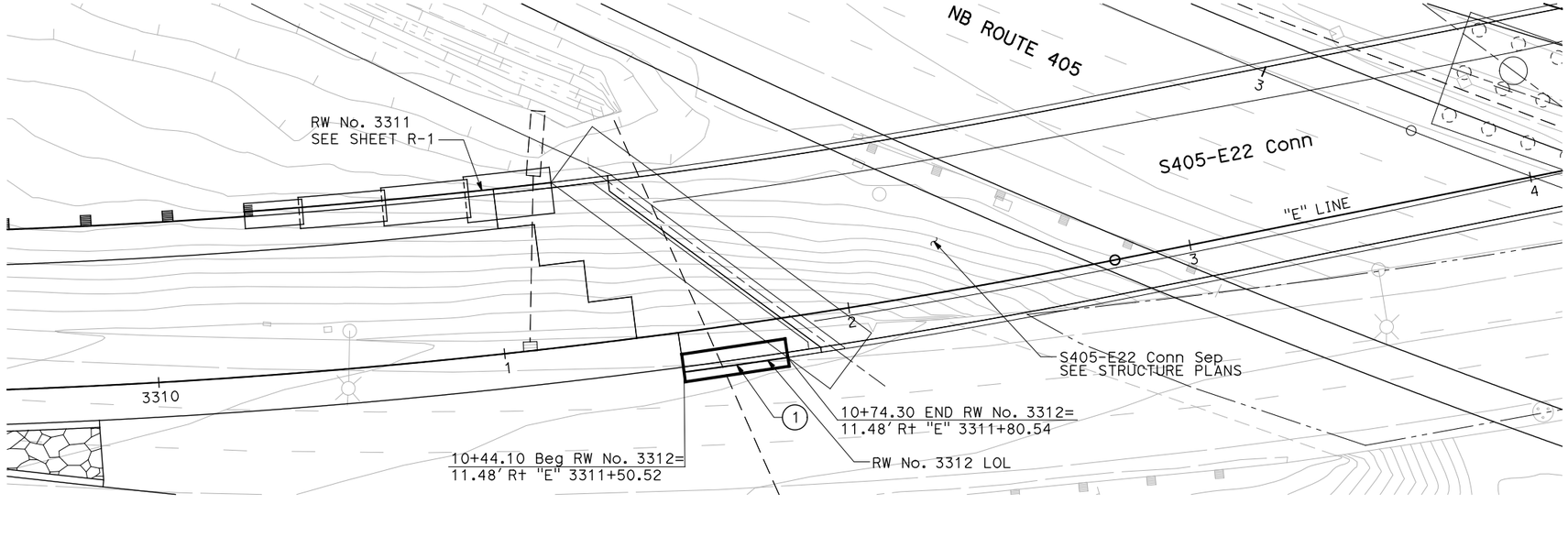


ELEVATION
SCALE 1"=20′

CURVE DATA				
No.	R	Δ	T	L
(1)	2011.48′	0°51′36″	15.10′	30.20′



TYPICAL SECTION
NO SCALE



ABBREVIATIONS:

TS TOP OF SLAB
TW TOP OF WALL

NOTES:

1. WEAKENED PLANES JOINTS SHOWN AT 24′-0" MAX SPACING PER B0-3
2. FOR DRAINAGE INLET DETAILS SEE DRAINAGE PLANS.
3. ELEVATIONS ARE ALONG THE RW LOL LINE.
4. WEEP HOLES AND PERVIOUS BACKFILL NOT SHOWN, SEE B0-3

RETAINING WALL PLAN
RETAINING WALL NO. 3312

SCALE 1" = 20′

FIGURE 7B

R-2

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PLATES

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06/30/09 geotechnical
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550 SOUTH MAIN STREET
ORANGE, CA 92863

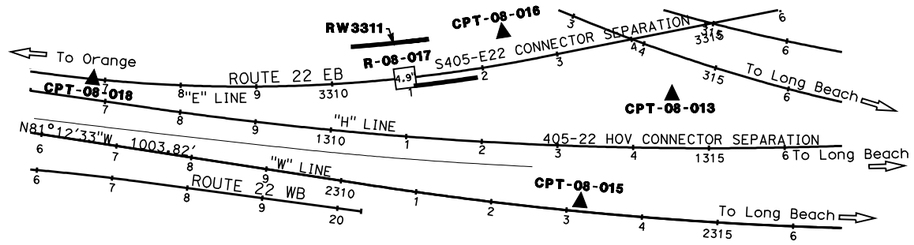
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

BENCHMARK:

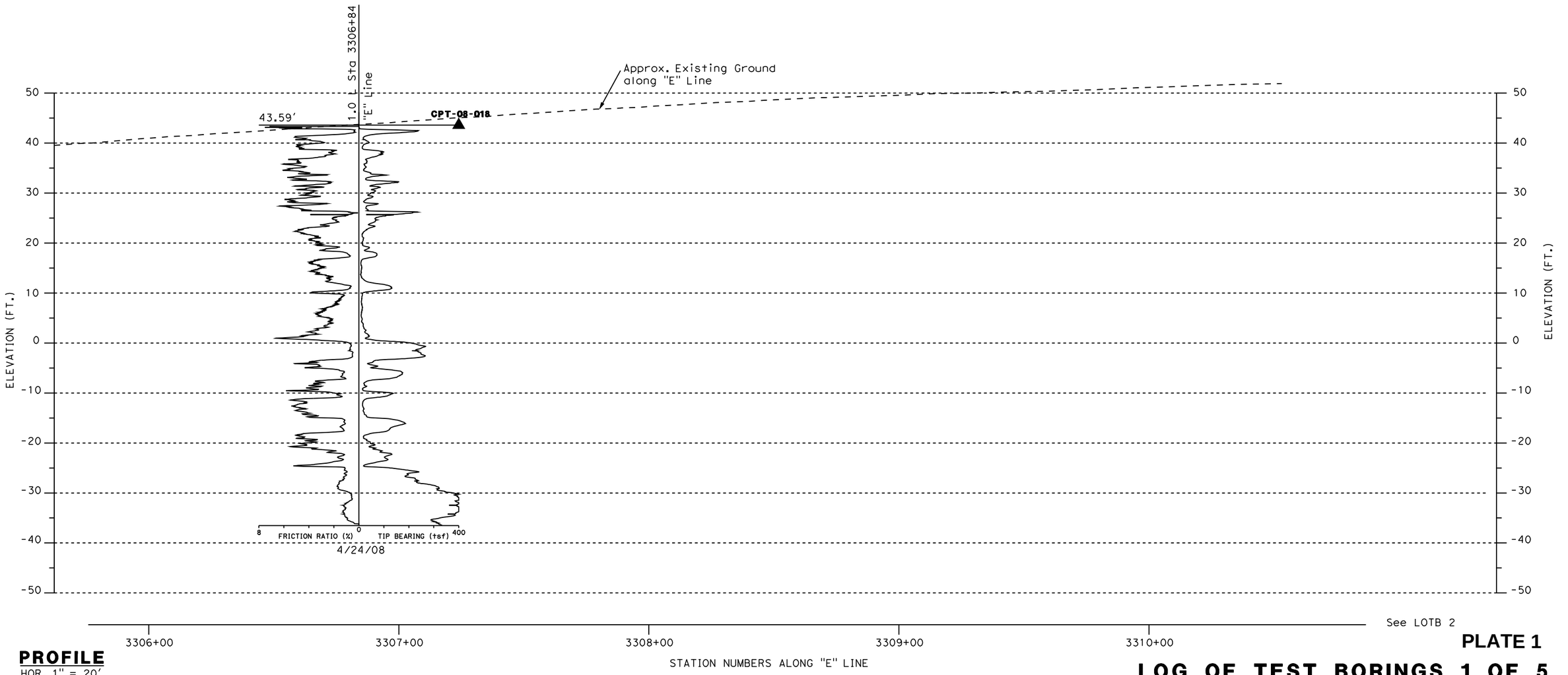
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 1

LOG OF TEST BORINGS 1 OF 5
TYPE 1 WALL NO. RW 3311
R-3

REVISED BY	KF	KF	KF	K. FERNANDES	CALCULATED-DESIGNED BY
DATE REVISED	10/23/08	02/23/09	05/18/09	C. SCHEYHING	CHECKED BY

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KF	05/18/09

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CONSULTANT FUNCTIONAL SUPERVISOR: C. SCHEYHING
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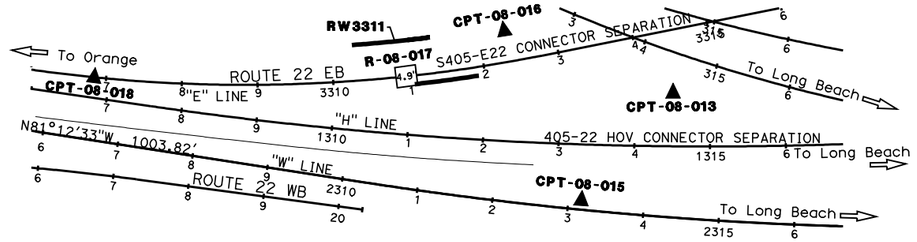
BENCHMARK:

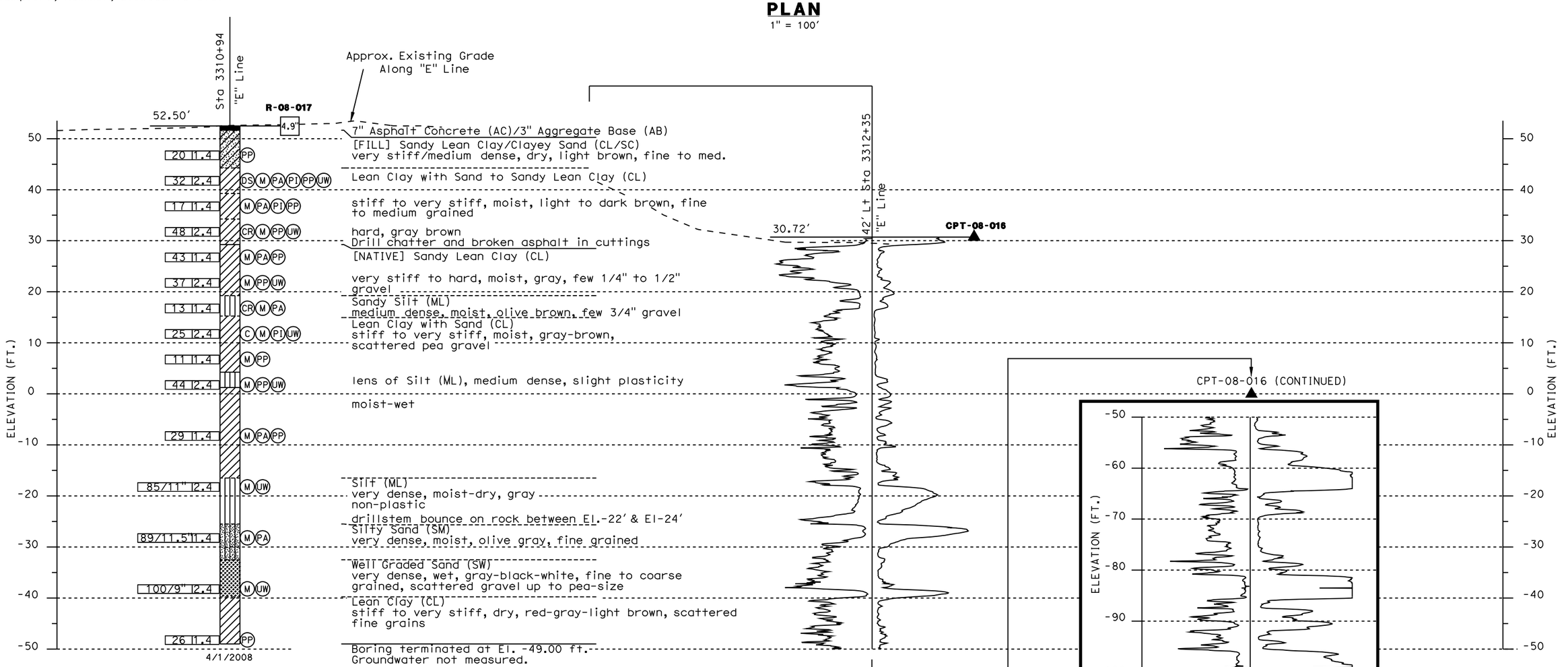
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1 — See LOTB 3

3311+00 — 3312+00 — 3313+00

STATION NO. ALONG "E" LINE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
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REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06/30/09 geotechnical — STATE OF CALIFORNIA

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ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

PLATE 2

LOG OF TEST BORINGS 2 OF 5
TYPE 1 WALL NO. RW 3311
R-4

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06/30/09 Geotechnical
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GDC JOB NO. I-436

REVISED BY	DATE REVISED
KF	10/23/08
KF	02/23/09
KF	05/18/09

CALCULATED-DESIGNED BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

CONSULTANT FUNCTIONAL SUPERVISOR: C. SCHEYHING

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

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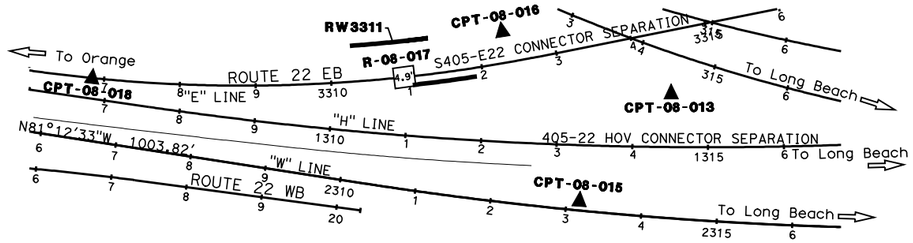
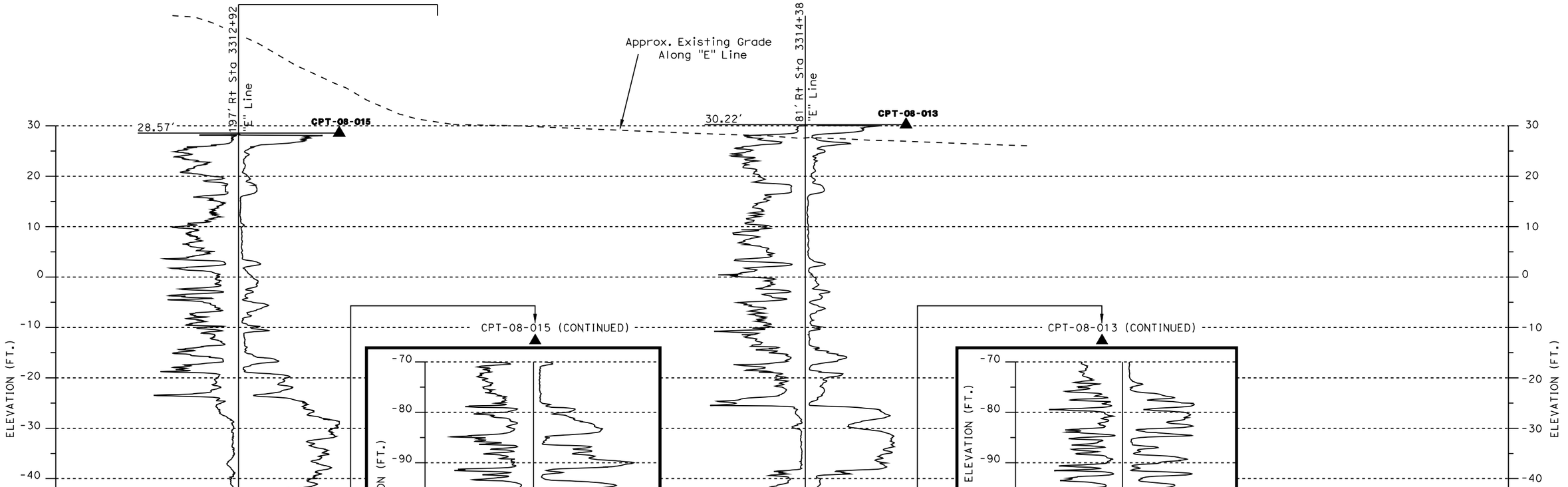


PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 2

3312+00 3313+00 3314+00 3315+00
STATION NO. ALONG "E" LINE

PLATE 3

LOG OF TEST BORINGS 3 OF 5
TYPE 1 WALL NO. RW 3311
R-6

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REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

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GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

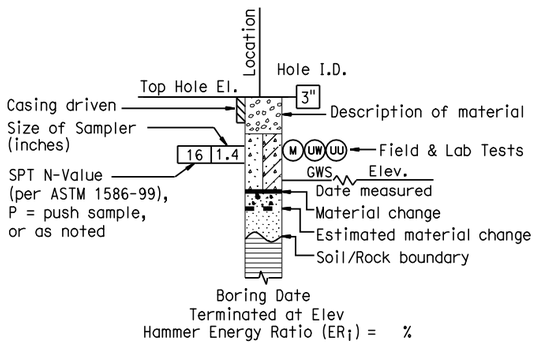
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes :

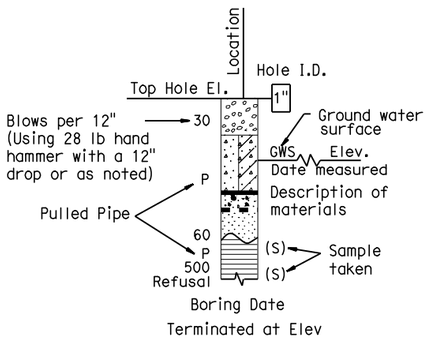
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers for rotary borings.

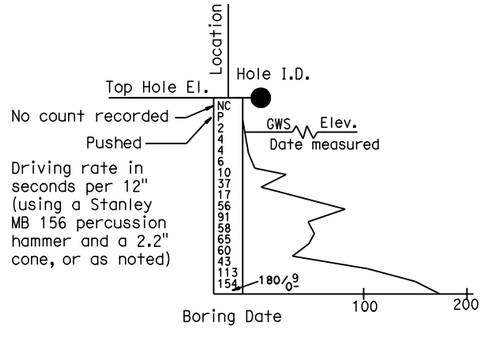
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



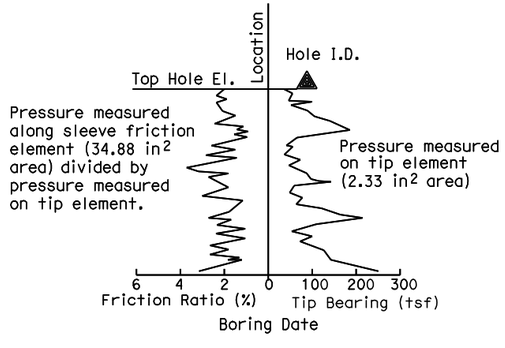
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 4

LOG OF TEST BORINGS 4 OF 5
TYPE 1 WALL NO. RW 3311
R-6

K. FERNANDES	KF	KF	KF	KF	KF
C. SCHEYHING	10/23/08	02/23/09	05/18/09		
DESIGNED BY	REVISED BY				
CHECKED BY	DATE REVISED				

CALCULATED-

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CONSULTANT FUNCTIONAL SUPERVISOR
C. SCHEYHING
Gibbons

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DGN FILE => $REQUEST
CU 12235
EA 071621

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06/30/09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 5

LOG OF TEST BORINGS 5 OF 5
TYPE 1 WALL NO. RW 3311
R-7

KF	05/18/09	
KF	02/23/09	
KF	10/23/08	
REVISED BY	DATE REVISED	
K. FERNANDES	C. SCHEYHING	
CALCULATED-DESIGNED BY	CHECKED BY	
C. SCHEYHING		

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 00-00-00
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => $USER
DGN FILE => $REQUEST

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
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Exp. 06/30/09 geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

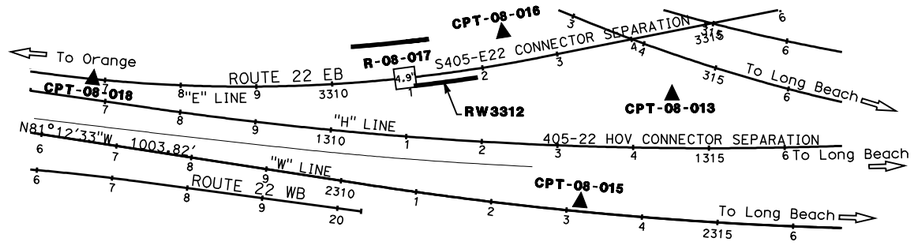
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

BENCHMARK:

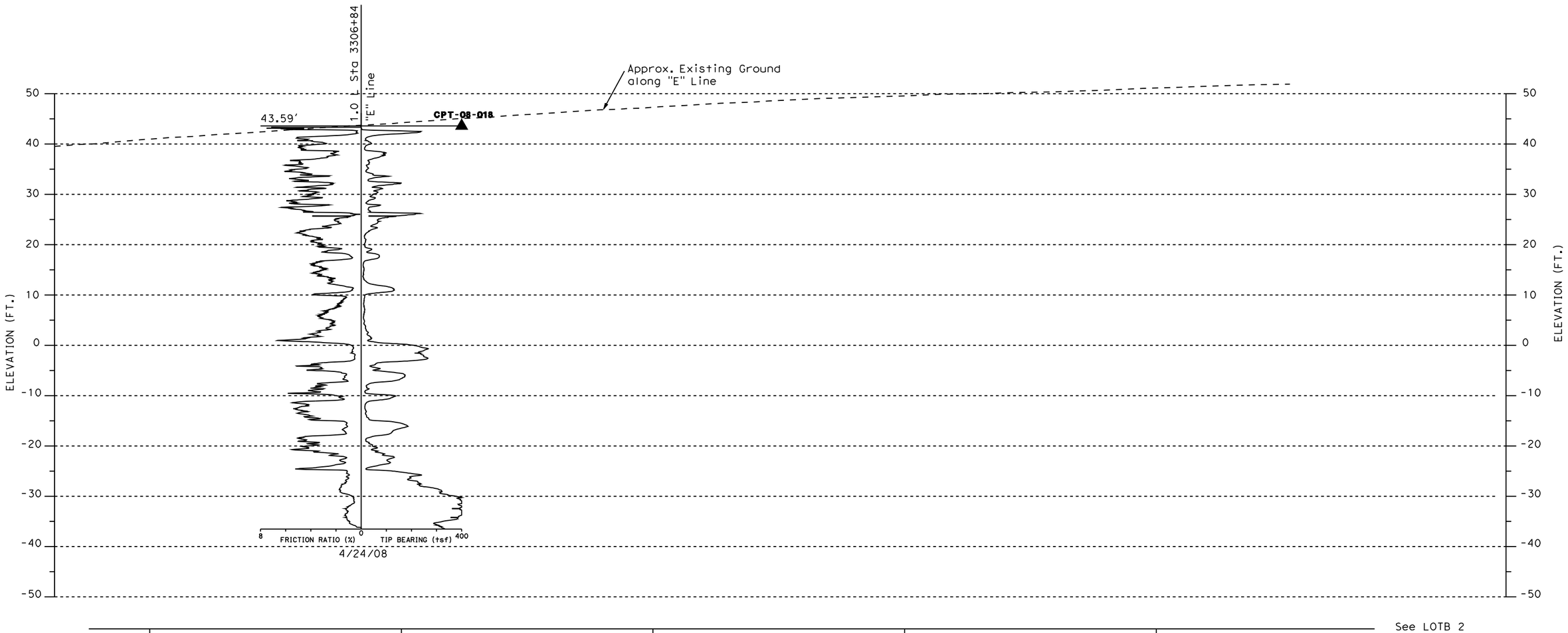
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 6

LOG OF TEST BORINGS 1 OF 5
TYPE 1 WALL NO. RW 3312
R-9

KF	KF	KF	K. FERNANDES	CALCULATED-DESIGNED BY	CONSULTANT FUNCTIONAL SUPERVISOR
KF	KF	KF	C. SCHEYHING	CHECKED BY	C. SCHEYHING
05/18/09	02/23/09	10/23/08	DATE REVISED	REVISED BY	STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 00-00-00
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => $USER DGN FILE => $REQUEST | CU 12235 | EA 071621

REVISED BY	DATE REVISED
KF	10/23/08
KF	02/23/09
KF	05/18/09

CALCULATED-DESIGNED BY: K. FERNANDES
CHECKED BY: C. SCHEYHING
CONSULTANT FUNCTIONAL SUPERVISOR: C. SCHEYHING
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

BENCHMARK:

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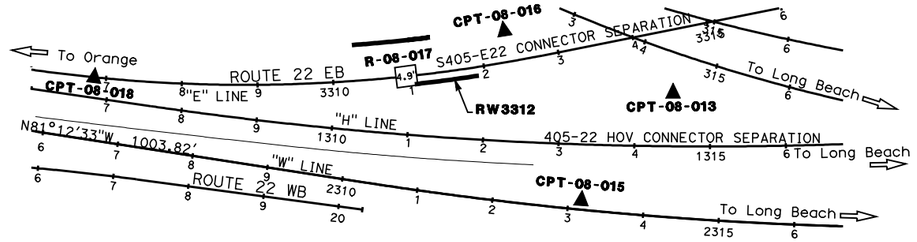
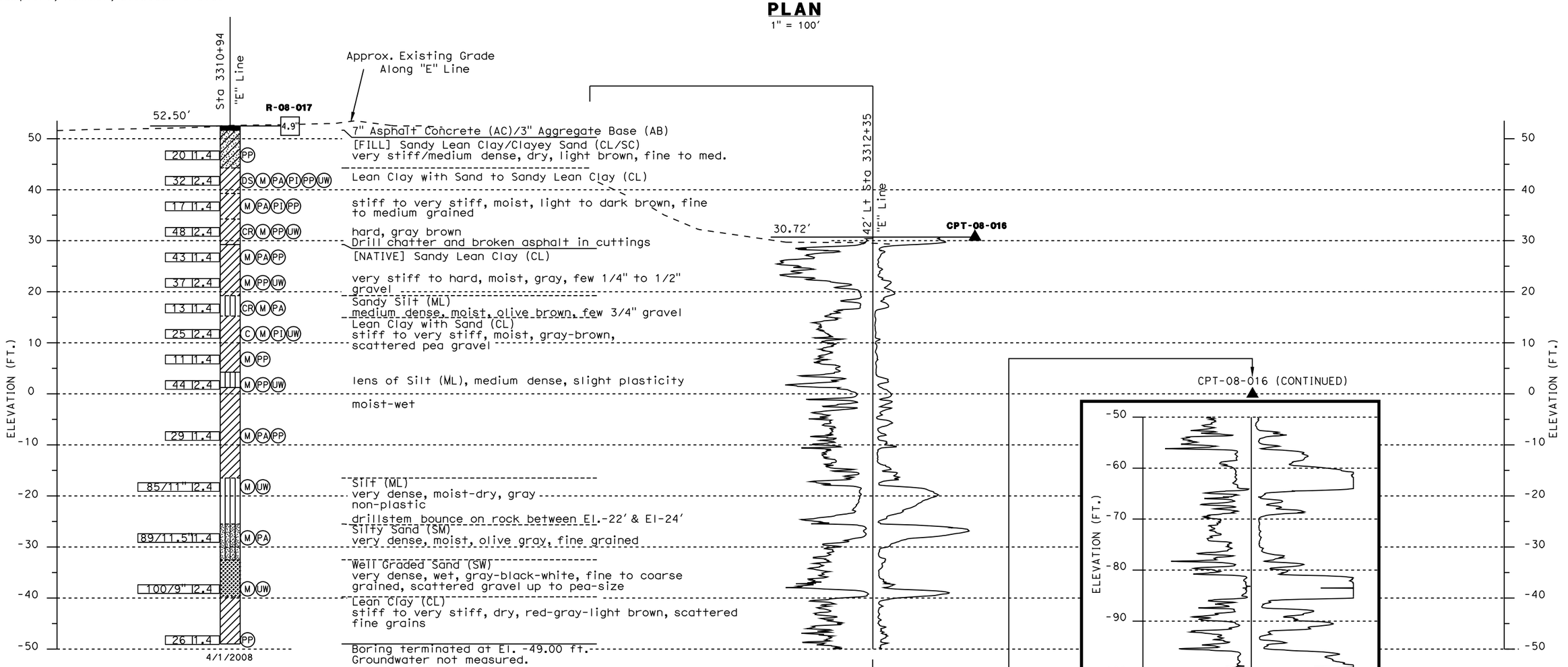
Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1 — See LOTB 3
3311+00 — 3312+00 — 3313+00
STATION NO. ALONG "E" LINE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06/30/09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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IRVINE, CA 92612

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550 SOUTH MAIN STREET
ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

PLATE 7

LOG OF TEST BORINGS 2 OF 5
TYPE 1 WALL NO. RW 3312
R-10

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06/30/09 geotechnical
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GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

REVISED BY	DATE REVISED
KF	10/23/08
KF	02/23/09
KF	05/18/09

CALCULATED-DESIGNED BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

CONSULTANT FUNCTIONAL SUPERVISOR: C. SCHEYHING

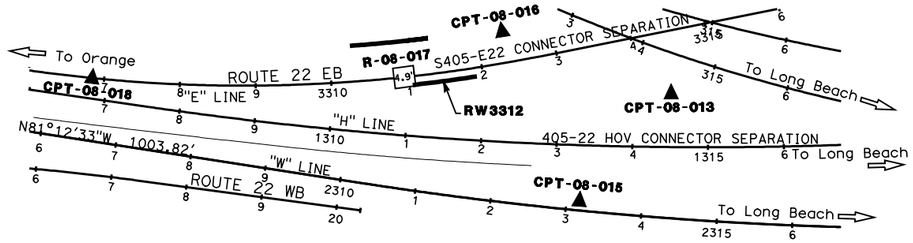
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

BENCHMARK:

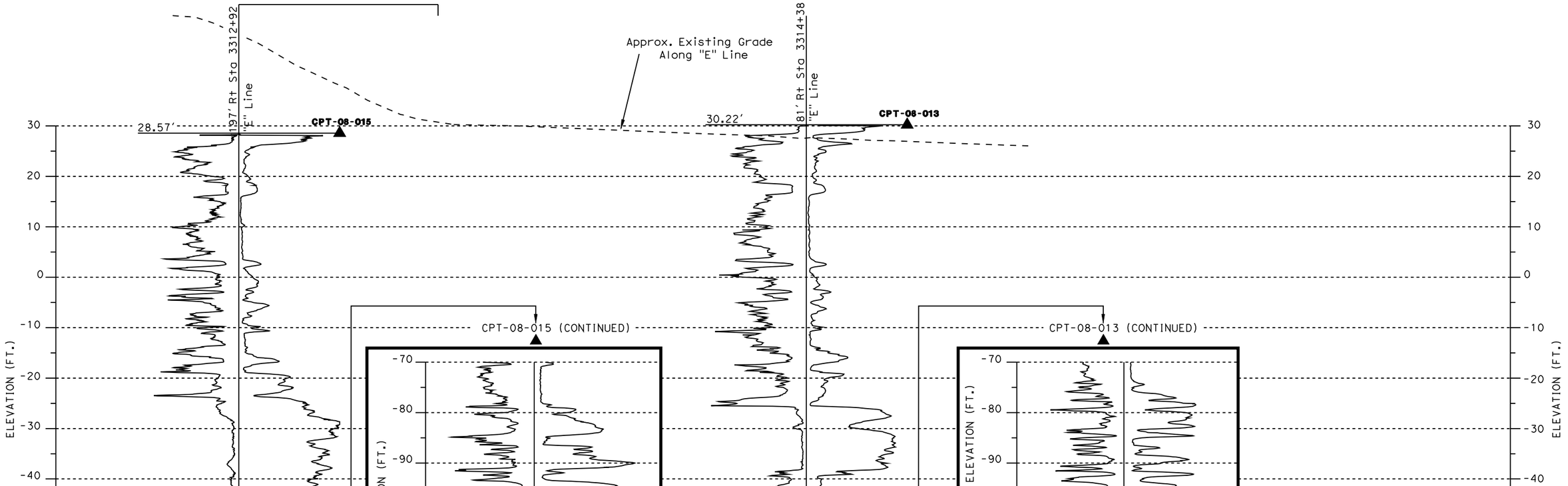
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 2

3312+00 3313+00 3314+00 3315+00
STATION NO. ALONG "E" LINE

PLATE 8

LOG OF TEST BORINGS 3 OF 5
TYPE 1 WALL NO. RW 3312
R-11

LAST REVISION 00-00-00
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => $USER | DGN FILE => $REQUEST | CU 12235 | EA 071621

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06/30/09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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PARSONS
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TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

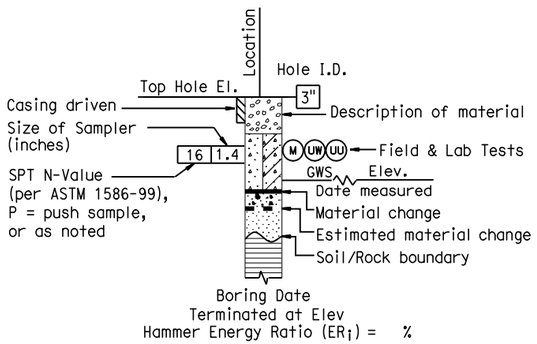
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes :

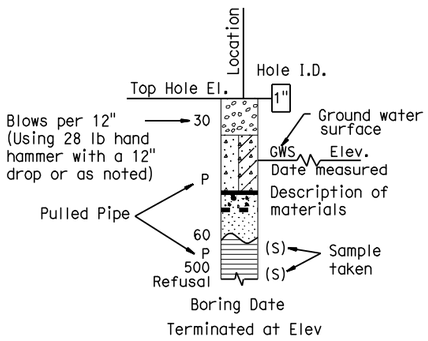
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers for rotary borings.

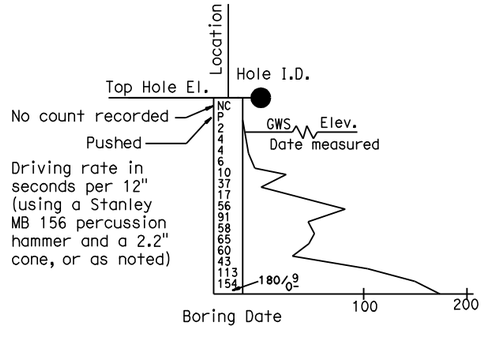
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



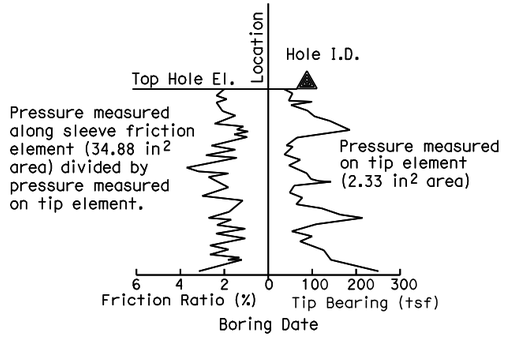
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 9

LOG OF TEST BORINGS 4 OF 5
TYPE 1 WALL NO. RW 3312
R-12

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
CONSULTANT FUNCTIONAL SUPERVISOR: C. SCHEYHING
CALCULATED-DESIGNED BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

REVISED BY	DATE REVISED
KF	10/23/08
KF	02/23/09
KF	05/18/09

LAST REVISION 00-00-00
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 4/11/2008
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
USERNAME => $USER
DGN FILE => $REQUEST
CU 12235
EA 071621

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
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- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06/30/09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 10

LOG OF TEST BORINGS 5 OF 5
TYPE 1 WALL NO. RW 3312
R-13

	REVISED BY	DATE REVISED
KF	KF	10/23/08
KF	KF	02/23/09
KF	KF	05/18/09

CALCULATED-DESIGNED BY: K. FERNANDES
CHECKED BY: C. SCHEYHING
CONSULTANT FUNCTIONAL SUPERVISOR: C. SCHEYHING
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 00-00-00
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 4/11/2008
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
USERNAME => $USER
DGN FILE => $REQUEST
CU 12235
EA 071621

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the project site were investigated by Group Delta Consultants, Inc. (GDC) by performing sixteen (16) soil borings (9 hollow-stem auger borings, and 7 rotary wash borings), and thirty-two (32) Cone Penetration Tests (CPTs) during the period of March 26 to May 9th, 2008. The borings were performed to depths of 16.5 feet to 137 feet below ground surface (bgs) and the CPTs were performed to depths of 20 to 164 feet bgs. In addition, on October 8th, 2008, eight (8) hand auger borings were advanced to depths of 5 feet bgs to collect supplemental near-surface samples for R-Value and index tests for pavement design. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at selected undercrossing, overcrossing, overhead sign, retaining wall, and new pavement locations. Locations of the borings and CPTs are presented in Figures 2A through 2N of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1.

14 hollow stem auger and rotary wash borings and 32 CPTs were performed from the freeway lanes, connector ramps, and shoulders of SR-22/I-405. 8 hand auger borings were performed from the freeway shoulders of SR-22/I-405 in or adjacent to proposed pavement areas. 2 borings were performed from surface streets in the vicinity of the Bolsa Chica Rd. OC. All of the exploration locations were within the Caltrans Right-of-Way (ROW), with the exception of R-08-019, and R-08-023, which were located within the Cities of Westminster and Garden Grove ROWs respectively.

Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night. The exploration methods are described in the following sections.

A.2 Soil Drilling and Sampling

A total of sixteen (16) soil borings; seven (7) rotary wash (R-08-004, R-05-005, R-08-011, R-08-012, R-08-017, R-08-019, and R-08-023), and nine (9) hollow-stem auger borings (A-08-101, A-08-103, A-08-105, A-08-112, A-08-115, A-08-116, A-08-119, A-08-120 and A-08-122) were drilled and sampled during this project. C & L Drilling, Inc. of La Habra, California drilled and sampled the rotary wash

borings. R & C Drilling, Inc. of Van Nuys, California drilled and sampled the hollow stem auger borings. All drilling companies acted as subcontractors to GDC. All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS) and were assigned a group name and group symbol, as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The rotary wash and hollow stem auger boring logs are presented in Figures A-2 through A-17d.

The rotary wash borings were drilled using a Mayhew 1000 drill rig. The hollow-stem auger borings were drilled using a Mobile B-61 drill rig. All drill rigs were truck mounted. The Mayhew 1000 used a 4.875-inch drill bit in conjunction with bentonite slurry to drill to desired depths. The Mobile B-61 used an 8-inch auger to bore to desired depths.

Additionally, eight (8) hand auger borings (HA-08-01 through HA-08-08) were advanced by GDC personnel using a nominal 3-inch diameter hand auger. The hand auger boring logs are presented in Figures A-50 through A-57.

Bulk samples of the near-surface soils were collected along the project alignment. Drive samples were collected from the borings generally at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using an automatic, downhole or rope and cathead hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive

sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured using a well sounder.

The hollow stem auger and hand auger borings were abandoned by backfilling the borehole with drill cuttings and cement grout mix as needed to the ground surface. The rotary wash borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with either asphalt patch or quickset cement.

Rotary wash borings drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California. for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of thirty-two (32) CPT soundings (CPT-08-001 through CPT-08-003, CPT-08-006 through CPT-08-009, CPT-08-013 through CPT-08-014B, CPT-08-015, CPT-08-016, CPT-08-018, CPT-08-020 through CPT-08-022, CPT-08-102 through CPT-08-111, CPT-08-113, CPT-08-114, CPT-08-117 through CPT-08-119, and CPT-08-121) were completed during the current project to depths ranging from 20 to 164 feet below ground surface. Kehoe Testing and Engineering, Inc. of Long Beach, California performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D5778 test standard using an electronic cone penetrometer. A 2.32-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly

continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in Appendix A on Figures A-18a through A-49b. Soil behavior type and other interpretations of the CPT data provided by Kehoe and are in our files.

At the completion of the sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned following each test by backfilling bentonite into the hole, to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1	Summary of Field Explorations
Table A-2	Borehole/CPT Survey Data

List of Figures

Figure A-1a	Key for Soil Classification
Figure A-1b	Boring Legend
Figures A-2 through A-17d	Hollow Stem and Rotary Wash Boring Logs
Figures A-18a through A-49b	Cone Penetration Test Results
Figure A-50 to A-57	Hand Auger Boring Logs

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
A-08-101	"A Line" 391+12 94 L	4/3/2008	A	19.5	21.5	L-12	15.5	4	
A-08-103	"A Line" 381+63 100 L	4/3/2008	A	19.5	31.5	L-12	13.2	6.3	
A-08-105	"A Line" 376+62 90 L	4/3/2008	A	19.8	41.5	L-11	18.3	1.5	
A-08-112	"A Line" 358+50 102 R	4/14/2008	A	23	41.5	L-10	Hole obstructed at 7.75 ft (dry)	NA	GW is below Elev. 15.3 feet
A-08-115	"A Line" 348+52 102 R	4/14/2008	A	21.5	16.5	L-9	Hole obstructed at 7.5 ft (dry)	NA	GW is below Elev. 14 feet
A-08-116	"A Line" 345+34 86 L	4/3/2008	A	22	16.5	L-9	11.4	10.6	
A-08-119	1335+66 105 R	4/14/2008	A	23	31.5	L-8	Hole obstructed at 5.7 ft (dry)	NA	GW is below Elev. 17 feet
A-08-120	1333+97 108 L	4/1/2008	A	25.86	51.50	L-8	12	13.86	
A-08-122	1322+20 176 R	4/14/2008	A	31.94	51.5	L-7	16.5	15.44	
CPT-08-001	1330+95 41 L	4/11/2008	CPT	24.92	163.5	L-7	Hole obstructed at 10' (dry)	NA	GW is below Elev. 14.92 feet
CPT-08-002	1328+67 53 R	3/26/2008	CPT	25.74	107.6	L-7	7	18.74	Inclination Refusal at 107.6'
CPT-08-003	1328+35 168 L	4/1/2008	CPT	27.74	150.0	L-7	Hole obstructed at 10' (dry)	NA	GW is below Elev. 17.74 feet
CPT-08-006	1321+35 243 L	3/31/2008	CPT	42.13	150.3	L-6	Hole obstructed at 20' (dry)	NA	GW is below Elev. 22.13 feet
CPT-08-007	1320+67 21 R	3/27/2008	CPT	27.27	105.5	L-6	Hole obstructed at 7' (dry)	NA	GW is below Elev. 20.27 feet
CPT-08-008	1319+18 200 L	4/1/2008	CPT	48.39	150.2	L-6	Hole obstructed at 34' (dry)	NA	GW is below Elev. 14.39 feet
CPT-08-009	1318+62 43 R	4/15/2008	CPT	29.33	130.3	L-6	Hole obstructed at 17' (dry)	NA	GW is below Elev. 12.33 feet
CPT-08-013	1314+50 71 L	4/15/2008	CPT	30.22	130.3	L-6	Hole obstructed at 16' (dry)	NA	GW is below Elev. 14.22 feet
CPT-08-014	1314+34 142 L	3/27/2008	CPT	27.93	61.0	L-6	Hole obstructed at 10' (dry)	NA	Inclination Refusal at 61 feet GW is below Elev. 17.93 feet
CPT-08-014B	1314+25 145 L	3/27/2008	CPT	27.94	79.9	L-6	Hole obstructed at 7' (dry)	NA	Inclination Refusal at 80 feet GW is below Elev. 20.94 feet
CPT-08-015	1313+33 73 R	3/31/2008	CPT	28.57	150.2	L-6	Hole obstructed at 12' (dry)	NA	GW is below EL. 16.57 feet
CPT-08-016	1312+20 146 L	4/15/2008	CPT	30.72	130.3	L-6	Hole obstructed at 15' (dry)	NA	GW is below Elev. 15.72 feet
CPT-08-018	"W Line" 2306+56 83 L	4/24/2008	CPT	43.59	80.1	L-3	Hole obstructed at 24' (dry)	NA	GW is below Elev. 19.59 feet

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
CPT-08-020	"W Line" 2301+43 102 L	4/1/2008	CPT	28.35	124.6	L-3	Hole obstructed at 12' (dry)	NA	GW is below Elev. 16.35 feet
CPT-08-021	"W Line" 2302+53 40 L	3/31/2008	CPT	25.97	150.2	L-3	Hole obstructed at 7' (dry)	NA	GW is below Elev. 18.97 feet
CPT-08-022	"W" Line" 2301+98 2 R	4/24/2008	CPT	25.20	118.5	L-3	Hole obstructed at 5' (dry)	NA	Tip Refusal to 118.5' GW is below Elev. 20.2 feet
CPT-08-102	"A Line" 386+73 94 L	4/3/2008	CPT	20	50.0	L-12	8	12	
CPT-08-103	"A Line" 381+73 100 L	4/3/2008	CPT	19.5	30.1	L-12	Hole obstructed at 9' (dry)	NA	GW is below Elev. 10.5 feet
CPT-08-104	"A Line" 378+20 108 R	4/14/2008	CPT	19.5	50.3	L-11	Hole obstructed at 7' (dry)	NA	GW is below Elev. 12.5 feet
CPT-08-105	"A Line" 376+72 90 L	4/3/2008	CPT	19.8	40.3	L-11	Hole obstructed at 8' (dry)	NA	GW observed at 18.3' (El. 1.5 ft) in nearby A-08-105
CPT-08-106	"A Line" 373+20 104 R	4/14/2008	CPT	20	40.4	L-11	Hole obstructed at 5' (dry)	NA	GW is below Elev. 15 feet
CPT-08-107	"A Line" 371+74 90 L	4/3/2008	CPT	20.5	50.1	L-11	Hole obstructed at 9' (dry)	NA	GW is below Elev. 11.5 feet
CPT-08-108	"A Line" 368+16 104 R	4/14/2008	CPT	21	30.2	L-11	Hole obstructed at 11' (dry)	NA	GW is below Elev. 10 feet
CPT-08-109	"A Line" 366+70 90 L	4/3/2008	CPT	22	30.1	L-10	Hole obstructed at 8' (dry)	NA	GW is below Elev. 12 feet
CPT-08-110	"A Line" 363+24 106 R	4/14/2008	CPT	23	50.2	L-10	Hole obstructed at 5' (dry)	NA	GW is below Elev. 18 feet
CPT-08-111	"A Line" 361+62 88 L	4/3/2008	CPT	23	40.4	L-10	Hole obstructed at 9' (dry)	NA	GW is below Elev. 14 feet
CPT-08-113	"A Line" 356+88 88 L	4/3/2008	CPT	22.5	40.1	L-10	Hole obstructed at 7' (dry)	NA	GW is below El. 15.5 feet
CPT-08-114	"A Line" 353+82 105 R	4/14/2008	CPT	21.5	30.2	L-9	Hole obstructed at 5' (dry)	NA	GW is below El. 16.5 feet
CPT-08-117	1340+34 100 R	4/14/2008	CPT	22	50.1	L-8	Hole obstructed at 7' (dry)	NA	GW is below Elev. 15 feet
CPT-08-118	1340+00 94 L	4/3/2008	CPT	24	20.1	L-8	Hole obstructed at 9' (dry)	NA	GW is below Elev. 15 feet
CPT-08-119	1335+56 105 R	4/14/2008	CPT	23	50.3	L-8	Hole obstructed at 6' (dry)	NA	GW is below Elev. 17 feet
CPT-08-121	1327+42 159 R	4/14/2008	CPT	28.41	30.1	L-7	Hole obstructed at 9' (dry)	NA	GW is below Elev. 19.41 feet
HA-08-01	"B" 293+60 95R	10/8/2008	HA	26	5.0	L-2	NE	NA	GW is below Elev. 21
HA-08-02	"E Line" 3299+42 51L	10/8/2008	HA	27	5.0	L-3	NE	NA	GW is below Elev. 22
HA-08-03	"W Line" 2302+04 84L	10/8/2008	HA	28	5.0	L-3	NE	NA	GW is below Elev. 23

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
HA-08-04	"E Line" 3307+28 74R	10/8/2008	HA	43	5.0	L-3	NE	NA	GW is below Elev. 38
HA-08-05	"NB 405" 310+50 128R	10/8/2008	HA	24.9	5.0	L-6	NE	NA	GW is below Elev. -19.9
HA-08-06	"W" 51+08 61L	10/8/2008	HA	29	5.0	L-5	NE	NA	GW is below Elev. 24
HA-08-07	"NB405" 314+20 90L	10/8/2008	HA	28.5	5.0	L-6	NE	NA	GW is below Elev. 23.5
HA-08-08	"A Line" 374+70 104L	10/8/2008	HA	20	5.0	L-11	NE	NA	GW is below Elev. 15
R-08-004	1325+03 165 L	4/24/2008	R	31.21	61.5	L-7	NA	NA	
R-08-005	1324+48 63 R	3/27/2008	R	27.83	137.0	L-7	NA	NA	
R-08-011	1316+25 20 L	4/15/2008	R	29.54	121.5	L-6	NA	NA	
R-08-012	1315+94 196 L	4/11/2008	R	24.10	101.5	L-6	9	15.1	
R-08-017	1310+93 76 L	4/1/2008	R	52.50	101.5	L-6	NA	NA	
R-08-019	"V V Line" 38+33 47 R	4/23/2008	R	53.62	86.5	L-4	NA	NA	
R-08-023	"V V Line" 44+88 28 L	5/8/2008	R	46.16	96.5	L-3	31	15.16	

Notes:
1. Stationing relative to SR-22 "H" line, except where noted otherwise. Right and left offsets defined by looking along station line in direction of increasing station.
2. Elevations based upon topographic contours in Figure 2 of main report, except for borings/CPTs reported to 0.01 ft., which were surveyed

NA = Not Available
NE = Not encountered

A = Auger Boring
CPT = Cone Penetration Test
HA = Hand Auger Boring
R = Rotary Wash Boring

Table A-2
Borehole / CPT Survey Data

Pt. No.	Northing	Easting	Elev. (ft)	Description
106	2230280	6018519	46.16	R-08-023 SHOT @ AC FS
107	2229764	6018108	53.62	R-08-019 SHOT @ AC FS
110	2230155	6018384	25.2	CPT-08-022 SHOT @ AC/FS
112	2230043	6018423	28.35	CPT-08-020 SHOT @ AC/FS
114	2230141	6017919	43.59	CPT-08-018 SHOT @ AC/FS
115	2230122	6018324	25.97	CPT-08-021 SHOT @ AC/FS
117	2230079	6017378	30.72	CPT-08-016 AC/FS
118	2230161	6017155	30.22	CPT-08-013 AC/FS
119	2230303	6017276	28.57	CPT-08-015 AC/FS
120	2230211	6016981	29.54	R-08-011 AC/FS
121	2230262	6016741	29.33	CPT-08-009 AC/FS
123	2230036	6017016	24.1	R-08-012
125	2230090	6017170	27.93	CPT-08-14 (W'LY) CONC. FS
126	2230087	6017179	27.94	CPT-08-14B (W'LY) CONC. FS
130	2230140	6017510	52.5	R-08-017 AC/FS
132	2230223	6016538	27.27	CPT-08-007
135	2230303	6015854	28.41	CPT-08-121
136	2230233	6016155	27.83	R-08-005
137	2230365	6016376	31.94	A-08-122
140	2229878	6016920	23.82	EMH CL OF MH CONDUIT IS DOWN 8 FT FROM MH # 140
144	2230187	6015739	25.74	CPT-08-002
145	2230074	6015519	24.92	CPT-08-001
146	2229984	6015221	25.86	A-08-120
147	2229970	6015789	27.74	CPT-08-03
149	2230001	6016120	31.21	R-08-004 FS @ CONC
151	2229955	6016494	42.13	CPT-08-006 FS @ AC
152	2230016	6016705	48.39	CPT-08-008 FS @ AC

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

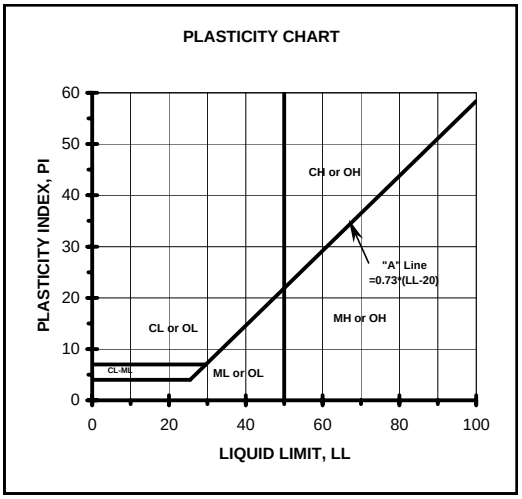
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375-inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME		**PROJECT NUMBER**	**BORING**
SR-22 West Orange County Connectors		I-436	**A-08-101**
SITE LOCATION	**START**	**FINISH**	**SHEET NO.**
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 1

DRILLING COMPANY	**DRILLING METHOD**	**LOGGED BY**	**CHECKED BY**
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	**BORING DIA. (in)**	**TOTAL DEPTH (ft)**	**GROUND ELEV (ft)**	**DEPTH*ELEV.* GROUND WATER (ft)**
Mobile B-61	8	21.5	19.5	▼ 15.5 / *4.0*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **7" Aggregate Base (AB)**
			B1			12	CR RV	37	31:11			**Clayey Sand (SC)** moist, brown, fine to medium grained with pea-sized to 1/2" gravel medium dense
			R2	12 20 23	110.3	15						
	15											
5			S3	13 9 10		24		86				**Lean Clay (CL)** very stiff, moist, brown, with fine to coarse grains and fine granite gravel
	10											
10			R4	7 10 18	91.3	29				2.0		
	5											**Lean Clay with Sand (CL)** stiff, olive-brown with trace of orange mottling, fine grained, with fine gravel of clay cemented sand
15			S5	5 6 6		28		72		1.25		▼
	0											
20			R6	12 12 16	93.5	28				1.25		stiff to very stiff, with some rounded fine quartz grains
	-5											*Boring terminated at 21.5 feet below ground surface (bgs).* *Groundwater encountered at 15.5 feet bgs.* *Borehole backfilled with soil cuttings and grout mix and patched with asphalt.*

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-103**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	31.5	19.5	▼ 13.2 / *6.3*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5" Asphalt Concrete (AC) **5" Aggregate Base (AB)** **Silty, Clayey Sand (SC)** moist, brown, fine to coarse grained, with subrounded granite gravel up to 3", dominantly fine-sized
			B1				RV					
5	15											
			R2	5 7 9	88.8	26						medium dense, interbedded Silty, Clayey Sand (SC-SM) and Silty Sand (SM)
												Silty Sand (SM) medium dense, moist, brown, fine grained, with trace of clay
												Lean Clay (CL) firm, moist, olive brown, some fine to medium grains
10	10											
			S3	2 3 3		31				0.5		
												Sandy Lean Clay (CL) stiff, moist, olive brown, fine grained
15	5											
			R4	12 13 18	96.1	28		65		1.5		stiff to very stiff
	0											
20			S5	7 7 7		24				1.25		
	-5											

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FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-103**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	31.5	19.5	▼ 13.2 / *6.3*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R6	12 20 20	101.7	24				2.75		**Sandy Lean Clay (CL)** very stiff, moist, olive brown, fine grained, with some silt
	-10											**Clayey Silt (ML)** very stiff, moist-wet, olive gray, fine grained
30			S7	12 14 14		29		45				**Silty Sand (SM)** medium dense, wet, gray, fine grained
												Boring terminated at 31.5 feet below ground surface (bgs). *Groundwater encountered at 13.2 feet bgs.* *Borehole backfilled with soil cuttings and grout mix and patched with asphalt.*
	-15											
35												
	-20											
40												
	-25											
45												
	-30											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-105**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	41.5	19.8	▼ 18.3 / *1.5*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												6.5" Asphalt Concrete **8" Aggregate Base**
			B1			11		27	28:14			**Clayey Sand (SC)** moist, brown, fine to coarse grained, with gravel up to 1.5"
5	15											
												Sandy Lean Clay (CL) stiff, moist, olive brown, fine grained
10	10		R2	8 12 15	99.2	23	CR	62		1.0		
15	5											
												very stiff, grading coarser to Clayey Sand (SC)
20	0		R3	12 14 19	105.4	22						**Clayey Sand (SC)** medium dense, moist, olive brown, fine grained, with some silt
	-5											

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FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** A-08-105
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/3/2008	**FINISH** 4/3/2008	**SHEET NO.** 2 of 2
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 41.5	**GROUND ELEV (ft)** 19.8
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**		**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ 18.3 / *1.5*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
30	-10		R4	10 15 16	107.2	18						**Clayey Sand (SC)** medium dense, moist, olive brown, fine grained, with some silt
35	-15											**Silty Sand (SM)** medium dense, wet, gray, fine grained
40	-20		R5	19 25 50/5"	104.6	22		35	NP			very dense
45	-25											*Boring terminated at 41.5 feet below ground surface (bgs).* *Groundwater encountered at 18.3 feet bgs.* *Borehole backfilled with soil cuttings and grout mix and patched with asphalt.*
	-30											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **A-08-112**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 1 of 2
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 41.5	**GROUND ELEV (ft)** 23
DEPTH *ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **9" Aggregate Base (AB)**
	20		B1			11	CR	45				**Clayey Sand (SC)** moist, brown, fine to medium grained, with pieces of hard clay up to 1/2"
5			S2	4 2 4		31						
	15											**Silty Clay (CL)** firm, moist, olive brown, scattered fine grains pocket penetrometer=0.75 tsf
10			R3	5 7 8	88.8	33		62		1.0		**Sandy Clayey Silt (ML)** firm to stiff, moist-wet, olive gray, fine grained
	10											
15			S4	5 5 5		32		77	NP	0.75		**Silt with Sand (ML)** firm to stiff, moist-wet, olive gray, scattered fine grains
	5											
20			R5	8 11 15	101.8	24				1.2		stiff to very stiff, scattered fine grains up to fine gravel
	0											

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FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-112**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mobile B-61	8	41.5	23	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S6	5 7 10		24				1.25-1.5		**Silt with Sand (ML)** stiff to very stiff, moist-wet, olive gray, scattered fine grains
	-5											
30			R7	10 15 20	93.8	26				2.0-3.0		**Silty Clay (CL)** stiff to very stiff, moist, olive gray, no grains visible
	-10											
35			S8	10 15 24		44						hard
	-15											
40			R9	20 30 50/6"	95.2	27				3.5		**Silt (ML)** dense/very stiff to hard, moist, olive gray, trace to no clay
	-20											*Boring terminated at 41.5 feet below ground surface (bgs).* *Borehole obstructed at 7.75 feet bgs after removal of auger, possible caving.* *No groundwater encountered to 7.75 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
45												
	-25											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-5 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **A-08-115**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 1 of 1
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 16.5	**GROUND ELEV (ft)** 21.5
DEPTH *ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **8" Aggregate Base (AB)**
	20											**Sandy Lean Clay/Clayey Sand (CL/SC)** moist, brown,fine to medium grained with scattered fine gravel
			B1			24	RV	75				**Lean Clay with Sand (CL)** stiff, moist, olive brown, trace of silt
5												
			R2	5 6 9	89.6	29		80		2.0		
	15											
10												
			S3	3 3 4		29				1.25		firm to stiff, with some silt
	10											
												Interbedded Clayey Silt (ML) and Silty Sand (SM) stiff to very stiff/medium dense, moist, olive gray
15												
			R4	7 12 12	94	27				1.7		
	5											**Silty Clay (CL)** stiff to very stiff, moist, olive gray
												Boring terminated at 16.5 feet below ground surface (bgs). *Borehole obstructed at 7.5 feet bgs after removal of auger, possible caving.* *No groundwater encountered to 7.5 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
20												
	0											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-6

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-116**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	16.5	22	▼ 11.4 / *10.6*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **6.5" Aggregate Base (AB)**
	20		B1			4	PA	8				**Well Graded Sand with Silt (SW-SM)** loose, moist, yellow brown, fine to coarse grained with some fine gravel up to 3/4"
5			R2	6 7 7	99	23		86	37:17	2.0		**Lean Clay (CL)** stiff, moist, olive brown, with few scattered fine to coarse grains
	15											
10												brown gray
	10		S3	3 4 5		29	CR			1.0		
15												very stiff
			R4	6 9 15	96.7	27				2.1-2.6		
	5											**Silty Sand (SM)** medium dense, wet, brown, fine grained
20												*Boring terminated at 16.5 feet below ground surface (bgs).* *Groundwater encountered at 11.4 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
	0											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-7

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **A-08-119**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 1 of 2
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 31.5	**GROUND ELEV (ft)** 23
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5" Asphalt Concrete (AC) **5" Aggregate Base (AB)**
												Silty Clayey Sand (SC) moist, olive brown, fine grained
	20		B1			15		36	32:12			
5			S2	5 8 9								medium dense no sample recovery, Lean Clay with sand (CL) in sampler shoe
	15											**Lean Clay with Sand (CL)** stiff to very stiff, moist-wet, olive brown, with scattered fine to coarse grains and few fine gravel
10			R3	8 12 15	88.3	31				1.0		with some interbedded Silt (ML) and Silty Sand (SM)
	10											
15			S4	6 7 11		27		72		1.75-2.0		very stiff
	5											
20			R5	10 15 25	99.4	26	CR					
	0											**Silty Clay (CL)** stiff to very stiff, moist-wet, olive gray, with few scattered fine grains, no gravel

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-8 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-119**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mobile B-61	8	31.5	23	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S6	7 12 14		24				1.5-2.0		**Silty Clay (CL)** stiff to very stiff, moist-wet, olive gray, with few scattered fine grains, no gravel
	-5											
30			R7	30 50/6"	99.1	26				1.25		
	-10											**Silty Sand (SM)** very dense, olive brown, fine grained *Boring terminated at 31.5 feet below ground surface (bgs).* *Borehole obstructed at 5.67 feet bgs after removal of auger, possible caving.* *No groundwater encountered to 5.67 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
35												
	-15											
40												
	-20											
45												
	-25											

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FIGURE A-8 b

LOG OF TEST BORING

PROJECT NAME: SR-22 West Orange County Connectors	PROJECT NUMBER: I-436	BORING: **A-08-120**	
SITE LOCATION: Cities of Seal Beach, Westminster, and Garden Grove, California	START: 4/1/2008	FINISH: 4/1/2008	SHEET NO.: 1 of 3
DRILLING COMPANY: R & C Drilling Inc.	DRILLING METHOD: Hollow Stem Auger	LOGGED BY: S. Navaratnarajah	CHECKED BY: C. Scheyhing
DRILLING EQUIPMENT: Mobile B-61	BORING DIA. (in): 8	TOTAL DEPTH (ft): 51.5	GROUND ELEV (ft): 25.86
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)	NOTES: Surveyed 01/09		DEPTH/*ELEV.* GROUND WATER (ft): ▼ 12.0 / *13.9*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	25											**3" Asphalt Concrete (AC)** **9" Aggregate Base (AB)**
												Sandy Lean Clay (CL) moist, dark brown-black
			B1			9	RV	27				**Silty Sand (SM)** moist, light brown, fine to medium grained, with lenses of clay
5												
	20		R2	4 6 11	103.7	11						medium dense
												Clayey Sand (SC) medium dense, moist-wet, dark brown, fine grained
10												
	15		S3	2 4 8		21						▼
												Lean Clay with Sand (CL) firm-stiff, wet, dark brown, with lenses of fine grained sand
15												
	10		R4	4 6 8		29	CN	72	36:17	0.5		
20												
	5		S5	9 8 15		26				2.0-2.25		**Silty Clay (CL)** very stiff, wet, dark brown
												Clayey Sand (SC) medium dense, wet, dark brown, fine grained

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FIGURE A-9 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-120**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	S. Navaratnarajah	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	25.86	▼ 12.0 / *13.9*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0		R6	7 13 13	99.2	25						**Clayey Sand (SC)** medium dense, wet, dark brown, fine grained
30	-5		S7	6 17 23		24						**Sandy Silt (ML)** medium dense to dense, wet, dark brown, fine grained
35	-10		R8	9 20 22	100.3	25		55	NP			
40	-15		S9	20 22 30		21						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
45	-20		R10	26 50/6"	97.1	27		19				

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FIGURE A-9 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **A-08-120**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/1/2008	**FINISH** 4/1/2008	**SHEET NO.** 3 of 3
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** S. Navaratnarajah	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 25.86	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ 12.0 / *13.9*
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** Surveyed 01/09			

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-25		S11	20 27 30		28						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
												Boring terminated at 51.5 feet below ground surface (bgs). *Groundwater encountered at 12 feet bgs.* *Borehole obstructed below 5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
55	-30											
60	-35											
65	-40											
70	-45											

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FIGURE A-9 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** A-08-122
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/14/2008	**FINISH** 4/14/2008	**SHEET NO.** 1 of 3
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 31.94
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ 16.5 / *15.4*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **7" Aggregate Base (AB)**
	30		B1			7	CR	23	26:11			**Clayey Sand (SC)** moist-dry, light brown, fine to coarse grained with pieces of hard brown clay up to 3/4"
5			R2	5 7 19	107.6	18	CN					medium dense, becomes brown, finer, with scattered gravel up to 1/2"
	25											
10			S3	5 11 14		13		40				with chunk of asphalt at 10 feet depth
	20											
15			R4	11 13 16	100	23		26				▼ **Silty Sand (SM)** medium dense, moist, olive gray, fine grained
	15											**Lean Clay (CL)** stiff, moist, olive brown
20			S5	3 4 8						1.0		
	10											**Poorly Graded Sand (SP)** medium dense, moist, orange brown
												Silty Clay with Sand (CL) stiff to very stiff, moist, olive gray

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-10 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	31.94	▼ 16.5 / *15.4*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R6	9 16 20	87.2	31		88		1.5-1.75		**Silty Clay (CL)** stiff to very stiff, moist, olive gray
	5											
30			S7	5 6 9		26						**Silty Sand (SM)** medium dense, moist, gray olive, fine grained
	0											
35			R8	11 20 35	96.8	28		26				dense, some clay
	-5											
												Silty to Clayey Sand (SC/SM) dense, wet, olive gray, fine grained
40			S9a	13 14 20		30						
			S9b							2.0-2.5		**Silty Clay (CL)** very stiff to hard, moist, olive gray
	-10											
												Clayey Silt (ML) very stiff to hard, moist, olive brown
45			R10	20 50/6"	86.4	35				2.0-2.75		**Silty Clay (CL)** very stiff to hard, wet-moist, olive gray
	-15											

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FIGURE A-10 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	31.94	▼ 16.5 / *15.4*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S11	20 30 30		27						**Silty Sand/Sandy Silt (SM/ML)** very dense/hard, wet-moist, olive gray, fine grained
	-20											*Boring terminated at 51.5 feet below ground surface (bgs).* *Groundwater encountered at 16.5 feet bgs.* *Borehole obstructed below 22.5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
55	-25											
60	-30											
65	-35											
70	-40											

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FIGURE A-10 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

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FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.

NOTES: Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	30											**8.25" Concrete Pavement (PCC)** **4.75" Concrete Treated Base** **3" Aggregate Base (AB)**
												9" Poorly Graded Sand (SP) moist, red-yellow, fine grained
			B1			16	CR RV	66	29:12			**Sandy Lean Clay (CL)** firm, moist, dark brown, in chunks up to 1.5"
			R2	13 25 30	117.1	16	DS			4.5+		hard, dry, dark gray, fine grained
5	25											**Sandy Silt (ML)** dense/hard, dry-moist, brown, fine grained, trace of clay
10	20		S3	6 12 18		22		66		4.5+		
												Lean Clay (CL) stiff, moist, olive brown
15												pocket penetrometer = 1.0-1.25
	15		R4	5 9 13	100.5	24		27				**Silty Sand (SM)** medium dense, wet, light brown gray, fine grained with occasional coarse grains and few fine gravel, with clay
												Sandy Lean Clay (CL) firm to stiff, wet, olive light brown, very fine grains barely visible with some to trace of silt
20	10		S5	2 3 4		31		66		1.0		
												Lean Clay (CL) stiff, moist, gray olive brown

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FIGURE A-11 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	5		R6	5 7 12	91.1	31	DS			1.25-1.5		**Lean Clay (CL)** stiff, moist, gray olive brown, no visible sand grains, with fine to 3/4" angular light gray fine grained sandstone gravel in sampler shoe
												Sandy Lean Clay (CL) stiff, moist, olive gray, trace fine grains, with some silt
30	0		S7	2 5 8		29		55				
35	-5		R8	8 8 14	92.3	30				1.5-2.2		stiff to very stiff, less silt, occasional fine grain
40	-10		S9	2 7 14		32				2.0		
45	-15		R10	20 27 38	105.2	22		51		4.5		**Sandy Silt/Silty Sand (ML/SM)** very dense/hard, gray, trace of clay

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FIGURE A-11 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-004
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/24/2008	**FINISH** 4/24/2008	**SHEET NO.** 3 of 3
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 61.5	**GROUND ELEV (ft)** 31.21
DEPTH *ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-20		S11	10 8 11		32		86				**Lean Clay with Sand (CL)** very stiff, wet, olive gray, little to no silt, rolls very good thread
55												**Silt (ML)** dense/hard, wet, gray,with some fine grains and clay
	-25		R12	12 23 25	109.6	19				4.5+		
60												**Sandy Silt (ML)** dense, wet, gray olive, fine grains barely visible
	-30		S13	9 13 20		26		56				
65												*Boring terminated at 61.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
	-35											
70												
	-40											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-11 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 1 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												8.5" Concrete Pavement (PCC) **8.5" Lean Concrete/slurry** **6" Aggregate Base (AB)**
	25		B1			16	RV	63	29:9			**Sandy Lean Clay (CL)** moist, gray, very fine grains and few coarse grains, rolls very good thread
5			R1	3 9 16	108.3	19	CN PA	53	32:13	4.5+		dark gray, very stiff to hard, with silt
	20											
10			S2	3 5 5		26	PA	18				**Silty Sand (SM)** loose to medium dense, moist-wet, gray brown, fine grained
	15											**Sandy Silty Clay (CL)** stiff, moist, brown gray, fine grained
15			R3	5 6 7	98	27	DS	65				
	10											
20			S4	3 3 4		29						**Silty Sand (SM)** loose, wet, gray brown, fine grained with scattered coarse grains
	5											**Silty Clay with Sand (CL)** stiff, moist, brown gray, fine grained

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-12 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	2 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	7 12 12	97.6	26		24				**Silty Sand (SM)** medium dense, wet, gray brown, fine grained with scattered coarse grains and fine gravel of clay cemented coarse sand
	0											**Lean Clay (CL)** stiff, wet-moist, gray brown
30			S6	3 4 8		41		97	46:20	1.25		
	-5											
35												
	-10											
40			S7	4 4 8		31			39:20	1.5		with very fine to coarse sand grains and some silt
	-15											**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay harder drilling
45												
	-20											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-12 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	3 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R8	18 28 23	103	23		85		4.5		**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay, slight to no plasticity
	-25											
55												**Lean Clay with Sand (CL)** hard, wet, scattered fine grains
	-30											
60												
	-35											
65												
	-40											
70			R9	30 50/6"		45		75	43:19	4.5		very stiff to hard Torvane = 3.6 to 4.0 ksf
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-12 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 4 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
80	-50											
85	-55											
90	-60											
95	-65											
	-70											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-12 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	5 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
105	-75	⋈	R10	50/5"	82.4	39				2.5		**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)**hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray, drill chatter at 100'
110	-80											
115	-85											
120	-90											
	-95											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-12 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	6 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
130	-100											**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)**hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
												drill chatter
135	-105		S11	12 17 32		27						
												Boring terminated at 137 feet below ground surface (bgs). *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
140	-110											
	-115											
145												
	-120											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-12 f

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Asphalt Concrete (AC) **Aggregate Base (AB)**
												Clayey Sand (SC) medium dense, moist, olive brown, fine grained, with some silt
5	25		S1	7 12 13		19		47	33:14			
10	20		R2	7 12 20	96.9	19						
15	15		S3	2 2 4		31	CR			0.5		**Sandy Lean Clay (CL)** firm, wet, olive brown, fine grained, scattered few fine gravel, rolls very good thread
20	10		R4	4 8 11	94.6	24	CN	52	34:18	1.0		stiff, olive gray, with gravelly lense at 20' to 20.3' containing sunrounded to angular black and gray with orange limonite stained granite pieces 1/4" to 3/4"
	5											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-13 a

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 2 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	4 5 5		46						**Sandy Lean Clay (CL)** stiff, wet, olive brown, fine grained, with few fine gravel
	0											**Sandy Silt (ML)** stiff to very stiff, moist, gray, single black and white granodiorite cobble 2.5", with some clay and decomposed organic fibers
30			R6	5 13 18	93.2	30				1.5		
	-5											
35			S7	4 11 16		28		68		1.0		with fine angular gravel in thin lense at 35', little to no clay
	-10											**Silty Clay with Sand (CL)** hard, moist, gray, rolls very poor thread, with some gravel in lense at 40'
40			R8	11 15 32	97.9	25		80		4.0		
	-15											
45			S9	10 20 30		33						**Clayey Silt (ML)** hard, moist, gray, no gravel
	-20											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-13 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 3 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	14 24 36	83.9	35				3.5		**Clayey Silt (ML)** hard, moist, gray, no gravel **Silt (ML)** very dense, moist, gray, trace to no clay
55	-25											
												Well Graded Sand with Silt (SW-SM) very dense, wet, gray-red-black-brown, fine to medium grained
60	-30		S11	26 44 50/4"		15	PA	7				
65	-35											**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains
70	-40		R12	27 28 50/5"	114.8	17			31:16	3.5		
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-13 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-50		S13	11 21 32		17		45				**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains **Clayey Sand (SC)** very dense, dry-moist, light brown-gray-orange, fine grained
85	-55											**Silty Sand (SM)** very dense, moist, gray, fine grains barely visible, trace to no clay
90	-60		R14	20 37 48	102.4	24		29				
95	-65											**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-70											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-13 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S15	11 22 48		40						**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-75											
105												**Silty Sand (SM)** very dense, moist, gray, fine grained
	-80											
110												
	-85											
115												
	-90											
120			R16	40 50/4"		24		27				*Boring terminated at 121.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-95											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-13 e

LOG OF TEST BORING

PROJECT NAME		**PROJECT NUMBER**	**BORING**
SR-22 West Orange County Connectors		I-436	**R-08-012**
SITE LOCATION	**START**	**FINISH**	**SHEET NO.**
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	1 of 5
DRILLING COMPANY	**DRILLING METHOD**	**LOGGED BY**	**CHECKED BY**
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing
DRILLING EQUIPMENT	**BORING DIA. (in)**	**TOTAL DEPTH (ft)**	**GROUND ELEV (ft)**	**DEPTH*ELEV.* GROUND WATER (ft)**
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*
SAMPLING METHOD	**NOTES**			
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09			

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												4" Asphalt Concrete (AC) **8" Aggregate Base (AB)**
												Lean Clay with Sand (CL) stiff to very stiff, moist-wet, dark brown, fine to medium grained, tiny flecks of mica
5	20		R1	4 5 9	95.8	28		80	47:27	2.4		
												▼
10	15		S2	1 1 2		39				0.75		**Lean Clay (CL)** firm, wet, dark brown
												Sandy Lean Clay (CL) stiff to very stiff, wet, fine to medium grained, tiny flecks of mica
15	10		R3	3 6 8	102.1	24	DS	58		2.75		
20	5		S4	2 2 3		27				1.1		with some fine gravel
	0											**Silty Lean Clay with Sand (CL)** very stiff, wet, dark brown, with fine gravel

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-14 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-012

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	5 10 15	92.7	29		80	33:12	2.25		**Silty Lean Clay with Sand (CL)** very stiff, wet, dark brown, with fine gravel
	-5											**Lean Clay (CL)** stiff to very stiff, wet, dark brown, with some silt
30			S6	2 6 12		34				1.25-1.5		
	-10											**Silty Clay (CL)** very stiff, wet, olive brown, fine grained
35			R7	9 18 21	93.9	30				4.0		
	-15											**Sandy Silt (ML)** hard/dense, wet, dark brown
40			S8	7 24 26		28						
	-20											
45			R9	16 20 34	99	26		70	26:03			
	-25											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-14 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S10	7 11 15		38				3.3		**Silty Clay (CL)** very stiff, wet, olive gray, with scattered coarse grains
	-30											
55			R11	7 15 17	88.5	33		96		2.8		
	-35											
60			S12	6 11 16		29				3.75		color changes to yellow-gray, with some pieces of siltstone
	-40											**Sandy Lean Clay (CL)** very stiff, wet, gray
65			R13	10 15 20	107.1	21		61		3.0		with some white clay and some small pieces of claystone gravel
	-45											
70			S14	5 6 18		21				1.5		color changes to white-gray
	-50											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-14 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-55		R15	19 30 50/4"	97.9	31		57				**Sandy Lean Clay (CL)** hard, wet, dark brown-gray, fine grained, with up to 2" thick lenses of clay and silt
85	-60											
90	-65		S16	15 32 38								no recovery (no sand catcher in sampler)
95	-70		S17	15 32 35		31		89				**Clayey Silt/Silty Clay with Sand (ML/CL)** hard, wet, gray
	-75											

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FIGURE A-14 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R18	14 39 50/4"	134.9	18						**Clayey Sand (SC)** very dense, wet, dark gray, fine grained
												Boring terminated at 101.5 feet below ground surface (bgs). *Groundwater encountered at 9.0 feet bgs.* *Borehole backfilled with cement/bentonite grout mix and patched with asphalt.*
105	-80											
110	-85											
	-90											
115	-95											
120	-100											

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-14 e

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-017
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/1/2008	**FINISH** 4/1/2008	**SHEET NO.** 1 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 101.5	**GROUND ELEV (ft)** 52.5
DEPTH *ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	50											**7" Asphalt Concrete (AC)** **3" Aggregate Base (AB)** **[FILL]** **Lean Clay with Sand/Clayey Sand (CL/SC)** very stiff/medium dense, dry, light brown, fine to medium grained
5	45		S1	7 10 10						3.0		
10	40		R2	6 10 22	89.3	32	DS	82	35:14	2.5		**Lean Clay with Sand (CL)** very stiff, moist, dark brown with orange mottling, scattered fine grains
15	35		S3	4 6 11		27		55	34:14	1.25		**Sandy Lean Clay (CL)** stiff to very stiff, light brown, fine to medium grained
20	30		R4	8 23 25	108.8	19	CR			4.5+		**Lean Clay with Sand (CL)** hard, moist, gray brown, fine grained 19' - 19.5' Drill chatter at 21' Drill chatter and broken asphalt in cuttings, old asphalt in sampler shoe
												[NATIVE] **Sandy Lean Clay (CL)** hard, moist, gray, fine grained with scattered coarse grains and few 1/2" claystone gravel

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FIGURE A-15 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	8 20 23		20		63		4.5+		**Sandy Lean Clay (CL)** hard, moist, gray, scattered coarse grains and few 1/2" claystone gravel
	25											
30			R6	5 13 24	109.3	15				4.0		very stiff to hard, with scattered fine grains and few 1/4" gravel of dark purple-gray slate
	20											
												Sandy Silt (ML) medium dense, moist, olive brown, scattered coarse grains and few 3/4" pieces of slate, non-plastic
35			S7	5 5 8		34	CR	57				
	15											**Lean Clay (CL)** stiff to very stiff, moist, gray-brown, few fine grains and scattered pea-sized slate gravel
40			R8	8 10 15	96.2	28	CN		39:19			
	10											
45			S9	3 4 7		36				1.2		no gravel
	5											
												Silt (ML) medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-15 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	7 15 29	100.0	25				3.0		**Silt (ML)** medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity
	0											**Lean Clay with Sand (CL)** very stiff, moist-wet, gray-brown, scattered fine grains and pea-sized gray claystone gravel
55												
	-5											
60			S11	11 15 14		31		82		2.0		becomes gray, no gravel
	-10											
65												
	-15											
70			R12	21 35 50/5"	96.7	27						**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic
	-20											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-15 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-017
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/1/2008	**FINISH** 4/1/2008	**SHEET NO.** 4 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 101.5	**GROUND ELEV (ft)** 52.5
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-25											**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic 76' - 78' drillstem bounce on rock
80			S13	35 39 50/5.5"		19		22				**Silty Sand (SM)** very dense, moist, olive gray, fine grained, no gravel
	-30											
85												**Well Graded Sand (SW)** very dense, wet, gray-black-white, fine to coarse grained, with scattered granite gravel up to pea-size, no clay
	-35											
90			R14	50/6" 50/3"	111.4	18						
	-40											**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
95												
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-15 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S15	6 9 17						1.5		**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
	-50											*Boring terminated at 101.5 feet below ground surface (bgs).* *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
105												
	-55											
110												
	-60											
115												
	-65											
120												
	-70											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-15 e

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-019
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/23/2008	**FINISH** 4/23/2008	**SHEET NO.** 1 of 4
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 86.5	**GROUND ELEV (ft)** 53.62
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												2" Asphalt Concrete (AC) **4" Aggregate Base (AB)** **[FILL]** **Sandy Lean Clay (CL)** very stiff to hard, moist, light brown olive to olive gray, fine to coarse grained with scattered fine gravel
5	50		S1	8 12 15		20		59	34:14	4.0		no gravel
10	45		R2	8 13 20	114.3	17	DS		39:19	4.5+		
15	40		S3	9 13 20		27		57				**Sandy Clayey Silt (ML)** hard, moist, olive brown, very fine grained
20	35		R4	13 24 36	110.8	15				4.5+		**Sandy Lean Clay (CL)** hard, moist, olive gray, fine grained with scattered fine gravel, trace of silt
	30											**Silty Sand/Sandy Silt (SM/ML)** dense/hard, moist, olive gray, fine grained

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-16 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-019**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	2 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53.62	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	9 14 20		18						**Silty Sand/Sandy Silt (SM/ML)** dense/hard, moist, olive gray, fine grained
	25											**[NATIVE]** **Silty Clay with Sand (CL)** hard, dry-moist, olive gray, fine grained, with small roots and twigs
30			R6	13 17 28	107.6	19		71	33:12	4.5		
												Sandy Lean Clay (CL) stiff, moist, olive gray
	20											
35			S7	5 7 7		29	CR					**Silty Sand (SM)** medium dense, wet, olive brown, fine grained with few scattered fine gravel, trace to no clay
												Sandy Lean Clay (CL) stiff, moist, olive gray, fine grained
	15											
40			R8	5 9 13	103.8	23	DS			1.25		
												Silty Sand (SM) medium dense, moist, olive brown, fine grained with scattered coarse grains, trace to no clay
	10											**Sandy Lean Clay (CL)** stiff, moist, olive gray, fine grained
45												
												Clayey Silt/Silty Clay (ML/CL) very stiff, moist, olive gray
	5											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-16 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-019

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	3 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53.62	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S9	6 11 16				31				**Silty Sand (SM)** medium dense to dense, wet, olive brown, fine grained
	0											
55												
												Clayey Silt with Sand (ML) hard, moist, gray, fine grained
	-5											becomes harder, drill bounce
60			R10	14 40 30	100.2	24				4.5		
	-10											
65												
												Poorly Graded Sand with Silt (SP-SM) very dense, moist to wet, brown gray, fine grained, no gravel
	-15											
70			S11	20 27 30								no recovery (no catcher) SP in tip as described above
	-20											becomes harder, drill bounce

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

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FIGURE A-16 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-019**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	4 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53.62	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Poorly Graded Sand with Silt (SP-SM) very dense, moist, olive gray
	-25		R12	17 44 50/4"	103.8	23						
80												
	-30											
85			R13	19 38 50/5.5"	94.4	29		12				
	-35											*Boring terminated at 86.5 feet below ground surface (bgs).* *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
90												
	-40											
95												
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-16 d

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-023
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 5/8/2008	**FINISH** 5/8/2008	**SHEET NO.** 1 of 4
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 96.5	**GROUND ELEV (ft)** 46.16
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ 31.0 / *15.2*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												4" Asphalt Concrete (AC) **10" Aggregate Base (AB)**
	45											**[FILL]** **Sandy Lean Clay (CL)** very stiff to hard, red-brown, dry, fine to coarse grained with scattered pieces of hard red clay and fine subrounded granite gravel
5												
	40		R-1	8 13 18	115.8	10		54	32:13	4.5+		light brown-yellow fine grained Clayey Sand (SC) in sampler shoe
												Clayey Sand (SC) medium dense, moist, brown-yellow, fine grained
10												
	35		S-2	6 12 16		23						
												Sandy Clayey Silt (ML) very stiff, moist, gray, with some fine grains and scattered fine gravel
15												
	30		R-3	8 24 34	113.8	15		55		4.5		**Sandy Lean Clay (CL)** hard, moist, brown-yellow, fine grained
												Sandy Lean Clay (CL) very stiff, moist, gray-brown, scattered fine grains and fine gravel, with some very thin bedding present, little silt, rolls excellent thread with pieces of broken asphalt in sampler shoe
20												
	25		S-4	5 11 17		22	CR	61		3.25		
												[NATIVE] **Sandy Lean Clay/Lean Clay with Sand (CL)** stiff, brown-yellow, moist, fine grained

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-17 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	2 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	46.16	▼ 31.0 / *15.2*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	20		R-5	3 7 10	88.7	31	DS			1.5		**[NATIVE]** **Sandy Lean Clay/Lean Clay with Sand (CL)** stiff, brown-yellow, moist, fine grained
30	15		S-6	3 4 6		34	CR					**Lean Clay (CL)** stiff, moist, gray-brown, scattered fine grains and fine gravel, with thin sand lense at 30.5', rolls excellent thread
35	10		R-7	6 12 13		28	DS			1-1.25		with some pieces of dry light brown-gray clay and red-orange color mottling
40	5		S-8	4 6 9		24		49	29:10	2.0		**Clayey Sand/Sandy Lean Clay (SC/CL)** medium dense/stiff to very stiff, moist, light brown-gray, with some fine grains and silt
45	0		R-9	21 41 50/5"	107.8	19	PA	11				**Poorly Graded Sand with Silt (SP-SM)** very dense, brown, wet, fine to medium grained
												Clayey Silt with Sand (ML) very stiff, moist, olive gray

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-17 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	3 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	46.16	▼ 31.0 / *15.2*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-5											**Clayey Silt with Sand (ML)** very stiff, moist, olive gray
55												
	-10		R-10	9 17 35	98.8	26		84		2.0		
60												
	-15											**Poorly Graded Sand with Silt/Silty Sand (SP-SM/SM)** dense, gray, wet, fine grained, long organic fibers present
65												
	-20		S-11	15 14 13		40						**Lean Clay (CL)** very stiff, gray, moist, with some silt
												Poorly Graded Sand (SP) very dense, light brown-gray, wet, fine to medium grained, little to no silt
70												
	-25											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-17 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	4 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	46.16	▼ 31.0 / *15.2*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-30		R-12	50/5"	106.8	21		2				**Poorly Graded Sand (SP)** very dense, light brown-gray, wet, fine to medium grained, little to no silt drill chatter and fine to 1/2" gravel cuttings 77.5' to 78'
80	-35		S-13	40 50/5"		25						with red staining of quartz grains drill chatter and fine gravel cuttings
85	-40		R-14	25 44 50/5"	108.1	19		8				**Well Graded Sand with Silt (SW-SM)** very dense, light brown-gray, wet, fine to coarse grained, with scattered fine gravel up to 1/2" with thin lenses of interbedded gray Silt (ML)
90	-45											**Poorly Graded Sand (SP)** very dense, gray-white-black-orange, moist, fine grained
95	-50		R-15	50/5" 10/1"	101.4	23		4				*Boring terminated at 96.5 feet below ground surface (bgs).* *Groundwater measured at 31 feet bgs with tape after bailing hole.* *Borehole backfilled with grout mix and patched with asphalt.*

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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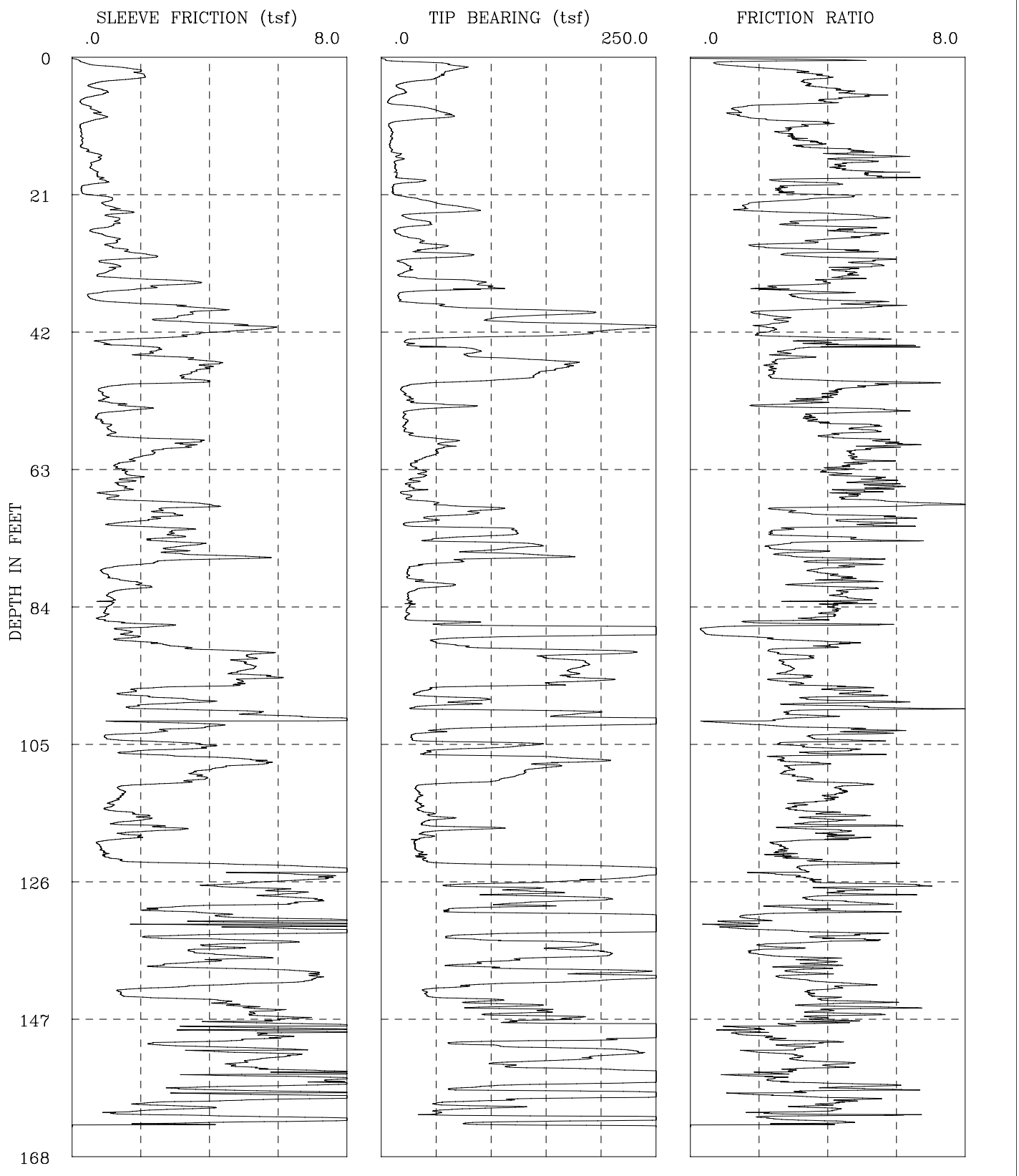
FIGURE A-17 d



CPT-08-001	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-18a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	23.76	0.23	0.98	0.03	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
0.60	2	70.09	1.38	1.97	0.09	silty sand to sandy silt	>90	>48	22	UNDEFINED
0.95	3	55.67	2.02	3.63	0.15	clayey silt to silty clay	UNDFND	UNDFD	27	3.7
1.25	4	30.61	1.05	3.43	0.22	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
1.55	5	16.82	0.69	4.07	0.28	silty clay to clay	UNDFND	UNDFD	11	1.1
1.85	6	16.90	0.81	4.80	0.33	clay	UNDFND	UNDFD	16	1.1
2.15	7	6.99	0.28	3.98	0.39	clay	UNDFND	UNDFD	7	.4
2.45	8	35.18	0.51	1.45	0.45	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
2.75	9	60.31	0.80	1.32	0.51	silty sand to sandy silt	60-70	40-42	19	UNDEFINED
3.05	10	29.62	0.66	2.22	0.57	sandy silt to clayey silt	UNDFND	UNDFD	11	1.9
3.35	11	7.61	0.24	3.20	0.61	clay	UNDFND	UNDFD	7	.4
3.65	12	9.66	0.27	2.79	0.64	silty clay to clay	UNDFND	UNDFD	6	.5
3.95	13	9.17	0.29	3.19	0.67	silty clay to clay	UNDFND	UNDFD	6	.5
4.25	14	8.03	0.29	3.61	0.69	clay	UNDFND	UNDFD	8	.4
4.55	15	12.89	0.61	4.71	0.72	clay	UNDFND	UNDFD	12	.8
4.85	16	15.75	0.78	4.98	0.75	clay	UNDFND	UNDFD	15	.9
5.15	17	12.55	0.55	4.40	0.78	clay	UNDFND	UNDFD	12	.7
5.45	18	13.48	0.69	5.10	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	23.21	0.84	3.60	0.84	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
6.05	20	17.10	0.59	3.47	0.86	silty clay to clay	UNDFND	UNDFD	11	1.0
6.40	21	10.89	0.31	2.89	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	31.02	1.07	3.46	0.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.9
7.00	23	61.58	1.01	1.64	0.95	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
7.35	24	60.46	1.37	2.27	0.98	sandy silt to clayey silt	UNDFND	UNDFD	23	3.9
7.65	25	29.05	1.28	4.39	1.02	silty clay to clay	UNDFND	UNDFD	19	1.8
7.95	26	34.53	1.17	3.38	1.04	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
8.25	27	13.57	0.66	4.84	1.07	clay	UNDFND	UNDFD	13	.7
8.55	28	28.88	1.22	4.21	1.10	silty clay to clay	UNDFND	UNDFD	18	1.8
8.85	29	48.40	1.15	2.37	1.13	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
9.15	30	46.72	1.67	3.58	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.45	31	52.32	1.94	3.71	1.19	clayey silt to silty clay	UNDFND	UNDFD	25	3.3
9.75	32	21.37	1.12	5.26	1.21	clay	UNDFND	UNDFD	20	1.2
10.05	33	24.45	1.10	4.51	1.24	clay	UNDFND	UNDFD	23	1.5
10.35	34	29.00	1.26	4.35	1.27	silty clay to clay	UNDFND	UNDFD	19	1.8
10.65	35	91.00	3.20	3.52	1.30	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
10.95	36	63.93	1.66	2.59	1.33	sandy silt to clayey silt	UNDFND	UNDFD	24	4.1
11.25	37	15.91	0.51	3.17	1.36	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	33.67	1.72	5.12	1.38	clay	UNDFND	UNDFD	32	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-18b

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	121.13	3.82	3.16	1.41	sandy silt to clayey silt	UNDFND	UNDFD	46	7.9
12.15	40	144.57	3.24	2.24	1.44	silty sand to sandy silt	70-80	40-42	46	UNDEFINED
12.45	41	141.02	3.52	2.50	1.47	silty sand to sandy silt	70-80	40-42	45	UNDEFINED
12.80	42	229.65	5.19	2.26	1.50	silty sand to sandy silt	80-90	42-44	>50	UNDEFINED
13.10	43	127.54	3.09	2.43	1.53	silty sand to sandy silt	60-70	40-42	41	UNDEFINED
13.40	44	23.79	0.99	4.18	1.56	silty clay to clay	UNDFND	UNDFD	15	1.4
13.75	45	75.82	2.38	3.14	1.59	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
14.05	46	91.79	2.70	2.95	1.62	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
14.35	47	167.68	3.99	2.38	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	158.43	3.79	2.39	1.68	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.95	49	138.54	3.28	2.37	1.70	silty sand to sandy silt	60-70	40-42	44	UNDEFINED
15.25	50	66.77	3.07	4.60	1.73	silty clay to clay	UNDFND	UNDFD	43	4.2
15.55	51	19.58	0.89	4.57	1.76	clay	UNDFND	UNDFD	19	1.1
15.85	52	22.88	0.93	4.07	1.79	silty clay to clay	UNDFND	UNDFD	15	1.3
16.15	53	32.38	1.06	3.27	1.82	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
16.45	54	56.17	1.84	3.27	1.85	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
16.75	55	21.04	0.86	4.08	1.87	silty clay to clay	UNDFND	UNDFD	13	1.1
17.05	56	22.57	0.82	3.65	1.90	silty clay to clay	UNDFND	UNDFD	14	1.2
17.35	57	20.99	1.08	5.14	1.93	clay	UNDFND	UNDFD	20	1.1
17.65	58	25.85	1.16	4.47	1.96	clay	UNDFND	UNDFD	25	1.4
17.95	59	57.41	3.08	5.36	1.99	clay	UNDFND	UNDFD	>50	3.5
18.25	60	55.25	3.20	5.79	2.02	clay	UNDFND	UNDFD	>50	3.4
18.55	61	49.82	2.33	4.68	2.04	silty clay to clay	UNDFND	UNDFD	32	3.0
18.85	62	36.09	1.79	4.96	2.07	clay	UNDFND	UNDFD	35	2.1
19.20	63	29.36	1.34	4.55	2.10	silty clay to clay	UNDFND	UNDFD	19	1.7
19.50	64	38.47	1.62	4.21	2.13	silty clay to clay	UNDFND	UNDFD	25	2.3
19.80	65	31.34	1.65	5.27	2.16	clay	UNDFND	UNDFD	30	1.8
20.15	66	28.11	1.50	5.35	2.19	clay	UNDFND	UNDFD	27	1.6
20.45	67	22.82	1.11	4.85	2.22	clay	UNDFND	UNDFD	22	1.2
20.75	68	34.59	1.95	5.63	2.25	clay	UNDFND	UNDFD	33	2.0
21.05	69	80.79	3.53	4.37	2.28	clayey silt to silty clay	UNDFND	UNDFD	39	5.1
21.35	70	80.36	2.80	3.48	2.31	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
21.65	71	41.92	2.17	5.17	2.34	clay	UNDFND	UNDFD	40	2.5
21.95	72	50.66	1.91	3.76	2.37	clayey silt to silty clay	UNDFND	UNDFD	24	3.0
22.25	73	121.34	2.96	2.44	2.39	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
22.55	74	59.23	2.71	4.58	2.42	silty clay to clay	UNDFND	UNDFD	38	3.6
22.85	75	132.79	3.35	2.52	2.45	silty sand to sandy silt	60-70	38-40	42	UNDEFINED
23.15	76	103.02	2.99	2.90	2.48	sandy silt to clayey silt	UNDFND	UNDFD	39	6.5
23.45	77	120.24	4.37	3.64	2.51	sandy silt to clayey silt	UNDFND	UNDFD	46	7.7
23.75	78	43.59	1.86	4.27	2.54	silty clay to clay	UNDFND	UNDFD	28	2.5
24.05	79	24.18	0.89	3.69	2.56	silty clay to clay	UNDFND	UNDFD	15	1.2
24.35	80	27.45	1.17	4.25	2.59	silty clay to clay	UNDFND	UNDFD	18	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-18c

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	53.30	1.98	3.72	2.62	clayey silt to silty clay	UNDFND	UNDFD	26	3.2
24.95	82	31.15	1.49	4.79	2.65	clay	UNDFND	UNDFD	30	1.7
25.25	83	24.27	1.10	4.54	2.68	clay	UNDFND	UNDFD	23	1.2
25.60	84	25.74	1.09	4.23	2.71	silty clay to clay	UNDFND	UNDFD	16	1.3
25.90	85	23.57	0.97	4.10	2.74	silty clay to clay	UNDFND	UNDFD	15	1.2
26.20	86	23.16	0.90	3.91	2.77	silty clay to clay	UNDFND	UNDFD	15	1.2
26.55	87	122.93	2.02	1.64	2.80	sand to silty sand	50-60	36-38	29	UNDEFINED
26.85	88	422.67	1.51	0.36	2.83	gravelly sand to sand	>90	42-44	>50	UNDEFINED
27.15	89	114.10	1.60	1.40	2.86	sand to silty sand	50-60	36-38	27	UNDEFINED
27.45	90	60.32	2.53	4.20	2.88	clayey silt to silty clay	UNDFND	UNDFD	29	3.6
27.75	91	179.66	4.58	2.55	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.05	92	161.47	5.13	3.18	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	186.46	5.06	2.71	2.97	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.65	94	174.18	5.06	2.91	3.00	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.95	95	179.71	5.40	3.00	3.03	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.25	96	169.41	4.89	2.89	3.05	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.55	97	48.71	2.24	4.59	3.08	silty clay to clay	UNDFND	UNDFD	31	2.8
29.85	98	48.37	1.99	4.11	3.11	clayey silt to silty clay	UNDFND	UNDFD	23	2.8
30.15	99	81.26	3.27	4.03	3.14	clayey silt to silty clay	UNDFND	UNDFD	39	5.0
30.45	100	69.91	2.77	3.97	3.17	clayey silt to silty clay	UNDFND	UNDFD	33	4.2
30.75	101	181.80	5.91	3.25	3.20	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.7
31.05	102	305.75	5.58	1.83	3.22	sand to silty sand	80-90	40-42	>50	UNDEFINED
31.35	103	108.82	3.55	3.26	3.25	sandy silt to clayey silt	UNDFND	UNDFD	42	6.8
31.65	104	36.31	1.64	4.53	3.28	silty clay to clay	UNDFND	UNDFD	23	2.0
32.00	105	71.87	2.24	3.12	3.31	sandy silt to clayey silt	UNDFND	UNDFD	28	4.3
32.30	106	89.69	3.35	3.73	3.34	clayey silt to silty clay	UNDFND	UNDFD	43	5.5
32.60	107	78.77	2.48	3.15	3.37	sandy silt to clayey silt	UNDFND	UNDFD	30	4.8
32.95	108	175.05	5.42	3.09	3.40	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.2
33.25	109	144.13	4.11	2.85	3.43	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
33.55	110	124.86	3.67	2.94	3.46	sandy silt to clayey silt	UNDFND	UNDFD	48	7.8
33.85	111	88.12	3.30	3.74	3.49	clayey silt to silty clay	UNDFND	UNDFD	42	5.4
34.15	112	32.09	1.44	4.49	3.52	silty clay to clay	UNDFND	UNDFD	20	1.6
34.45	113	34.81	1.48	4.25	3.55	silty clay to clay	UNDFND	UNDFD	22	1.8
34.75	114	33.04	1.23	3.71	3.57	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
35.05	115	35.14	1.08	3.07	3.60	clayey silt to silty clay	UNDFND	UNDFD	17	1.8
35.35	116	43.18	1.80	4.17	3.63	silty clay to clay	UNDFND	UNDFD	28	2.4
35.65	117	49.14	1.84	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	24	2.8
35.95	118	67.87	2.38	3.51	3.69	clayey silt to silty clay	UNDFND	UNDFD	33	4.0
36.25	119	44.43	1.89	4.25	3.72	silty clay to clay	UNDFND	UNDFD	28	2.4
36.55	120	35.62	1.35	3.79	3.74	clayey silt to silty clay	UNDFND	UNDFD	17	1.8
36.85	121	30.52	0.80	2.62	3.77	sandy silt to clayey silt	UNDFND	UNDFD	12	1.5
37.15	122	35.28	0.92	2.60	3.80	sandy silt to clayey silt	UNDFND	UNDFD	14	1.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure 18d

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	36.96	1.21	3.29	3.83	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
37.75	124	150.61	5.46	3.63	3.86	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
38.05	125	270.44	8.08	2.99	3.89	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	205.07	6.96	3.39	3.92	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
38.70	127	97.89	4.71	4.81	3.95	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.00	128	130.35	6.23	4.78	3.97	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.35	129	175.35	6.62	3.78	4.01	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
39.65	130	109.82	4.12	3.75	4.04	sandy silt to clayey silt	UNDFND	UNDFD	42	6.8
39.95	131	129.69	3.49	2.69	4.06	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
40.25	132	366.81	5.92	1.61	4.09	sand to silty sand	80-90	40-42	>50	UNDEFINED
40.55	133	473.19	6.06	1.28	4.12	sand	>90	40-42	>50	UNDEFINED
40.85	134	255.01	7.59	2.98	4.15	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
41.15	135	76.82	3.57	4.65	4.18	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
41.45	136	186.41	4.87	2.61	4.21	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
41.75	137	187.40	3.81	2.03	4.23	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.05	138	162.63	4.87	2.99	4.26	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.2
42.35	139	83.37	3.06	3.67	4.29	clayey silt to silty clay	UNDFND	UNDFD	40	5.0
42.65	140	184.30	5.91	3.20	4.32	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.7
42.95	141	240.31	7.08	2.95	4.35	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
43.25	142	130.74	5.43	4.16	4.38	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	47.20	1.86	3.94	4.40	clayey silt to silty clay	UNDFND	UNDFD	23	2.5
43.85	144	51.48	1.93	3.76	4.43	clayey silt to silty clay	UNDFND	UNDFD	25	2.8
44.15	145	107.78	4.44	4.12	4.46	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.45	146	125.67	5.45	4.33	4.49	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.80	147	144.19	5.78	4.01	4.52	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
45.10	148	193.49	6.58	3.40	4.55	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
45.40	149	392.69	5.95	1.51	4.58	sand to silty sand	80-90	40-42	>50	UNDEFINED
45.75	150	304.00	5.69	1.87	4.61	sand to silty sand	70-80	38-40	>50	UNDEFINED
46.05	151	93.69	3.11	3.32	4.64	sandy silt to clayey silt	UNDFND	UNDFD	36	5.6
46.35	152	201.95	4.94	2.44	4.67	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
46.65	153	203.37	6.12	3.01	4.70	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
46.95	154	125.92	4.89	3.89	4.73	sandy silt to clayey silt	UNDFND	UNDFD	48	7.7
47.25	155	196.18	6.34	3.23	4.75	sandy silt to clayey silt	UNDFND	UNDFD	>50	12.4
47.55	156	324.05	7.05	2.18	4.78	sand to silty sand	70-80	38-40	>50	UNDEFINED
47.85	157	253.66	7.80	3.07	4.81	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
48.15	158	96.21	4.37	4.55	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
48.45	159	273.04	7.06	2.58	4.87	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
48.75	160	85.04	3.99	4.70	4.90	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
49.05	161	83.24	3.12	3.74	4.92	clayey silt to silty clay	UNDFND	UNDFD	40	4.9
49.35	162	103.25	2.75	2.67	4.95	sandy silt to clayey silt	UNDFND	UNDFD	40	6.2
49.65	163	218.69	6.58	3.01	4.98	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED

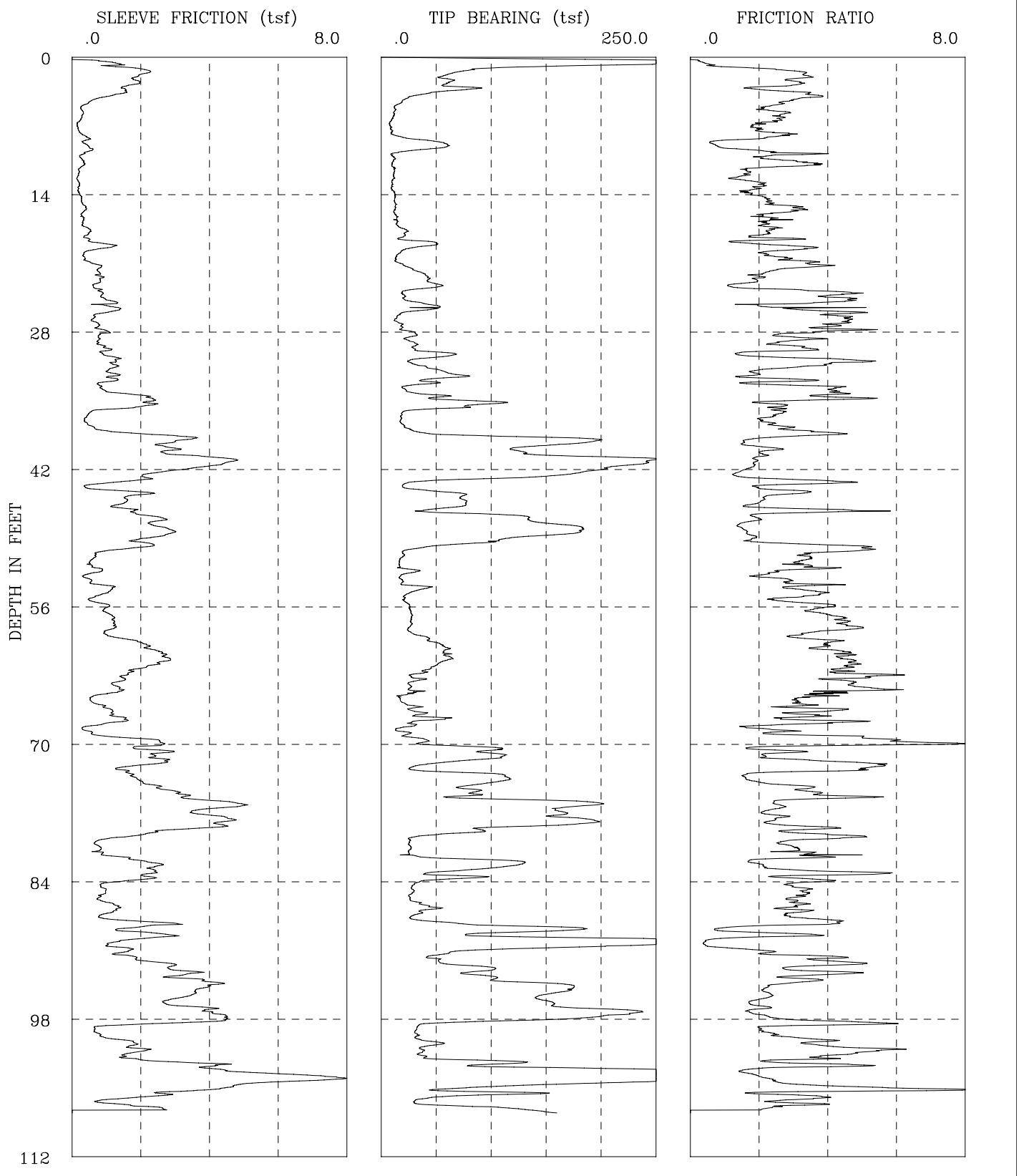
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemente

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-18e



CPT−08−002	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-19a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-002
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :03/27/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	231.31	0.96	0.42	0.03	sand	>90	>48	44	UNDEFINED
0.60	2	69.54	2.07	2.98	0.09	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
0.95	3	64.39	1.75	2.71	0.15	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.25	4	45.22	1.32	2.91	0.22	sandy silt to clayey silt	UNDFND	UNDFD	17	3.0
1.55	5	16.76	0.45	2.67	0.28	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
1.85	6	11.81	0.30	2.53	0.33	clayey silt to silty clay	UNDFND	UNDFD	6	.7
2.15	7	8.57	0.19	2.23	0.39	silty clay to clay	UNDFND	UNDFD	5	.5
2.45	8	10.44	0.25	2.38	0.45	silty clay to clay	UNDFND	UNDFD	7	.6
2.75	9	46.68	0.42	0.90	0.51	silty sand to sandy silt	50-60	40-42	15	UNDEFINED
3.05	10	26.63	0.43	1.63	0.57	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
3.35	11	10.94	0.31	2.86	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	11.63	0.21	1.79	0.64	clayey silt to silty clay	UNDFND	UNDFD	6	.7
3.95	13	10.59	0.18	1.66	0.67	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.25	14	10.68	0.19	1.79	0.69	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.55	15	12.42	0.28	2.23	0.72	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.85	16	12.42	0.36	2.91	0.75	silty clay to clay	UNDFND	UNDFD	8	.7
5.15	17	14.15	0.31	2.22	0.78	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.45	18	19.31	0.44	2.30	0.81	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
5.75	19	26.81	0.48	1.79	0.84	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
6.05	20	30.90	0.85	2.75	0.86	sandy silt to clayey silt	UNDFND	UNDFD	12	1.9
6.40	21	14.37	0.41	2.83	0.89	clayey silt to silty clay	UNDFND	UNDFD	7	.8
6.70	22	28.43	0.79	2.78	0.93	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
7.00	23	42.74	0.81	1.90	0.95	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
7.35	24	35.12	0.75	2.13	0.98	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
7.65	25	26.22	1.05	3.99	1.02	silty clay to clay	UNDFND	UNDFD	17	1.6
7.95	26	39.16	1.14	2.92	1.04	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
8.25	27	14.42	0.64	4.46	1.07	clay	UNDFND	UNDFD	14	.8
8.55	28	21.73	0.87	4.01	1.10	silty clay to clay	UNDFND	UNDFD	14	1.3
8.85	29	27.31	0.78	2.85	1.13	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
9.15	30	34.04	0.92	2.72	1.16	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
9.45	31	45.67	1.16	2.54	1.19	sandy silt to clayey silt	UNDFND	UNDFD	17	2.9
9.75	32	42.09	1.15	2.74	1.21	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.05	33	57.64	1.22	2.11	1.24	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
10.35	34	29.58	0.84	2.84	1.27	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
10.65	35	48.52	1.96	4.04	1.30	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
10.95	36	77.30	1.84	2.38	1.33	sandy silt to clayey silt	UNDFND	UNDFD	30	5.0
11.25	37	18.72	0.45	2.40	1.36	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
11.55	38	20.65	0.53	2.55	1.38	clayey silt to silty clay	UNDFND	UNDFD	10	1.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-19b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	91.54	2.45	2.68	1.41	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
12.15	40	159.48	2.82	1.77	1.44	sand to silty sand	70-80	40-42	38	UNDEFINED
12.45	41	161.83	3.30	2.04	1.47	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
12.80	42	225.22	4.12	1.83	1.50	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.10	43	149.98	2.29	1.53	1.53	sand to silty sand	70-80	40-42	36	UNDEFINED
13.40	44	25.63	0.82	3.20	1.56	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
13.75	45	67.71	1.74	2.57	1.59	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
14.05	46	66.77	1.48	2.21	1.62	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
14.35	47	101.54	2.22	2.19	1.65	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.65	48	164.51	2.49	1.51	1.68	sand to silty sand	70-80	40-42	39	UNDEFINED
14.95	49	152.04	2.63	1.73	1.70	sand to silty sand	70-80	40-42	36	UNDEFINED
15.25	50	69.46	2.04	2.94	1.73	sandy silt to clayey silt	UNDFND	UNDFD	27	4.4
15.55	51	20.03	0.77	3.86	1.76	silty clay to clay	UNDFND	UNDFD	13	1.1
15.85	52	16.37	0.56	3.40	1.79	silty clay to clay	UNDFND	UNDFD	10	.8
16.15	53	24.11	0.59	2.45	1.82	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
16.45	54	24.86	0.74	3.00	1.85	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.75	55	27.84	0.96	3.45	1.87	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
17.05	56	23.07	0.77	3.32	1.90	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
17.35	57	26.92	1.02	3.77	1.93	silty clay to clay	UNDFND	UNDFD	17	1.5
17.65	58	27.28	1.22	4.46	1.96	silty clay to clay	UNDFND	UNDFD	17	1.5
17.95	59	27.34	1.06	3.87	1.99	silty clay to clay	UNDFND	UNDFD	17	1.5
18.25	60	47.30	1.78	3.76	2.02	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
18.55	61	58.08	2.45	4.22	2.04	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
18.85	62	57.96	2.67	4.60	2.07	silty clay to clay	UNDFND	UNDFD	37	3.6
19.20	63	38.89	1.81	4.65	2.10	silty clay to clay	UNDFND	UNDFD	25	2.3
19.50	64	29.78	1.36	4.55	2.13	silty clay to clay	UNDFND	UNDFD	19	1.7
19.80	65	26.42	1.23	4.64	2.16	clay	UNDFND	UNDFD	25	1.5
20.15	66	20.99	0.66	3.12	2.19	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
20.45	67	31.74	1.13	3.55	2.22	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
20.75	68	38.61	1.23	3.19	2.25	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
21.05	69	19.40	0.48	2.46	2.28	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
21.35	70	37.11	2.24	6.05	2.31	clay	UNDFND	UNDFD	36	2.1
21.65	71	99.90	2.31	2.31	2.34	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
21.95	72	79.22	2.53	3.20	2.37	sandy silt to clayey silt	UNDFND	UNDFD	30	4.9
22.25	73	48.77	1.57	3.22	2.39	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
22.55	74	109.19	1.92	1.76	2.42	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
22.85	75	80.46	2.73	3.40	2.45	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
23.15	76	121.99	3.79	3.11	2.48	sandy silt to clayey silt	UNDFND	UNDFD	47	7.8
23.45	77	171.79	4.17	2.43	2.51	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
23.75	78	177.61	4.33	2.44	2.54	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.05	79	118.99	3.60	3.03	2.56	sandy silt to clayey silt	UNDFND	UNDFD	46	7.6
24.35	80	36.24	1.39	3.84	2.59	clayey silt to silty clay	UNDFND	UNDFD	17	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

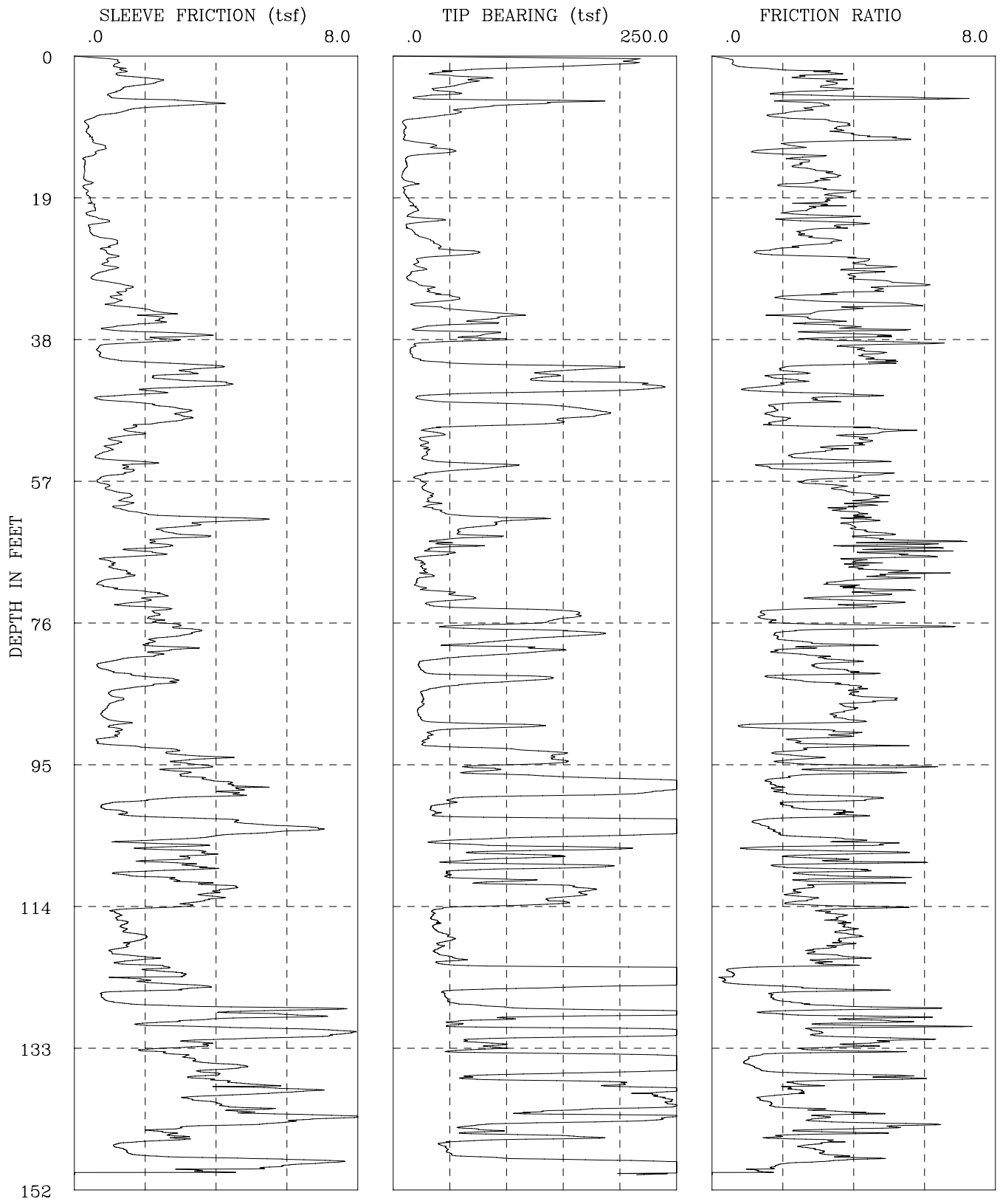
Figure A-19c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	25.95	0.75	2.91	2.62	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
24.95	82	55.24	1.38	2.50	2.65	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
25.25	83	108.52	2.42	2.23	2.68	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
25.60	84	56.21	2.06	3.67	2.71	clayey silt to silty clay	UNDFND	UNDFD	27	3.4
25.90	85	28.97	0.91	3.13	2.74	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
26.20	86	26.68	0.84	3.15	2.77	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
26.55	87	40.87	1.25	3.05	2.80	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
26.85	88	34.62	1.24	3.57	2.83	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
27.15	89	137.54	2.00	1.45	2.86	sand to silty sand	60-70	36-38	33	UNDEFINED
27.45	90	184.69	2.24	1.21	2.88	sand to silty sand	60-70	38-40	44	UNDEFINED
27.75	91	179.26	1.36	0.76	2.91	sand	60-70	38-40	34	UNDEFINED
28.05	92	51.73	1.67	3.23	2.94	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
28.35	93	82.15	2.86	3.48	2.97	sandy silt to clayey silt	UNDFND	UNDFD	31	5.1
28.65	94	92.36	3.38	3.65	3.00	sandy silt to clayey silt	UNDFND	UNDFD	35	5.7
28.95	95	160.64	3.96	2.46	3.03	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
29.25	96	150.37	3.35	2.23	3.05	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
29.55	97	165.04	3.19	1.93	3.08	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
29.85	98	211.39	4.25	2.01	3.11	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.15	99	59.70	2.26	3.79	3.14	clayey silt to silty clay	UNDFND	UNDFD	29	3.5
30.45	100	31.52	0.78	2.48	3.17	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
30.75	101	44.12	1.69	3.83	3.20	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
31.05	102	37.28	1.77	4.76	3.22	silty clay to clay	UNDFND	UNDFD	24	2.0
31.35	103	95.97	3.26	3.39	3.25	sandy silt to clayey silt	UNDFND	UNDFD	37	5.9
31.65	104	317.74	5.55	1.75	3.28	sand to silty sand	80-90	40-42	>50	UNDEFINED
32.00	105	207.20	5.86	2.83	3.31	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
32.30	106	81.40	2.84	3.49	3.34	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
32.60	107	49.13	1.37	2.80	3.37	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-19d



CPT-08-003	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-20a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-003
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	194.33	1.07	0.55	0.03	sand	>90	>48	37	UNDEFINED
0.60	2	113.82	1.27	1.11	0.09	sand to silty sand	>90	>48	27	UNDEFINED
0.95	3	56.03	1.63	2.91	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	61.88	2.07	3.34	0.22	sandy silt to clayey silt	UNDFND	UNDFD	24	4.1
1.55	5	46.25	1.21	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.85	6	67.11	1.84	2.74	0.33	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
2.15	7	97.86	2.93	3.00	0.39	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.45	8	52.21	1.11	2.12	0.45	sandy silt to clayey silt	UNDFND	UNDFD	20	3.4
2.75	9	14.50	0.39	2.69	0.51	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.05	10	10.33	0.38	3.63	0.57	clay	UNDFND	UNDFD	10	.6
3.35	11	9.85	0.42	4.30	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	23.30	0.62	2.64	0.64	clayey silt to silty clay	UNDFND	UNDFD	11	1.5
3.95	13	45.75	0.75	1.65	0.67	silty sand to sandy silt	50-60	38-40	15	UNDEFINED
4.25	14	16.32	0.39	2.42	0.69	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
4.55	15	11.85	0.29	2.48	0.72	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.85	16	9.10	0.29	3.14	0.75	silty clay to clay	UNDFND	UNDFD	6	.5
5.15	17	10.43	0.33	3.14	0.78	silty clay to clay	UNDFND	UNDFD	7	.6
5.45	18	13.44	0.33	2.43	0.81	clayey silt to silty clay	UNDFND	UNDFD	6	.8
5.75	19	10.57	0.38	3.60	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	15.08	0.48	3.15	0.86	silty clay to clay	UNDFND	UNDFD	10	.9
6.40	21	19.81	0.53	2.66	0.89	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
6.70	22	24.65	0.60	2.44	0.93	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
7.00	23	17.45	0.62	3.57	0.95	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	18.51	0.48	2.60	0.98	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
7.65	25	32.58	1.08	3.31	1.02	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
7.95	26	46.32	0.94	2.02	1.04	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
8.25	27	54.56	1.04	1.91	1.07	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
8.55	28	20.67	0.88	4.27	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	22.71	0.99	4.35	1.13	clay	UNDFND	UNDFD	22	1.4
9.15	30	13.39	0.54	4.05	1.16	clay	UNDFND	UNDFD	13	.7
9.45	31	24.92	1.31	5.25	1.19	clay	UNDFND	UNDFD	24	1.5
9.75	32	35.11	1.37	3.91	1.21	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
10.05	33	50.18	1.17	2.33	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
10.35	34	32.32	1.44	4.45	1.27	silty clay to clay	UNDFND	UNDFD	21	2.0
10.65	35	95.00	2.33	2.45	1.30	silty sand to sandy silt	60-70	38-40	30	UNDEFINED
10.95	36	79.01	2.32	2.94	1.33	sandy silt to clayey silt	UNDFND	UNDFD	30	5.1
11.25	37	32.63	1.17	3.57	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	81.49	3.02	3.70	1.38	clayey silt to silty clay	UNDFND	UNDFD	39	5.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-20b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	40.60	1.68	4.13	1.41	silty clay to clay	UNDFND	UNDFD	26	2.5
12.15	40	15.50	0.68	4.39	1.44	clay	UNDFND	UNDFD	15	.8
12.45	41	20.46	0.93	4.55	1.47	clay	UNDFND	UNDFD	20	1.2
12.80	42	130.77	3.33	2.55	1.50	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
13.10	43	138.62	2.87	2.07	1.53	silty sand to sandy silt	60-70	40-42	44	UNDEFINED
13.40	44	161.68	3.47	2.14	1.56	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
13.75	45	199.32	2.77	1.39	1.59	sand to silty sand	70-80	40-42	48	UNDEFINED
14.05	46	29.23	1.06	3.62	1.62	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.35	47	109.13	2.12	1.94	1.65	silty sand to sandy silt	60-70	38-40	35	UNDEFINED
14.65	48	181.84	3.07	1.69	1.68	sand to silty sand	70-80	40-42	44	UNDEFINED
14.95	49	156.24	3.03	1.94	1.70	silty sand to sandy silt	70-80	40-42	50	UNDEFINED
15.25	50	75.12	1.78	2.37	1.73	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
15.55	51	36.79	1.63	4.43	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	26.68	1.15	4.30	1.79	silty clay to clay	UNDFND	UNDFD	17	1.5
16.15	53	28.65	0.98	3.42	1.82	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
16.45	54	27.87	0.68	2.45	1.85	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
16.75	55	68.67	1.68	2.45	1.87	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
17.05	56	58.30	1.53	2.63	1.90	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
17.35	57	22.31	0.82	3.68	1.93	silty clay to clay	UNDFND	UNDFD	14	1.2
17.65	58	27.15	0.86	3.16	1.96	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
17.95	59	31.09	1.29	4.15	1.99	silty clay to clay	UNDFND	UNDFD	20	1.8
18.25	60	33.00	1.47	4.45	2.02	silty clay to clay	UNDFND	UNDFD	21	1.9
18.55	61	34.39	1.32	3.85	2.04	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
18.85	62	59.32	2.49	4.20	2.07	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
19.20	63	100.08	4.10	4.09	2.10	clayey silt to silty clay	UNDFND	UNDFD	48	6.4
19.50	64	60.03	2.58	4.30	2.13	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
19.80	65	62.52	2.93	4.69	2.16	silty clay to clay	UNDFND	UNDFD	40	3.9
20.15	66	45.80	2.27	4.96	2.19	silty clay to clay	UNDFND	UNDFD	29	2.7
20.45	67	39.51	2.08	5.25	2.22	clay	UNDFND	UNDFD	38	2.3
20.75	68	23.35	0.97	4.15	2.25	silty clay to clay	UNDFND	UNDFD	15	1.2
21.05	69	26.37	1.19	4.52	2.28	clay	UNDFND	UNDFD	25	1.4
21.35	70	29.19	1.47	5.02	2.31	clay	UNDFND	UNDFD	28	1.6
21.65	71	20.43	0.75	3.65	2.34	silty clay to clay	UNDFND	UNDFD	13	1.0
21.95	72	37.47	1.67	4.46	2.37	silty clay to clay	UNDFND	UNDFD	24	2.2
22.25	73	61.04	2.26	3.70	2.39	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
22.55	74	40.74	1.78	4.36	2.42	silty clay to clay	UNDFND	UNDFD	26	2.4
22.85	75	153.95	2.38	1.55	2.45	sand to silty sand	60-70	38-40	37	UNDEFINED
23.15	76	145.43	2.26	1.55	2.48	sand to silty sand	60-70	38-40	35	UNDEFINED
23.45	77	79.79	3.08	3.86	2.51	clayey silt to silty clay	UNDFND	UNDFD	38	5.0
23.75	78	166.37	3.12	1.87	2.54	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.05	79	86.63	2.13	2.46	2.56	sandy silt to clayey silt	UNDFND	UNDFD	33	5.4
24.35	80	121.85	2.70	2.22	2.59	silty sand to sandy silt	50-60	36-38	39	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-20c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	70.56	1.96	2.77	2.62	sandy silt to clayey silt	UNDFND	UNDFD	27	4.3
24.95	82	23.48	0.79	3.36	2.65	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
25.25	83	27.90	1.08	3.87	2.68	silty clay to clay	UNDFND	UNDFD	18	1.5
25.60	84	116.37	2.50	2.15	2.71	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
25.90	85	45.45	1.79	3.94	2.74	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.20	86	25.31	1.05	4.16	2.77	silty clay to clay	UNDFND	UNDFD	16	1.3
26.55	87	26.18	1.15	4.37	2.80	silty clay to clay	UNDFND	UNDFD	17	1.3
26.85	88	22.08	0.84	3.82	2.83	silty clay to clay	UNDFND	UNDFD	14	1.1
27.15	89	23.95	0.88	3.68	2.86	silty clay to clay	UNDFND	UNDFD	15	1.2
27.45	90	91.50	1.23	1.35	2.88	sand to silty sand	40-50	34-36	22	UNDEFINED
27.75	91	36.80	1.25	3.38	2.91	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
28.05	92	28.62	0.79	2.77	2.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
28.35	93	63.32	1.89	2.99	2.97	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
28.65	94	143.01	3.21	2.24	3.00	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
28.95	95	139.64	3.26	2.33	3.03	silty sand to sandy silt	60-70	36-38	45	UNDEFINED
29.25	96	77.29	3.22	4.16	3.05	clayey silt to silty clay	UNDFND	UNDFD	37	4.7
29.55	97	144.11	3.30	2.29	3.08	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
29.85	98	260.92	4.43	1.70	3.11	sand to silty sand	70-80	40-42	>50	UNDEFINED
30.15	99	239.29	4.51	1.89	3.14	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.45	100	76.41	2.91	3.81	3.17	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
30.75	101	39.98	0.85	2.13	3.20	sandy silt to clayey silt	UNDFND	UNDFD	15	2.2
31.05	102	36.80	1.41	3.83	3.22	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
31.35	103	302.36	4.13	1.37	3.25	sand	80-90	40-42	>50	UNDEFINED
31.65	104	401.48	6.37	1.59	3.28	sand to silty sand	80-90	40-42	>50	UNDEFINED
32.00	105	187.48	4.19	2.24	3.31	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
32.30	106	69.33	2.47	3.56	3.34	clayey silt to silty clay	UNDFND	UNDFD	33	4.2
32.60	107	131.64	3.09	2.35	3.37	silty sand to sandy silt	50-60	36-38	42	UNDEFINED
32.95	108	94.61	2.82	2.98	3.40	sandy silt to clayey silt	UNDFND	UNDFD	36	5.8
33.25	109	138.97	3.40	2.45	3.43	silty sand to sandy silt	50-60	36-38	44	UNDEFINED
33.55	110	48.16	1.68	3.48	3.46	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
33.85	111	96.45	3.23	3.35	3.49	sandy silt to clayey silt	UNDFND	UNDFD	37	5.9
34.15	112	167.98	4.29	2.56	3.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	154.78	3.87	2.50	3.55	silty sand to sandy silt	60-70	36-38	49	UNDEFINED
34.75	114	125.68	3.30	2.63	3.57	silty sand to sandy silt	50-60	34-36	40	UNDEFINED
35.05	115	37.68	1.39	3.70	3.60	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.35	116	35.49	1.27	3.57	3.63	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
35.65	117	37.17	1.41	3.78	3.66	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.95	118	43.23	1.66	3.84	3.69	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
36.25	119	48.24	1.79	3.72	3.72	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
36.55	120	40.35	1.31	3.23	3.74	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
36.85	121	44.49	1.56	3.52	3.77	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
37.15	122	49.84	1.64	3.29	3.80	clayey silt to silty clay	UNDFND	UNDFD	24	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-20d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	405.25	2.48	0.61	3.83	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
37.75	124	522.17	2.37	0.45	3.86	gravelly sand to sand	>90	42-44	>50	UNDEFINED
38.05	125	366.03	2.89	0.79	3.89	sand	80-90	40-42	>50	UNDEFINED
38.40	126	56.03	1.57	2.80	3.92	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
38.70	127	49.16	0.98	1.99	3.95	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
39.00	128	128.27	4.85	3.78	3.97	sandy silt to clayey silt	UNDFND	UNDFD	49	8.0
39.35	129	207.98	5.28	2.54	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.65	130	54.46	2.58	4.74	4.04	silty clay to clay	UNDFND	UNDFD	35	3.1
39.95	131	236.15	6.99	2.96	4.06	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.25	132	135.01	5.24	3.88	4.09	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
40.55	133	89.44	3.39	3.79	4.12	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
40.85	134	133.31	2.54	1.91	4.15	silty sand to sandy silt	50-60	34-36	43	UNDEFINED
41.15	135	356.55	3.44	0.97	4.18	sand	80-90	40-42	>50	UNDEFINED
41.45	136	364.45	4.41	1.21	4.21	sand	80-90	40-42	>50	UNDEFINED
41.75	137	111.47	3.66	3.28	4.23	sandy silt to clayey silt	UNDFND	UNDFD	43	6.8
42.05	138	163.59	4.57	2.80	4.26	silty sand to sandy silt	50-60	36-38	>50	UNDEFINED
42.35	139	249.43	5.82	2.33	4.29	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
42.65	140	236.17	3.79	1.60	4.32	sand to silty sand	70-80	38-40	>50	UNDEFINED
42.95	141	244.78	4.13	1.69	4.35	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.25	142	151.12	5.28	3.49	4.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
43.55	143	230.25	6.98	3.03	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	77.11	3.85	4.99	4.43	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.15	145	106.06	2.68	2.53	4.46	silty sand to sandy silt	40-50	32-34	34	UNDEFINED
44.45	146	89.20	2.17	2.44	4.49	silty sand to sandy silt	40-50	30-32	28	UNDEFINED
44.80	147	46.72	1.33	2.85	4.52	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
45.10	148	90.27	3.53	3.91	4.55	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
45.40	149	304.28	6.52	2.14	4.58	sand to silty sand	70-80	38-40	>50	UNDEFINED

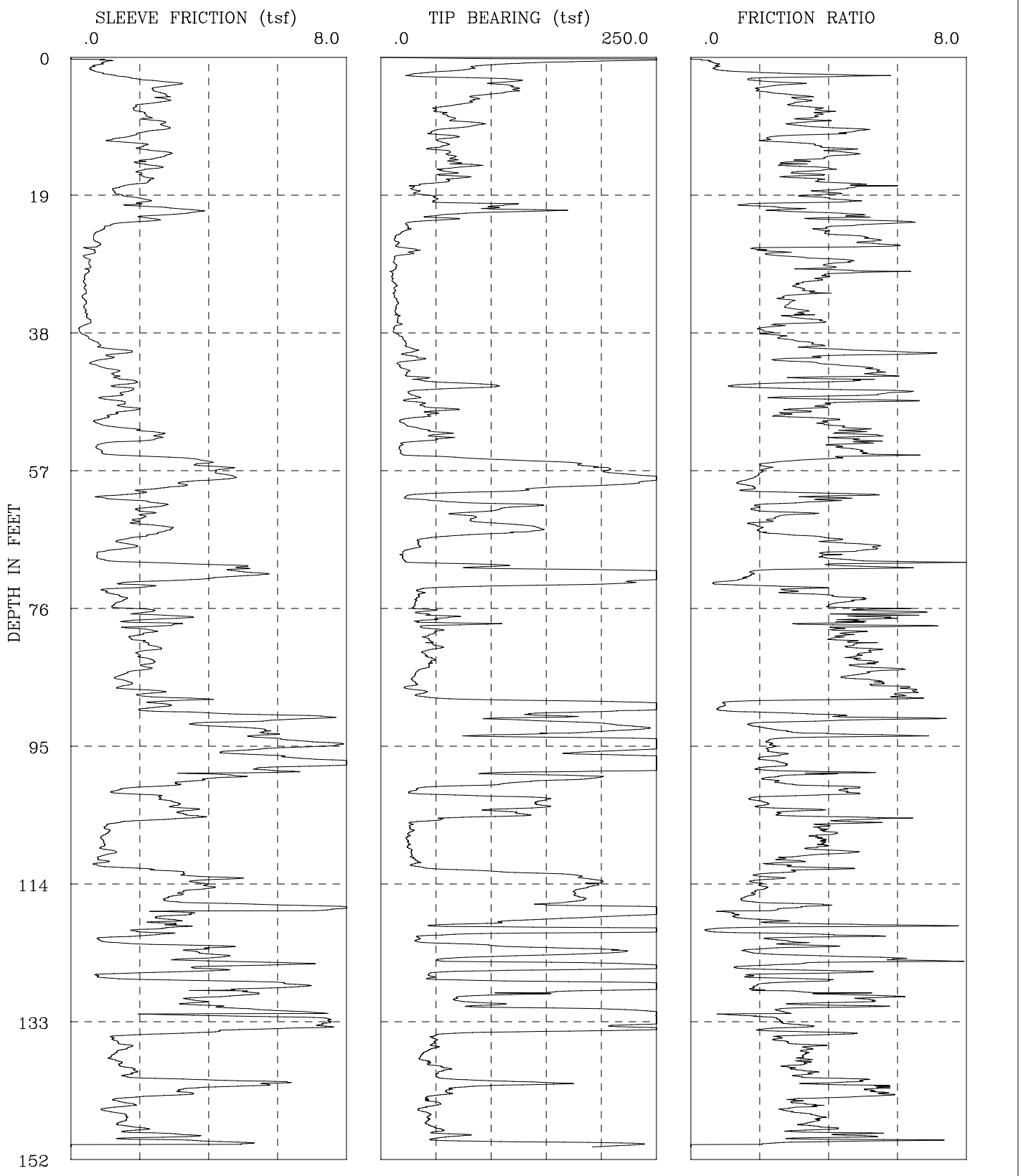
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-20d



I-436 SR-22 Phase 2	CPT-08-006
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-21a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-006
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 23.95013

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	162.45	0.77	0.48	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	76.38	0.63	0.82	0.09	sand to silty sand	>90	>48	18	UNDEFINED
0.95	3	63.52	1.49	2.35	0.15	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
1.25	4	113.90	2.86	2.51	0.22	silty sand to sandy silt	>90	46-48	36	UNDEFINED
1.55	5	115.30	2.51	2.17	0.28	silty sand to sandy silt	80-90	46-48	37	UNDEFINED
1.85	6	84.43	2.76	3.27	0.33	sandy silt to clayey silt	UNDFND	UNDFD	32	5.6
2.15	7	63.54	2.01	3.17	0.39	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
2.45	8	54.73	2.06	3.76	0.45	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
2.75	9	70.87	2.42	3.42	0.51	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
3.05	10	73.38	2.72	3.70	0.57	clayey silt to silty clay	UNDFND	UNDFD	35	4.8
3.35	11	54.98	1.90	3.46	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	56.38	1.52	2.69	0.69	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
3.95	13	53.42	2.17	4.07	0.75	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
4.25	14	63.43	2.72	4.28	0.81	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
4.55	15	73.86	2.10	2.84	0.87	sandy silt to clayey silt	UNDFND	UNDFD	28	4.8
4.85	16	62.42	2.22	3.56	0.93	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
5.15	17	65.35	2.18	3.34	0.98	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
5.45	18	42.04	1.86	4.43	1.04	silty clay to clay	UNDFND	UNDFD	27	2.7
5.75	19	31.71	1.28	4.04	1.10	silty clay to clay	UNDFND	UNDFD	20	2.0
6.05	20	48.78	1.96	4.01	1.16	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
6.40	21	104.43	2.40	2.30	1.23	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
6.70	22	79.82	3.00	3.76	1.29	clayey silt to silty clay	UNDFND	UNDFD	38	5.2
7.00	23	42.95	2.00	4.65	1.35	silty clay to clay	UNDFND	UNDFD	27	2.7
7.35	24	23.52	0.94	3.99	1.41	silty clay to clay	UNDFND	UNDFD	15	1.4
7.65	25	14.30	0.67	4.67	1.46	clay	UNDFND	UNDFD	14	.8
7.95	26	14.61	0.79	5.38	1.48	clay	UNDFND	UNDFD	14	.8
8.25	27	28.39	0.61	2.15	1.51	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
8.55	28	13.67	0.46	3.40	1.54	silty clay to clay	UNDFND	UNDFD	9	.8
8.85	29	13.23	0.54	4.12	1.57	clay	UNDFND	UNDFD	13	.7
9.15	30	10.79	0.47	4.38	1.60	clay	UNDFND	UNDFD	10	.6
9.45	31	10.52	0.39	3.68	1.63	clay	UNDFND	UNDFD	10	.5
9.75	32	13.07	0.41	3.11	1.65	silty clay to clay	UNDFND	UNDFD	8	.7
10.05	33	12.31	0.40	3.24	1.68	silty clay to clay	UNDFND	UNDFD	8	.6
10.35	34	14.68	0.41	2.81	1.71	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.65	35	13.72	0.40	2.95	1.74	silty clay to clay	UNDFND	UNDFD	9	.7
10.95	36	14.96	0.45	3.03	1.77	silty clay to clay	UNDFND	UNDFD	10	.8
11.25	37	16.01	0.53	3.31	1.80	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	11.83	0.26	2.20	1.82	clayey silt to silty clay	UNDFND	UNDFD	6	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.63	0.45	2.55	1.85	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	22.52	0.77	3.43	1.88	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	27.99	1.43	5.13	1.91	clay	UNDFND	UNDFD	27	1.7
12.80	42	29.48	0.96	3.27	1.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	17.73	0.83	4.67	1.97	clay	UNDFND	UNDFD	17	1.0
13.40	44	24.24	1.32	5.42	2.00	clay	UNDFND	UNDFD	23	1.4
13.75	45	55.41	1.62	2.93	2.03	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.05	46	64.79	1.58	2.43	2.06	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
14.35	47	29.69	1.21	4.07	2.09	silty clay to clay	UNDFND	UNDFD	19	1.7
14.65	48	32.38	1.44	4.44	2.12	silty clay to clay	UNDFND	UNDFD	21	1.9
14.95	49	52.70	1.67	3.17	2.14	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
15.25	50	32.61	1.01	3.10	2.17	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
15.55	51	22.71	0.93	4.11	2.20	silty clay to clay	UNDFND	UNDFD	15	1.3
15.85	52	47.86	2.26	4.73	2.23	silty clay to clay	UNDFND	UNDFD	31	2.9
16.15	53	47.63	2.28	4.79	2.26	silty clay to clay	UNDFND	UNDFD	30	2.9
16.45	54	18.02	0.82	4.52	2.29	clay	UNDFND	UNDFD	17	.9
16.75	55	21.24	1.11	5.21	2.31	clay	UNDFND	UNDFD	20	1.1
17.05	56	120.80	3.63	3.01	2.34	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8
17.35	57	195.95	4.16	2.12	2.37	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
17.65	58	227.67	4.46	1.96	2.40	sand to silty sand	70-80	40-42	>50	UNDEFINED
17.95	59	242.58	3.71	1.53	2.43	sand to silty sand	70-80	40-42	>50	UNDEFINED
18.25	60	144.72	2.54	1.75	2.46	sand to silty sand	60-70	38-40	35	UNDEFINED
18.55	61	32.52	1.34	4.12	2.48	silty clay to clay	UNDFND	UNDFD	21	1.9
18.85	62	92.90	2.38	2.56	2.51	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
19.20	63	94.62	2.15	2.27	2.54	silty sand to sandy silt	50-60	36-38	30	UNDEFINED
19.50	64	82.54	2.00	2.42	2.57	sandy silt to clayey silt	UNDFND	UNDFD	32	5.2
19.80	65	126.10	2.42	1.92	2.60	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.15	66	104.68	2.48	2.37	2.63	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.45	67	35.75	1.52	4.24	2.66	silty clay to clay	UNDFND	UNDFD	23	2.1
20.75	68	29.61	1.56	5.27	2.69	clay	UNDFND	UNDFD	28	1.7
21.05	69	19.51	0.76	3.91	2.72	silty clay to clay	UNDFND	UNDFD	12	1.0
21.35	70	51.59	2.44	4.73	2.75	silty clay to clay	UNDFND	UNDFD	33	3.1
21.65	71	183.98	4.92	2.67	2.78	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	284.59	4.66	1.64	2.81	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.25	73	178.65	2.05	1.15	2.83	sand to silty sand	60-70	38-40	43	UNDEFINED
22.55	74	37.16	1.16	3.11	2.86	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
22.85	75	32.94	1.51	4.59	2.89	silty clay to clay	UNDFND	UNDFD	21	1.8
23.15	76	30.33	1.31	4.33	2.92	silty clay to clay	UNDFND	UNDFD	19	1.7
23.45	77	40.64	2.27	5.57	2.95	clay	UNDFND	UNDFD	39	2.4
23.75	78	49.14	2.50	5.08	2.98	clay	UNDFND	UNDFD	47	2.9
24.05	79	58.91	2.43	4.12	3.00	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
24.35	80	46.35	2.11	4.55	3.03	silty clay to clay	UNDFND	UNDFD	30	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	43.88	2.01	4.57	3.06	silty clay to clay	UNDFND	UNDFD	28	2.6
24.95	82	49.09	2.41	4.90	3.09	silty clay to clay	UNDFND	UNDFD	31	2.9
25.25	83	41.14	2.00	4.87	3.12	silty clay to clay	UNDFND	UNDFD	26	2.4
25.60	84	45.40	2.28	5.01	3.15	clay	UNDFND	UNDFD	43	2.6
25.90	85	35.27	1.95	5.52	3.18	clay	UNDFND	UNDFD	34	2.0
26.20	86	29.36	1.41	4.82	3.21	clay	UNDFND	UNDFD	28	1.6
26.55	87	27.94	1.59	5.70	3.24	clay	UNDFND	UNDFD	27	1.5
26.85	88	36.55	2.29	6.28	3.27	clay	UNDFND	UNDFD	35	2.0
27.15	89	144.06	2.95	2.05	3.30	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
27.45	90	276.73	2.43	0.88	3.32	sand	70-80	40-42	>50	UNDEFINED
27.75	91	155.74	5.46	3.51	3.35	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.0
28.05	92	162.70	4.92	3.03	3.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	224.38	5.18	2.31	3.41	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
28.65	94	156.75	5.65	3.60	3.44	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
28.95	95	316.45	7.30	2.31	3.47	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
29.25	96	221.44	5.16	2.33	3.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
29.55	97	292.69	6.53	2.23	3.52	sand to silty sand	70-80	40-42	>50	UNDEFINED
29.85	98	304.81	7.81	2.56	3.55	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
30.15	99	185.34	5.18	2.80	3.58	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	172.86	4.09	2.37	3.61	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.75	101	72.03	2.46	3.42	3.64	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
31.05	102	45.82	1.71	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
31.35	103	145.21	2.81	1.93	3.69	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
31.65	104	129.56	3.25	2.51	3.72	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
32.00	105	106.14	3.35	3.16	3.75	sandy silt to clayey silt	UNDFND	UNDFD	41	6.6
32.30	106	33.99	1.49	4.39	3.78	silty clay to clay	UNDFND	UNDFD	22	1.8
32.60	107	27.13	1.05	3.88	3.81	silty clay to clay	UNDFND	UNDFD	17	1.3
32.95	108	24.39	0.93	3.79	3.84	silty clay to clay	UNDFND	UNDFD	16	1.1
33.25	109	24.87	0.93	3.75	3.87	silty clay to clay	UNDFND	UNDFD	16	1.2
33.55	110	27.90	1.14	4.09	3.90	silty clay to clay	UNDFND	UNDFD	18	1.4
33.85	111	31.44	0.89	2.82	3.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
34.15	112	40.50	1.37	3.38	3.96	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
34.45	113	149.32	3.39	2.27	3.99	silty sand to sandy silt	50-60	36-38	48	UNDEFINED
34.75	114	195.25	4.02	2.06	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	184.39	3.78	2.05	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.35	116	178.86	3.01	1.68	4.07	sand to silty sand	60-70	36-38	43	UNDEFINED
35.65	117	166.93	4.09	2.45	4.10	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	293.52	6.35	2.16	4.13	sand to silty sand	70-80	38-40	>50	UNDEFINED
36.25	119	203.09	2.92	1.44	4.16	sand to silty sand	60-70	36-38	49	UNDEFINED
36.55	120	89.66	2.95	3.29	4.18	sandy silt to clayey silt	UNDFND	UNDFD	34	5.5
36.85	121	284.22	2.34	0.82	4.21	sand	70-80	38-40	>50	UNDEFINED
37.15	122	36.08	1.23	3.42	4.24	clayey silt to silty clay	UNDFND	UNDFD	17	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	101.45	3.10	3.05	4.27	sandy silt to clayey silt	UNDFND	UNDFD	39	6.2
37.75	124	194.66	3.85	1.98	4.30	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.05	125	83.68	4.24	5.07	4.33	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	220.43	4.73	2.14	4.36	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.70	127	46.37	1.29	2.78	4.39	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
39.00	128	205.41	4.99	2.43	4.42	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.35	129	242.22	5.49	2.27	4.45	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
39.65	130	78.54	4.06	5.17	4.48	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	98.93	3.91	3.96	4.50	clayey silt to silty clay	UNDFND	UNDFD	47	6.0
40.25	132	241.09	5.40	2.24	4.53	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
40.55	133	283.46	6.92	2.44	4.56	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.85	134	243.92	6.92	2.84	4.59	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
41.15	135	99.59	2.95	2.96	4.62	sandy silt to clayey silt	UNDFND	UNDFD	38	6.1
41.45	136	48.78	1.29	2.65	4.65	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
41.75	137	46.78	1.61	3.44	4.67	clayey silt to silty clay	UNDFND	UNDFD	22	2.5
42.05	138	37.42	1.22	3.27	4.70	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
42.35	139	41.42	1.36	3.29	4.73	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
42.65	140	56.91	1.74	3.07	4.76	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2
42.95	141	53.32	1.97	3.70	4.79	clayey silt to silty clay	UNDFND	UNDFD	26	2.9
43.25	142	121.91	5.49	4.51	4.82	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	62.84	3.38	5.37	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.85	144	44.82	1.97	4.39	4.87	silty clay to clay	UNDFND	UNDFD	29	2.4
44.15	145	47.98	1.57	3.26	4.90	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
44.45	146	39.48	1.21	3.06	4.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.0
44.80	147	42.47	1.55	3.65	4.96	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
45.10	148	49.22	1.82	3.70	4.99	clayey silt to silty clay	UNDFND	UNDFD	24	2.6
45.40	149	61.08	2.67	4.37	5.02	clayey silt to silty clay	UNDFND	UNDFD	29	3.4
45.75	150	144.76	2.88	1.99	5.05	silty sand to sandy silt	50-60	34-36	46	UNDEFINED

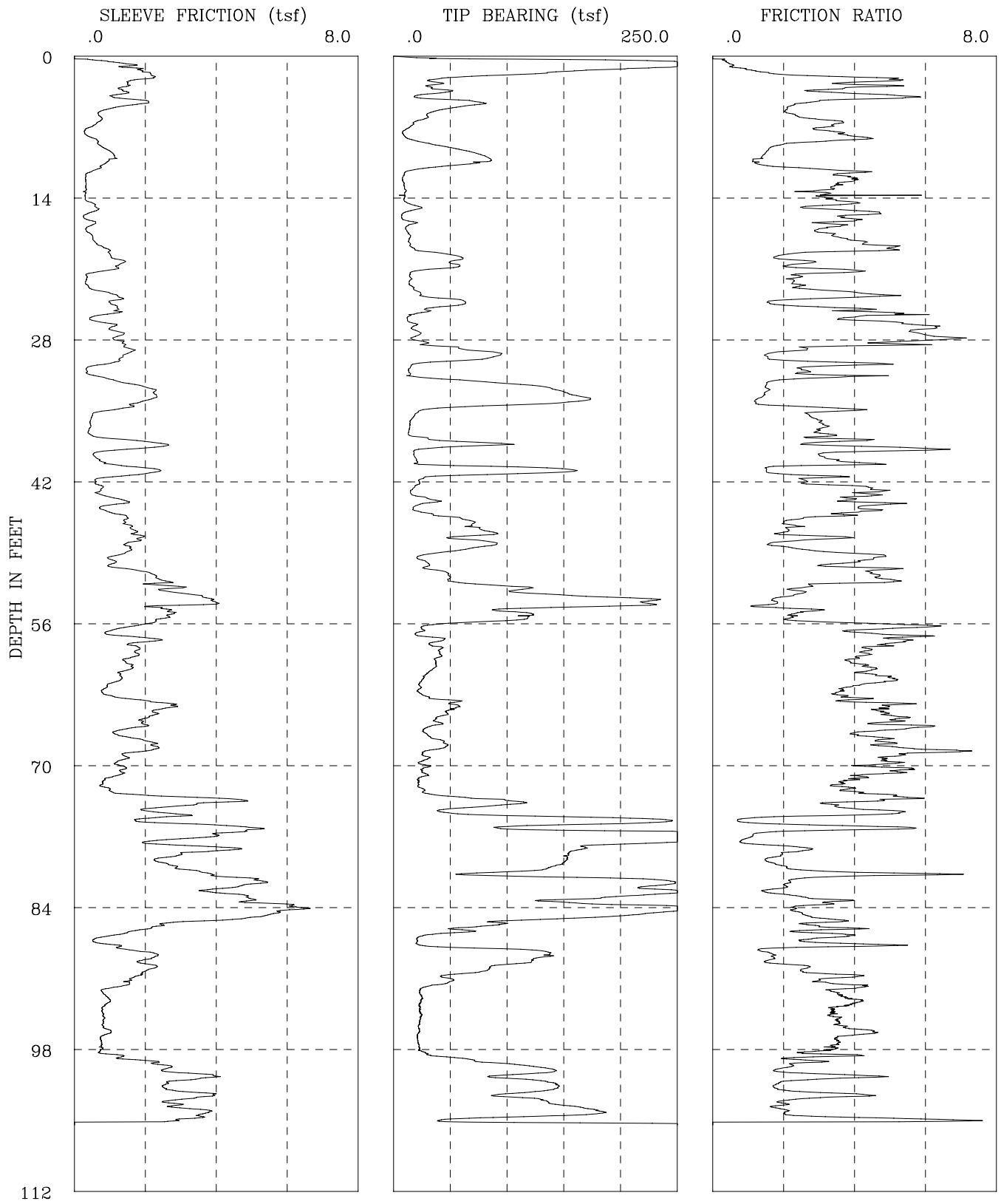
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-21e



CPT-08-007	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-22a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-007
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :03/28/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	216.40	0.96	0.45	0.03	sand	>90	>48	41	UNDEFINED
0.60	2	148.05	1.98	1.34	0.09	sand to silty sand	>90	>48	35	UNDEFINED
0.95	3	36.63	1.61	4.41	0.15	silty clay to clay	UNDFND	UNDFD	23	2.4
1.25	4	33.72	1.28	3.79	0.22	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
1.55	5	64.49	1.68	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.85	6	33.60	0.75	2.22	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.15	7	18.31	0.61	3.34	0.39	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
2.45	8	9.44	0.34	3.64	0.45	clay	UNDFND	UNDFD	9	.5
2.75	9	31.55	0.69	2.20	0.51	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
3.05	10	72.20	1.06	1.46	0.57	silty sand to sandy silt	60-70	42-44	23	UNDEFINED
3.35	11	64.99	0.86	1.32	0.61	silty sand to sandy silt	60-70	40-42	21	UNDEFINED
3.65	12	11.54	0.42	3.62	0.64	clay	UNDFND	UNDFD	11	.7
3.95	13	8.86	0.32	3.62	0.67	clay	UNDFND	UNDFD	8	.5
4.25	14	10.13	0.32	3.12	0.69	silty clay to clay	UNDFND	UNDFD	6	.6
4.55	15	15.04	0.48	3.21	0.72	silty clay to clay	UNDFND	UNDFD	10	.9
4.85	16	11.13	0.43	3.88	0.75	clay	UNDFND	UNDFD	11	.6
5.15	17	13.23	0.46	3.47	0.78	silty clay to clay	UNDFND	UNDFD	8	.8
5.45	18	13.02	0.42	3.24	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	14.38	0.64	4.45	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	39.97	1.00	2.49	0.86	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
6.40	21	52.08	1.27	2.44	0.89	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
6.70	22	15.80	0.47	2.97	0.93	clayey silt to silty clay	UNDFND	UNDFD	8	.9
7.00	23	15.40	0.37	2.40	0.95	clayey silt to silty clay	UNDFND	UNDFD	7	.9
7.35	24	33.74	1.09	3.22	0.98	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
7.65	25	46.17	1.13	2.44	1.02	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
7.95	26	16.16	0.72	4.48	1.04	clay	UNDFND	UNDFD	15	.9
8.25	27	17.66	1.02	5.79	1.07	clay	UNDFND	UNDFD	17	1.0
8.55	28	20.56	1.25	6.08	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	45.96	1.48	3.22	1.13	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.15	30	84.14	1.39	1.65	1.16	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
9.45	31	18.11	0.61	3.39	1.19	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
9.75	32	28.07	0.69	2.46	1.21	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
10.05	33	121.53	1.87	1.54	1.24	sand to silty sand	60-70	40-42	29	UNDEFINED
10.35	34	162.61	2.22	1.37	1.27	sand to silty sand	70-80	42-44	39	UNDEFINED
10.65	35	82.46	1.50	1.82	1.30	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
10.95	36	18.02	0.51	2.83	1.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
11.25	37	14.18	0.44	3.09	1.36	silty clay to clay	UNDFND	UNDFD	9	.7
11.55	38	22.16	0.78	3.51	1.38	clayey silt to silty clay	UNDFND	UNDFD	11	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-22b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.90	2.08	3.59	1.41	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
12.15	40	18.74	0.61	3.27	1.44	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
12.45	41	82.92	1.54	1.86	1.47	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
12.80	42	60.95	1.26	2.07	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	18.19	0.72	3.96	1.53	silty clay to clay	UNDFND	UNDFD	12	1.0
13.40	44	27.22	1.09	4.01	1.56	silty clay to clay	UNDFND	UNDFD	17	1.6
13.75	45	22.13	0.96	4.33	1.59	clay	UNDFND	UNDFD	21	1.2
14.05	46	58.74	1.44	2.45	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.35	47	77.98	1.64	2.11	1.65	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
14.65	48	72.15	1.76	2.43	1.68	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
14.95	49	62.49	1.51	2.42	1.70	sandy silt to clayey silt	UNDFND	UNDFD	24	3.9
15.25	50	25.22	1.09	4.32	1.73	silty clay to clay	UNDFND	UNDFD	16	1.4
15.55	51	36.25	1.53	4.22	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	51.84	2.38	4.59	1.79	silty clay to clay	UNDFND	UNDFD	33	3.2
16.15	53	107.86	2.72	2.52	1.82	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
16.45	54	202.76	3.78	1.87	1.85	sand to silty sand	70-80	40-42	49	UNDEFINED
16.75	55	138.33	2.65	1.92	1.87	silty sand to sandy silt	60-70	38-40	44	UNDEFINED
17.05	56	100.37	2.43	2.42	1.90	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
17.35	57	25.59	1.26	4.94	1.93	clay	UNDFND	UNDFD	25	1.4
17.65	58	34.30	1.82	5.31	1.96	clay	UNDFND	UNDFD	33	2.0
17.95	59	39.10	1.73	4.42	1.99	silty clay to clay	UNDFND	UNDFD	25	2.3
18.25	60	38.65	1.56	4.03	2.02	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
18.55	61	34.27	1.50	4.37	2.04	silty clay to clay	UNDFND	UNDFD	22	2.0
18.85	62	25.51	1.25	4.89	2.07	clay	UNDFND	UNDFD	24	1.4
19.20	63	23.04	0.85	3.71	2.10	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	44.90	1.96	4.37	2.13	silty clay to clay	UNDFND	UNDFD	29	2.7
19.80	65	50.87	2.44	4.79	2.16	silty clay to clay	UNDFND	UNDFD	32	3.1
20.15	66	37.85	1.98	5.22	2.19	clay	UNDFND	UNDFD	36	2.2
20.45	67	28.16	1.29	4.58	2.22	clay	UNDFND	UNDFD	27	1.6
20.75	68	42.73	2.05	4.80	2.25	silty clay to clay	UNDFND	UNDFD	27	2.5
21.05	69	31.04	1.80	5.81	2.28	clay	UNDFND	UNDFD	30	1.7
21.35	70	27.73	1.31	4.73	2.31	clay	UNDFND	UNDFD	27	1.5
21.65	71	26.57	1.33	4.99	2.34	clay	UNDFND	UNDFD	25	1.4
21.95	72	21.70	0.81	3.75	2.37	silty clay to clay	UNDFND	UNDFD	14	1.1
22.25	73	30.80	1.36	4.41	2.39	silty clay to clay	UNDFND	UNDFD	20	1.7
22.55	74	95.42	3.88	4.06	2.42	clayey silt to silty clay	UNDFND	UNDFD	46	6.0
22.85	75	63.37	2.47	3.90	2.45	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
23.15	76	196.07	2.70	1.38	2.48	sand to silty sand	70-80	40-42	47	UNDEFINED
23.45	77	239.29	4.55	1.90	2.51	sand to silty sand	70-80	40-42	>50	UNDEFINED
23.75	78	255.20	2.71	1.06	2.54	sand	80-90	40-42	49	UNDEFINED
24.05	79	158.51	3.65	2.30	2.56	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	149.73	2.50	1.67	2.59	sand to silty sand	60-70	38-40	36	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-22c

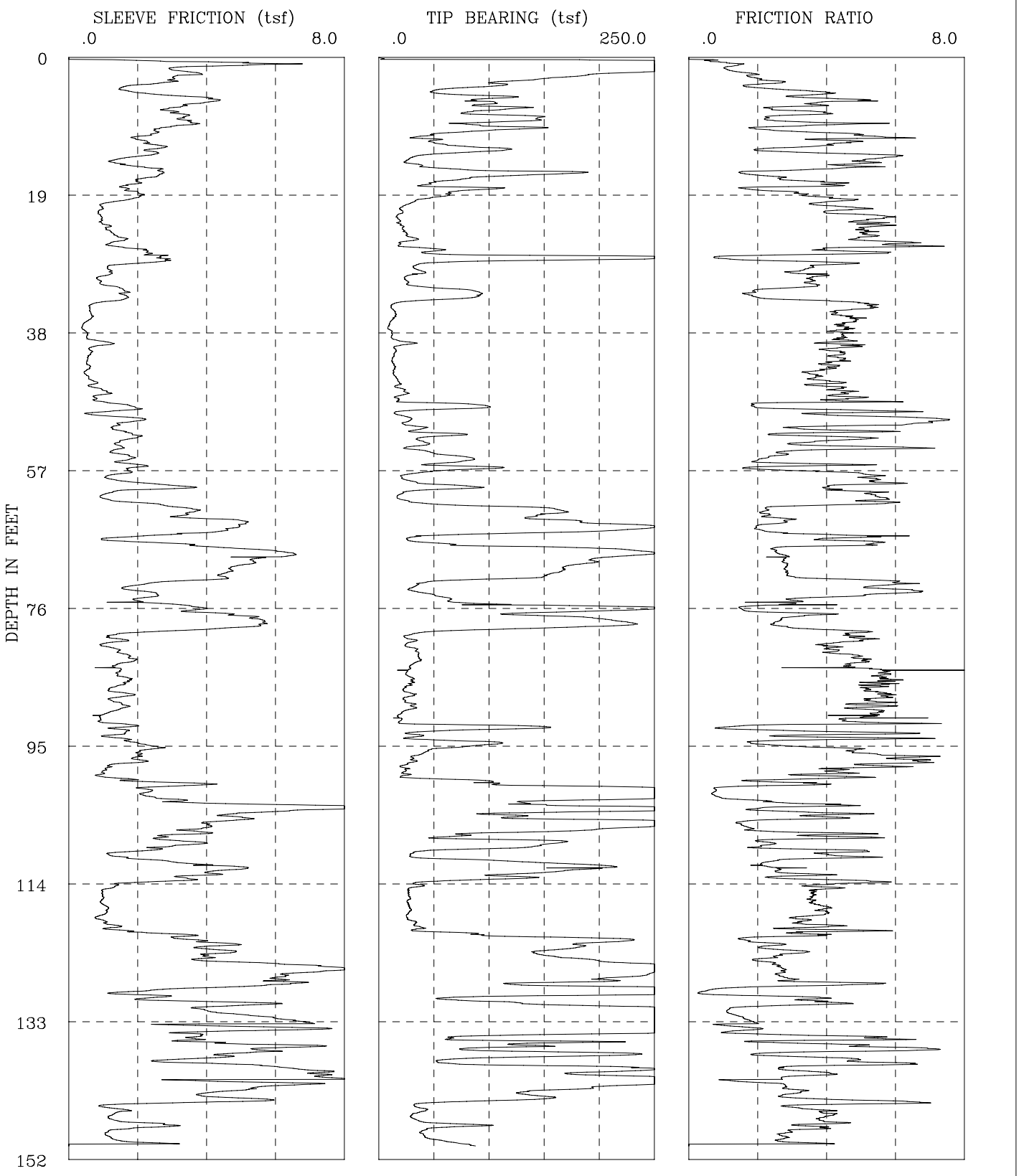
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	103.90	3.48	3.35	2.62	sandy silt to clayey silt	UNDFND	UNDFD	40	6.6
24.95	82	226.47	5.02	2.22	2.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
25.25	83	233.29	4.22	1.81	2.68	sand to silty sand	70-80	40-42	>50	UNDEFINED
25.60	84	190.99	5.45	2.86	2.71	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
25.90	85	225.64	5.62	2.49	2.74	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
26.20	86	93.86	3.01	3.20	2.77	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
26.55	87	40.37	1.25	3.11	2.80	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
26.85	88	41.22	0.99	2.41	2.83	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
27.15	89	133.06	2.15	1.62	2.86	sand to silty sand	50-60	36-38	32	UNDEFINED
27.45	90	100.53	2.07	2.06	2.88	silty sand to sandy silt	50-60	34-36	32	UNDEFINED
27.75	91	57.92	1.80	3.11	2.91	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
28.05	92	37.83	1.33	3.52	2.94	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
28.35	93	23.96	0.86	3.60	2.97	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
28.65	94	23.41	0.89	3.79	3.00	silty clay to clay	UNDFND	UNDFD	15	1.1
28.95	95	23.63	0.81	3.44	3.03	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
29.25	96	22.55	0.82	3.64	3.05	silty clay to clay	UNDFND	UNDFD	14	1.1
29.55	97	21.59	0.88	4.06	3.08	silty clay to clay	UNDFND	UNDFD	14	1.0
29.85	98	22.18	0.77	3.45	3.11	clayey silt to silty clay	UNDFND	UNDFD	11	1.0
30.15	99	37.59	1.04	2.77	3.14	sandy silt to clayey silt	UNDFND	UNDFD	14	2.1
30.45	100	106.00	2.43	2.29	3.17	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
30.75	101	114.31	3.36	2.94	3.20	sandy silt to clayey silt	UNDFND	UNDFD	44	7.2
31.05	102	139.99	2.63	1.88	3.22	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.35	103	112.41	3.46	3.08	3.25	sandy silt to clayey silt	UNDFND	UNDFD	43	7.0
31.65	104	148.84	2.83	1.90	3.28	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
32.00	105	128.25	3.49	2.72	3.31	silty sand to sandy silt	50-60	36-38	41	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-22d



I-436 Sr-22 Phase 2	CPT-08-008
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-23a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-008
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 30.83989

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	317.32	3.23	1.02	0.03	sand	>90	UNDFD	>50	UNDEFINED
0.60	2	284.69	3.39	1.19	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	174.65	3.27	1.87	0.15	sand to silty sand	>90	>48	42	UNDEFINED
1.25	4	106.28	2.30	2.16	0.22	silty sand to sandy silt	>90	46-48	34	UNDEFINED
1.55	5	55.47	1.86	3.36	0.28	clayey silt to silty clay	UNDFND	UNDFD	27	3.6
1.85	6	102.04	3.91	3.83	0.33	clayey silt to silty clay	UNDFND	UNDFD	49	6.7
2.15	7	109.15	3.36	3.08	0.39	sandy silt to clayey silt	UNDFND	UNDFD	42	7.2
2.45	8	97.11	3.13	3.22	0.45	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.75	9	129.81	3.40	2.62	0.51	silty sand to sandy silt	80-90	44-46	41	UNDEFINED
3.05	10	111.34	2.96	2.66	0.57	sandy silt to clayey silt	UNDFND	UNDFD	43	7.3
3.35	11	55.24	2.33	4.22	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	49.76	2.17	4.35	0.69	silty clay to clay	UNDFND	UNDFD	32	3.2
3.95	13	96.84	2.55	2.63	0.75	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
4.25	14	43.32	2.14	4.94	0.81	clay	UNDFND	UNDFD	41	2.8
4.55	15	29.77	1.42	4.78	0.87	clay	UNDFND	UNDFD	29	1.9
4.85	16	103.20	2.55	2.47	0.93	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.15	17	104.66	2.36	2.26	0.98	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.45	18	50.64	1.80	3.55	1.04	clayey silt to silty clay	UNDFND	UNDFD	24	3.3
5.75	19	79.14	1.87	2.36	1.10	sandy silt to clayey silt	UNDFND	UNDFD	30	5.2
6.05	20	45.48	1.82	4.00	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.40	21	23.42	0.99	4.22	1.23	silty clay to clay	UNDFND	UNDFD	15	1.4
6.70	22	19.08	0.89	4.66	1.29	clay	UNDFND	UNDFD	18	1.1
7.00	23	18.32	0.95	5.20	1.35	clay	UNDFND	UNDFD	18	1.1
7.35	24	22.28	1.16	5.19	1.41	clay	UNDFND	UNDFD	21	1.3
7.65	25	29.23	1.46	5.01	1.48	clay	UNDFND	UNDFD	28	1.8
7.95	26	21.33	1.29	6.07	1.54	clay	UNDFND	UNDFD	20	1.3
8.25	27	47.64	2.14	4.50	1.59	silty clay to clay	UNDFND	UNDFD	30	3.0
8.55	28	221.16	2.65	1.20	1.65	sand	80-90	42-44	42	UNDEFINED
8.85	29	39.56	1.59	4.02	1.71	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.15	30	35.53	1.19	3.36	1.77	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
9.45	31	24.82	0.88	3.55	1.83	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
9.75	32	42.57	1.26	2.95	1.87	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.05	33	90.03	1.63	1.81	1.90	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
10.35	34	42.78	1.27	2.96	1.93	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.65	35	12.07	0.61	5.04	1.95	clay	UNDFND	UNDFD	12	.6
10.95	36	14.80	0.66	4.43	1.98	clay	UNDFND	UNDFD	14	.8
11.25	37	10.69	0.50	4.69	2.01	clay	UNDFND	UNDFD	10	.5
11.55	38	9.83	0.44	4.44	2.04	clay	UNDFND	UNDFD	9	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-23b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	12.25	0.54	4.44	2.07	clay	UNDFND	UNDFD	12	.6
12.15	40	22.75	1.01	4.45	2.10	clay	UNDFND	UNDFD	22	1.3
12.45	41	14.68	0.63	4.27	2.12	clay	UNDFND	UNDFD	14	.8
12.80	42	12.86	0.56	4.32	2.15	clay	UNDFND	UNDFD	12	.6
13.10	43	14.12	0.58	4.09	2.19	clay	UNDFND	UNDFD	14	.7
13.40	44	13.63	0.50	3.65	2.21	silty clay to clay	UNDFND	UNDFD	9	.7
13.75	45	17.72	0.69	3.89	2.24	silty clay to clay	UNDFND	UNDFD	11	1.0
14.05	46	19.72	0.86	4.35	2.27	clay	UNDFND	UNDFD	19	1.1
14.35	47	20.11	0.91	4.52	2.30	clay	UNDFND	UNDFD	19	1.1
14.65	48	55.24	1.26	2.28	2.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.4
14.95	49	48.93	1.49	3.04	2.36	sandy silt to clayey silt	UNDFND	UNDFD	19	3.0
15.25	50	24.62	1.53	6.20	2.39	clay	UNDFND	UNDFD	24	1.4
15.55	51	28.65	1.48	5.15	2.42	clay	UNDFND	UNDFD	27	1.7
15.85	52	46.69	1.58	3.39	2.44	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
16.15	53	42.68	1.80	4.21	2.47	silty clay to clay	UNDFND	UNDFD	27	2.6
16.45	54	35.11	1.46	4.17	2.50	silty clay to clay	UNDFND	UNDFD	22	2.1
16.75	55	51.15	1.43	2.79	2.53	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
17.05	56	77.09	1.67	2.16	2.56	silty sand to sandy silt	40-50	34-36	25	UNDEFINED
17.35	57	75.95	1.93	2.54	2.59	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
17.65	58	29.92	1.41	4.70	2.61	clay	UNDFND	UNDFD	29	1.7
17.95	59	33.00	1.79	5.42	2.64	clay	UNDFND	UNDFD	32	1.9
18.25	60	62.66	2.61	4.16	2.67	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
18.55	61	18.58	1.01	5.45	2.70	clay	UNDFND	UNDFD	18	.9
18.85	62	45.21	2.05	4.54	2.73	silty clay to clay	UNDFND	UNDFD	29	2.7
19.20	63	158.20	3.51	2.22	2.76	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
19.50	64	152.38	4.01	2.63	2.79	silty sand to sandy silt	60-70	38-40	49	UNDEFINED
19.80	65	229.45	4.96	2.16	2.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
20.15	66	126.43	3.42	2.71	2.85	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.45	67	37.10	1.83	4.94	2.88	clay	UNDFND	UNDFD	36	2.2
20.75	68	171.97	4.77	2.77	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.05	69	229.56	6.06	2.64	2.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
21.35	70	188.98	5.27	2.79	2.96	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.65	71	166.90	4.70	2.81	2.99	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	136.64	4.43	3.25	3.02	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
22.25	73	39.86	2.33	5.84	3.05	clay	UNDFND	UNDFD	38	2.3
22.55	74	34.00	2.05	6.03	3.08	clay	UNDFND	UNDFD	33	1.9
22.85	75	59.66	2.21	3.71	3.11	clayey silt to silty clay	UNDFND	UNDFD	29	3.6
23.15	76	160.88	3.05	1.89	3.13	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.45	77	169.77	4.07	2.40	3.16	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.75	78	203.90	5.53	2.71	3.19	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
24.05	79	181.16	5.03	2.77	3.22	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	36.69	1.77	4.82	3.25	clay	UNDFND	UNDFD	35	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-23c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	28.63	1.36	4.73	3.28	clay	UNDFND	UNDFD	27	1.5
24.95	82	29.79	1.24	4.16	3.30	silty clay to clay	UNDFND	UNDFD	19	1.6
25.25	83	36.03	1.65	4.58	3.33	silty clay to clay	UNDFND	UNDFD	23	2.0
25.60	84	32.99	1.63	4.93	3.36	clay	UNDFND	UNDFD	32	1.8
25.90	85	26.08	1.38	5.31	3.39	clay	UNDFND	UNDFD	25	1.4
26.20	86	28.70	1.63	5.66	3.42	clay	UNDFND	UNDFD	27	1.5
26.55	87	26.79	1.45	5.41	3.45	clay	UNDFND	UNDFD	26	1.4
26.85	88	27.43	1.55	5.64	3.48	clay	UNDFND	UNDFD	26	1.4
27.15	89	24.58	1.33	5.41	3.51	clay	UNDFND	UNDFD	24	1.2
27.45	90	30.17	1.56	5.19	3.54	clay	UNDFND	UNDFD	29	1.6
27.75	91	19.23	1.02	5.32	3.57	clay	UNDFND	UNDFD	18	.9
28.05	92	29.02	1.14	3.94	3.60	silty clay to clay	UNDFND	UNDFD	19	1.5
28.35	93	105.53	1.62	1.54	3.62	sand to silty sand	40-50	34-36	25	UNDEFINED
28.65	94	30.76	1.39	4.51	3.65	silty clay to clay	UNDFND	UNDFD	20	1.6
28.95	95	91.03	2.02	2.22	3.68	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
29.25	96	49.59	2.27	4.58	3.71	silty clay to clay	UNDFND	UNDFD	32	2.9
29.55	97	32.21	2.01	6.24	3.74	clay	UNDFND	UNDFD	31	1.7
29.85	98	25.46	1.50	5.87	3.77	clay	UNDFND	UNDFD	24	1.3
30.15	99	24.99	1.00	3.98	3.79	silty clay to clay	UNDFND	UNDFD	16	1.2
30.45	100	57.94	1.52	2.63	3.82	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
30.75	101	182.64	3.08	1.69	3.85	sand to silty sand	60-70	36-38	44	UNDEFINED
31.05	102	304.83	2.25	0.74	3.88	sand	70-80	38-40	>50	UNDEFINED
31.35	103	191.91	3.15	1.64	3.91	sand to silty sand	60-70	36-38	46	UNDEFINED
31.65	104	309.81	7.76	2.51	3.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
32.00	105	132.49	5.06	3.82	3.97	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
32.30	106	261.51	4.25	1.63	4.00	sand to silty sand	70-80	38-40	>50	UNDEFINED
32.60	107	180.06	3.81	2.11	4.03	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
32.95	108	92.84	2.93	3.15	4.06	sandy silt to clayey silt	UNDFND	UNDFD	36	5.7
33.25	109	143.35	3.24	2.26	4.09	silty sand to sandy silt	50-60	34-36	46	UNDEFINED
33.55	110	37.99	1.65	4.34	4.12	silty clay to clay	UNDFND	UNDFD	24	2.0
33.85	111	84.92	2.33	2.75	4.14	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
34.15	112	195.34	4.57	2.34	4.17	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	134.08	3.88	2.90	4.20	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
34.75	114	68.75	2.67	3.89	4.23	clayey silt to silty clay	UNDFND	UNDFD	33	4.1
35.05	115	31.48	1.18	3.75	4.26	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
35.35	116	27.43	0.99	3.61	4.29	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.65	117	26.74	0.97	3.62	4.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.95	118	28.14	1.12	3.98	4.34	silty clay to clay	UNDFND	UNDFD	18	1.4
36.25	119	25.84	0.90	3.47	4.37	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
36.55	120	33.59	1.22	3.65	4.40	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
36.85	121	53.41	1.86	3.48	4.43	clayey silt to silty clay	UNDFND	UNDFD	26	3.0
37.15	122	177.85	3.50	1.97	4.46	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-23d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	184.03	4.24	2.31	4.48	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.75	124	147.66	4.37	2.96	4.51	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.3
38.05	125	188.81	4.20	2.22	4.54	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.40	126	279.50	7.41	2.65	4.57	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
38.70	127	236.16	6.36	2.69	4.60	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.00	128	165.57	6.23	3.76	4.63	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
39.35	129	372.47	2.81	0.75	4.66	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
39.65	130	109.59	2.43	2.22	4.69	silty sand to sandy silt	40-50	32-34	35	UNDEFINED
39.95	131	181.83	4.81	2.64	4.72	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
40.25	132	367.72	4.34	1.18	4.75	sand	80-90	38-40	>50	UNDEFINED
40.55	133	372.43	6.20	1.66	4.78	sand to silty sand	80-90	38-40	>50	UNDEFINED
40.85	134	356.93	5.62	1.58	4.80	sand to silty sand	80-90	38-40	>50	UNDEFINED
41.15	135	235.11	4.02	1.71	4.83	sand to silty sand	60-70	36-38	>50	UNDEFINED
41.45	136	115.16	3.79	3.29	4.86	sandy silt to clayey silt	UNDFND	UNDFD	44	7.1
41.75	137	106.79	6.18	5.79	4.89	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	181.15	4.74	2.61	4.92	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.35	139	65.23	3.56	5.45	4.95	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.65	140	225.04	6.72	2.99	4.97	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.95	141	235.00	7.51	3.20	5.00	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
43.25	142	267.68	5.61	2.10	5.03	sand to silty sand	70-80	36-38	>50	UNDEFINED
43.55	143	155.70	4.77	3.06	5.06	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.8
43.85	144	140.77	4.76	3.38	5.09	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
44.15	145	41.24	2.02	4.89	5.12	clay	UNDFND	UNDFD	40	2.1
44.45	146	37.43	1.46	3.90	5.14	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
44.80	147	36.25	1.47	4.06	5.18	silty clay to clay	UNDFND	UNDFD	23	1.8
45.10	148	65.19	2.24	3.44	5.21	clayey silt to silty clay	UNDFND	UNDFD	31	3.7
45.40	149	40.22	1.12	2.78	5.23	sandy silt to clayey silt	UNDFND	UNDFD	15	2.0
45.75	150	66.48	1.28	1.93	5.27	silty sand to sandy silt	<40	<30	21	UNDEFINED

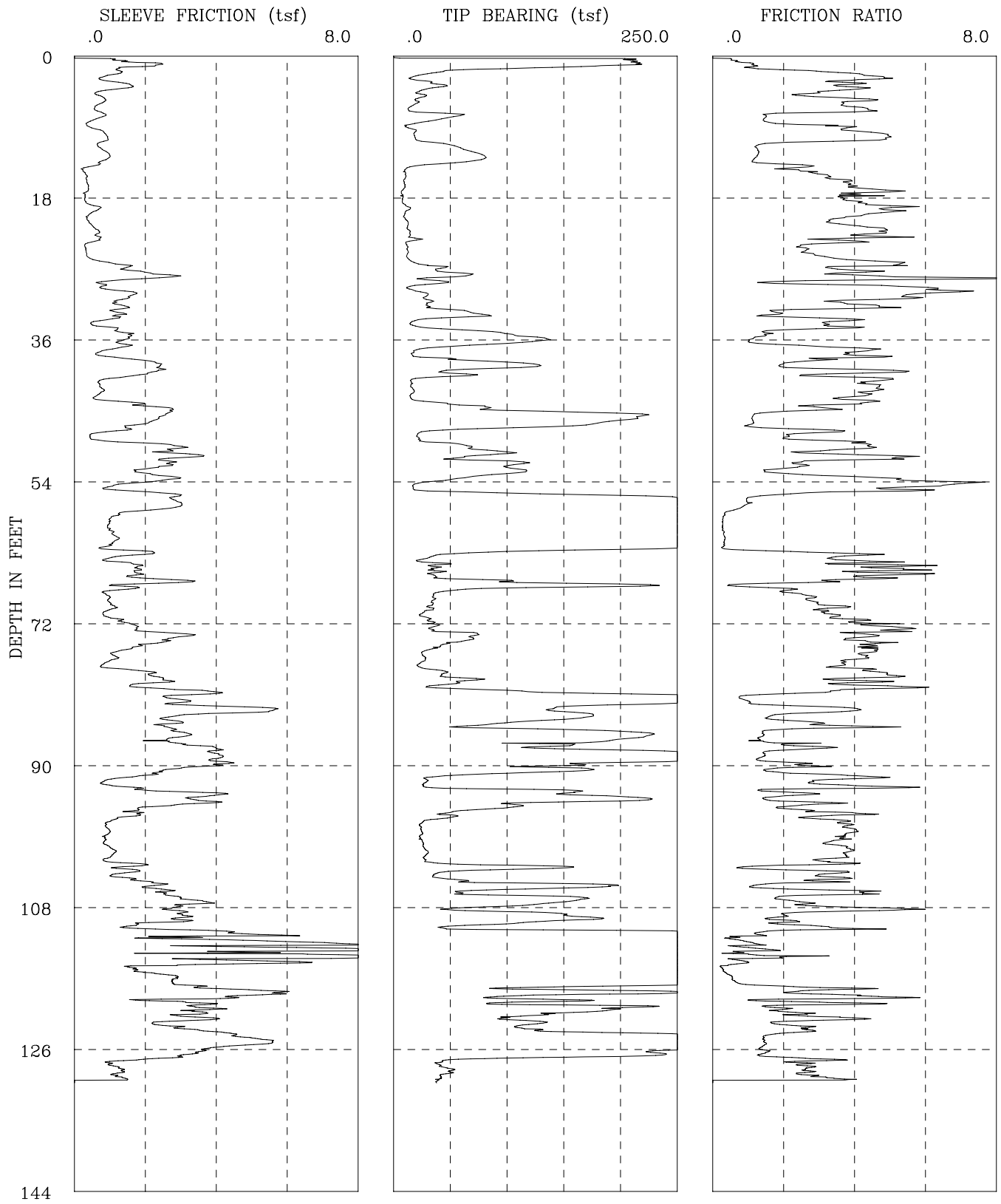
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-23e



CPT-08-009	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-24a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-009
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	176.67	1.34	0.76	0.03	sand	>90	>48	34	UNDEFINED
0.60	2	110.06	1.54	1.40	0.09	sand to silty sand	>90	>48	26	UNDEFINED
0.95	3	22.26	0.92	4.15	0.15	silty clay to clay	UNDFND	UNDFD	14	1.4
1.25	4	38.08	1.47	3.86	0.22	clayey silt to silty clay	UNDFND	UNDFD	18	2.5
1.55	5	24.56	0.72	2.93	0.28	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
1.85	6	20.87	0.82	3.92	0.33	silty clay to clay	UNDFND	UNDFD	13	1.3
2.15	7	14.98	0.61	4.09	0.39	clay	UNDFND	UNDFD	14	.9
2.45	8	49.86	0.76	1.53	0.45	silty sand to sandy silt	50-60	40-42	16	UNDEFINED
2.75	9	18.88	0.39	2.08	0.51	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
3.05	10	18.26	0.78	4.29	0.57	clay	UNDFND	UNDFD	17	1.1
3.35	11	23.79	0.87	3.67	0.61	silty clay to clay	UNDFND	UNDFD	15	1.5
3.65	12	56.98	0.72	1.26	0.64	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.95	13	77.32	0.97	1.25	0.67	silty sand to sandy silt	60-70	40-42	25	UNDEFINED
4.25	14	49.19	0.71	1.44	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.70	0.27	2.52	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	9.98	0.34	3.45	0.75	clay	UNDFND	UNDFD	10	.6
5.15	17	9.53	0.38	4.04	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.31	0.31	4.30	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	8.33	0.34	4.09	0.84	clay	UNDFND	UNDFD	8	.4
6.05	20	12.40	0.63	5.05	0.86	clay	UNDFND	UNDFD	12	.7
6.40	21	10.39	0.38	3.68	0.89	clay	UNDFND	UNDFD	10	.6
6.70	22	12.52	0.52	4.17	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	14.35	0.67	4.70	0.95	clay	UNDFND	UNDFD	14	.8
7.35	24	14.78	0.48	3.25	0.98	silty clay to clay	UNDFND	UNDFD	9	.8
7.65	25	12.39	0.33	2.65	1.02	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.95	26	13.31	0.52	3.90	1.04	clay	UNDFND	UNDFD	13	.7
8.25	27	34.75	1.37	3.94	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
8.55	28	53.92	2.35	4.35	1.10	silty clay to clay	UNDFND	UNDFD	34	3.4
8.85	29	33.92	1.08	3.17	1.13	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.15	30	18.05	1.14	6.32	1.16	clay	UNDFND	UNDFD	17	1.0
9.45	31	29.51	1.48	5.02	1.19	clay	UNDFND	UNDFD	28	1.8
9.75	32	31.42	1.31	4.16	1.21	silty clay to clay	UNDFND	UNDFD	20	1.9
10.05	33	70.50	1.19	1.69	1.24	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
10.35	34	24.79	0.79	3.20	1.27	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
10.65	35	44.75	1.01	2.26	1.30	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.95	36	116.99	1.53	1.30	1.33	sand to silty sand	60-70	40-42	28	UNDEFINED
11.25	37	87.31	1.36	1.56	1.36	silty sand to sandy silt	50-60	38-40	28	UNDEFINED
11.55	38	19.08	0.79	4.16	1.38	silty clay to clay	UNDFND	UNDFD	12	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-24a

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	60.44	1.67	2.76	1.41	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
12.15	40	99.25	2.42	2.44	1.44	silty sand to sandy silt	60-70	38-40	32	UNDEFINED
12.45	41	47.95	1.73	3.61	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	15.69	0.72	4.57	1.50	clay	UNDFND	UNDFD	15	.8
13.10	43	16.90	0.76	4.48	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	22.82	0.95	4.16	1.56	silty clay to clay	UNDFND	UNDFD	15	1.3
13.75	45	88.21	2.42	2.74	1.59	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
14.05	46	212.87	2.47	1.16	1.62	sand	80-90	42-44	41	UNDEFINED
14.35	47	166.63	1.83	1.10	1.65	sand to silty sand	70-80	40-42	40	UNDEFINED
14.65	48	35.55	0.96	2.71	1.68	sandy silt to clayey silt	UNDFND	UNDFD	14	2.1
14.95	49	27.45	0.85	3.11	1.70	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
15.25	50	69.66	2.81	4.03	1.73	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
15.55	51	78.70	3.02	3.84	1.76	clayey silt to silty clay	UNDFND	UNDFD	38	5.0
15.85	52	99.36	2.61	2.63	1.79	sandy silt to clayey silt	UNDFND	UNDFD	38	6.4
16.15	53	107.93	1.96	1.82	1.82	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
16.45	54	57.10	2.58	4.52	1.85	silty clay to clay	UNDFND	UNDFD	36	3.5
16.75	55	18.35	1.12	6.10	1.87	clay	UNDFND	UNDFD	18	1.0
17.05	56	142.23	2.50	1.76	1.90	silty sand to sandy silt	60-70	38-40	45	UNDEFINED
17.35	57	302.62	2.91	0.96	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	359.93	2.22	0.62	1.96	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.95	59	357.37	1.09	0.31	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	345.25	0.96	0.28	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	350.09	1.07	0.31	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	348.41	1.16	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	205.38	1.35	0.66	2.10	sand	70-80	40-42	39	UNDEFINED
19.50	64	31.89	1.24	3.88	2.13	silty clay to clay	UNDFND	UNDFD	20	1.8
19.80	65	36.97	1.68	4.55	2.16	silty clay to clay	UNDFND	UNDFD	24	2.2
20.15	66	36.07	1.72	4.78	2.19	clay	UNDFND	UNDFD	35	2.1
20.45	67	129.77	2.38	1.83	2.22	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
20.75	68	86.11	1.28	1.49	2.25	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.05	69	35.09	0.95	2.71	2.28	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0
21.35	70	33.27	1.08	3.24	2.31	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
21.65	71	27.00	0.87	3.21	2.34	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
21.95	72	32.72	1.31	4.01	2.37	silty clay to clay	UNDFND	UNDFD	21	1.8
22.25	73	35.45	1.81	5.09	2.39	clay	UNDFND	UNDFD	34	2.0
22.55	74	70.72	2.93	4.14	2.42	clayey silt to silty clay	UNDFND	UNDFD	34	4.4
22.85	75	47.99	2.14	4.45	2.45	silty clay to clay	UNDFND	UNDFD	31	2.9
23.15	76	28.22	1.25	4.43	2.48	silty clay to clay	UNDFND	UNDFD	18	1.5
23.45	77	26.78	1.07	4.00	2.51	silty clay to clay	UNDFND	UNDFD	17	1.4
23.75	78	27.32	1.08	3.95	2.54	silty clay to clay	UNDFND	UNDFD	17	1.5
24.05	79	48.32	2.26	4.68	2.56	silty clay to clay	UNDFND	UNDFD	31	2.9
24.35	80	54.32	2.17	3.99	2.59	clayey silt to silty clay	UNDFND	UNDFD	26	3.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-24c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	103.75	3.23	3.11	2.62	sandy silt to clayey silt	UNDFND	UNDFD	40	6.5
24.95	82	326.66	2.89	0.88	2.65	sand	80-90	40-42	>50	UNDEFINED
25.25	83	182.41	4.15	2.28	2.68	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
25.60	84	163.72	3.76	2.30	2.71	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
25.90	85	100.74	2.70	2.68	2.74	sandy silt to clayey silt	UNDFND	UNDFD	39	6.3
26.20	86	166.32	2.91	1.75	2.77	sand to silty sand	60-70	38-40	40	UNDEFINED
26.55	87	200.53	2.78	1.38	2.80	sand to silty sand	70-80	38-40	48	UNDEFINED
26.85	88	160.88	3.75	2.33	2.83	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.15	89	286.40	4.04	1.41	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.45	90	206.49	4.04	1.95	2.88	sand to silty sand	70-80	38-40	49	UNDEFINED
27.75	91	139.13	2.57	1.85	2.91	silty sand to sandy silt	60-70	36-38	44	UNDEFINED
28.05	92	34.29	1.29	3.75	2.94	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
28.35	93	45.98	1.29	2.81	2.97	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
28.65	94	170.87	3.51	2.05	3.00	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.95	95	163.46	3.43	2.10	3.03	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.25	96	77.60	1.86	2.39	3.05	sandy silt to clayey silt	UNDFND	UNDFD	30	4.7
29.55	97	43.32	1.43	3.29	3.08	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
29.85	98	24.11	0.91	3.76	3.11	silty clay to clay	UNDFND	UNDFD	15	1.2
30.15	99	24.52	0.95	3.87	3.14	silty clay to clay	UNDFND	UNDFD	16	1.2
30.45	100	24.94	0.85	3.42	3.17	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
30.75	101	27.60	1.05	3.81	3.20	silty clay to clay	UNDFND	UNDFD	18	1.4
31.05	102	28.23	1.01	3.58	3.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
31.35	103	75.49	1.43	1.90	3.25	silty sand to sandy silt	40-50	32-34	24	UNDEFINED
31.65	104	67.26	1.44	2.14	3.28	silty sand to sandy silt	<40	30-32	21	UNDEFINED
32.00	105	69.78	1.79	2.56	3.31	sandy silt to clayey silt	UNDFND	UNDFD	27	4.2
32.30	106	131.75	2.34	1.77	3.34	silty sand to sandy silt	50-60	36-38	42	UNDEFINED
32.60	107	121.84	2.82	2.32	3.37	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
32.95	108	114.00	3.24	2.84	3.40	sandy silt to clayey silt	UNDFND	UNDFD	44	7.1
33.25	109	118.33	3.01	2.55	3.43	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
33.55	110	143.40	2.65	1.85	3.46	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
33.85	111	120.94	2.56	2.12	3.49	silty sand to sandy silt	50-60	34-36	39	UNDEFINED
34.15	112	459.01	4.06	0.88	3.52	gravelly sand to sand	>90	42-44	>50	UNDEFINED
34.45	113	625.38	6.09	0.97	3.55	gravelly sand to sand	>90	42-44	>50	UNDEFINED
34.75	114	651.22	7.45	1.14	3.57	sand	>90	42-44	>50	UNDEFINED
35.05	115	611.68	7.34	1.20	3.60	sand	>90	42-44	>50	UNDEFINED
35.35	116	636.71	2.30	0.36	3.63	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.65	117	550.17	2.55	0.46	3.66	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.95	118	370.38	2.95	0.80	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	185.88	4.99	2.69	3.72	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
36.55	120	121.64	3.70	3.04	3.74	sandy silt to clayey silt	UNDFND	UNDFD	47	7.6
36.85	121	163.10	3.63	2.23	3.77	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.15	122	139.79	3.30	2.36	3.80	silty sand to sandy silt	50-60	36-38	45	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

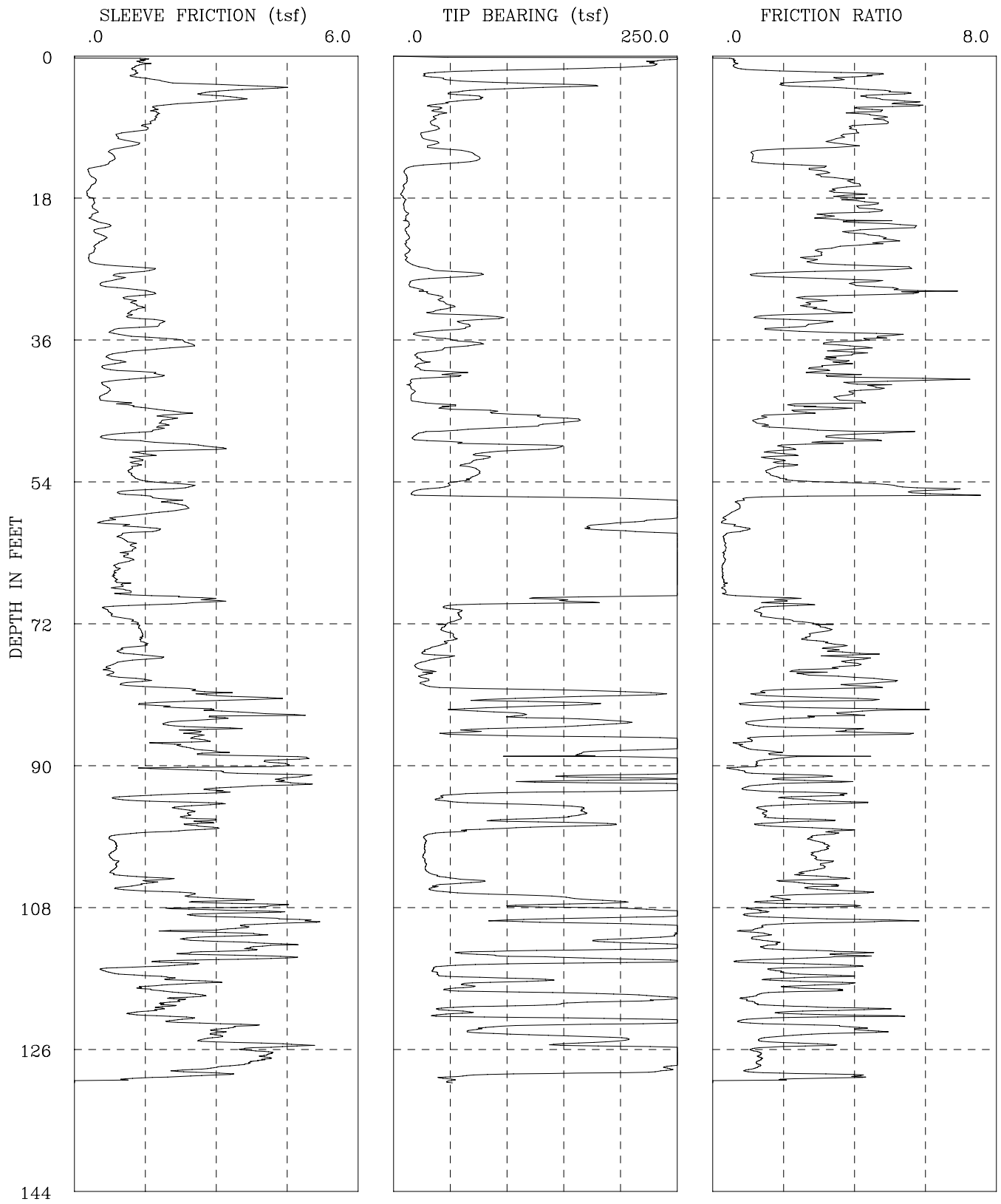
Figure A-24d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	116.43	2.94	2.52	3.83	silty sand to sandy silt	50-60	34-36	37	UNDEFINED
37.75	124	130.60	3.39	2.60	3.86	silty sand to sandy silt	50-60	34-36	42	UNDEFINED
38.05	125	327.37	4.90	1.50	3.89	sand to silty sand	80-90	40-42	>50	UNDEFINED
38.40	126	325.27	4.64	1.43	3.92	sand	80-90	40-42	>50	UNDEFINED
38.70	127	217.86	3.28	1.51	3.95	sand to silty sand	60-70	38-40	>50	UNDEFINED
39.00	128	49.93	1.36	2.73	3.97	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
39.35	129	47.90	1.27	2.65	4.01	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
39.65	130	39.94	0.87	2.19	4.04	sandy silt to clayey silt	UNDFND	UNDFD	15	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-24e



CPT-08-013	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-25a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-013
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	221.69	1.21	0.54	0.03	sand	>90	>48	42	UNDEFINED
0.60	2	152.50	1.28	0.84	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	37.31	1.44	3.86	0.15	clayey silt to silty clay	UNDFND	UNDFD	18	2.4
1.25	4	131.37	3.31	2.52	0.22	silty sand to sandy silt	>90	>48	42	UNDEFINED
1.55	5	62.35	2.98	4.78	0.28	silty clay to clay	UNDFND	UNDFD	40	4.1
1.85	6	60.18	3.00	4.98	0.33	silty clay to clay	UNDFND	UNDFD	38	3.9
2.15	7	36.81	1.72	4.67	0.39	silty clay to clay	UNDFND	UNDFD	24	2.4
2.45	8	38.49	1.74	4.51	0.45	silty clay to clay	UNDFND	UNDFD	25	2.5
2.75	9	34.86	1.55	4.44	0.51	silty clay to clay	UNDFND	UNDFD	22	2.2
3.05	10	30.49	1.20	3.93	0.57	silty clay to clay	UNDFND	UNDFD	19	1.9
3.35	11	32.88	1.11	3.38	0.61	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
3.65	12	39.30	0.98	2.48	0.64	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
3.95	13	73.07	0.83	1.13	0.67	silty sand to sandy silt	60-70	40-42	23	UNDEFINED
4.25	14	51.62	0.72	1.39	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.53	0.32	3.02	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	11.70	0.41	3.51	0.75	silty clay to clay	UNDFND	UNDFD	7	.7
5.15	17	9.41	0.36	3.84	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.53	0.28	3.69	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	9.60	0.41	4.24	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	10.03	0.43	4.30	0.86	clay	UNDFND	UNDFD	10	.5
6.40	21	11.42	0.39	3.41	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	12.43	0.64	5.13	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	12.24	0.53	4.32	0.95	clay	UNDFND	UNDFD	12	.7
7.35	24	11.49	0.53	4.62	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	13.00	0.40	3.09	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	11.21	0.31	2.79	1.04	silty clay to clay	UNDFND	UNDFD	7	.6
8.25	27	22.68	1.08	4.78	1.07	clay	UNDFND	UNDFD	22	1.4
8.55	28	63.75	1.09	1.71	1.10	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
8.85	29	18.14	0.71	3.90	1.13	silty clay to clay	UNDFND	UNDFD	12	1.0
9.15	30	23.23	1.25	5.37	1.16	clay	UNDFND	UNDFD	22	1.4
9.45	31	39.65	1.28	3.22	1.19	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.75	32	48.68	1.32	2.71	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	49.00	1.19	2.43	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.35	34	72.45	1.65	2.28	1.27	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
10.65	35	54.74	1.20	2.19	1.30	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
10.95	36	29.90	1.37	4.59	1.33	silty clay to clay	UNDFND	UNDFD	19	1.8
11.25	37	65.90	2.40	3.64	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.2
11.55	38	31.44	1.21	3.86	1.38	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-25b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	24.01	0.84	3.48	1.41	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
12.15	40	22.03	0.70	3.20	1.44	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	47.99	1.67	3.49	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	14.78	0.73	4.92	1.50	clay	UNDFND	UNDFD	14	.8
13.10	43	17.07	0.70	4.10	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	18.06	0.70	3.86	1.56	silty clay to clay	UNDFND	UNDFD	12	1.0
13.75	45	58.87	1.54	2.62	1.59	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.05	46	128.95	2.08	1.61	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	135.90	1.84	1.36	1.65	sand to silty sand	60-70	40-42	33	UNDEFINED
14.65	48	40.11	1.35	3.36	1.68	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.95	49	30.92	1.08	3.50	1.70	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
15.25	50	126.49	2.68	2.12	1.73	silty sand to sandy silt	60-70	38-40	40	UNDEFINED
15.55	51	79.67	1.40	1.76	1.76	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
15.85	52	66.65	1.33	2.00	1.79	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
16.15	53	74.04	1.18	1.60	1.82	silty sand to sandy silt	40-50	36-38	24	UNDEFINED
16.45	54	65.99	1.35	2.05	1.85	silty sand to sandy silt	40-50	34-36	21	UNDEFINED
16.75	55	42.30	2.20	5.20	1.87	clay	UNDFND	UNDFD	41	2.6
17.05	56	42.41	1.22	2.88	1.90	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
17.35	57	270.93	2.05	0.76	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	322.94	2.17	0.67	1.96	sand	>90	42-44	>50	UNDEFINED
17.95	59	271.44	1.00	0.37	1.99	gravelly sand to sand	80-90	42-44	43	UNDEFINED
18.25	60	184.07	1.06	0.57	2.02	sand	70-80	40-42	35	UNDEFINED
18.55	61	240.92	1.31	0.54	2.04	sand	80-90	40-42	46	UNDEFINED
18.85	62	335.61	1.11	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	343.25	1.19	0.35	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	347.37	1.14	0.33	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	325.24	0.93	0.29	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	308.74	0.85	0.27	2.19	gravelly sand to sand	80-90	42-44	49	UNDEFINED
20.45	67	294.69	0.94	0.32	2.22	gravelly sand to sand	80-90	42-44	47	UNDEFINED
20.75	68	312.45	1.05	0.33	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	193.92	2.23	1.15	2.28	sand	70-80	40-42	37	UNDEFINED
21.35	70	85.13	1.54	1.81	2.31	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.65	71	57.93	0.75	1.30	2.34	silty sand to sandy silt	<40	32-34	18	UNDEFINED
21.95	72	54.08	1.20	2.22	2.37	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
22.25	73	43.96	1.39	3.15	2.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.6
22.55	74	53.03	1.43	2.69	2.42	sandy silt to clayey silt	UNDFND	UNDFD	20	3.2
22.85	75	42.52	1.42	3.33	2.45	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
23.15	76	29.27	1.07	3.65	2.48	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
23.45	77	36.28	1.39	3.83	2.51	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
23.75	78	22.25	0.73	3.27	2.54	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
24.05	79	28.59	0.88	3.07	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	27.66	1.25	4.53	2.59	clay	UNDFND	UNDFD	26	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-25c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	151.28	2.53	1.67	2.62	sand to silty sand	60-70	38-40	36	UNDEFINED
24.95	82	135.12	3.32	2.46	2.65	silty sand to sandy silt	60-70	36-38	43	UNDEFINED
25.25	83	122.70	1.99	1.62	2.68	sand to silty sand	50-60	36-38	29	UNDEFINED
25.60	84	105.54	3.53	3.34	2.71	sandy silt to clayey silt	UNDFND	UNDFD	40	6.7
25.90	85	187.58	2.18	1.16	2.74	sand	70-80	38-40	36	UNDEFINED
26.20	86	73.92	2.71	3.66	2.77	clayey silt to silty clay	UNDFND	UNDFD	35	4.5
26.55	87	216.57	2.51	1.16	2.80	sand	70-80	38-40	41	UNDEFINED
26.85	88	253.25	2.43	0.96	2.83	sand	70-80	40-42	49	UNDEFINED
27.15	89	193.09	3.70	1.91	2.86	sand to silty sand	70-80	38-40	46	UNDEFINED
27.45	90	336.49	4.31	1.28	2.88	sand	80-90	40-42	>50	UNDEFINED
27.75	91	329.36	2.78	0.84	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	176.66	4.55	2.57	2.94	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.35	93	316.67	3.81	1.20	2.97	sand	80-90	40-42	>50	UNDEFINED
28.65	94	98.30	2.18	2.22	3.00	silty sand to sandy silt	50-60	34-36	31	UNDEFINED
28.95	95	68.39	1.98	2.90	3.03	sandy silt to clayey silt	UNDFND	UNDFD	26	4.1
29.25	96	165.82	2.33	1.41	3.05	sand to silty sand	60-70	38-40	40	UNDEFINED
29.55	97	135.73	2.55	1.88	3.08	silty sand to sandy silt	50-60	36-38	43	UNDEFINED
29.85	98	150.63	2.73	1.81	3.11	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
30.15	99	46.04	1.57	3.41	3.14	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
30.45	100	27.76	0.81	2.91	3.17	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
30.75	101	27.47	0.87	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.05	102	26.69	0.76	2.86	3.22	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
31.35	103	28.13	0.89	3.16	3.25	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.65	104	30.83	0.82	2.65	3.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.00	105	58.65	1.60	2.72	3.31	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
32.30	106	36.49	1.23	3.38	3.34	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
32.60	107	124.23	2.74	2.21	3.37	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.95	108	165.71	3.35	2.02	3.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
33.25	109	266.87	3.17	1.19	3.43	sand	70-80	38-40	>50	UNDEFINED
33.55	110	150.47	4.47	2.97	3.46	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
33.85	111	260.23	3.10	1.19	3.49	sand	70-80	38-40	50	UNDEFINED
34.15	112	231.12	3.09	1.34	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	233.85	3.79	1.62	3.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.75	114	119.93	3.08	2.57	3.57	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
35.05	115	193.54	3.19	1.65	3.60	sand to silty sand	60-70	36-38	46	UNDEFINED
35.35	116	48.11	1.36	2.82	3.63	sandy silt to clayey silt	UNDFND	UNDFD	18	2.7
35.65	117	46.39	1.00	2.17	3.66	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
35.95	118	92.32	2.29	2.48	3.69	sandy silt to clayey silt	UNDFND	UNDFD	35	5.6
36.25	119	91.47	1.84	2.02	3.72	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
36.55	120	229.01	2.35	1.03	3.74	sand	70-80	38-40	44	UNDEFINED
36.85	121	95.88	1.88	1.96	3.77	silty sand to sandy silt	40-50	32-34	31	UNDEFINED
37.15	122	56.55	1.58	2.80	3.80	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-25d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.82	2.62	1.17	3.83	sand	70-80	38-40	43	UNDEFINED
37.75	124	76.88	3.16	4.11	3.86	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
38.05	125	168.18	2.89	1.72	3.89	sand to silty sand	60-70	36-38	40	UNDEFINED
38.40	126	217.42	3.96	1.82	3.92	sand to silty sand	60-70	38-40	>50	UNDEFINED
38.70	127	313.08	4.04	1.29	3.95	sand	70-80	40-42	>50	UNDEFINED
39.00	128	290.48	3.81	1.31	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	216.19	2.80	1.29	4.01	sand	60-70	38-40	41	UNDEFINED
39.65	130	52.30	1.29	2.48	4.04	sandy silt to clayey silt	UNDFND	UNDFD	20	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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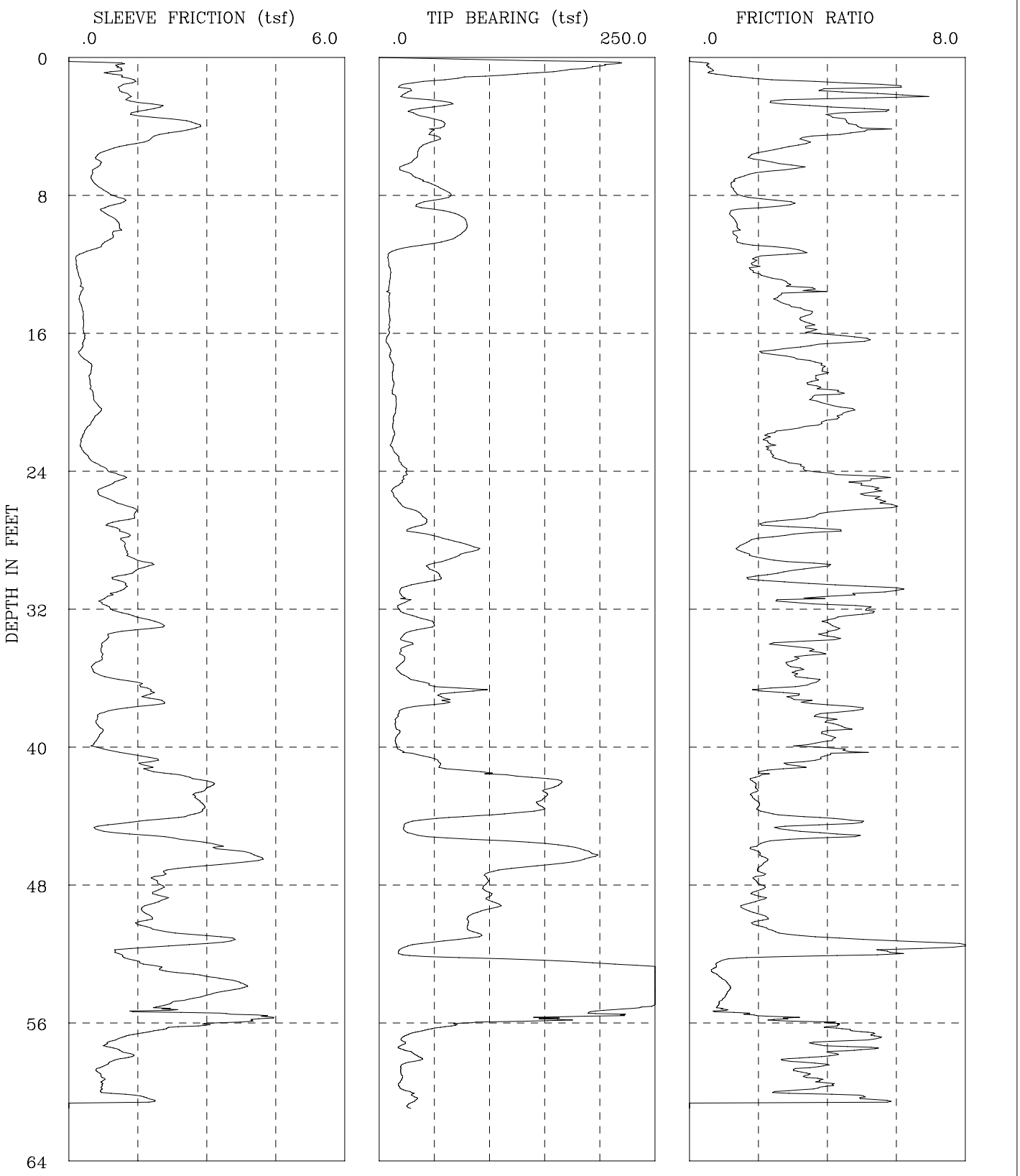
Figure A-25d



I-436 SR-22 Phase 2	CPT-08-014
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-26a

Engineer : Nava
On Site Loc: CPT-08-014
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/27/2008
Cone Used : 30 ton
Water table (feet) : 9.8

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	168.58	0.88	0.52	0.03	sand	>90	>48	32	UNDEFINED
0.60	2	39.05	1.22	3.14	0.09	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
0.95	3	39.86	1.55	3.89	0.15	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
1.25	4	49.74	2.29	4.61	0.22	silty clay to clay	UNDFND	UNDFD	32	3.3
1.55	5	47.93	1.83	3.81	0.28	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
1.85	6	33.76	0.73	2.16	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.15	7	26.57	0.55	2.06	0.39	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
2.45	8	55.85	0.74	1.33	0.45	silty sand to sandy silt	60-70	40-42	18	UNDEFINED
2.75	9	48.65	0.95	1.95	0.51	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
3.05	10	77.93	1.05	1.35	0.57	silty sand to sandy silt	60-70	42-44	25	UNDEFINED
3.35	11	57.59	0.85	1.47	0.61	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.65	12	9.78	0.25	2.51	0.64	silty clay to clay	UNDFND	UNDFD	6	.6
3.95	13	9.94	0.21	2.13	0.67	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.25	14	8.85	0.26	2.98	0.69	silty clay to clay	UNDFND	UNDFD	6	.5
4.55	15	9.10	0.28	3.09	0.72	silty clay to clay	UNDFND	UNDFD	6	.5
4.85	16	9.33	0.32	3.39	0.75	clay	UNDFND	UNDFD	9	.5
5.15	17	7.99	0.32	3.96	0.78	clay	UNDFND	UNDFD	8	.4
5.45	18	11.10	0.35	3.13	0.81	silty clay to clay	UNDFND	UNDFD	7	.6
5.75	19	12.49	0.47	3.73	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	13.37	0.51	3.82	0.86	silty clay to clay	UNDFND	UNDFD	9	.8
6.40	21	14.44	0.62	4.31	0.89	clay	UNDFND	UNDFD	14	.8
6.70	22	12.95	0.38	2.96	0.93	silty clay to clay	UNDFND	UNDFD	8	.7
7.00	23	12.37	0.29	2.32	0.95	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.35	24	21.10	0.67	3.19	0.98	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
7.65	25	18.30	0.95	5.19	1.02	clay	UNDFND	UNDFD	18	1.1
7.95	26	16.94	0.95	5.60	1.04	clay	UNDFND	UNDFD	16	1.0
8.25	27	38.95	1.27	3.26	1.07	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
8.55	28	44.30	1.16	2.61	1.10	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
8.85	29	78.74	1.27	1.61	1.13	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
9.15	30	50.70	1.53	3.01	1.16	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
9.45	31	33.78	1.13	3.35	1.19	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.75	32	21.10	0.82	3.89	1.21	silty clay to clay	UNDFND	UNDFD	13	1.2
10.05	33	37.77	1.63	4.30	1.24	silty clay to clay	UNDFND	UNDFD	24	2.3
10.35	34	26.68	1.01	3.79	1.27	silty clay to clay	UNDFND	UNDFD	17	1.6
10.65	35	21.80	0.71	3.28	1.30	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
10.95	36	19.61	0.60	3.04	1.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
11.25	37	55.37	1.58	2.85	1.36	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
11.55	38	45.02	1.59	3.53	1.38	clayey silt to silty clay	UNDFND	UNDFD	22	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

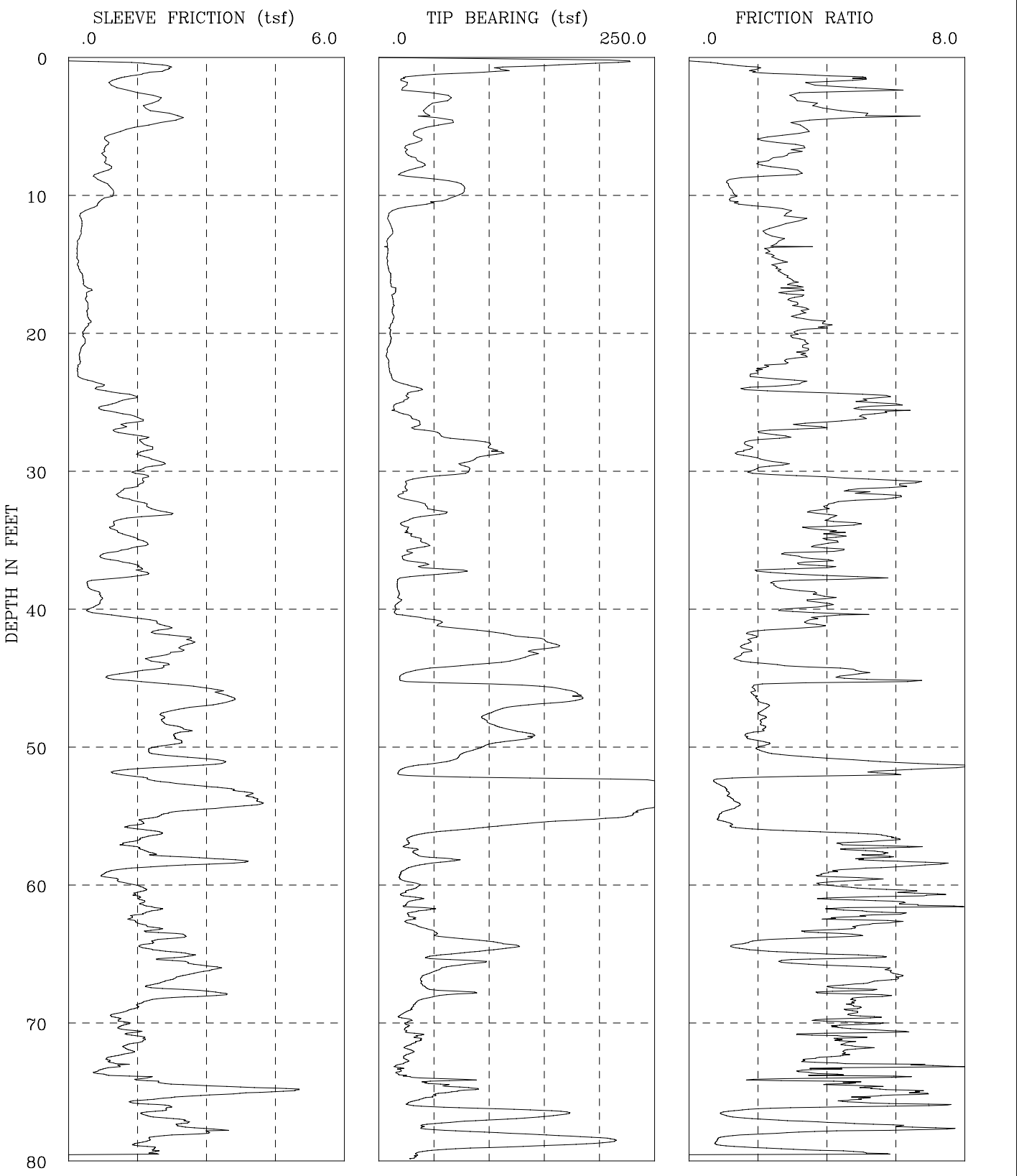
Figure A-26b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	15.69	0.64	4.06	1.41	clay	UNDFND	UNDFD	15	.8
12.15	40	16.39	0.64	3.89	1.44	silty clay to clay	UNDFND	UNDFD	10	.9
12.45	41	35.12	1.34	3.81	1.47	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
12.80	42	104.33	2.21	2.12	1.50	silty sand to sandy silt	60-70	38-40	33	UNDEFINED
13.10	43	153.81	2.91	1.89	1.53	silty sand to sandy silt	70-80	40-42	49	UNDEFINED
13.40	44	133.88	2.85	2.13	1.56	silty sand to sandy silt	60-70	40-42	43	UNDEFINED
13.75	45	30.33	1.23	4.07	1.59	silty clay to clay	UNDFND	UNDFD	19	1.8
14.05	46	146.99	3.11	2.12	1.62	silty sand to sandy silt	70-80	40-42	47	UNDEFINED
14.35	47	164.16	3.49	2.12	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	97.53	1.97	2.02	1.68	silty sand to sandy silt	50-60	38-40	31	UNDEFINED
14.95	49	99.74	1.96	1.96	1.70	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
15.25	50	90.96	1.68	1.85	1.73	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
15.55	51	84.34	2.16	2.56	1.76	sandy silt to clayey silt	UNDFND	UNDFD	32	5.4
15.85	52	32.48	2.10	6.47	1.79	clay	UNDFND	UNDFD	31	1.9
16.15	53	204.31	1.67	0.82	1.82	sand	70-80	40-42	39	UNDEFINED
16.45	54	338.84	3.41	1.01	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	276.06	2.74	0.99	1.87	sand	80-90	42-44	>50	UNDEFINED
17.05	56	177.37	3.19	1.80	1.90	sand to silty sand	70-80	40-42	42	UNDEFINED
17.35	57	39.62	1.84	4.63	1.93	silty clay to clay	UNDFND	UNDFD	25	2.4
17.65	58	24.92	1.06	4.25	1.96	silty clay to clay	UNDFND	UNDFD	16	1.4
17.95	59	24.87	0.80	3.24	1.99	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
18.25	60	19.78	0.72	3.65	2.02	silty clay to clay	UNDFND	UNDFD	13	1.0
18.55	61	29.80	0.97	3.26	2.04	clayey silt to silty clay	UNDFND	UNDFD	14	1.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-26c



I-436 SR-22 Phase 2	CPT-08-014B
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-27a

Engineer : Nava
On Site Loc: CPT-08-014B
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/28/2008
Cone Used : 30 ton
Water table (feet) : 9.84

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	155.39	1.55	1.00	0.03	sand to silty sand	>90	>48	37	UNDEFINED
0.60	2	33.76	1.16	3.44	0.09	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
0.95	3	46.10	1.58	3.44	0.15	clayey silt to silty clay	UNDFND	UNDFD	22	3.0
1.25	4	50.25	1.84	3.66	0.22	clayey silt to silty clay	UNDFND	UNDFD	24	3.3
1.55	5	53.80	2.02	3.76	0.28	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
1.85	6	35.02	0.94	2.69	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
2.15	7	26.02	0.79	3.05	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.7
2.45	8	36.27	0.85	2.33	0.45	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
2.75	9	37.98	0.67	1.77	0.51	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
3.05	10	75.88	0.94	1.23	0.57	silty sand to sandy silt	60-70	42-44	24	UNDEFINED
3.35	11	42.76	0.64	1.49	0.61	silty sand to sandy silt	40-50	38-40	14	UNDEFINED
3.65	12	9.33	0.28	3.01	0.64	silty clay to clay	UNDFND	UNDFD	6	.5
3.95	13	11.77	0.28	2.38	0.67	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.25	14	9.14	0.19	2.09	0.69	silty clay to clay	UNDFND	UNDFD	6	.5
4.55	15	7.77	0.19	2.51	0.72	silty clay to clay	UNDFND	UNDFD	5	.4
4.85	16	9.62	0.26	2.67	0.75	silty clay to clay	UNDFND	UNDFD	6	.5
5.15	17	12.33	0.37	3.03	0.78	silty clay to clay	UNDFND	UNDFD	8	.7
5.45	18	13.04	0.39	3.01	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	12.89	0.42	3.23	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	11.24	0.41	3.66	0.86	clay	UNDFND	UNDFD	11	.6
6.40	21	10.24	0.33	3.21	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	7.75	0.25	3.18	0.93	clay	UNDFND	UNDFD	7	.4
7.00	23	9.58	0.21	2.17	0.95	clayey silt to silty clay	UNDFND	UNDFD	5	.5
7.35	24	23.17	0.53	2.31	0.98	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
7.65	25	24.10	1.20	4.98	1.02	clay	UNDFND	UNDFD	23	1.5
7.95	26	19.25	1.02	5.30	1.04	clay	UNDFND	UNDFD	18	1.1
8.25	27	36.49	1.27	3.48	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
8.55	28	75.00	1.53	2.03	1.10	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
8.85	29	100.38	1.69	1.68	1.13	silty sand to sandy silt	60-70	40-42	32	UNDEFINED
9.15	30	80.43	1.79	2.22	1.16	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
9.45	31	39.41	1.60	4.07	1.19	silty clay to clay	UNDFND	UNDFD	25	2.5
9.75	32	21.67	1.19	5.49	1.21	clay	UNDFND	UNDFD	21	1.3
10.05	33	45.22	1.77	3.92	1.24	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
10.35	34	31.07	1.31	4.23	1.27	silty clay to clay	UNDFND	UNDFD	20	1.9
10.65	35	29.44	1.20	4.08	1.30	silty clay to clay	UNDFND	UNDFD	19	1.8
10.95	36	35.68	1.38	3.85	1.33	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
11.25	37	30.67	1.08	3.52	1.36	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
11.55	38	45.87	1.36	2.96	1.38	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-27b

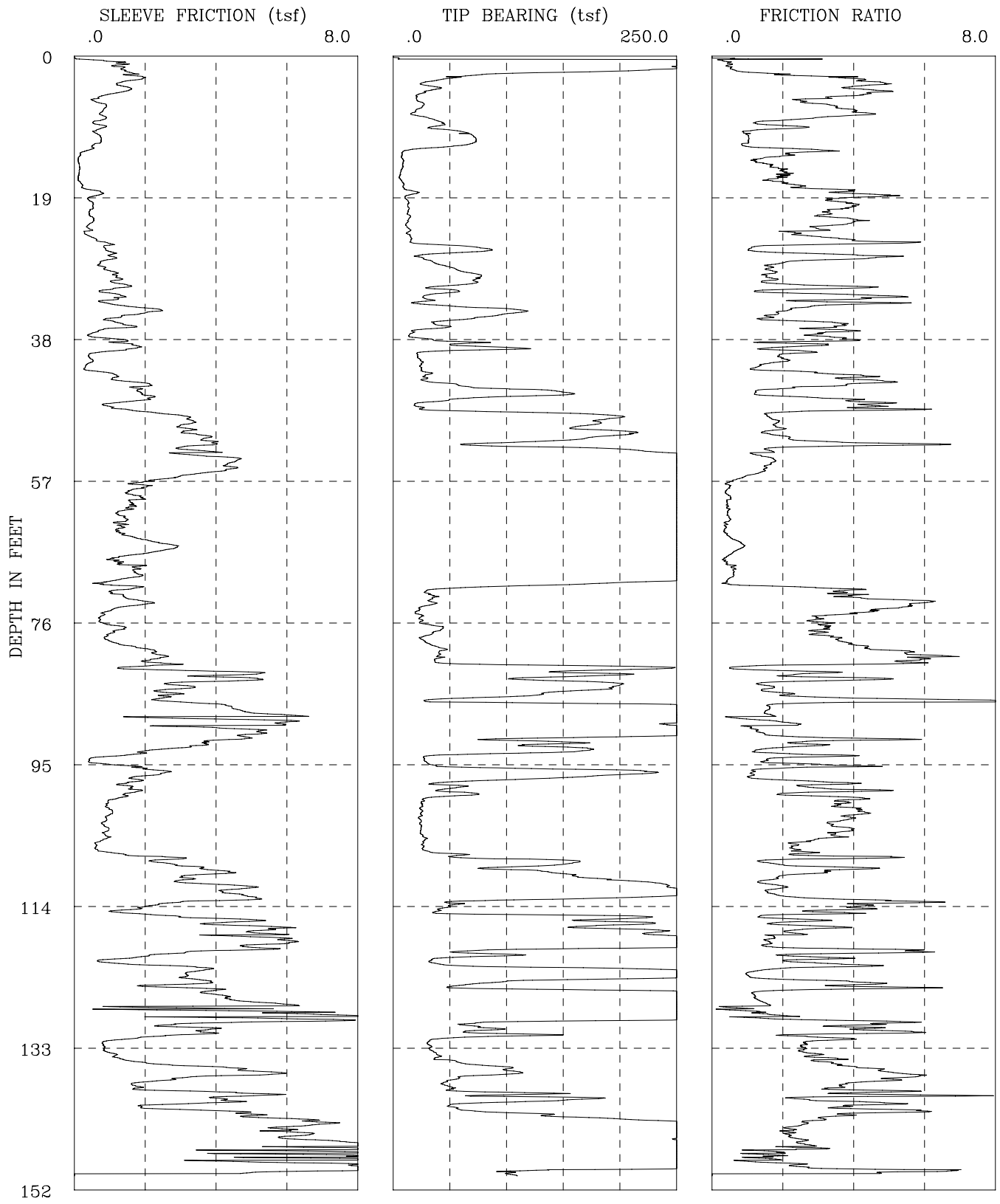
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.32	0.50	2.91	1.41	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	17.33	0.66	3.82	1.44	silty clay to clay	UNDFND	UNDFD	11	.9
12.45	41	28.89	1.04	3.62	1.47	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
12.80	42	87.66	2.10	2.39	1.50	silty sand to sandy silt	50-60	38-40	28	UNDEFINED
13.10	43	152.52	2.57	1.68	1.53	sand to silty sand	70-80	40-42	37	UNDEFINED
13.40	44	124.83	1.99	1.59	1.56	sand to silty sand	60-70	40-42	30	UNDEFINED
13.75	45	32.74	1.38	4.23	1.59	silty clay to clay	UNDFND	UNDFD	21	2.0
14.05	46	135.20	2.73	2.02	1.62	silty sand to sandy silt	60-70	40-42	43	UNDEFINED
14.35	47	161.62	3.33	2.06	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	100.03	2.12	2.12	1.68	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.95	49	116.57	2.35	2.02	1.70	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
15.25	50	114.64	2.24	1.96	1.73	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
15.55	51	74.27	2.38	3.20	1.76	sandy silt to clayey silt	UNDFND	UNDFD	28	4.7
15.85	52	26.95	1.84	6.81	1.79	clay	UNDFND	UNDFD	26	1.5
16.15	53	247.11	2.35	0.95	1.82	sand	80-90	42-44	47	UNDEFINED
16.45	54	329.94	3.97	1.20	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	246.35	2.93	1.19	1.87	sand	80-90	42-44	47	UNDEFINED
17.05	56	141.72	1.55	1.09	1.90	sand to silty sand	60-70	38-40	34	UNDEFINED
17.35	57	34.72	1.67	4.82	1.93	clay	UNDFND	UNDFD	33	2.0
17.65	58	31.05	1.67	5.37	1.96	clay	UNDFND	UNDFD	30	1.8
17.95	59	44.78	2.60	5.81	1.99	clay	UNDFND	UNDFD	43	2.7
18.25	60	22.70	0.96	4.22	2.02	silty clay to clay	UNDFND	UNDFD	14	1.2
18.55	61	28.73	1.55	5.40	2.04	clay	UNDFND	UNDFD	28	1.6
18.85	62	33.50	1.72	5.13	2.07	clay	UNDFND	UNDFD	32	1.9
19.20	63	29.57	1.51	5.11	2.10	clay	UNDFND	UNDFD	28	1.7
19.50	64	58.38	2.13	3.65	2.13	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
19.80	65	104.00	1.91	1.84	2.16	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.15	66	65.66	2.70	4.11	2.19	clayey silt to silty clay	UNDFND	UNDFD	31	4.1
20.45	67	41.47	2.41	5.81	2.22	clay	UNDFND	UNDFD	40	2.4
20.75	68	55.50	2.59	4.67	2.25	silty clay to clay	UNDFND	UNDFD	35	3.4
21.05	69	33.18	1.58	4.77	2.28	clay	UNDFND	UNDFD	32	1.9
21.35	70	23.43	1.11	4.72	2.31	clay	UNDFND	UNDFD	22	1.2
21.65	71	28.95	1.33	4.60	2.34	clay	UNDFND	UNDFD	28	1.6
21.95	72	30.22	1.40	4.63	2.37	clay	UNDFND	UNDFD	29	1.7
22.25	73	24.36	1.05	4.31	2.39	silty clay to clay	UNDFND	UNDFD	16	1.3
22.55	74	21.57	0.98	4.54	2.42	clay	UNDFND	UNDFD	21	1.1
22.85	75	70.00	3.22	4.60	2.45	silty clay to clay	UNDFND	UNDFD	45	4.3
23.15	76	38.26	2.22	5.80	2.48	clay	UNDFND	UNDFD	37	2.2
23.45	77	134.52	1.96	1.45	2.51	sand to silty sand	60-70	36-38	32	UNDEFINED
23.75	78	61.55	2.77	4.50	2.54	silty clay to clay	UNDFND	UNDFD	39	3.7
24.05	79	182.21	1.80	0.99	2.56	sand	70-80	38-40	35	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-27c



CPT-08-015	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-28a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-015
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :04/01/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	188.91	0.68	0.36	0.03	sand	>90	>48	36	UNDEFINED
0.60	2	245.14	1.33	0.54	0.09	sand	>90	>48	47	UNDEFINED
0.95	3	80.00	1.73	2.16	0.15	silty sand to sandy silt	80-90	46-48	26	UNDEFINED
1.25	4	30.23	1.34	4.43	0.22	silty clay to clay	UNDFND	UNDFD	19	2.0
1.55	5	31.90	1.39	4.35	0.28	silty clay to clay	UNDFND	UNDFD	20	2.1
1.85	6	20.96	0.64	3.07	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
2.15	7	25.59	0.84	3.29	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
2.45	8	19.04	0.78	4.09	0.45	silty clay to clay	UNDFND	UNDFD	12	1.2
2.75	9	37.50	0.71	1.89	0.51	sandy silt to clayey silt	UNDFND	UNDFD	14	2.4
3.05	10	42.04	0.75	1.78	0.57	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
3.35	11	68.39	0.67	0.99	0.61	sand to silty sand	60-70	40-42	16	UNDEFINED
3.65	12	69.52	0.68	0.97	0.64	sand to silty sand	60-70	40-42	17	UNDEFINED
3.95	13	21.50	0.39	1.83	0.67	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
4.25	14	7.98	0.13	1.66	0.69	clayey silt to silty clay	UNDFND	UNDFD	4	.4
4.55	15	8.56	0.13	1.52	0.72	clayey silt to silty clay	UNDFND	UNDFD	4	.5
4.85	16	6.84	0.14	2.04	0.75	silty clay to clay	UNDFND	UNDFD	4	.3
5.15	17	6.58	0.12	1.84	0.78	silty clay to clay	UNDFND	UNDFD	4	.3
5.45	18	9.47	0.25	2.64	0.81	silty clay to clay	UNDFND	UNDFD	6	.5
5.75	19	16.34	0.67	4.13	0.84	clay	UNDFND	UNDFD	16	1.0
6.05	20	12.53	0.46	3.65	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	13.31	0.48	3.61	0.89	silty clay to clay	UNDFND	UNDFD	9	.8
6.70	22	13.93	0.49	3.49	0.93	silty clay to clay	UNDFND	UNDFD	9	.8
7.00	23	12.17	0.43	3.53	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
7.35	24	14.05	0.37	2.67	0.98	clayey silt to silty clay	UNDFND	UNDFD	7	.8
7.65	25	16.25	0.70	4.28	1.02	clay	UNDFND	UNDFD	16	.9
7.95	26	70.30	0.91	1.30	1.04	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
8.25	27	36.15	1.09	3.00	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
8.55	28	35.95	0.79	2.20	1.10	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
8.85	29	57.12	0.96	1.68	1.13	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
9.15	30	74.57	1.22	1.63	1.16	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
9.45	31	57.77	1.32	2.29	1.19	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
9.75	32	45.23	0.98	2.17	1.21	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.05	33	27.73	1.11	3.99	1.24	silty clay to clay	UNDFND	UNDFD	18	1.7
10.35	34	60.12	1.61	2.68	1.27	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
10.65	35	101.12	1.84	1.82	1.30	silty sand to sandy silt	60-70	38-40	32	UNDEFINED
10.95	36	49.06	1.12	2.28	1.33	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
11.25	37	33.56	1.14	3.41	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	18.57	0.62	3.32	1.38	clayey silt to silty clay	UNDFND	UNDFD	9	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-28b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.41	1.51	2.63	1.41	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
12.15	40	64.46	1.18	1.84	1.44	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
12.45	41	22.56	0.45	2.01	1.47	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
12.80	42	24.89	0.35	1.40	1.50	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
13.10	43	28.76	0.97	3.37	1.53	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
13.40	44	35.14	1.50	4.27	1.56	silty clay to clay	UNDFND	UNDFD	22	2.1
13.75	45	104.77	1.87	1.78	1.59	silty sand to sandy silt	60-70	38-40	33	UNDEFINED
14.05	46	99.53	2.07	2.08	1.62	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.35	47	25.19	1.11	4.40	1.65	silty clay to clay	UNDFND	UNDFD	16	1.4
14.65	48	96.06	1.98	2.06	1.68	silty sand to sandy silt	50-60	38-40	31	UNDEFINED
14.95	49	190.00	3.26	1.72	1.70	sand to silty sand	70-80	40-42	45	UNDEFINED
15.25	50	169.05	3.14	1.86	1.73	sand to silty sand	70-80	40-42	40	UNDEFINED
15.55	51	200.67	3.40	1.69	1.76	sand to silty sand	70-80	40-42	48	UNDEFINED
15.85	52	127.34	3.82	3.00	1.79	sandy silt to clayey silt	UNDFND	UNDFD	49	8.2
16.15	53	163.46	3.32	2.03	1.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
16.45	54	262.62	3.75	1.43	1.85	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.75	55	265.52	4.41	1.66	1.87	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.05	56	287.07	4.15	1.45	1.90	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.35	57	328.80	2.71	0.83	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	402.74	1.90	0.47	1.96	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.95	59	382.21	1.58	0.41	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	368.25	1.75	0.47	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	357.14	1.59	0.45	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	286.20	1.29	0.45	2.07	gravelly sand to sand	80-90	42-44	46	UNDEFINED
19.20	63	318.32	1.35	0.43	2.10	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
19.50	64	344.13	1.28	0.37	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	319.72	1.72	0.54	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	317.79	2.67	0.84	2.19	sand	80-90	42-44	>50	UNDEFINED
20.45	67	345.99	1.91	0.55	2.22	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.75	68	311.68	1.17	0.38	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	290.11	1.74	0.60	2.28	sand	80-90	42-44	>50	UNDEFINED
21.35	70	299.59	1.72	0.57	2.31	sand	80-90	42-44	>50	UNDEFINED
21.65	71	194.12	1.06	0.54	2.34	sand	70-80	40-42	37	UNDEFINED
21.95	72	39.99	1.33	3.34	2.37	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
22.25	73	33.88	1.53	4.51	2.39	silty clay to clay	UNDFND	UNDFD	22	1.9
22.55	74	30.84	1.76	5.71	2.42	clay	UNDFND	UNDFD	30	1.7
22.85	75	22.20	0.91	4.10	2.45	silty clay to clay	UNDFND	UNDFD	14	1.1
23.15	76	24.14	0.72	2.98	2.48	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
23.45	77	38.80	1.22	3.15	2.51	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
23.75	78	31.52	0.99	3.14	2.54	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
24.05	79	28.49	1.07	3.76	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	41.83	2.01	4.80	2.59	silty clay to clay	UNDFND	UNDFD	27	2.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-28c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	40.15	2.37	5.91	2.62	clay	UNDFND	UNDFD	38	2.3
24.95	82	96.28	2.21	2.29	2.65	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
25.25	83	192.03	3.50	1.82	2.68	sand to silty sand	70-80	38-40	46	UNDEFINED
25.60	84	150.60	4.23	2.81	2.71	silty sand to sandy silt	60-70	38-40	48	UNDEFINED
25.90	85	192.89	2.94	1.52	2.74	sand to silty sand	70-80	38-40	46	UNDEFINED
26.20	86	124.28	2.62	2.11	2.77	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
26.55	87	127.55	3.23	2.53	2.80	silty sand to sandy silt	50-60	36-38	41	UNDEFINED
26.85	88	302.79	4.70	1.55	2.83	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.15	89	377.33	4.52	1.20	2.86	sand	80-90	42-44	>50	UNDEFINED
27.45	90	288.73	5.02	1.74	2.88	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.75	91	373.10	5.08	1.36	2.91	sand	80-90	42-44	>50	UNDEFINED
28.05	92	141.71	4.30	3.03	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.0
28.35	93	149.17	3.11	2.08	2.97	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
28.65	94	82.90	1.51	1.82	3.00	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
28.95	95	29.29	0.57	1.95	3.03	sandy silt to clayey silt	UNDFND	UNDFD	11	1.5
29.25	96	138.01	2.12	1.54	3.05	sand to silty sand	50-60	36-38	33	UNDEFINED
29.55	97	171.93	1.99	1.16	3.08	sand to silty sand	60-70	38-40	41	UNDEFINED
29.85	98	53.36	1.55	2.90	3.11	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
30.15	99	54.62	1.64	3.00	3.14	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
30.45	100	36.76	1.22	3.31	3.17	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
30.75	101	25.05	0.93	3.70	3.20	silty clay to clay	UNDFND	UNDFD	16	1.2
31.05	102	24.96	1.03	4.12	3.22	silty clay to clay	UNDFND	UNDFD	16	1.2
31.35	103	23.64	0.86	3.65	3.25	silty clay to clay	UNDFND	UNDFD	15	1.1
31.65	104	24.51	0.91	3.72	3.28	silty clay to clay	UNDFND	UNDFD	16	1.2
32.00	105	26.15	0.89	3.40	3.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
32.30	106	26.36	0.65	2.46	3.34	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
32.60	107	34.79	0.85	2.44	3.37	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.95	108	106.57	2.39	2.24	3.40	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
33.25	109	116.40	3.31	2.84	3.43	sandy silt to clayey silt	UNDFND	UNDFD	45	7.3
33.55	110	150.02	3.75	2.50	3.46	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
33.85	111	213.65	3.32	1.55	3.49	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.15	112	256.62	4.60	1.79	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	223.71	4.88	2.18	3.55	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
34.75	114	56.36	2.74	4.87	3.57	silty clay to clay	UNDFND	UNDFD	36	3.3
35.05	115	42.68	1.52	3.56	3.60	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
35.35	116	191.27	3.91	2.04	3.63	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.65	117	194.66	4.81	2.47	3.66	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	234.83	5.22	2.22	3.69	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.25	119	363.67	5.96	1.64	3.72	sand to silty sand	80-90	40-42	>50	UNDEFINED
36.55	120	223.36	4.94	2.21	3.74	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.85	121	73.36	2.36	3.22	3.77	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
37.15	122	37.67	1.21	3.22	3.80	clayey silt to silty clay	UNDFND	UNDFD	18	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-28d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.69	3.52	1.57	3.83	sand to silty sand	70-80	38-40	>50	UNDEFINED
37.75	124	259.10	3.23	1.25	3.86	sand	70-80	38-40	50	UNDEFINED
38.05	125	70.69	3.06	4.33	3.89	clayey silt to silty clay	UNDFND	UNDFD	34	4.2
38.40	126	262.06	3.92	1.50	3.92	sand to silty sand	70-80	38-40	>50	UNDEFINED
38.70	127	353.82	4.72	1.33	3.95	sand	80-90	40-42	>50	UNDEFINED
39.00	128	421.27	3.74	0.89	3.97	sand	80-90	40-42	>50	UNDEFINED
39.35	129	417.08	6.27	1.50	4.01	sand	80-90	40-42	>50	UNDEFINED
39.65	130	99.45	4.22	4.24	4.04	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	82.31	3.78	4.59	4.06	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
40.25	132	67.03	1.77	2.64	4.09	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
40.55	133	31.70	0.83	2.60	4.12	sandy silt to clayey silt	UNDFND	UNDFD	12	1.5
40.85	134	37.19	1.02	2.73	4.15	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
41.15	135	47.45	1.54	3.24	4.18	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
41.45	136	93.02	3.97	4.27	4.21	clayey silt to silty clay	UNDFND	UNDFD	45	5.6
41.75	137	86.19	4.64	5.38	4.23	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	47.31	2.08	4.40	4.26	silty clay to clay	UNDFND	UNDFD	30	2.6
42.35	139	62.94	2.61	4.15	4.29	clayey silt to silty clay	UNDFND	UNDFD	30	3.6
42.65	140	137.47	4.63	3.37	4.32	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.6
42.95	141	73.51	3.05	4.15	4.35	clayey silt to silty clay	UNDFND	UNDFD	35	4.3
43.25	142	89.26	4.07	4.56	4.38	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	198.93	5.95	2.99	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	268.30	6.43	2.40	4.43	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.15	145	285.73	6.27	2.19	4.46	sand to silty sand	70-80	38-40	>50	UNDEFINED
44.45	146	287.74	7.20	2.50	4.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.80	147	347.89	7.60	2.18	4.52	sand to silty sand	80-90	38-40	>50	UNDEFINED
45.10	148	492.38	7.21	1.47	4.55	sand	>90	40-42	>50	UNDEFINED
45.40	149	363.36	7.15	1.97	4.58	sand to silty sand	80-90	40-42	>50	UNDEFINED
45.75	150	140.86	5.16	3.66	4.61	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.7

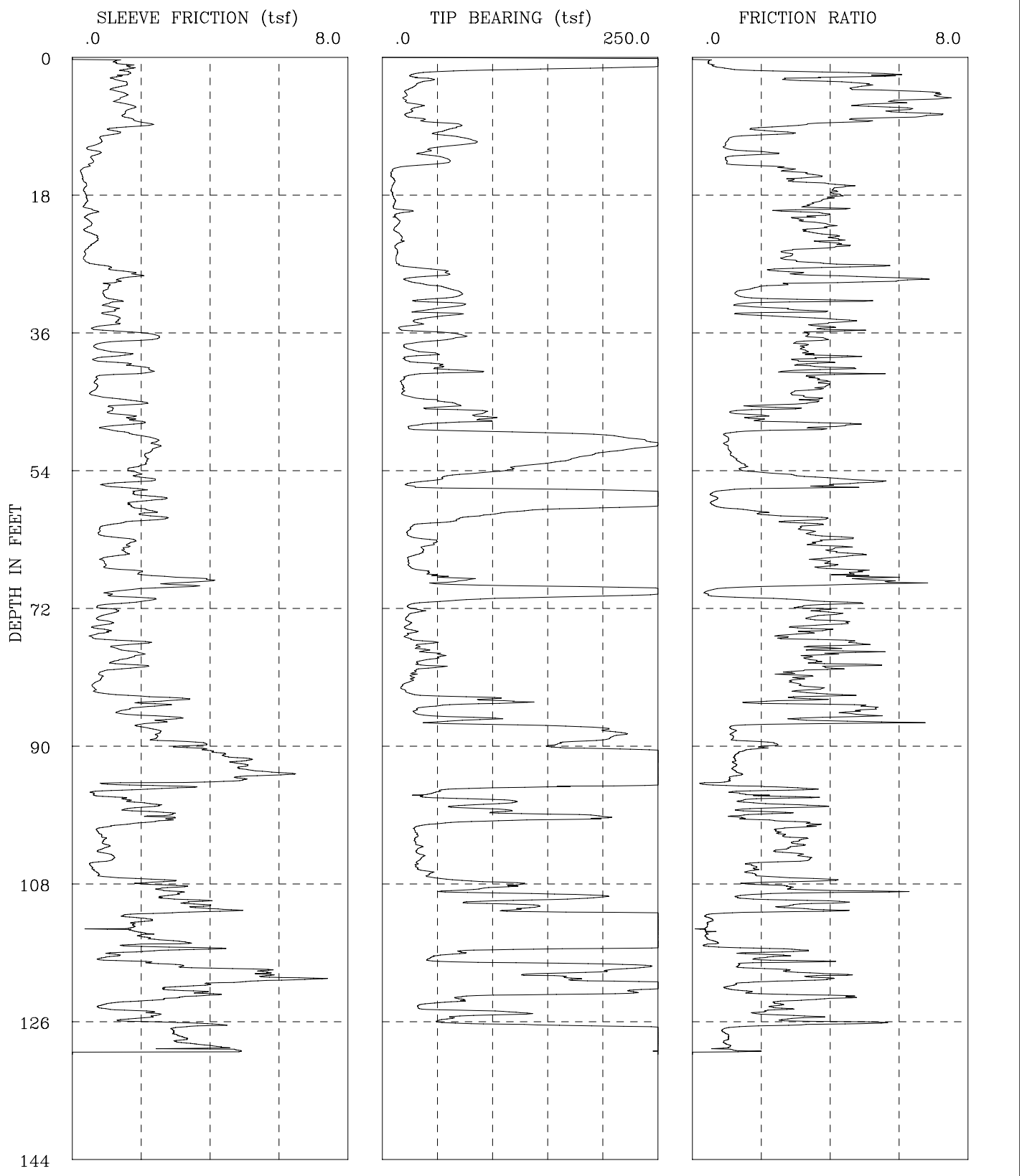
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-28d



CPT-08-016	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-29a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-016
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	268.07	1.16	0.43	0.03	gravelly sand to sand	>90	>48	43	UNDEFINED
0.60	2	140.01	1.61	1.15	0.09	sand to silty sand	>90	>48	34	UNDEFINED
0.95	3	34.32	1.38	4.02	0.15	silty clay to clay	UNDFND	UNDFD	22	2.2
1.25	4	29.35	1.43	4.86	0.22	clay	UNDFND	UNDFD	28	1.9
1.55	5	21.46	1.44	6.71	0.28	clay	UNDFND	UNDFD	21	1.4
1.85	6	22.21	1.37	6.18	0.33	clay	UNDFND	UNDFD	21	1.4
2.15	7	30.38	1.70	5.59	0.39	clay	UNDFND	UNDFD	29	1.9
2.45	8	25.84	1.56	6.03	0.45	clay	UNDFND	UNDFD	25	1.6
2.75	9	56.30	2.02	3.59	0.51	clayey silt to silty clay	UNDFND	UNDFD	27	3.7
3.05	10	55.57	1.23	2.21	0.57	sandy silt to clayey silt	UNDFND	UNDFD	21	3.6
3.35	11	74.39	0.86	1.16	0.61	silty sand to sandy silt	60-70	40-42	24	UNDEFINED
3.65	12	61.72	0.59	0.96	0.64	silty sand to sandy silt	50-60	40-42	20	UNDEFINED
3.95	13	41.31	0.69	1.67	0.67	silty sand to sandy silt	40-50	38-40	13	UNDEFINED
4.25	14	57.07	0.57	0.99	0.69	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
4.55	15	14.78	0.34	2.31	0.72	clayey silt to silty clay	UNDFND	UNDFD	7	.9
4.85	16	8.66	0.29	3.34	0.75	clay	UNDFND	UNDFD	8	.5
5.15	17	10.19	0.38	3.72	0.78	clay	UNDFND	UNDFD	10	.6
5.45	18	8.59	0.35	4.13	0.81	clay	UNDFND	UNDFD	8	.5
5.75	19	10.80	0.42	3.92	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	11.29	0.40	3.58	0.86	clay	UNDFND	UNDFD	11	.6
6.40	21	16.38	0.52	3.19	0.89	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
6.70	22	14.72	0.52	3.56	0.93	silty clay to clay	UNDFND	UNDFD	9	.8
7.00	23	11.95	0.42	3.54	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
7.35	24	17.40	0.70	4.05	0.98	silty clay to clay	UNDFND	UNDFD	11	1.0
7.65	25	12.64	0.50	3.95	1.02	clay	UNDFND	UNDFD	12	.7
7.95	26	13.30	0.37	2.76	1.04	clayey silt to silty clay	UNDFND	UNDFD	6	.7
8.25	27	12.92	0.44	3.41	1.07	silty clay to clay	UNDFND	UNDFD	8	.7
8.55	28	41.29	1.24	3.01	1.10	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
8.85	29	40.18	1.68	4.19	1.13	silty clay to clay	UNDFND	UNDFD	26	2.5
9.15	30	38.44	1.13	2.94	1.16	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
9.45	31	67.90	0.94	1.38	1.19	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
9.75	32	49.57	1.13	2.29	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	61.13	1.13	1.84	1.24	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.35	34	50.48	1.12	2.22	1.27	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
10.65	35	32.23	1.30	4.03	1.30	silty clay to clay	UNDFND	UNDFD	21	2.0
10.95	36	26.54	0.99	3.74	1.33	silty clay to clay	UNDFND	UNDFD	17	1.6
11.25	37	67.53	2.39	3.54	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
11.55	38	26.43	0.84	3.17	1.38	clayey silt to silty clay	UNDFND	UNDFD	13	1.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-29b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	36.52	1.22	3.35	1.41	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
12.15	40	23.90	0.90	3.78	1.44	silty clay to clay	UNDFND	UNDFD	15	1.4
12.45	41	54.71	1.98	3.62	1.47	clayey silt to silty clay	UNDFND	UNDFD	26	3.4
12.80	42	40.77	1.36	3.35	1.50	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
13.10	43	17.86	0.69	3.85	1.53	silty clay to clay	UNDFND	UNDFD	11	1.0
13.40	44	18.77	0.61	3.25	1.56	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
13.75	45	39.64	1.37	3.45	1.59	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.05	46	60.90	1.33	2.19	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
14.35	47	92.02	1.40	1.52	1.65	silty sand to sandy silt	50-60	38-40	29	UNDEFINED
14.65	48	67.04	1.81	2.69	1.68	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
14.95	49	63.22	1.16	1.83	1.70	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
15.25	50	217.30	2.18	1.00	1.73	sand	80-90	40-42	42	UNDEFINED
15.55	51	246.28	2.44	0.99	1.76	sand	80-90	42-44	47	UNDEFINED
15.85	52	203.65	2.22	1.09	1.79	sand	70-80	40-42	39	UNDEFINED
16.15	53	167.29	2.16	1.29	1.82	sand to silty sand	70-80	40-42	40	UNDEFINED
16.45	54	122.91	1.82	1.48	1.85	sand to silty sand	60-70	38-40	29	UNDEFINED
16.75	55	71.67	1.94	2.71	1.87	sandy silt to clayey silt	UNDFND	UNDFD	27	4.5
17.05	56	33.58	1.60	4.76	1.90	clay	UNDFND	UNDFD	32	2.0
17.35	57	178.75	1.73	0.97	1.93	sand	70-80	40-42	34	UNDEFINED
17.65	58	363.94	2.33	0.64	1.96	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.95	59	268.92	1.73	0.64	1.99	sand	80-90	42-44	>50	UNDEFINED
18.25	60	114.69	2.18	1.90	2.02	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
18.55	61	63.74	2.14	3.36	2.04	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
18.85	62	26.20	0.87	3.34	2.07	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
19.20	63	27.83	1.10	3.94	2.10	silty clay to clay	UNDFND	UNDFD	18	1.6
19.50	64	44.62	1.68	3.76	2.13	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
19.80	65	35.51	1.52	4.29	2.16	silty clay to clay	UNDFND	UNDFD	23	2.1
20.15	66	24.16	0.96	3.98	2.19	silty clay to clay	UNDFND	UNDFD	15	1.3
20.45	67	28.98	1.24	4.27	2.22	silty clay to clay	UNDFND	UNDFD	19	1.6
20.75	68	52.56	2.54	4.82	2.25	silty clay to clay	UNDFND	UNDFD	34	3.2
21.05	69	75.59	3.47	4.59	2.28	undefined	UNDFND	UNDFD	UDF	UNDEFINED
21.35	70	268.94	1.68	0.62	2.31	sand	80-90	40-42	>50	UNDEFINED
21.65	71	137.56	1.82	1.32	2.34	sand to silty sand	60-70	38-40	33	UNDEFINED
21.95	72	27.54	1.08	3.93	2.37	silty clay to clay	UNDFND	UNDFD	18	1.5
22.25	73	29.23	1.12	3.84	2.39	silty clay to clay	UNDFND	UNDFD	19	1.6
22.55	74	23.17	0.92	3.98	2.42	silty clay to clay	UNDFND	UNDFD	15	1.2
22.85	75	24.06	0.83	3.44	2.45	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
23.15	76	23.87	0.69	2.88	2.48	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
23.45	77	37.20	1.65	4.45	2.51	silty clay to clay	UNDFND	UNDFD	24	2.1
23.75	78	39.23	1.61	4.12	2.54	silty clay to clay	UNDFND	UNDFD	25	2.3
24.05	79	46.04	1.59	3.46	2.56	clayey silt to silty clay	UNDFND	UNDFD	22	2.7
24.35	80	39.52	1.64	4.15	2.59	silty clay to clay	UNDFND	UNDFD	25	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-29c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	28.57	0.86	3.01	2.62	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.95	82	24.97	0.74	2.98	2.65	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
25.25	83	18.73	0.63	3.34	2.68	clayey silt to silty clay	UNDFND	UNDFD	9	.9
25.60	84	63.24	2.11	3.33	2.71	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
25.90	85	75.66	2.26	2.99	2.74	sandy silt to clayey silt	UNDFND	UNDFD	29	4.7
26.20	86	31.91	1.55	4.87	2.77	clay	UNDFND	UNDFD	31	1.7
26.55	87	72.12	2.64	3.66	2.80	clayey silt to silty clay	UNDFND	UNDFD	35	4.4
26.85	88	188.87	2.23	1.18	2.83	sand	60-70	38-40	36	UNDEFINED
27.15	89	212.18	2.45	1.15	2.86	sand	70-80	38-40	41	UNDEFINED
27.45	90	164.34	3.36	2.04	2.88	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.75	91	268.49	4.04	1.51	2.91	sand to silty sand	70-80	40-42	>50	UNDEFINED
28.05	92	391.31	4.79	1.22	2.94	sand	>90	42-44	>50	UNDEFINED
28.35	93	405.58	4.93	1.22	2.97	sand	>90	42-44	>50	UNDEFINED
28.65	94	436.44	5.63	1.29	3.00	sand	>90	42-44	>50	UNDEFINED
28.95	95	416.18	3.46	0.83	3.03	gravelly sand to sand	>90	42-44	>50	UNDEFINED
29.25	96	106.27	2.09	1.97	3.05	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
29.55	97	52.39	1.03	1.96	3.08	silty sand to sandy silt	<40	30-32	17	UNDEFINED
29.85	98	95.32	2.13	2.23	3.11	silty sand to sandy silt	40-50	34-36	30	UNDEFINED
30.15	99	115.47	2.20	1.90	3.14	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
30.45	100	154.23	2.63	1.70	3.17	sand to silty sand	60-70	36-38	37	UNDEFINED
30.75	101	36.10	1.15	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
31.05	102	31.02	0.80	2.58	3.22	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
31.35	103	29.88	0.93	3.11	3.25	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
31.65	104	32.72	0.89	2.72	3.28	sandy silt to clayey silt	UNDFND	UNDFD	13	1.7
32.00	105	34.93	1.14	3.25	3.31	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
32.30	106	30.98	0.56	1.81	3.34	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.60	107	40.82	0.72	1.76	3.37	sandy silt to clayey silt	UNDFND	UNDFD	16	2.2
32.95	108	86.19	2.20	2.55	3.40	sandy silt to clayey silt	UNDFND	UNDFD	33	5.3
33.25	109	85.19	2.90	3.40	3.43	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
33.55	110	173.65	2.94	1.69	3.46	sand to silty sand	60-70	36-38	42	UNDEFINED
33.85	111	113.37	3.65	3.22	3.49	sandy silt to clayey silt	UNDFND	UNDFD	43	7.1
34.15	112	209.04	3.33	1.60	3.52	sand to silty sand	60-70	38-40	>50	UNDEFINED
34.45	113	393.52	1.93	0.49	3.55	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
34.75	114	423.53	1.62	0.38	3.57	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
35.05	115	511.27	2.03	0.40	3.60	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.35	116	478.89	2.65	0.55	3.63	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.65	117	189.30	2.67	1.41	3.66	sand to silty sand	60-70	36-38	45	UNDEFINED
35.95	118	49.08	1.04	2.12	3.69	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
36.25	119	179.02	2.77	1.54	3.72	sand to silty sand	60-70	36-38	43	UNDEFINED
36.55	120	176.85	5.54	3.13	3.74	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.3
36.85	121	201.63	5.74	2.84	3.77	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.15	122	284.33	3.20	1.13	3.80	sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

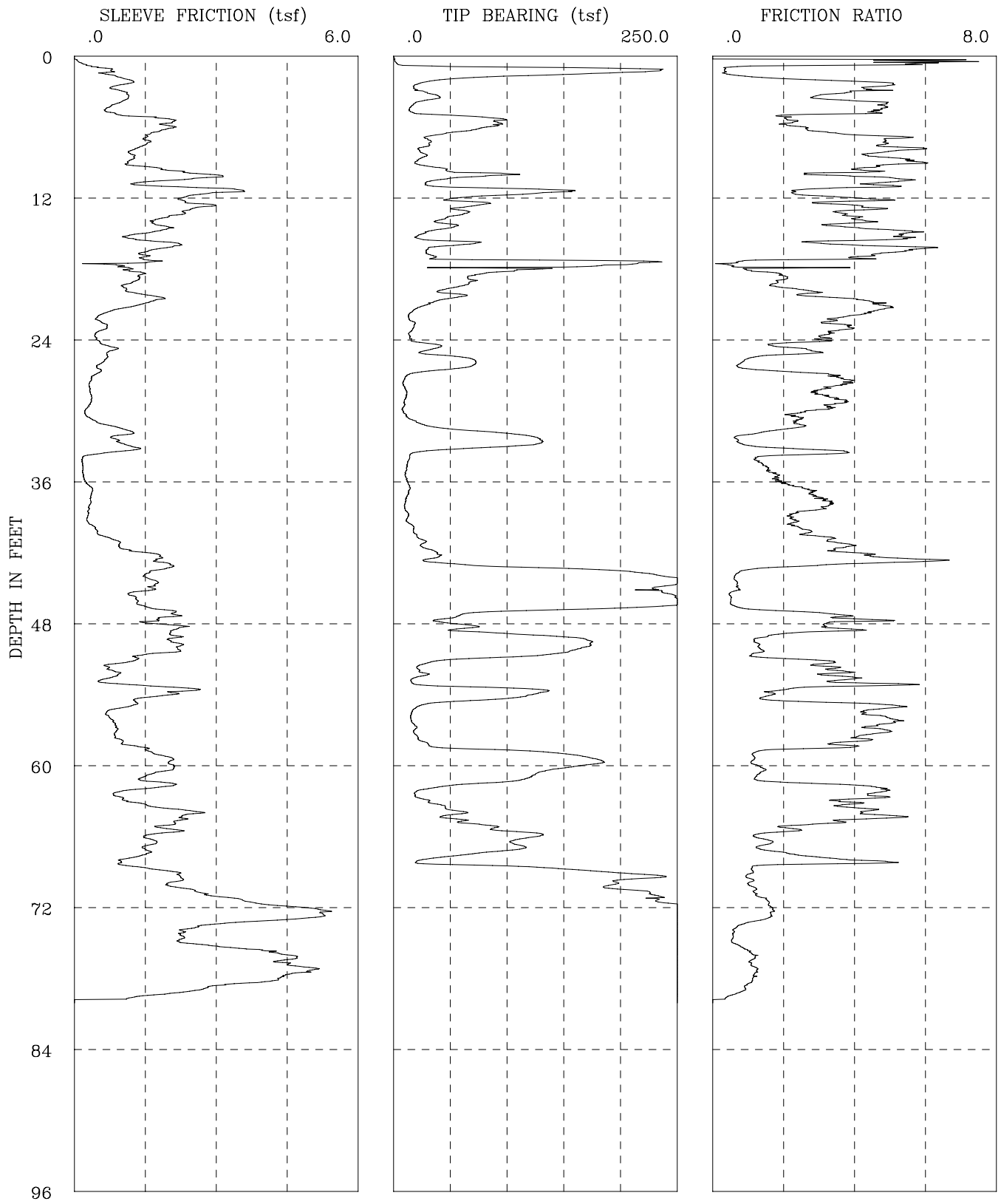
Figure A-29d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	148.01	3.67	2.48	3.83	silty sand to sandy silt	50-60	36-38	47	UNDEFINED
37.75	124	55.27	1.60	2.90	3.86	sandy silt to clayey silt	UNDFND	UNDFD	21	3.1
38.05	125	68.78	1.45	2.11	3.89	silty sand to sandy silt	<40	30-32	22	UNDEFINED
38.40	126	71.46	2.05	2.87	3.92	sandy silt to clayey silt	UNDFND	UNDFD	27	4.2
38.70	127	197.59	3.52	1.78	3.95	sand to silty sand	60-70	36-38	47	UNDEFINED
39.00	128	312.85	3.01	0.96	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	337.88	3.37	1.00	4.01	sand	80-90	40-42	>50	UNDEFINED
39.65	130	390.21	3.83	0.98	4.04	sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-29e



CPT-08-018	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-30a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-018
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 24.93438

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	34.20	0.21	0.60	0.03	silty sand to sandy silt	80-90	>48	11	UNDEFINED
0.60	2	143.63	0.87	0.60	0.09	sand	>90	>48	28	UNDEFINED
0.95	3	23.57	1.01	4.29	0.15	silty clay to clay	UNDFND	UNDFD	15	1.5
1.25	4	29.47	1.03	3.50	0.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
1.55	5	27.04	0.84	3.10	0.28	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
1.85	6	90.35	2.00	2.21	0.33	silty sand to sandy silt	70-80	44-46	29	UNDEFINED
2.15	7	43.26	1.62	3.75	0.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.8
2.45	8	27.60	1.40	5.08	0.45	clay	UNDFND	UNDFD	26	1.8
2.75	9	24.03	1.20	5.01	0.51	clay	UNDFND	UNDFD	23	1.5
3.05	10	53.84	1.98	3.67	0.57	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
3.35	11	41.97	2.01	4.79	0.63	silty clay to clay	UNDFND	UNDFD	27	2.7
3.65	12	107.15	2.89	2.70	0.69	sandy silt to clayey silt	UNDFND	UNDFD	41	7.0
3.95	13	64.06	2.54	3.96	0.75	clayey silt to silty clay	UNDFND	UNDFD	31	4.2
4.25	14	52.47	2.01	3.82	0.81	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
4.55	15	42.78	1.78	4.17	0.87	silty clay to clay	UNDFND	UNDFD	27	2.7
4.85	16	40.48	1.54	3.81	0.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
5.15	17	32.34	1.67	5.16	0.98	clay	UNDFND	UNDFD	31	2.0
5.45	18	131.32	1.15	0.88	1.04	sand to silty sand	70-80	40-42	31	UNDEFINED
5.75	19	82.62	1.32	1.60	1.10	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
6.05	20	56.77	1.12	1.97	1.16	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
6.40	21	45.10	1.58	3.51	1.23	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.70	22	17.45	0.80	4.59	1.29	clay	UNDFND	UNDFD	17	1.0
7.00	23	16.61	0.59	3.56	1.35	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	15.17	0.49	3.22	1.41	silty clay to clay	UNDFND	UNDFD	10	.9
7.65	25	32.55	0.73	2.23	1.48	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
7.95	26	63.89	0.63	0.99	1.51	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
8.25	27	34.16	0.48	1.41	1.54	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
8.55	28	9.16	0.33	3.60	1.57	clay	UNDFND	UNDFD	9	.5
8.85	29	10.94	0.35	3.16	1.60	silty clay to clay	UNDFND	UNDFD	7	.6
9.15	30	8.79	0.29	3.28	1.63	clay	UNDFND	UNDFD	8	.4
9.45	31	14.47	0.34	2.35	1.66	clayey silt to silty clay	UNDFND	UNDFD	7	.8
9.75	32	63.14	1.01	1.60	1.68	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.05	33	123.84	0.96	0.77	1.71	sand to silty sand	60-70	38-40	30	UNDEFINED
10.35	34	29.30	0.72	2.46	1.74	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
10.65	35	12.23	0.17	1.39	1.77	clayey silt to silty clay	UNDFND	UNDFD	6	.6
10.95	36	10.97	0.19	1.78	1.80	clayey silt to silty clay	UNDFND	UNDFD	5	.5
11.25	37	13.57	0.34	2.48	1.83	clayey silt to silty clay	UNDFND	UNDFD	7	.7
11.55	38	11.15	0.34	3.06	1.85	silty clay to clay	UNDFND	UNDFD	7	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

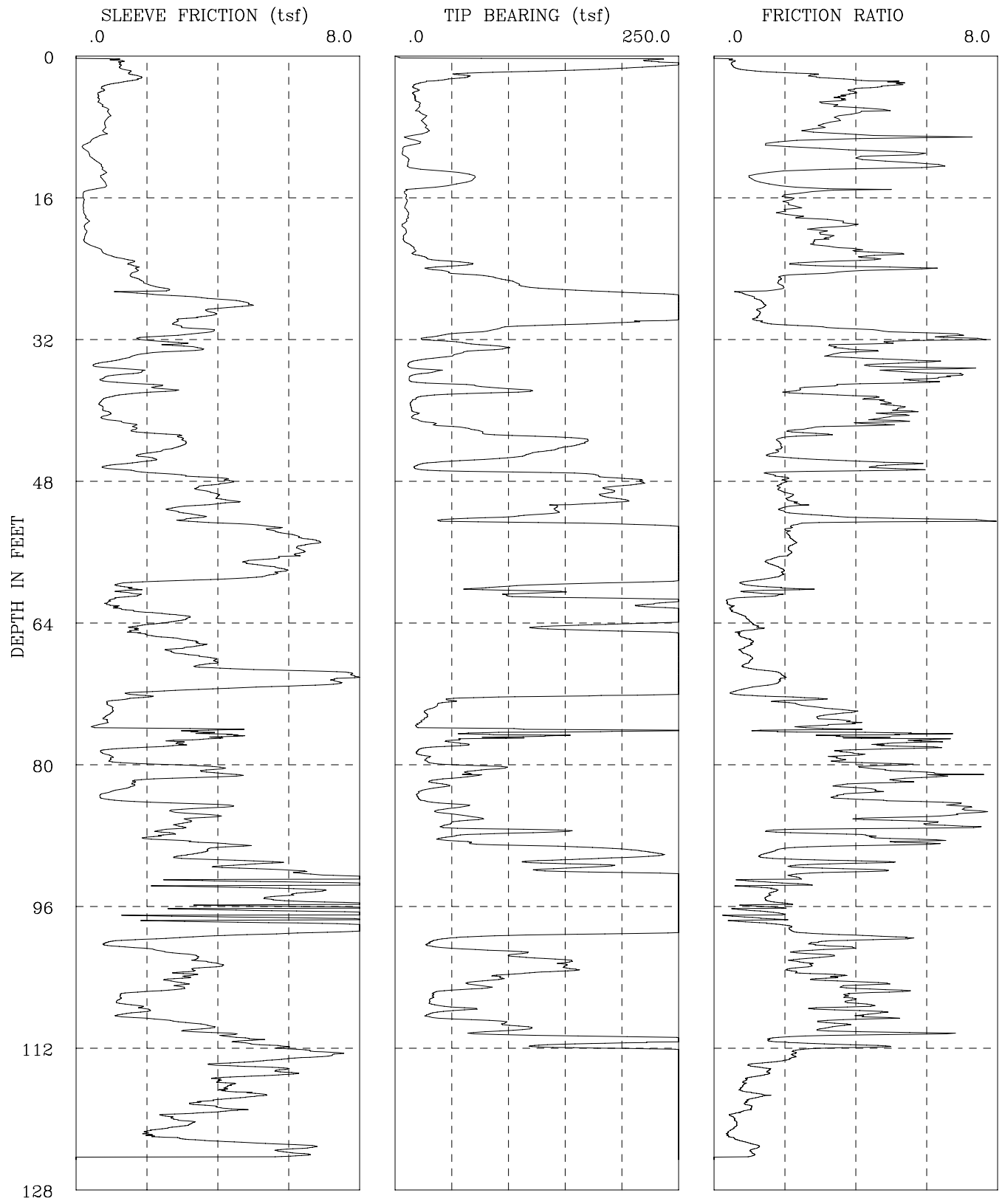
Figure A-30b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	11.41	0.30	2.59	1.88	silty clay to clay	UNDFND	UNDFD	7	.6
12.15	40	14.09	0.32	2.30	1.91	clayey silt to silty clay	UNDFND	UNDFD	7	.7
12.45	41	19.93	0.58	2.93	1.94	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
12.80	42	29.89	1.08	3.61	1.97	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	39.71	1.84	4.62	2.00	silty clay to clay	UNDFND	UNDFD	25	2.4
13.40	44	184.43	1.72	0.93	2.03	sand	70-80	40-42	35	UNDEFINED
13.75	45	246.32	1.67	0.68	2.06	sand	80-90	40-42	47	UNDEFINED
14.05	46	248.95	1.27	0.51	2.09	sand	80-90	40-42	48	UNDEFINED
14.35	47	179.26	1.70	0.95	2.12	sand	70-80	40-42	34	UNDEFINED
14.65	48	50.24	1.86	3.70	2.15	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
14.95	49	86.89	2.16	2.48	2.18	sandy silt to clayey silt	UNDFND	UNDFD	33	5.5
15.25	50	170.53	2.13	1.25	2.20	sand to silty sand	70-80	38-40	41	UNDEFINED
15.55	51	120.37	1.66	1.38	2.23	sand to silty sand	60-70	38-40	29	UNDEFINED
15.85	52	25.18	0.84	3.33	2.26	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.15	53	20.83	0.75	3.59	2.29	silty clay to clay	UNDFND	UNDFD	13	1.1
16.45	54	98.30	2.05	2.09	2.32	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
16.75	55	64.17	1.36	2.12	2.35	silty sand to sandy silt	40-50	32-34	20	UNDEFINED
17.05	56	16.41	0.75	4.58	2.37	clay	UNDFND	UNDFD	16	.8
17.35	57	17.88	0.86	4.79	2.40	clay	UNDFND	UNDFD	17	.9
17.65	58	20.50	0.90	4.41	2.43	clay	UNDFND	UNDFD	20	1.1
17.95	59	68.80	1.37	1.99	2.46	silty sand to sandy silt	40-50	34-36	22	UNDEFINED
18.25	60	174.08	1.98	1.14	2.49	sand to silty sand	60-70	38-40	42	UNDEFINED
18.55	61	137.10	1.86	1.36	2.52	sand to silty sand	60-70	38-40	33	UNDEFINED
18.85	62	81.50	1.74	2.13	2.54	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
19.20	63	23.19	1.01	4.34	2.57	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	47.92	1.98	4.12	2.61	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
19.80	65	56.83	2.24	3.93	2.63	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
20.15	66	108.78	1.79	1.64	2.66	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
20.45	67	108.99	1.60	1.46	2.69	sand to silty sand	50-60	36-38	26	UNDEFINED
20.75	68	51.06	1.30	2.55	2.72	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
21.05	69	123.78	1.54	1.24	2.75	sand to silty sand	50-60	36-38	30	UNDEFINED
21.35	70	211.00	2.16	1.02	2.78	sand	70-80	38-40	40	UNDEFINED
21.65	71	212.96	2.55	1.20	2.81	sand	70-80	38-40	41	UNDEFINED
21.95	72	251.25	3.99	1.59	2.84	sand to silty sand	70-80	40-42	>50	UNDEFINED
22.25	73	315.52	5.12	1.62	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.55	74	367.51	2.81	0.77	2.89	sand	80-90	42-44	>50	UNDEFINED
22.85	75	401.60	2.25	0.56	2.92	gravelly sand to sand	>90	42-44	>50	UNDEFINED
23.15	76	395.11	3.65	0.92	2.95	sand	>90	42-44	>50	UNDEFINED
23.45	77	408.09	4.54	1.11	2.98	sand	>90	42-44	>50	UNDEFINED
23.75	78	393.78	4.74	1.20	3.01	sand	>90	42-44	>50	UNDEFINED
24.05	79	337.28	3.40	1.01	3.03	sand	80-90	40-42	>50	UNDEFINED
24.35	80	309.14	1.42	0.46	3.06	gravelly sand to sand	80-90	40-42	49	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-30c



CPT-08-020	I-436 Garden Grove Freeway (SR-22)
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-31a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-020
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :04/01/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	199.33	1.02	0.51	0.03	sand	>90	>48	38	UNDEFINED
0.60	2	152.07	1.39	0.91	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	43.99	1.55	3.53	0.15	clayey silt to silty clay	UNDFND	UNDFD	21	2.9
1.25	4	17.70	0.75	4.25	0.22	clay	UNDFND	UNDFD	17	1.1
1.55	5	17.64	0.63	3.58	0.28	silty clay to clay	UNDFND	UNDFD	11	1.1
1.85	6	21.00	0.79	3.74	0.33	silty clay to clay	UNDFND	UNDFD	13	1.3
2.15	7	24.78	0.92	3.73	0.39	silty clay to clay	UNDFND	UNDFD	16	1.6
2.45	8	25.47	0.83	3.26	0.45	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
2.75	9	22.65	0.79	3.50	0.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
3.05	10	17.51	0.38	2.17	0.57	clayey silt to silty clay	UNDFND	UNDFD	8	1.1
3.35	11	5.71	0.26	4.53	0.61	clay	UNDFND	UNDFD	5	.3
3.65	12	11.00	0.50	4.57	0.64	clay	UNDFND	UNDFD	11	.6
3.95	13	18.99	0.80	4.21	0.67	clay	UNDFND	UNDFD	18	1.2
4.25	14	81.63	0.73	0.90	0.69	sand to silty sand	60-70	40-42	20	UNDEFINED
4.55	15	39.08	1.00	2.55	0.72	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
4.85	16	10.46	0.21	2.00	0.75	clayey silt to silty clay	UNDFND	UNDFD	5	.6
5.15	17	8.28	0.18	2.17	0.78	silty clay to clay	UNDFND	UNDFD	5	.4
5.45	18	14.27	0.21	1.50	0.81	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.75	19	6.91	0.28	4.04	0.84	clay	UNDFND	UNDFD	7	.3
6.05	20	10.73	0.32	3.00	0.86	silty clay to clay	UNDFND	UNDFD	7	.6
6.40	21	5.72	0.20	3.56	0.89	clay	UNDFND	UNDFD	5	.2
6.70	22	15.50	0.54	3.49	0.93	silty clay to clay	UNDFND	UNDFD	10	.9
7.00	23	22.70	1.04	4.56	0.95	clay	UNDFND	UNDFD	22	1.4
7.35	24	47.71	1.63	3.41	0.98	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
7.65	25	68.39	1.62	2.37	1.02	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
7.95	26	107.67	2.01	1.87	1.04	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
8.25	27	201.56	2.23	1.11	1.07	sand	80-90	42-44	39	UNDEFINED
8.55	28	335.71	4.39	1.31	1.10	sand	>90	44-46	>50	UNDEFINED
8.85	29	306.91	4.05	1.32	1.13	sand	>90	44-46	>50	UNDEFINED
9.15	30	265.86	3.26	1.23	1.16	sand	>90	44-46	>50	UNDEFINED
9.45	31	114.78	3.22	2.80	1.19	sandy silt to clayey silt	UNDFND	UNDFD	44	7.5
9.75	32	41.01	2.63	6.42	1.21	clay	UNDFND	UNDFD	39	2.6
10.05	33	73.89	2.93	3.96	1.24	clayey silt to silty clay	UNDFND	UNDFD	35	4.7
10.35	34	60.49	2.29	3.78	1.27	clayey silt to silty clay	UNDFND	UNDFD	29	3.8
10.65	35	17.59	0.88	5.00	1.30	clay	UNDFND	UNDFD	17	1.0
10.95	36	25.60	1.46	5.70	1.33	clay	UNDFND	UNDFD	25	1.5
11.25	37	15.36	0.92	5.98	1.36	clay	UNDFND	UNDFD	15	.8
11.55	38	92.89	2.41	2.59	1.38	sandy silt to clayey silt	UNDFND	UNDFD	36	6.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-31b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	32.31	1.08	3.33	1.41	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
12.15	40	13.96	0.71	5.08	1.44	clay	UNDFND	UNDFD	13	.7
12.45	41	16.61	0.84	5.09	1.47	clay	UNDFND	UNDFD	16	.9
12.80	42	36.77	1.42	3.85	1.50	clayey silt to silty clay	UNDFND	UNDFD	18	2.2
13.10	43	89.90	2.22	2.47	1.53	sandy silt to clayey silt	UNDFND	UNDFD	34	5.8
13.40	44	165.21	3.05	1.84	1.56	sand to silty sand	70-80	40-42	40	UNDEFINED
13.75	45	130.84	2.29	1.75	1.59	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
14.05	46	59.30	1.85	3.12	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.35	47	55.58	1.37	2.47	1.65	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.65	48	198.10	3.82	1.93	1.68	sand to silty sand	70-80	40-42	47	UNDEFINED
14.95	49	197.80	3.66	1.85	1.70	sand to silty sand	70-80	40-42	47	UNDEFINED
15.25	50	188.92	3.98	2.11	1.73	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
15.55	51	165.77	3.71	2.24	1.76	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
15.85	52	129.33	3.11	2.40	1.79	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
16.15	53	118.85	3.85	3.24	1.82	sandy silt to clayey silt	UNDFND	UNDFD	46	7.7
16.45	54	272.51	5.68	2.08	1.85	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.75	55	297.00	6.58	2.21	1.87	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.05	56	296.56	6.36	2.15	1.90	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.35	57	313.26	5.80	1.85	1.93	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.65	58	311.48	5.27	1.69	1.96	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.95	59	292.43	5.50	1.88	1.99	sand to silty sand	80-90	42-44	>50	UNDEFINED
18.25	60	190.58	2.02	1.06	2.02	sand	70-80	40-42	37	UNDEFINED
18.55	61	102.88	1.55	1.51	2.04	sand to silty sand	50-60	36-38	25	UNDEFINED
18.85	62	215.27	1.05	0.49	2.07	sand	70-80	40-42	41	UNDEFINED
19.20	63	290.20	1.58	0.55	2.10	sand	80-90	42-44	>50	UNDEFINED
19.50	64	313.36	2.94	0.94	2.13	sand	80-90	42-44	>50	UNDEFINED
19.80	65	160.82	1.73	1.07	2.16	sand to silty sand	60-70	38-40	39	UNDEFINED
20.15	66	293.35	2.57	0.88	2.19	sand	80-90	42-44	>50	UNDEFINED
20.45	67	349.50	3.14	0.90	2.22	sand	>90	42-44	>50	UNDEFINED
20.75	68	347.39	3.34	0.96	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	407.69	3.74	0.92	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	412.50	7.07	1.71	2.31	sand to silty sand	>90	42-44	>50	UNDEFINED
21.65	71	410.21	7.27	1.77	2.34	sand to silty sand	>90	42-44	>50	UNDEFINED
21.95	72	394.85	3.06	0.78	2.37	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.25	73	79.24	1.42	1.80	2.39	silty sand to sandy silt	40-50	34-36	25	UNDEFINED
22.55	74	32.55	0.99	3.04	2.42	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
22.85	75	26.83	0.87	3.24	2.45	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
23.15	76	35.50	1.23	3.47	2.48	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
23.45	77	137.53	3.92	2.85	2.51	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
23.75	78	53.48	2.95	5.52	2.54	clay	UNDFND	UNDFD	>50	3.2
24.05	79	21.43	0.95	4.43	2.56	clay	UNDFND	UNDFD	21	1.1
24.35	80	30.01	1.17	3.90	2.59	silty clay to clay	UNDFND	UNDFD	19	1.6

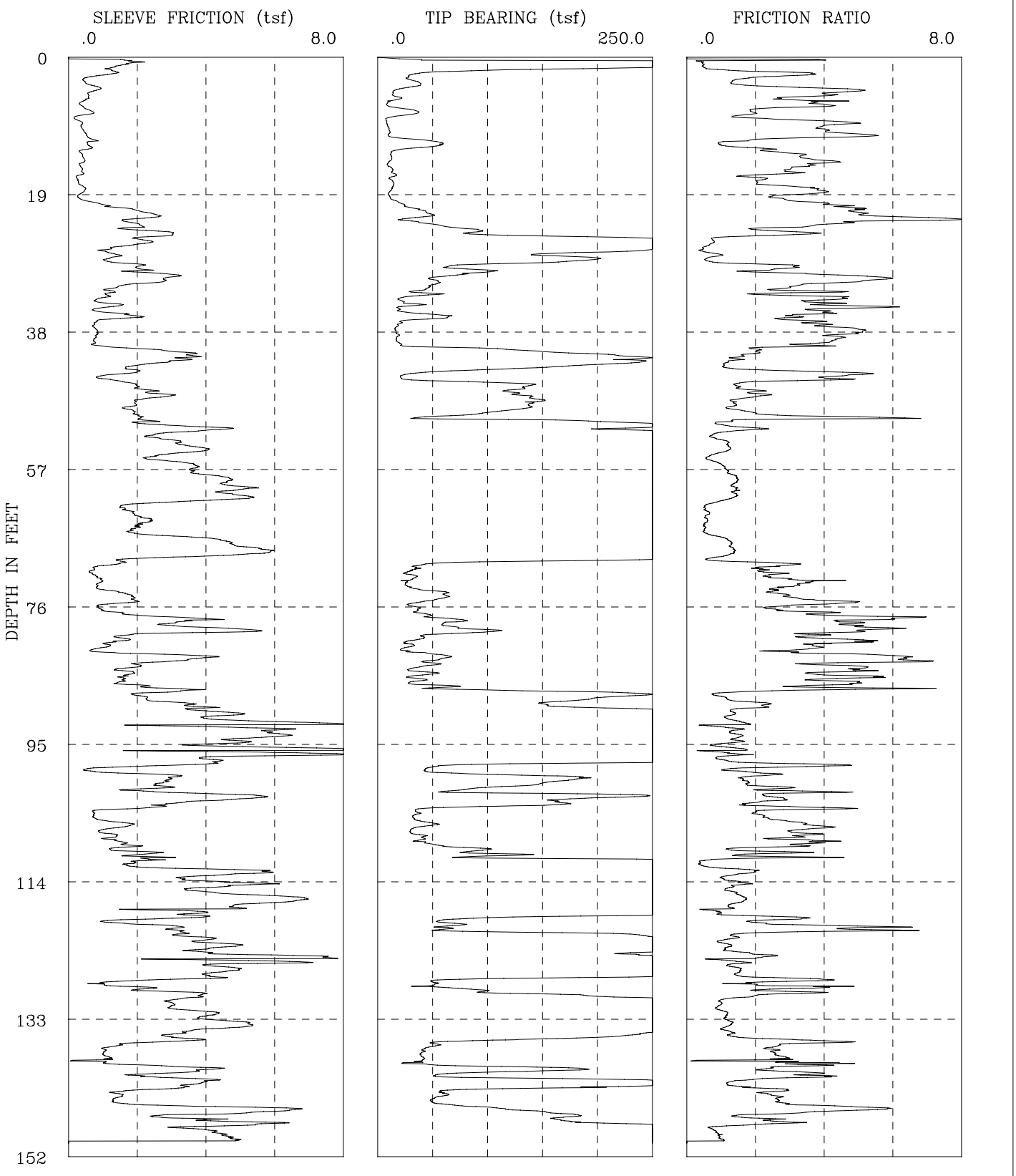
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-31c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	76.99	3.73	4.84	2.62	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.95	82	53.27	3.17	5.95	2.65	clay	UNDFND	UNDFD	>50	3.2
25.25	83	37.16	1.49	4.01	2.68	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
25.60	84	20.61	0.82	3.98	2.71	silty clay to clay	UNDFND	UNDFD	13	1.0
25.90	85	49.09	3.37	6.87	2.74	clay	UNDFND	UNDFD	47	2.9
26.20	86	51.52	3.33	6.46	2.77	clay	UNDFND	UNDFD	49	3.0
26.55	87	53.38	3.04	5.69	2.80	clay	UNDFND	UNDFD	>50	3.2
26.85	88	99.07	2.47	2.49	2.83	silty sand to sandy silt	50-60	34-36	32	UNDEFINED
27.15	89	61.05	3.29	5.39	2.86	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
27.45	90	204.30	3.74	1.83	2.88	sand to silty sand	70-80	38-40	49	UNDEFINED
27.75	91	170.34	3.96	2.32	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.05	92	157.54	5.06	3.21	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.1
28.35	93	338.39	6.95	2.05	2.97	sand to silty sand	80-90	40-42	>50	UNDEFINED
28.65	94	385.38	6.04	1.57	3.00	sand to silty sand	80-90	42-44	>50	UNDEFINED
28.95	95	387.61	6.21	1.60	3.03	sand to silty sand	80-90	42-44	>50	UNDEFINED
29.25	96	424.41	6.37	1.50	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	509.78	7.39	1.45	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	477.86	5.43	1.14	3.11	sand	>90	42-44	>50	UNDEFINED
30.15	99	377.17	8.13	2.16	3.14	sand to silty sand	80-90	40-42	>50	UNDEFINED
30.45	100	80.00	3.14	3.92	3.17	clayey silt to silty clay	UNDFND	UNDFD	38	4.9
30.75	101	41.29	1.34	3.25	3.20	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
31.05	102	112.26	3.10	2.76	3.22	sandy silt to clayey silt	UNDFND	UNDFD	43	7.0
31.35	103	151.08	3.82	2.53	3.25	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
31.65	104	125.95	3.17	2.52	3.28	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.00	105	78.72	2.89	3.67	3.31	clayey silt to silty clay	UNDFND	UNDFD	38	4.8
32.30	106	49.94	2.14	4.29	3.34	silty clay to clay	UNDFND	UNDFD	32	2.9
32.60	107	31.49	1.22	3.86	3.37	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
32.95	108	47.01	1.79	3.82	3.40	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
33.25	109	58.32	2.09	3.59	3.43	clayey silt to silty clay	UNDFND	UNDFD	28	3.4
33.55	110	105.60	3.53	3.34	3.46	sandy silt to clayey silt	UNDFND	UNDFD	40	6.6
33.85	111	191.60	4.50	2.35	3.49	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
34.15	112	184.55	5.29	2.87	3.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	307.66	6.95	2.26	3.55	sand to silty sand	80-90	40-42	>50	UNDEFINED
34.75	114	331.14	4.82	1.46	3.57	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.05	115	393.12	5.85	1.49	3.60	sand	80-90	40-42	>50	UNDEFINED
35.35	116	451.96	4.24	0.94	3.63	sand	>90	40-42	>50	UNDEFINED
35.65	117	535.15	4.35	0.81	3.66	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.95	118	392.58	4.63	1.18	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	391.03	3.89	0.99	3.72	sand	80-90	40-42	>50	UNDEFINED
36.55	120	511.97	3.08	0.60	3.74	gravelly sand to sand	>90	42-44	>50	UNDEFINED
36.85	121	497.06	3.08	0.62	3.77	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.15	122	499.91	2.14	0.43	3.80	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.45	123	515.30	4.07	0.79	3.83	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.75	124	548.07	6.19	1.13	3.86	sand	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 u: Nk= 15
(*) overconsolidated or cemented



I-436 SR-22 Phase 2	CPT-08-021
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-32a

Engineer : Nava
On Site Loc: CPT-08-021
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 9.84

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	312.43	1.49	0.48	0.03	gravelly sand to sand	>90	UNDFD	50	UNDEFINED
0.60	2	188.74	1.30	0.69	0.09	sand	>90	>48	36	UNDEFINED
0.95	3	30.90	0.83	2.70	0.15	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
1.25	4	36.20	0.61	1.68	0.22	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
1.55	5	16.48	0.74	4.47	0.28	clay	UNDFND	UNDFD	16	1.0
1.85	6	16.43	0.53	3.24	0.33	silty clay to clay	UNDFND	UNDFD	10	1.0
2.15	7	11.70	0.39	3.30	0.39	silty clay to clay	UNDFND	UNDFD	7	.7
2.45	8	32.16	0.60	1.85	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	2.1
2.75	9	9.17	0.26	2.83	0.51	silty clay to clay	UNDFND	UNDFD	6	.5
3.05	10	9.44	0.39	4.10	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	10.59	0.50	4.73	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	44.22	0.63	1.42	0.64	silty sand to sandy silt	40-50	38-40	14	UNDEFINED
3.95	13	34.87	0.54	1.55	0.67	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
4.25	14	12.36	0.40	3.22	0.69	silty clay to clay	UNDFND	UNDFD	8	.7
4.55	15	10.37	0.41	3.93	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	12.67	0.39	3.07	0.75	silty clay to clay	UNDFND	UNDFD	8	.7
5.15	17	13.77	0.30	2.17	0.78	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.45	18	14.07	0.33	2.35	0.81	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.75	19	11.59	0.44	3.82	0.84	clay	UNDFND	UNDFD	11	.6
6.05	20	12.37	0.34	2.78	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	26.20	1.19	4.53	0.89	clay	UNDFND	UNDFD	25	1.6
6.70	22	46.14	2.36	5.11	0.93	clay	UNDFND	UNDFD	44	2.9
7.00	23	31.89	1.89	5.94	0.95	clay	UNDFND	UNDFD	31	2.0
7.35	24	75.65	2.11	2.78	0.98	sandy silt to clayey silt	UNDFND	UNDFD	29	4.9
7.65	25	159.69	2.58	1.62	1.02	sand to silty sand	70-80	42-44	38	UNDEFINED
7.95	26	294.45	2.12	0.72	1.04	sand	>90	44-46	>50	UNDEFINED
8.25	27	233.07	1.16	0.50	1.07	sand	80-90	44-46	45	UNDEFINED
8.55	28	176.59	1.28	0.72	1.10	sand	80-90	42-44	34	UNDEFINED
8.85	29	105.96	1.77	1.67	1.13	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
9.15	30	88.45	2.28	2.58	1.16	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
9.45	31	54.22	2.92	5.38	1.19	clay	UNDFND	UNDFD	>50	3.4
9.75	32	49.47	1.67	3.37	1.21	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
10.05	33	41.59	1.17	2.81	1.24	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.35	34	22.05	0.92	4.16	1.27	silty clay to clay	UNDFND	UNDFD	14	1.3
10.65	35	25.65	1.13	4.42	1.30	silty clay to clay	UNDFND	UNDFD	16	1.5
10.95	36	45.23	1.57	3.47	1.33	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
11.25	37	29.83	0.95	3.19	1.36	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
11.55	38	16.84	0.78	4.62	1.38	clay	UNDFND	UNDFD	16	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.76	0.81	4.56	1.41	clay	UNDFND	UNDFD	17	1.0
12.15	40	19.31	0.75	3.87	1.44	silty clay to clay	UNDFND	UNDFD	12	1.1
12.45	41	116.15	2.44	2.10	1.47	silty sand to sandy silt	60-70	40-42	37	UNDEFINED
12.80	42	229.00	3.44	1.50	1.50	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.10	43	188.22	2.11	1.12	1.53	sand	70-80	40-42	36	UNDEFINED
13.40	44	53.23	1.70	3.20	1.56	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
13.75	45	57.04	1.31	2.30	1.59	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
14.05	46	130.58	2.12	1.62	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	130.24	2.64	2.03	1.65	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
14.65	48	143.42	1.99	1.38	1.68	sand to silty sand	60-70	40-42	34	UNDEFINED
14.95	49	125.21	1.79	1.43	1.70	sand to silty sand	60-70	38-40	30	UNDEFINED
15.25	50	67.85	2.03	2.99	1.73	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
15.55	51	235.05	2.59	1.10	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	263.32	3.81	1.45	1.79	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.15	53	316.90	2.61	0.83	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	281.50	3.42	1.22	1.85	sand	80-90	42-44	>50	UNDEFINED
16.75	55	341.06	3.51	1.03	1.87	sand	>90	42-44	>50	UNDEFINED
17.05	56	389.51	2.60	0.67	1.90	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.35	57	345.43	3.65	1.06	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	301.63	3.83	1.27	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	318.01	4.64	1.46	1.99	sand to silty sand	80-90	42-44	>50	UNDEFINED
18.25	60	354.11	4.97	1.40	2.02	sand	>90	42-44	>50	UNDEFINED
18.55	61	348.02	4.85	1.39	2.04	sand	>90	42-44	>50	UNDEFINED
18.85	62	348.19	3.28	0.94	2.07	sand	>90	42-44	>50	UNDEFINED
19.20	63	297.97	1.68	0.56	2.10	sand	80-90	42-44	>50	UNDEFINED
19.50	64	372.75	2.14	0.57	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	398.39	2.13	0.53	2.16	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.15	66	351.22	2.01	0.57	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	365.15	4.25	1.16	2.22	sand	>90	42-44	>50	UNDEFINED
20.75	68	393.56	5.19	1.32	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	402.02	5.04	1.25	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	171.99	1.64	0.96	2.31	sand	70-80	38-40	33	UNDEFINED
21.65	71	33.65	0.80	2.39	2.34	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
21.95	72	30.67	0.76	2.49	2.37	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
22.25	73	26.22	0.91	3.47	2.39	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
22.55	74	42.04	1.08	2.57	2.42	sandy silt to clayey silt	UNDFND	UNDFD	16	2.5
22.85	75	59.91	1.82	3.04	2.45	sandy silt to clayey silt	UNDFND	UNDFD	23	3.6
23.15	76	34.82	1.37	3.92	2.48	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
23.45	77	37.49	1.17	3.13	2.51	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
23.75	78	61.16	3.25	5.31	2.54	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.05	79	64.33	3.29	5.11	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	82.11	3.87	4.71	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	34.89	1.49	4.27	2.62	silty clay to clay	UNDFND	UNDFD	22	2.0
24.95	82	27.43	1.01	3.70	2.65	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
25.25	83	45.86	2.22	4.84	2.68	silty clay to clay	UNDFND	UNDFD	29	2.7
25.60	84	52.77	2.90	5.50	2.71	clay	UNDFND	UNDFD	>50	3.1
25.90	85	35.33	1.75	4.94	2.74	clay	UNDFND	UNDFD	34	2.0
26.20	86	39.81	1.68	4.21	2.77	silty clay to clay	UNDFND	UNDFD	25	2.3
26.55	87	45.07	1.79	3.98	2.80	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.85	88	160.38	2.83	1.76	2.83	sand to silty sand	60-70	38-40	38	UNDEFINED
27.15	89	196.87	2.31	1.18	2.86	sand	70-80	38-40	38	UNDEFINED
27.45	90	172.96	3.65	2.11	2.88	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.75	91	338.22	4.45	1.32	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	370.89	5.11	1.38	2.94	sand	80-90	42-44	>50	UNDEFINED
28.35	93	427.10	5.31	1.24	2.97	sand	>90	42-44	>50	UNDEFINED
28.65	94	421.84	6.02	1.43	3.00	sand	>90	42-44	>50	UNDEFINED
28.95	95	372.56	4.73	1.27	3.03	sand	80-90	40-42	>50	UNDEFINED
29.25	96	512.32	6.18	1.21	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	492.28	5.81	1.18	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	232.44	3.93	1.69	3.11	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.15	99	47.49	0.88	1.85	3.14	silty sand to sandy silt	<40	30-32	15	UNDEFINED
30.45	100	156.58	2.93	1.87	3.17	silty sand to sandy silt	60-70	36-38	50	UNDEFINED
30.75	101	141.39	2.75	1.95	3.20	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.05	102	99.35	2.76	2.78	3.22	sandy silt to clayey silt	UNDFND	UNDFD	38	6.2
31.35	103	197.21	4.98	2.53	3.25	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
31.65	104	122.94	2.71	2.21	3.28	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
32.00	105	34.69	0.79	2.26	3.31	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.30	106	40.75	1.21	2.97	3.34	sandy silt to clayey silt	UNDFND	UNDFD	16	2.2
32.60	107	36.99	1.35	3.66	3.37	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
32.95	108	37.99	1.21	3.17	3.40	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
33.25	109	46.90	1.67	3.55	3.43	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
33.55	110	90.11	1.78	1.98	3.46	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
33.85	111	198.07	2.17	1.10	3.49	sand	60-70	38-40	38	UNDEFINED
34.15	112	414.33	1.91	0.46	3.52	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
34.45	113	294.89	5.09	1.72	3.55	sand to silty sand	70-80	40-42	>50	UNDEFINED
34.75	114	310.52	3.67	1.18	3.57	sand	80-90	40-42	>50	UNDEFINED
35.05	115	324.42	4.55	1.40	3.60	sand	80-90	40-42	>50	UNDEFINED
35.35	116	327.31	4.68	1.43	3.63	sand	80-90	40-42	>50	UNDEFINED
35.65	117	399.38	6.50	1.63	3.66	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.95	118	394.07	4.01	1.02	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	293.94	3.78	1.29	3.72	sand	70-80	40-42	>50	UNDEFINED
36.55	120	66.96	1.70	2.54	3.74	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
36.85	121	65.44	3.17	4.84	3.77	silty clay to clay	UNDFND	UNDFD	42	3.8
37.15	122	253.08	3.60	1.42	3.80	sand to silty sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32d

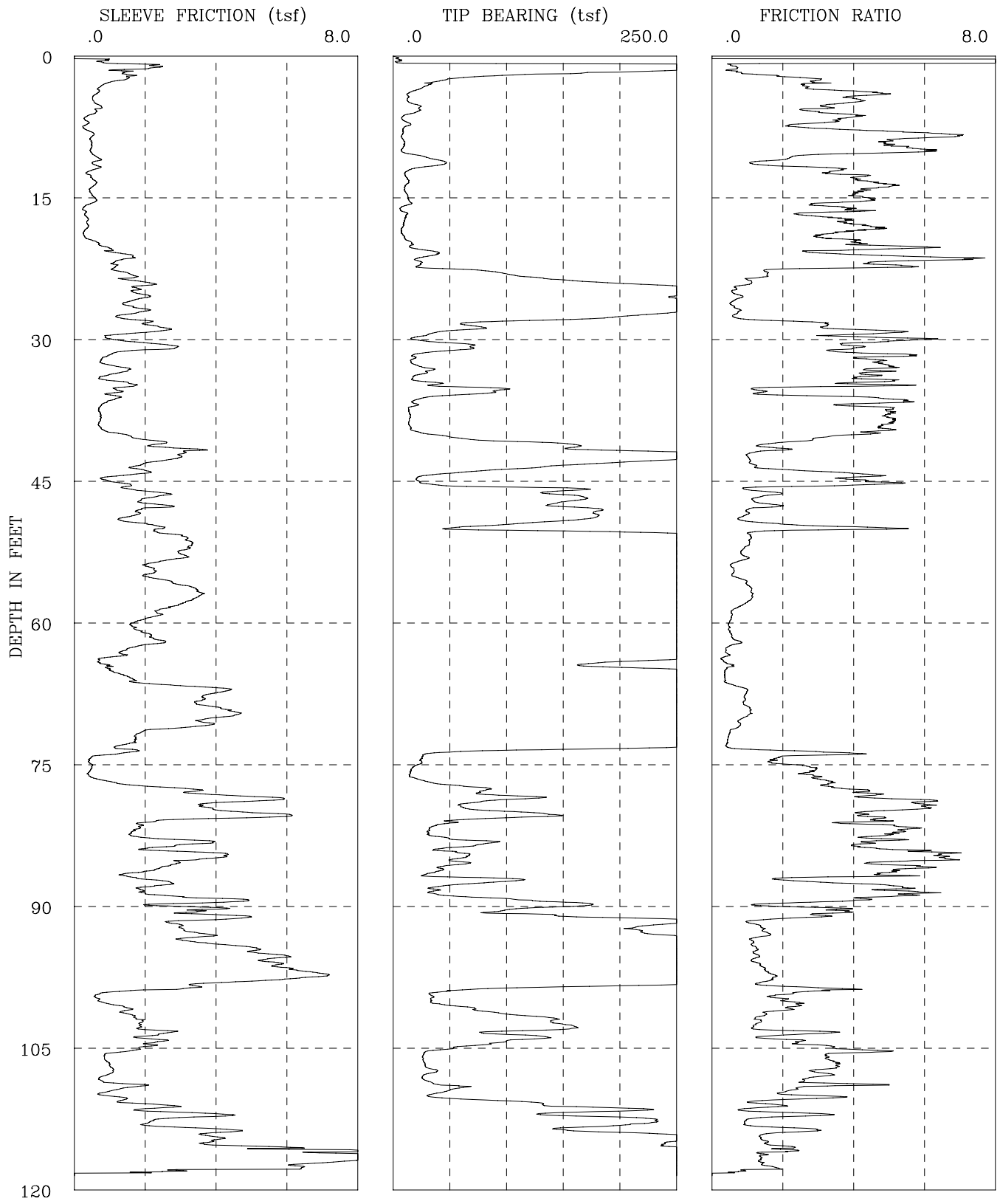
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	394.19	4.35	1.10	3.83	sand	80-90	40-42	>50	UNDEFINED
37.75	124	312.38	3.95	1.27	3.86	sand	70-80	40-42	>50	UNDEFINED
38.05	125	329.85	5.51	1.67	3.89	sand to silty sand	80-90	40-42	>50	UNDEFINED
38.40	126	354.67	5.16	1.45	3.92	sand	80-90	40-42	>50	UNDEFINED
38.70	127	289.77	4.34	1.50	3.95	sand to silty sand	70-80	38-40	>50	UNDEFINED
39.00	128	104.71	2.71	2.59	3.97	sandy silt to clayey silt	UNDFND	UNDFD	40	6.4
39.35	129	67.34	1.81	2.70	4.01	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
39.65	130	177.74	3.76	2.12	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.95	131	303.67	3.00	0.99	4.06	sand	70-80	38-40	>50	UNDEFINED
40.25	132	353.19	3.45	0.98	4.09	sand	80-90	40-42	>50	UNDEFINED
40.55	133	354.61	4.05	1.14	4.12	sand	80-90	40-42	>50	UNDEFINED
40.85	134	407.71	5.12	1.26	4.15	sand	80-90	40-42	>50	UNDEFINED
41.15	135	320.69	3.69	1.15	4.18	sand	70-80	38-40	>50	UNDEFINED
41.45	136	170.86	3.25	1.90	4.21	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
41.75	137	50.29	1.55	3.09	4.23	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
42.05	138	40.50	1.03	2.55	4.26	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.35	139	40.71	0.96	2.35	4.29	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.65	140	110.08	2.94	2.67	4.32	sandy silt to clayey silt	UNDFND	UNDFD	42	6.7
42.95	141	86.15	2.75	3.20	4.35	sandy silt to clayey silt	UNDFND	UNDFD	33	5.1
43.25	142	248.25	3.82	1.54	4.38	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.55	143	167.67	2.88	1.72	4.40	sand to silty sand	60-70	36-38	40	UNDEFINED
43.85	144	58.78	1.45	2.47	4.43	sandy silt to clayey silt	UNDFND	UNDFD	23	3.3
44.15	145	53.77	1.54	2.87	4.46	sandy silt to clayey silt	UNDFND	UNDFD	21	3.0
44.45	146	119.04	5.71	4.79	4.49	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.80	147	169.89	3.53	2.08	4.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
45.10	148	301.47	4.84	1.60	4.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
45.40	149	491.97	4.18	0.85	4.58	gravelly sand to sand	>90	40-42	>50	UNDEFINED
45.75	150	470.75	3.43	0.73	4.61	gravelly sand to sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32e



CPT-08-022	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-33a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-022
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	109.32	1.03	0.94	0.03	sand to silty sand	>90	>48	26	UNDEFINED
0.60	2	232.57	1.67	0.72	0.09	sand	>90	>48	45	UNDEFINED
0.95	3	46.61	1.18	2.53	0.15	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.25	4	18.71	0.66	3.54	0.22	silty clay to clay	UNDFND	UNDFD	12	1.2
1.55	5	14.24	0.55	3.86	0.28	silty clay to clay	UNDFND	UNDFD	9	.9
1.85	6	21.85	0.66	3.00	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.4
2.15	7	9.76	0.36	3.64	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	10.65	0.34	3.18	0.45	silty clay to clay	UNDFND	UNDFD	7	.6
2.75	9	8.31	0.49	5.91	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	8.94	0.48	5.36	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	24.24	0.61	2.50	0.61	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
3.65	12	34.31	0.60	1.75	0.64	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
3.95	13	11.27	0.43	3.81	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	12.04	0.56	4.66	0.69	clay	UNDFND	UNDFD	12	.7
4.55	15	11.67	0.48	4.11	0.72	clay	UNDFND	UNDFD	11	.7
4.85	16	13.16	0.49	3.69	0.75	silty clay to clay	UNDFND	UNDFD	8	.8
5.15	17	9.30	0.29	3.10	0.78	silty clay to clay	UNDFND	UNDFD	6	.5
5.45	18	9.84	0.37	3.81	0.81	clay	UNDFND	UNDFD	9	.5
5.75	19	7.72	0.31	4.00	0.84	clay	UNDFND	UNDFD	7	.4
6.05	20	12.55	0.47	3.77	0.86	clay	UNDFND	UNDFD	12	.7
6.40	21	27.26	1.06	3.87	0.89	silty clay to clay	UNDFND	UNDFD	17	1.7
6.70	22	24.27	1.35	5.57	0.93	clay	UNDFND	UNDFD	23	1.5
7.00	23	56.94	1.23	2.16	0.95	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
7.35	24	148.98	1.79	1.20	0.98	sand to silty sand	70-80	42-44	36	UNDEFINED
7.65	25	271.53	1.76	0.65	1.02	sand	>90	44-46	>50	UNDEFINED
7.95	26	260.22	1.81	0.70	1.04	sand	>90	44-46	50	UNDEFINED
8.25	27	262.27	1.76	0.67	1.07	sand	>90	44-46	>50	UNDEFINED
8.55	28	181.16	1.56	0.86	1.10	sand	80-90	42-44	35	UNDEFINED
8.85	29	67.04	2.34	3.49	1.13	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
9.15	30	26.50	1.27	4.81	1.16	clay	UNDFND	UNDFD	25	1.6
9.45	31	59.54	2.41	4.05	1.19	clayey silt to silty clay	UNDFND	UNDFD	29	3.8
9.75	32	26.32	1.08	4.09	1.21	silty clay to clay	UNDFND	UNDFD	17	1.6
10.05	33	19.48	0.97	4.95	1.24	clay	UNDFND	UNDFD	19	1.1
10.35	34	26.69	1.19	4.46	1.27	silty clay to clay	UNDFND	UNDFD	17	1.6
10.65	35	29.75	1.32	4.44	1.30	silty clay to clay	UNDFND	UNDFD	19	1.8
10.95	36	80.35	1.14	1.42	1.33	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
11.25	37	21.57	1.01	4.68	1.36	clay	UNDFND	UNDFD	21	1.2
11.55	38	14.50	0.71	4.88	1.38	clay	UNDFND	UNDFD	14	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-33b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	14.40	0.73	5.04	1.41	clay	UNDFND	UNDFD	14	.8
12.15	40	17.41	0.83	4.76	1.44	clay	UNDFND	UNDFD	17	1.0
12.45	41	66.93	1.88	2.81	1.47	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
12.80	42	188.85	2.83	1.50	1.50	sand to silty sand	70-80	40-42	45	UNDEFINED
13.10	43	263.77	2.72	1.03	1.53	sand	80-90	42-44	>50	UNDEFINED
13.40	44	120.80	1.87	1.55	1.56	sand to silty sand	60-70	38-40	29	UNDEFINED
13.75	45	28.42	1.21	4.26	1.59	silty clay to clay	UNDFND	UNDFD	18	1.7
14.05	46	106.26	1.65	1.56	1.62	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
14.35	47	157.73	2.24	1.42	1.65	sand to silty sand	70-80	40-42	38	UNDEFINED
14.65	48	158.03	2.20	1.40	1.68	sand to silty sand	70-80	40-42	38	UNDEFINED
14.95	49	176.04	1.58	0.90	1.70	sand	70-80	40-42	34	UNDEFINED
15.25	50	91.65	2.08	2.27	1.73	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
15.55	51	237.16	2.76	1.16	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	320.29	3.26	1.02	1.79	sand	>90	42-44	>50	UNDEFINED
16.15	53	355.17	3.07	0.87	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	338.21	2.37	0.70	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	365.14	2.17	0.60	1.87	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.05	56	291.92	2.58	0.88	1.90	sand	80-90	42-44	>50	UNDEFINED
17.35	57	311.80	3.46	1.11	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	310.82	3.32	1.07	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	386.25	2.56	0.66	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	387.99	2.10	0.54	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	352.17	1.69	0.48	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	379.90	2.19	0.58	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	350.92	1.85	0.53	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	282.08	1.05	0.37	2.13	gravelly sand to sand	80-90	42-44	45	UNDEFINED
19.80	65	200.71	0.88	0.44	2.16	sand	70-80	40-42	38	UNDEFINED
20.15	66	393.79	1.44	0.37	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	449.43	3.18	0.71	2.22	gravelly sand to sand	>90	44-46	>50	UNDEFINED
20.75	68	402.06	3.79	0.94	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	386.43	3.72	0.96	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	429.27	4.40	1.02	2.31	sand	>90	42-44	>50	UNDEFINED
21.65	71	467.40	3.60	0.77	2.34	gravelly sand to sand	>90	44-46	>50	UNDEFINED
21.95	72	377.27	1.95	0.52	2.37	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.25	73	367.80	1.58	0.43	2.39	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.55	74	102.48	1.32	1.29	2.42	sand to silty sand	50-60	36-38	25	UNDEFINED
22.85	75	24.58	0.45	1.82	2.45	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
23.15	76	16.24	0.45	2.76	2.48	clayey silt to silty clay	UNDFND	UNDFD	8	.7
23.45	77	23.09	0.74	3.19	2.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
23.75	78	72.10	2.71	3.76	2.54	clayey silt to silty clay	UNDFND	UNDFD	35	4.4
24.05	79	98.77	4.94	5.01	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	68.14	3.83	5.61	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-33c

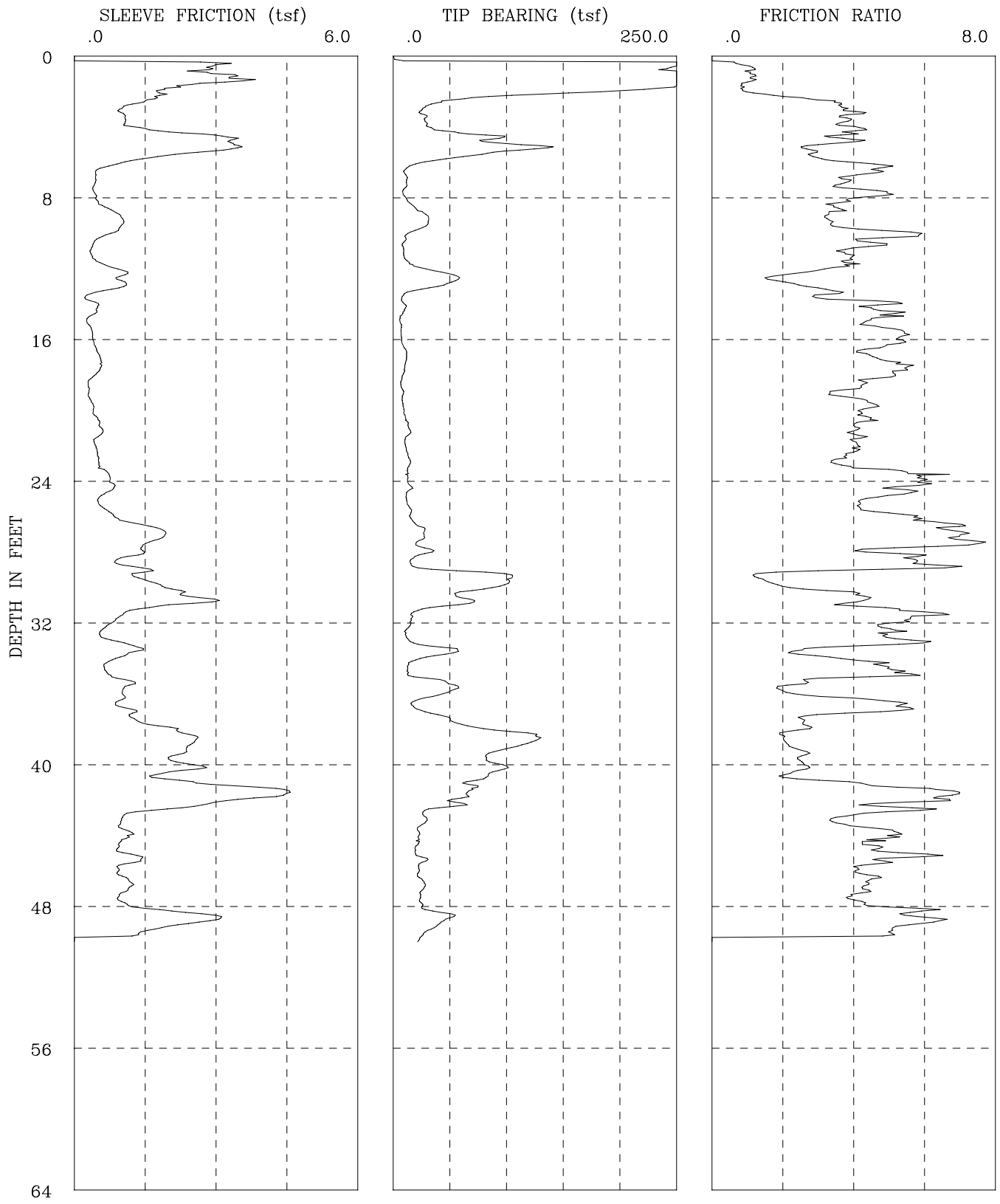
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	108.28	4.76	4.39	2.62	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.95	82	39.42	1.88	4.76	2.65	silty clay to clay	UNDFND	UNDFD	25	2.3
25.25	83	36.80	1.79	4.86	2.68	clay	UNDFND	UNDFD	35	2.1
25.60	84	66.12	2.95	4.47	2.71	clayey silt to silty clay	UNDFND	UNDFD	32	4.0
25.90	85	60.15	3.88	6.44	2.74	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
26.20	86	51.83	2.71	5.23	2.77	clay	UNDFND	UNDFD	50	3.1
26.55	87	51.63	1.76	3.40	2.80	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
26.85	88	62.88	2.37	3.76	2.83	clayey silt to silty clay	UNDFND	UNDFD	30	3.8
27.15	89	47.90	2.38	4.97	2.86	silty clay to clay	UNDFND	UNDFD	31	2.8
27.45	90	145.93	3.67	2.51	2.88	silty sand to sandy silt	60-70	36-38	47	UNDEFINED
27.75	91	113.42	3.84	3.38	2.91	sandy silt to clayey silt	UNDFND	UNDFD	43	7.2
28.05	92	244.50	3.38	1.38	2.94	sand to silty sand	70-80	40-42	>50	UNDEFINED
28.35	93	220.00	3.32	1.51	2.97	sand to silty sand	70-80	38-40	>50	UNDEFINED
28.65	94	294.49	3.45	1.17	3.00	sand	80-90	40-42	>50	UNDEFINED
28.95	95	416.11	5.06	1.21	3.03	sand	>90	42-44	>50	UNDEFINED
29.25	96	461.20	5.67	1.23	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	415.19	6.07	1.46	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	370.94	6.30	1.70	3.11	sand to silty sand	80-90	40-42	>50	UNDEFINED
30.15	99	160.48	3.05	1.90	3.14	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	34.31	0.70	2.03	3.17	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
30.75	101	52.27	1.21	2.31	3.20	sandy silt to clayey silt	UNDFND	UNDFD	20	3.0
31.05	102	110.03	1.56	1.41	3.22	sand to silty sand	50-60	34-36	26	UNDEFINED
31.35	103	150.02	1.87	1.25	3.25	sand to silty sand	60-70	36-38	36	UNDEFINED
31.65	104	113.92	2.28	2.00	3.28	silty sand to sandy silt	50-60	34-36	36	UNDEFINED
32.00	105	85.44	2.18	2.55	3.31	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
32.30	106	29.97	1.15	3.84	3.34	silty clay to clay	UNDFND	UNDFD	19	1.5
32.60	107	27.45	0.95	3.46	3.37	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
32.95	108	31.66	0.98	3.08	3.40	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
33.25	109	40.06	1.26	3.14	3.43	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
33.55	110	42.39	0.99	2.33	3.46	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
33.85	111	99.21	1.72	1.73	3.49	silty sand to sandy silt	40-50	34-36	32	UNDEFINED
34.15	112	176.22	2.89	1.64	3.52	sand to silty sand	60-70	36-38	42	UNDEFINED
34.45	113	215.92	2.57	1.19	3.55	sand	70-80	38-40	41	UNDEFINED
34.75	114	176.88	3.64	2.06	3.57	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	273.72	3.89	1.42	3.60	sand to silty sand	70-80	38-40	>50	UNDEFINED
35.35	116	308.96	6.18	2.00	3.63	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.65	117	635.31	8.78	1.38	3.66	sand	>90	42-44	>50	UNDEFINED
35.95	118	389.55	5.88	1.51	3.69	sand to silty sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-33d



CPT-08-102	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-34a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-102
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	253.16	2.29	0.90	0.03	sand	>90	>48	48	UNDEFINED
0.60	2	270.91	2.70	1.00	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	55.69	1.38	2.47	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	29.62	1.15	3.89	0.22	silty clay to clay	UNDFND	UNDFD	19	1.9
1.55	5	88.66	3.05	3.44	0.28	sandy silt to clayey silt	UNDFND	UNDFD	34	5.8
1.85	6	65.93	1.95	2.96	0.33	sandy silt to clayey silt	UNDFND	UNDFD	25	4.3
2.15	7	11.59	0.50	4.29	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	10.34	0.43	4.13	0.45	clay	UNDFND	UNDFD	10	.6
2.75	9	21.20	0.73	3.43	0.51	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
3.05	10	25.09	0.96	3.81	0.57	silty clay to clay	UNDFND	UNDFD	16	1.6
3.35	11	9.62	0.43	4.46	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	14.62	0.54	3.67	0.64	silty clay to clay	UNDFND	UNDFD	9	.9
3.95	13	49.15	1.04	2.11	0.67	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
4.25	14	12.76	0.45	3.55	0.69	silty clay to clay	UNDFND	UNDFD	8	.7
4.55	15	8.48	0.40	4.66	0.72	clay	UNDFND	UNDFD	8	.5
4.85	16	7.06	0.36	5.05	0.75	clay	UNDFND	UNDFD	7	.4
5.15	17	9.93	0.46	4.64	0.78	clay	UNDFND	UNDFD	10	.5
5.45	18	10.49	0.54	5.18	0.81	clay	UNDFND	UNDFD	10	.6
5.75	19	7.52	0.33	4.33	0.84	clay	UNDFND	UNDFD	7	.4
6.05	20	8.46	0.35	4.12	0.86	clay	UNDFND	UNDFD	8	.4
6.40	21	11.52	0.48	4.20	0.89	clay	UNDFND	UNDFD	11	.6
6.70	22	12.11	0.49	4.07	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	13.35	0.50	3.72	0.95	silty clay to clay	UNDFND	UNDFD	9	.8
7.35	24	12.80	0.69	5.42	0.98	clay	UNDFND	UNDFD	12	.7
7.65	25	13.12	0.66	5.05	1.02	clay	UNDFND	UNDFD	13	.7
7.95	26	14.64	0.71	4.84	1.04	clay	UNDFND	UNDFD	14	.8
8.25	27	24.06	1.63	6.79	1.07	clay	UNDFND	UNDFD	23	1.4
8.55	28	26.47	1.54	5.82	1.10	clay	UNDFND	UNDFD	25	1.6
8.85	29	23.38	1.17	5.00	1.13	clay	UNDFND	UNDFD	22	1.4
9.15	30	97.86	1.57	1.60	1.16	silty sand to sandy silt	60-70	40-42	31	UNDEFINED
9.45	31	61.41	2.45	3.98	1.19	clayey silt to silty clay	UNDFND	UNDFD	29	3.9
9.75	32	18.83	1.04	5.53	1.21	clay	UNDFND	UNDFD	18	1.1
10.05	33	12.30	0.63	5.11	1.24	clay	UNDFND	UNDFD	12	.6
10.35	34	38.79	1.18	3.04	1.27	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
10.65	35	13.92	0.69	4.94	1.30	clay	UNDFND	UNDFD	13	.7
10.95	36	47.15	1.08	2.28	1.33	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
11.25	37	23.33	1.03	4.41	1.36	clay	UNDFND	UNDFD	22	1.4
11.55	38	52.16	1.45	2.77	1.38	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-34b

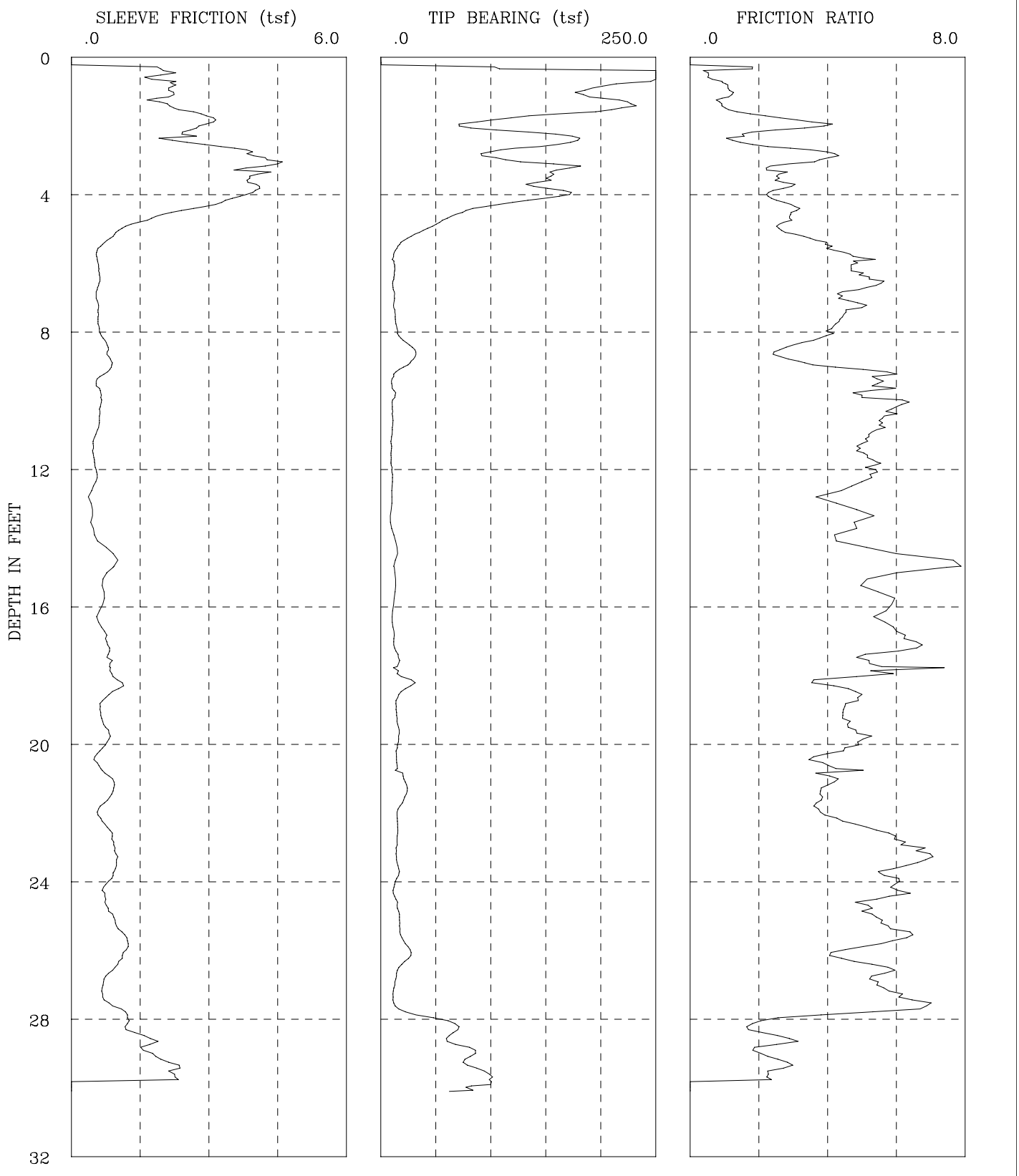
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	117.04	2.44	2.08	1.41	silty sand to sandy silt	60-70	40-42	37	UNDEFINED
12.15	40	88.28	2.21	2.50	1.44	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
12.45	41	88.67	2.17	2.44	1.47	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
12.80	42	64.22	3.79	5.90	1.50	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
13.10	43	38.47	1.82	4.72	1.53	silty clay to clay	UNDFND	UNDFD	25	2.3
13.40	44	24.58	1.05	4.28	1.56	silty clay to clay	UNDFND	UNDFD	16	1.4
13.75	45	20.63	1.03	4.99	1.59	clay	UNDFND	UNDFD	20	1.1
14.05	46	24.81	1.10	4.45	1.62	clay	UNDFND	UNDFD	24	1.4
14.35	47	25.70	1.14	4.43	1.65	silty clay to clay	UNDFND	UNDFD	16	1.5
14.65	48	24.39	1.06	4.35	1.68	silty clay to clay	UNDFND	UNDFD	16	1.4
14.95	49	43.74	2.59	5.91	1.70	clay	UNDFND	UNDFD	42	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-34c



CPT-08-103	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-35a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-103
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

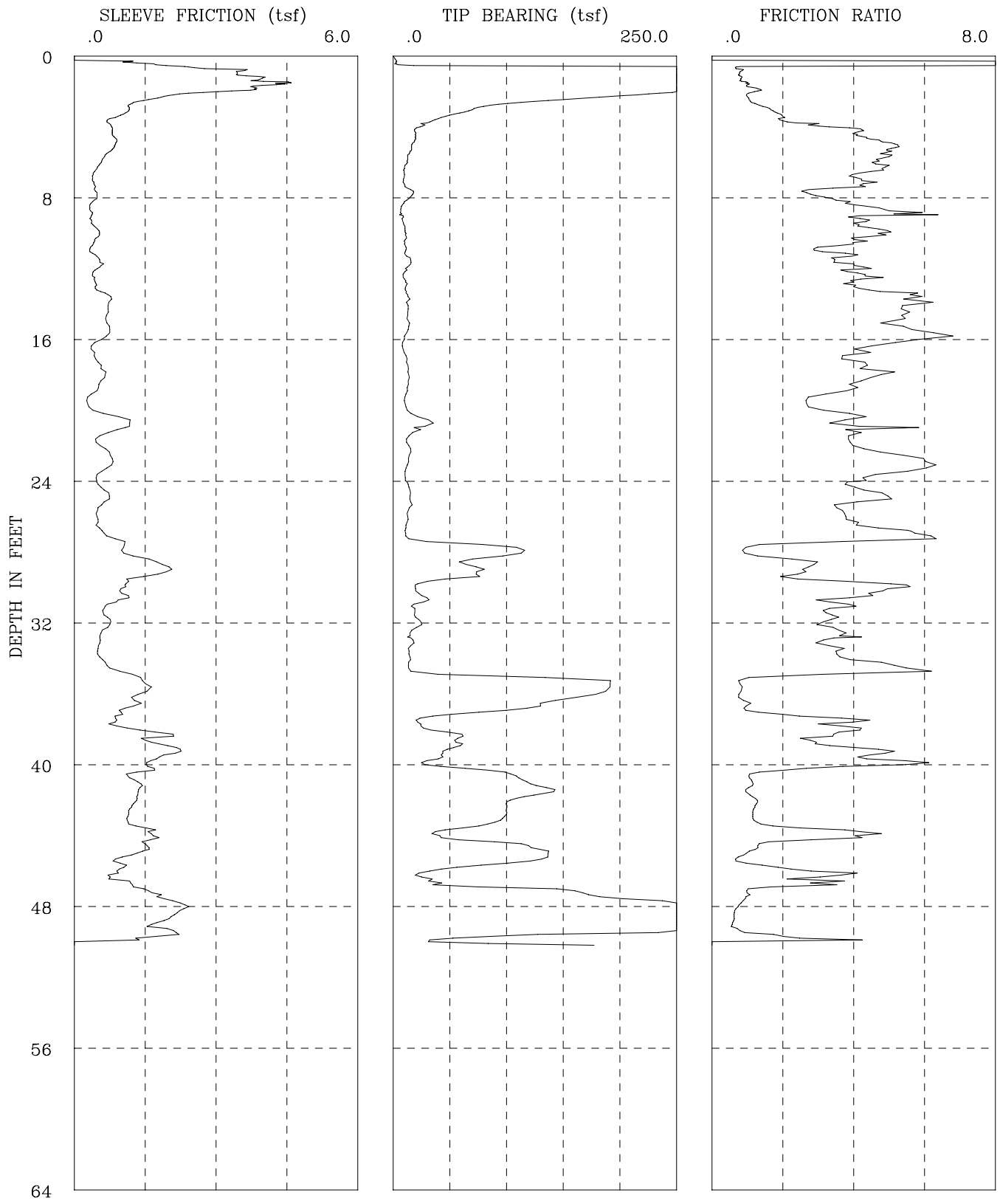
CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	191.77	1.72	0.90	0.03	sand	>90	>48	37	UNDEFINED
0.60	2	162.78	2.52	1.55	0.09	sand to silty sand	>90	>48	39	UNDEFINED
0.95	3	136.86	3.39	2.47	0.15	silty sand to sandy silt	>90	>48	44	UNDEFINED
1.25	4	154.99	3.82	2.46	0.22	silty sand to sandy silt	>90	>48	49	UNDEFINED
1.55	5	66.13	1.91	2.88	0.28	sandy silt to clayey silt	UNDFND	UNDFD	25	4.3
1.85	6	15.46	0.64	4.14	0.33	clay	UNDFND	UNDFD	15	1.0
2.15	7	11.89	0.58	4.88	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	13.45	0.59	4.42	0.45	clay	UNDFND	UNDFD	13	.8
2.75	9	25.91	0.81	3.11	0.51	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
3.05	10	11.36	0.63	5.56	0.57	clay	UNDFND	UNDFD	11	.7
3.35	11	10.59	0.59	5.61	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	9.55	0.49	5.15	0.64	clay	UNDFND	UNDFD	9	.5
3.95	13	10.30	0.47	4.56	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	9.78	0.45	4.56	0.69	clay	UNDFND	UNDFD	9	.5
4.55	15	13.38	0.90	6.70	0.72	clay	UNDFND	UNDFD	13	.8
4.85	16	12.83	0.70	5.49	0.75	clay	UNDFND	UNDFD	12	.7
5.15	17	10.91	0.62	5.70	0.78	clay	UNDFND	UNDFD	10	.6
5.45	18	14.71	0.83	5.64	0.81	clay	UNDFND	UNDFD	14	.9
5.75	19	19.84	0.87	4.39	0.84	clay	UNDFND	UNDFD	19	1.2
6.05	20	15.49	0.73	4.70	0.86	clay	UNDFND	UNDFD	15	.9
6.40	21	16.20	0.67	4.12	0.89	clay	UNDFND	UNDFD	16	.9
6.70	22	20.30	0.78	3.82	0.93	silty clay to clay	UNDFND	UNDFD	13	1.2
7.00	23	14.98	0.82	5.47	0.95	clay	UNDFND	UNDFD	14	.9
7.35	24	14.57	0.91	6.24	0.98	clay	UNDFND	UNDFD	14	.8
7.65	25	14.73	0.80	5.44	1.02	clay	UNDFND	UNDFD	14	.8
7.95	26	21.24	1.14	5.35	1.04	clay	UNDFND	UNDFD	20	1.3
8.25	27	16.26	0.85	5.25	1.07	clay	UNDFND	UNDFD	16	.9
8.55	28	24.87	0.97	3.90	1.10	silty clay to clay	UNDFND	UNDFD	16	1.5
8.85	29	71.81	1.56	2.17	1.13	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
9.15	30	88.99	1.47	1.65	1.16	silty sand to sandy silt	60-70	38-40	28	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-35b



CPT-08-104	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-36a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-104
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	209.97	2.07	0.98	0.03	sand	>90	>48	40	UNDEFINED
0.60	2	399.45	3.94	0.99	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	127.87	1.48	1.16	0.15	sand to silty sand	>90	>48	31	UNDEFINED
1.25	4	34.74	0.82	2.36	0.22	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
1.55	5	18.46	0.85	4.59	0.28	clay	UNDFND	UNDFD	18	1.2
1.85	6	13.47	0.66	4.87	0.33	clay	UNDFND	UNDFD	13	.8
2.15	7	9.59	0.42	4.41	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	14.07	0.45	3.22	0.45	silty clay to clay	UNDFND	UNDFD	9	.9
2.75	9	8.05	0.35	4.40	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	9.68	0.43	4.48	0.57	clay	UNDFND	UNDFD	9	.6
3.35	11	10.86	0.40	3.70	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	13.23	0.50	3.81	0.64	silty clay to clay	UNDFND	UNDFD	8	.8
3.95	13	10.38	0.42	4.07	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	12.30	0.66	5.38	0.69	clay	UNDFND	UNDFD	12	.7
4.55	15	13.15	0.69	5.24	0.72	clay	UNDFND	UNDFD	13	.8
4.85	16	12.26	0.73	5.98	0.75	clay	UNDFND	UNDFD	12	.7
5.15	17	8.81	0.35	4.02	0.78	clay	UNDFND	UNDFD	8	.5
5.45	18	13.19	0.63	4.78	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	12.91	0.51	3.98	0.84	clay	UNDFND	UNDFD	12	.7
6.05	20	2.47	0.10	3.99	0.86	clay	UNDFND	UNDFD	2	8.7
6.40	21	41.00	1.34	3.27	0.89	clayey silt to silty clay	UNDFND	UNDFD	20	2.6
6.70	22	13.00	0.44	3.40	0.93	silty clay to clay	UNDFND	UNDFD	8	.7
7.00	23	13.46	0.89	6.58	0.95	clay	UNDFND	UNDFD	13	.8
7.35	24	9.74	0.42	4.26	0.98	clay	UNDFND	UNDFD	9	.5
7.65	25	15.78	0.75	4.77	1.02	clay	UNDFND	UNDFD	15	.9
7.95	26	13.59	0.40	2.93	1.04	silty clay to clay	UNDFND	UNDFD	9	.8
8.25	27	-24.11	0.57	-2.34	1.07	undefined	UNDFND	UNDFD	UDF	UNDEFINED
8.55	28	115.85	0.85	0.74	1.10	sand to silty sand	60-70	40-42	28	UNDEFINED
8.85	29	79.10	2.16	2.73	1.13	sandy silt to clayey silt	UNDFND	UNDFD	30	5.1
9.15	30	36.54	1.11	3.03	1.16	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
9.45	31	24.00	0.94	3.91	1.19	silty clay to clay	UNDFND	UNDFD	15	1.4
9.75	32	20.66	0.68	3.29	1.21	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
10.05	33	17.44	0.60	3.44	1.24	silty clay to clay	UNDFND	UNDFD	11	1.0
10.35	34	14.95	0.51	3.44	1.27	silty clay to clay	UNDFND	UNDFD	10	.8
10.65	35	23.92	0.86	3.59	1.30	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
10.95	36	183.31	1.51	0.83	1.33	sand	70-80	42-44	35	UNDEFINED
11.25	37	137.54	1.23	0.89	1.36	sand to silty sand	70-80	40-42	33	UNDEFINED
11.55	38	33.36	0.91	2.73	1.38	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

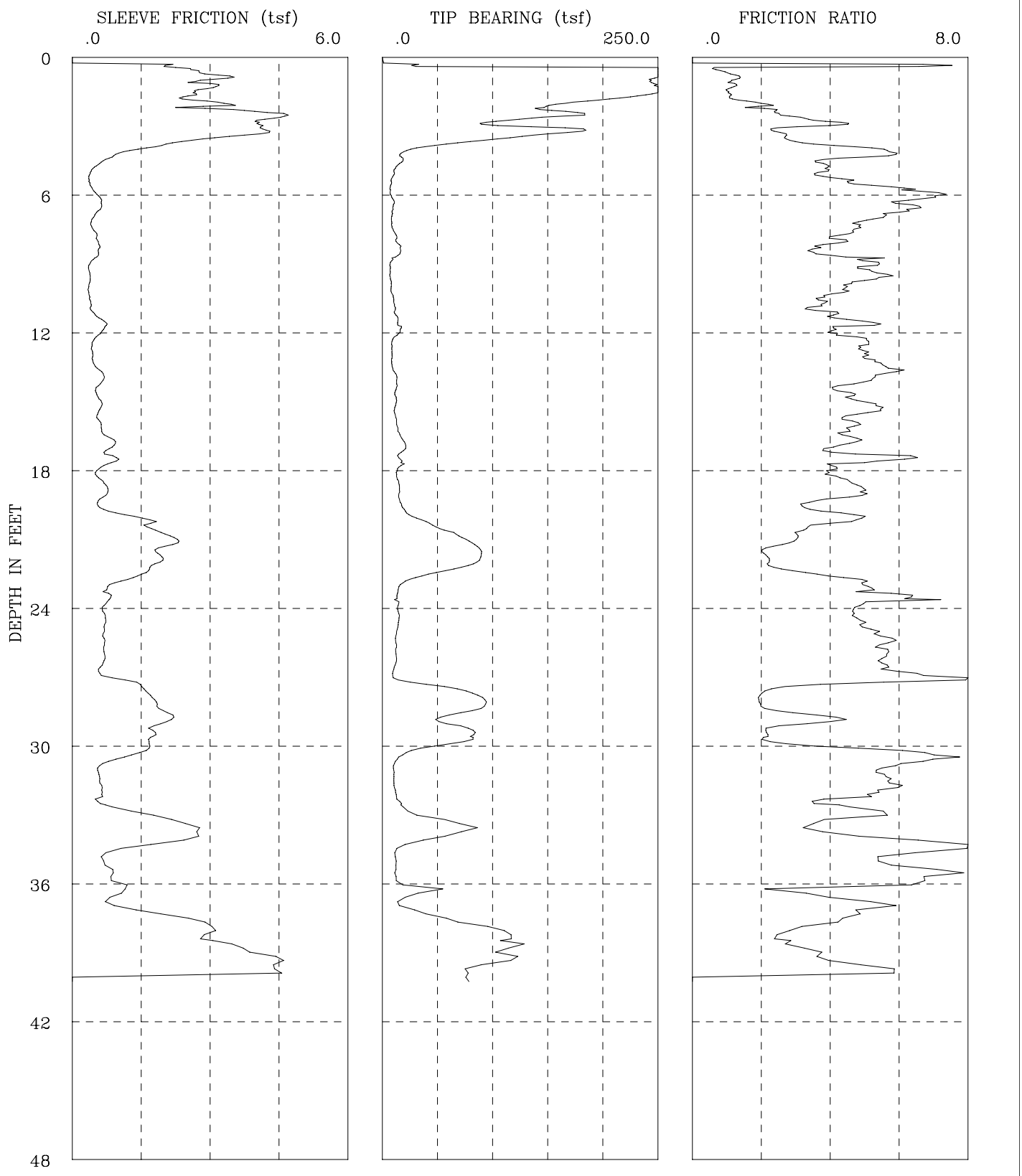
Figure A-36b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	54.03	1.74	3.22	1.41	sandy silt to clayey silt	UNDFND	UNDFD	21	3.4
12.15	40	41.04	1.93	4.70	1.44	silty clay to clay	UNDFND	UNDFD	26	2.5
12.45	41	85.26	1.38	1.62	1.47	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
12.80	42	124.36	1.36	1.09	1.50	sand to silty sand	60-70	40-42	30	UNDEFINED
13.10	43	99.48	1.18	1.18	1.53	sand to silty sand	60-70	38-40	24	UNDEFINED
13.40	44	63.31	1.41	2.23	1.56	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
13.75	45	107.97	1.49	1.38	1.59	sand to silty sand	60-70	38-40	26	UNDEFINED
14.05	46	77.55	0.95	1.22	1.62	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
14.35	47	61.75	1.12	1.81	1.65	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
14.65	48	241.40	2.04	0.85	1.68	sand	80-90	42-44	46	UNDEFINED
14.95	49	320.91	1.97	0.61	1.70	gravelly sand to sand	>90	42-44	>50	UNDEFINED
15.25	50	146.04	1.53	1.05	1.73	sand to silty sand	60-70	40-42	35	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-36c



CPT-08-105	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-37a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-105
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

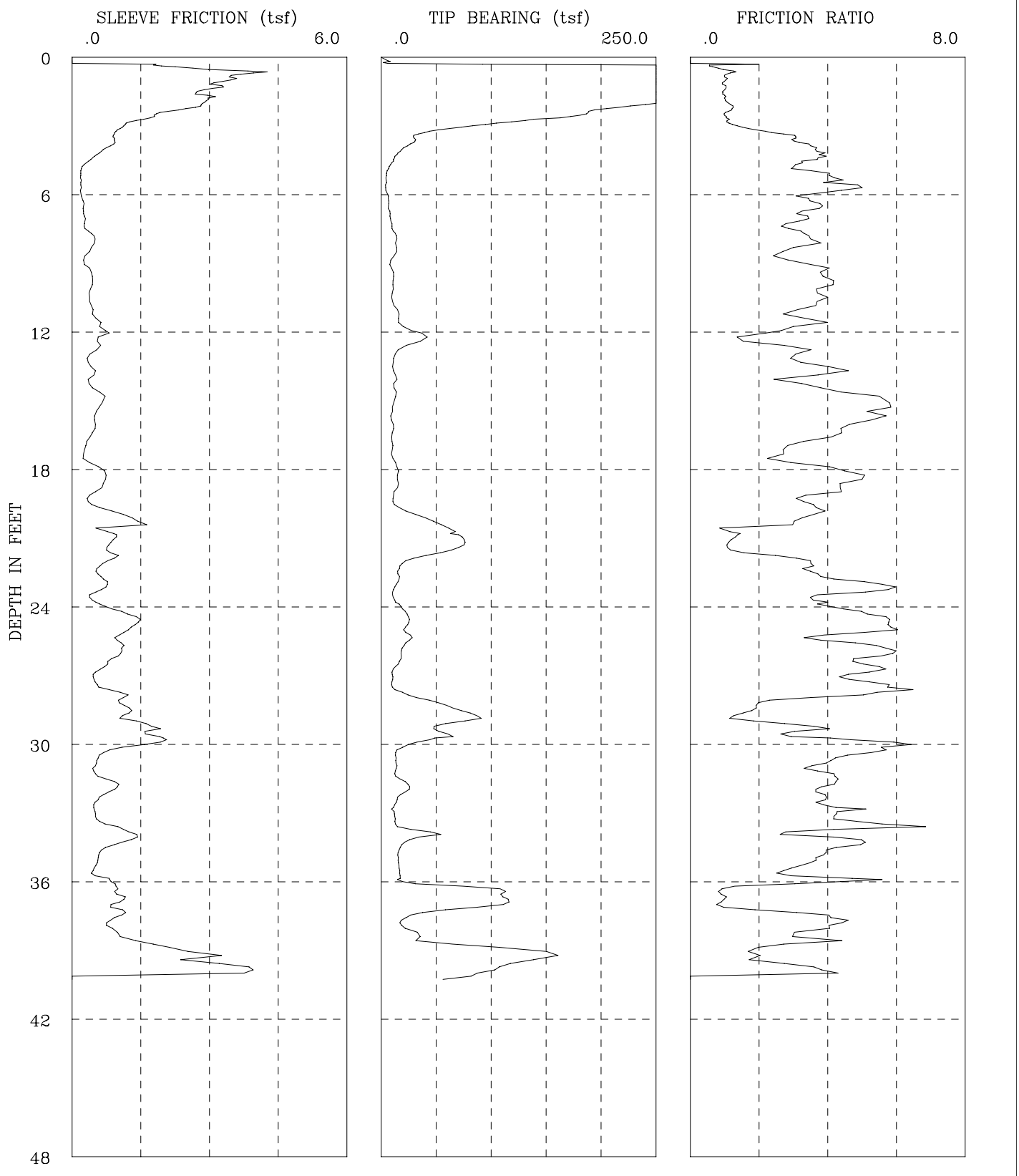
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	206.04	2.29	1.11	0.03	sand	>90	>48	39	UNDEFINED
0.60	2	232.09	2.85	1.23	0.09	sand	>90	>48	44	UNDEFINED
0.95	3	143.90	3.98	2.77	0.15	silty sand to sandy silt	>90	>48	46	UNDEFINED
1.25	4	82.25	2.51	3.05	0.22	sandy silt to clayey silt	UNDFND	UNDFD	32	5.4
1.55	5	14.19	0.59	4.19	0.28	clay	UNDFND	UNDFD	14	.9
1.85	6	7.76	0.44	5.70	0.33	clay	UNDFND	UNDFD	7	.4
2.15	7	9.30	0.56	6.01	0.39	clay	UNDFND	UNDFD	9	.5
2.45	8	10.90	0.49	4.46	0.45	clay	UNDFND	UNDFD	10	.6
2.75	9	12.67	0.51	4.01	0.51	clay	UNDFND	UNDFD	12	.8
3.05	10	7.43	0.37	5.00	0.57	clay	UNDFND	UNDFD	7	.4
3.35	11	10.04	0.38	3.81	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	14.31	0.63	4.43	0.64	clay	UNDFND	UNDFD	14	.9
3.95	13	9.30	0.46	4.91	0.67	clay	UNDFND	UNDFD	9	.5
4.25	14	10.14	0.56	5.50	0.69	clay	UNDFND	UNDFD	10	.6
4.55	15	12.52	0.57	4.57	0.72	clay	UNDFND	UNDFD	12	.7
4.85	16	11.92	0.59	4.96	0.75	clay	UNDFND	UNDFD	11	.7
5.15	17	16.94	0.77	4.54	0.78	clay	UNDFND	UNDFD	16	1.0
5.45	18	17.00	0.79	4.64	0.81	clay	UNDFND	UNDFD	16	1.0
5.75	19	14.25	0.65	4.53	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	17.62	0.69	3.92	0.86	silty clay to clay	UNDFND	UNDFD	11	1.0
6.40	21	52.82	1.83	3.46	0.89	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
6.70	22	87.09	1.97	2.26	0.93	silty sand to sandy silt	60-70	40-42	28	UNDEFINED
7.00	23	42.20	1.36	3.23	0.95	clayey silt to silty clay	UNDFND	UNDFD	20	2.7
7.35	24	13.68	0.74	5.39	0.98	clay	UNDFND	UNDFD	13	.8
7.65	25	14.17	0.71	4.98	1.02	clay	UNDFND	UNDFD	14	.8
7.95	26	12.34	0.69	5.63	1.04	clay	UNDFND	UNDFD	12	.7
8.25	27	11.09	0.69	6.25	1.07	clay	UNDFND	UNDFD	11	.6
8.55	28	70.90	1.62	2.29	1.10	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
8.85	29	69.40	2.01	2.89	1.13	sandy silt to clayey silt	UNDFND	UNDFD	27	4.5
9.15	30	72.46	1.71	2.36	1.16	sandy silt to clayey silt	UNDFND	UNDFD	28	4.7
9.45	31	15.33	0.99	6.44	1.19	clay	UNDFND	UNDFD	15	.9
9.75	32	10.85	0.61	5.65	1.21	clay	UNDFND	UNDFD	10	.5
10.05	33	18.59	0.93	4.99	1.24	clay	UNDFND	UNDFD	18	1.1
10.35	34	68.12	2.64	3.87	1.27	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
10.65	35	14.81	1.03	6.96	1.30	clay	UNDFND	UNDFD	14	.8
10.95	36	15.29	0.93	6.07	1.33	clay	UNDFND	UNDFD	15	.8
11.25	37	15.30	0.61	4.00	1.36	clay	UNDFND	UNDFD	15	.8
11.55	38	80.91	2.51	3.10	1.38	sandy silt to clayey silt	UNDFND	UNDFD	31	5.2
11.85	39	120.28	3.32	2.76	1.41	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-37b



CPT−08−106	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-38a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-106
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

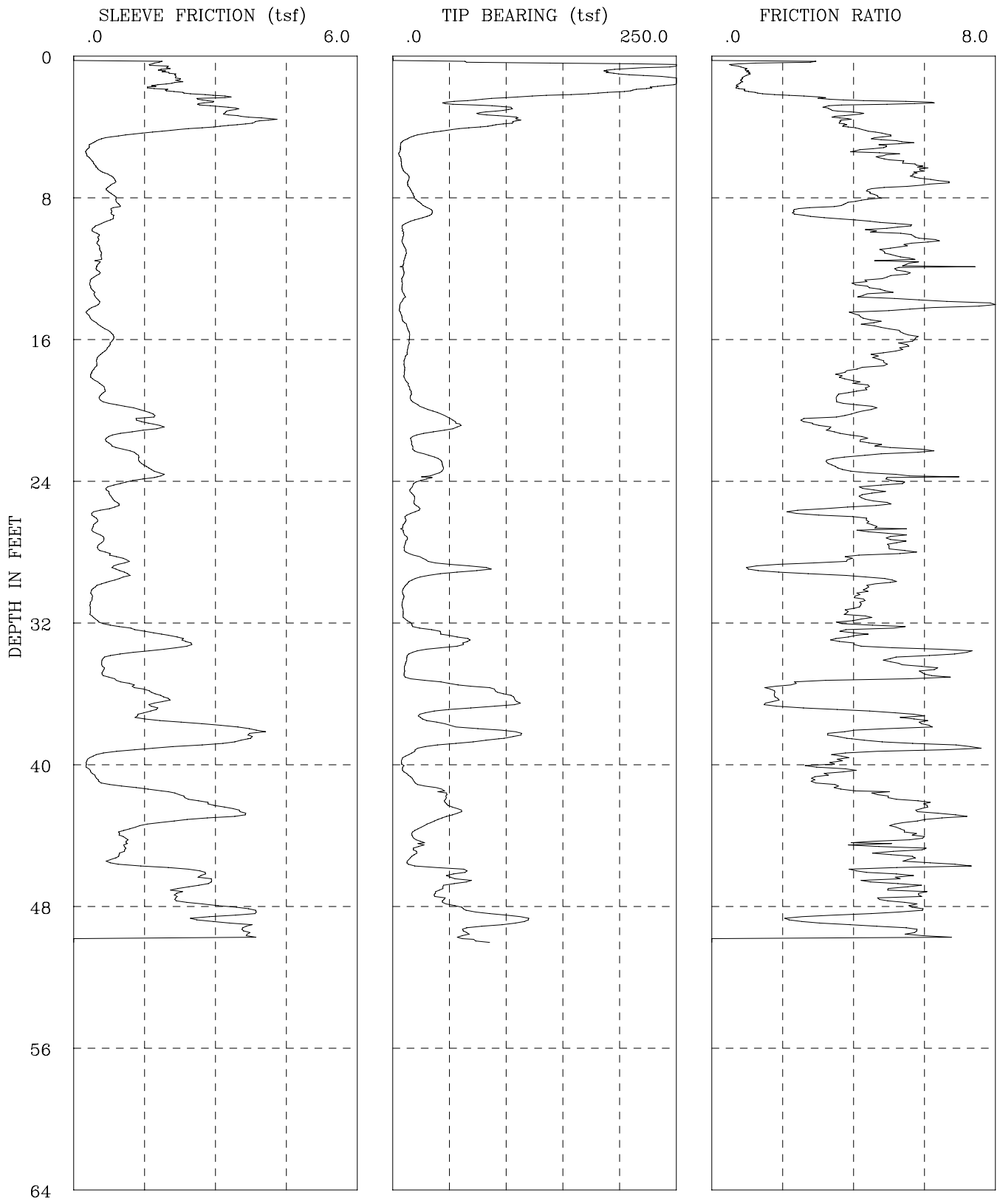
CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	261.49	2.61	1.00	0.03	sand	>90	>48	>50	UNDEFINED
0.60	2	297.96	2.96	0.99	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	149.99	1.75	1.17	0.15	sand to silty sand	>90	>48	36	UNDEFINED
1.25	4	27.59	0.84	3.06	0.22	clayey silt to silty clay	UNDFND	UNDFD	13	1.8
1.55	5	8.92	0.31	3.53	0.28	clay	UNDFND	UNDFD	9	.5
1.85	6	4.75	0.19	4.03	0.33	clay	UNDFND	UNDFD	5	.2
2.15	7	7.36	0.26	3.48	0.39	clay	UNDFND	UNDFD	7	.4
2.45	8	11.69	0.38	3.25	0.45	silty clay to clay	UNDFND	UNDFD	7	.7
2.75	9	11.38	0.33	2.92	0.51	silty clay to clay	UNDFND	UNDFD	7	.7
3.05	10	10.78	0.43	3.96	0.57	clay	UNDFND	UNDFD	10	.6
3.35	11	11.11	0.38	3.44	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	19.60	0.62	3.15	0.64	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
3.95	13	24.59	0.50	2.03	0.67	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
4.25	14	10.60	0.34	3.25	0.69	silty clay to clay	UNDFND	UNDFD	7	.6
4.55	15	13.12	0.66	5.03	0.72	clay	UNDFND	UNDFD	13	.8
4.85	16	9.25	0.58	6.29	0.75	clay	UNDFND	UNDFD	9	.5
5.15	17	6.72	-0.03	-0.38	0.78	undefined	UNDFND	UNDFD	UDF	UNDEFINED
5.45	18	19.05	1.03	5.40	0.81	clay	UNDFND	UNDFD	18	1.2
5.75	19	-8.17	-0.34	4.12	0.84	undefined	UNDFND	UNDFD	UDF	UNDEFINED
6.05	20	21.26	1.27	5.96	0.86	clay	UNDFND	UNDFD	20	1.3
6.40	21	57.67	0.90	1.56	0.89	silty sand to sandy silt	50-60	38-40	18	UNDEFINED
6.70	22	56.92	0.82	1.44	0.93	silty sand to sandy silt	50-60	38-40	18	UNDEFINED
7.00	23	15.95	0.63	3.97	0.95	silty clay to clay	UNDFND	UNDFD	10	.9
7.35	24	13.61	0.61	4.47	0.98	clay	UNDFND	UNDFD	13	.8
7.65	25	23.42	1.31	5.58	1.02	clay	UNDFND	UNDFD	22	1.4
7.95	26	21.88	1.04	4.77	1.04	clay	UNDFND	UNDFD	21	1.3
8.25	27	13.16	0.65	4.96	1.07	clay	UNDFND	UNDFD	13	.7
8.55	28	19.81	0.83	4.20	1.10	silty clay to clay	UNDFND	UNDFD	13	1.2
8.85	29	72.28	1.22	1.69	1.13	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
9.15	30	45.84	1.76	3.85	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.45	31	13.99	0.63	4.50	1.19	clay	UNDFND	UNDFD	13	.8
9.75	32	19.17	0.76	3.98	1.21	silty clay to clay	UNDFND	UNDFD	12	1.1
10.05	33	13.57	0.55	4.04	1.24	clay	UNDFND	UNDFD	13	.7
10.35	34	24.39	0.91	3.72	1.27	silty clay to clay	UNDFND	UNDFD	16	1.4
10.65	35	19.05	0.84	4.39	1.30	clay	UNDFND	UNDFD	18	1.1
10.95	36	16.36	0.56	3.44	1.33	silty clay to clay	UNDFND	UNDFD	10	.9
11.25	37	96.26	1.00	1.04	1.36	sand to silty sand	60-70	38-40	23	UNDEFINED
11.55	38	39.97	0.92	2.31	1.38	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
11.85	39	49.00	1.37	2.79	1.41	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
12.15	40	130.64	3.15	2.41	1.44	silty sand to sandy silt	60-70	40-42	42	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****→

Figure A-38b



CPT-08-107	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-39a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-107
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	163.17	1.56	0.96	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	241.48	1.99	0.82	0.09	sand	>90	>48	46	UNDEFINED
0.95	3	97.09	2.97	3.06	0.15	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
1.25	4	91.11	3.40	3.73	0.22	clayey silt to silty clay	UNDFND	UNDFD	44	6.0
1.55	5	16.95	0.81	4.79	0.28	clay	UNDFND	UNDFD	16	1.1
1.85	6	6.72	0.33	4.88	0.33	clay	UNDFND	UNDFD	6	.4
2.15	7	11.57	0.69	5.93	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	16.33	0.79	4.86	0.45	clay	UNDFND	UNDFD	16	1.0
2.75	9	29.64	0.86	2.91	0.51	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
3.05	10	12.15	0.56	4.58	0.57	clay	UNDFND	UNDFD	12	.7
3.35	11	9.67	0.53	5.50	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	10.16	0.54	5.35	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	8.86	0.43	4.80	0.67	clay	UNDFND	UNDFD	8	.5
4.25	14	8.84	0.46	5.23	0.69	clay	UNDFND	UNDFD	8	.5
4.55	15	7.16	0.35	4.94	0.72	clay	UNDFND	UNDFD	7	.4
4.85	16	13.57	0.70	5.18	0.75	clay	UNDFND	UNDFD	13	.8
5.15	17	13.23	0.70	5.26	0.78	clay	UNDFND	UNDFD	13	.8
5.45	18	10.32	0.45	4.39	0.81	clay	UNDFND	UNDFD	10	.6
5.75	19	12.76	0.52	4.11	0.84	clay	UNDFND	UNDFD	12	.7
6.05	20	19.16	0.75	3.94	0.86	silty clay to clay	UNDFND	UNDFD	12	1.2
6.40	21	49.32	1.61	3.27	0.89	clayey silt to silty clay	UNDFND	UNDFD	24	3.2
6.70	22	22.17	0.87	3.93	0.93	silty clay to clay	UNDFND	UNDFD	14	1.3
7.00	23	31.58	1.28	4.06	0.95	silty clay to clay	UNDFND	UNDFD	20	2.0
7.35	24	35.08	1.53	4.38	0.98	silty clay to clay	UNDFND	UNDFD	22	2.2
7.65	25	17.48	0.77	4.41	1.02	clay	UNDFND	UNDFD	17	1.0
7.95	26	17.69	0.63	3.57	1.04	silty clay to clay	UNDFND	UNDFD	11	1.0
8.25	27	9.94	0.46	4.66	1.07	clay	UNDFND	UNDFD	10	.5
8.55	28	11.48	0.60	5.20	1.10	clay	UNDFND	UNDFD	11	.6
8.85	29	48.92	0.96	1.97	1.13	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
9.15	30	20.99	0.80	3.80	1.16	silty clay to clay	UNDFND	UNDFD	13	1.2
9.45	31	8.81	0.37	4.19	1.19	clay	UNDFND	UNDFD	8	.4
9.75	32	10.69	0.42	3.92	1.21	clay	UNDFND	UNDFD	10	.5
10.05	33	42.94	1.68	3.91	1.24	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
10.35	34	32.47	1.61	4.97	1.27	clay	UNDFND	UNDFD	31	2.0
10.65	35	10.68	0.61	5.71	1.30	clay	UNDFND	UNDFD	10	.5
10.95	36	59.65	1.23	2.07	1.33	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
11.25	37	92.44	1.80	1.95	1.36	silty sand to sandy silt	60-70	38-40	30	UNDEFINED
11.55	38	37.16	2.15	5.78	1.38	clay	UNDFND	UNDFD	36	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

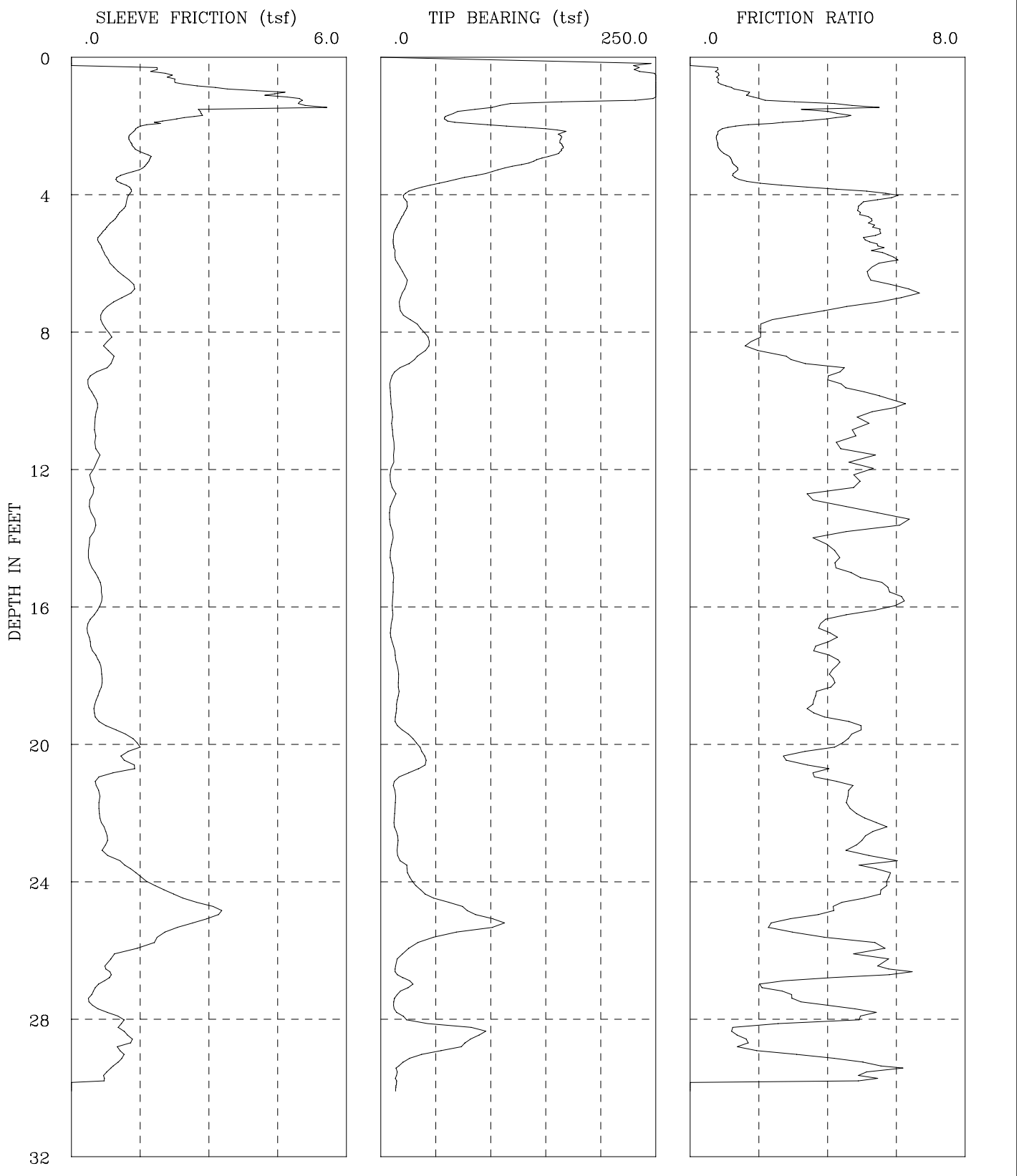
Figure A-39b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	86.62	3.53	4.07	1.41	clayey silt to silty clay	UNDFND	UNDFD	41	5.6
12.15	40	14.22	0.72	5.10	1.44	clay	UNDFND	UNDFD	14	.7
12.45	41	12.29	0.38	3.13	1.47	silty clay to clay	UNDFND	UNDFD	8	.6
12.80	42	38.53	1.72	4.45	1.50	silty clay to clay	UNDFND	UNDFD	25	2.4
13.10	43	52.05	3.23	6.21	1.53	clay	UNDFND	UNDFD	50	3.3
13.40	44	25.40	1.39	5.46	1.56	clay	UNDFND	UNDFD	24	1.5
13.75	45	20.68	1.06	5.15	1.59	clay	UNDFND	UNDFD	20	1.2
14.05	46	32.98	1.60	4.84	1.62	clay	UNDFND	UNDFD	32	2.0
14.35	47	50.49	2.61	5.17	1.65	clay	UNDFND	UNDFD	48	3.1
14.65	48	45.90	2.53	5.52	1.68	clay	UNDFND	UNDFD	44	2.8
14.95	49	97.36	3.35	3.44	1.70	sandy silt to clayey silt	UNDFND	UNDFD	37	6.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-39c



CPT−08−108	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-40a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-108
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

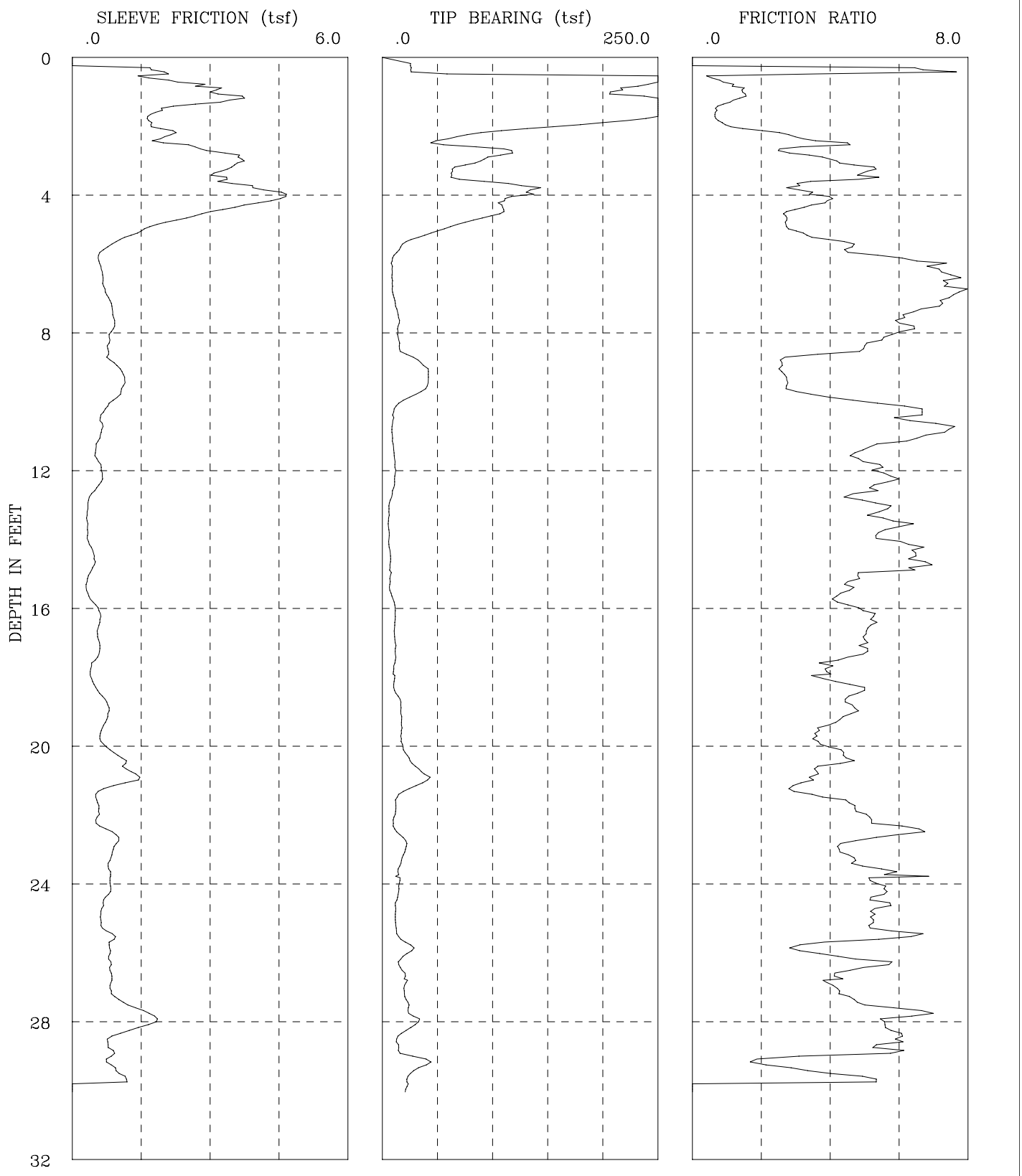
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	253.21	2.19	0.86	0.03	sand	>90	>48	49	UNDEFINED
0.60	2	120.87	3.52	2.91	0.09	sandy silt to clayey silt	UNDFND	UNDFD	46	8.0
0.95	3	155.93	1.46	0.93	0.15	sand	>90	>48	30	UNDEFINED
1.25	4	55.91	1.22	2.17	0.22	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.55	5	18.58	0.95	5.12	0.28	clay	UNDFND	UNDFD	18	1.2
1.85	6	13.01	0.72	5.50	0.33	clay	UNDFND	UNDFD	12	.8
2.15	7	20.72	1.19	5.77	0.39	clay	UNDFND	UNDFD	20	1.3
2.45	8	27.25	0.73	2.67	0.45	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
2.75	9	34.70	0.83	2.38	0.51	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
3.05	10	9.36	0.45	4.80	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	10.26	0.53	5.14	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	11.26	0.53	4.71	0.64	clay	UNDFND	UNDFD	11	.7
3.95	13	10.42	0.41	3.98	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	9.52	0.49	5.20	0.69	clay	UNDFND	UNDFD	9	.5
4.55	15	9.06	0.36	3.94	0.72	clay	UNDFND	UNDFD	9	.5
4.85	16	11.01	0.67	6.13	0.75	clay	UNDFND	UNDFD	11	.6
5.15	17	9.95	0.42	4.20	0.78	clay	UNDFND	UNDFD	10	.5
5.45	18	13.45	0.54	4.04	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	15.62	0.60	3.85	0.84	silty clay to clay	UNDFND	UNDFD	10	.9
6.05	20	18.74	0.84	4.47	0.86	clay	UNDFND	UNDFD	18	1.1
6.40	21	32.58	1.13	3.47	0.89	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
6.70	22	12.78	0.59	4.63	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	13.95	0.72	5.14	0.95	clay	UNDFND	UNDFD	13	.8
7.35	24	23.02	1.27	5.53	0.98	clay	UNDFND	UNDFD	22	1.4
7.65	25	68.60	2.76	4.02	1.02	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
7.95	26	52.75	1.79	3.40	1.04	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
8.25	27	18.50	0.74	4.00	1.07	silty clay to clay	UNDFND	UNDFD	12	1.1
8.55	28	16.93	0.67	3.93	1.10	silty clay to clay	UNDFND	UNDFD	11	1.0
8.85	29	70.90	1.15	1.63	1.13	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
9.15	30	15.91	0.57	3.61	1.16	silty clay to clay	UNDFND	UNDFD	10	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-40b



CPT-08-109	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-41a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-109
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

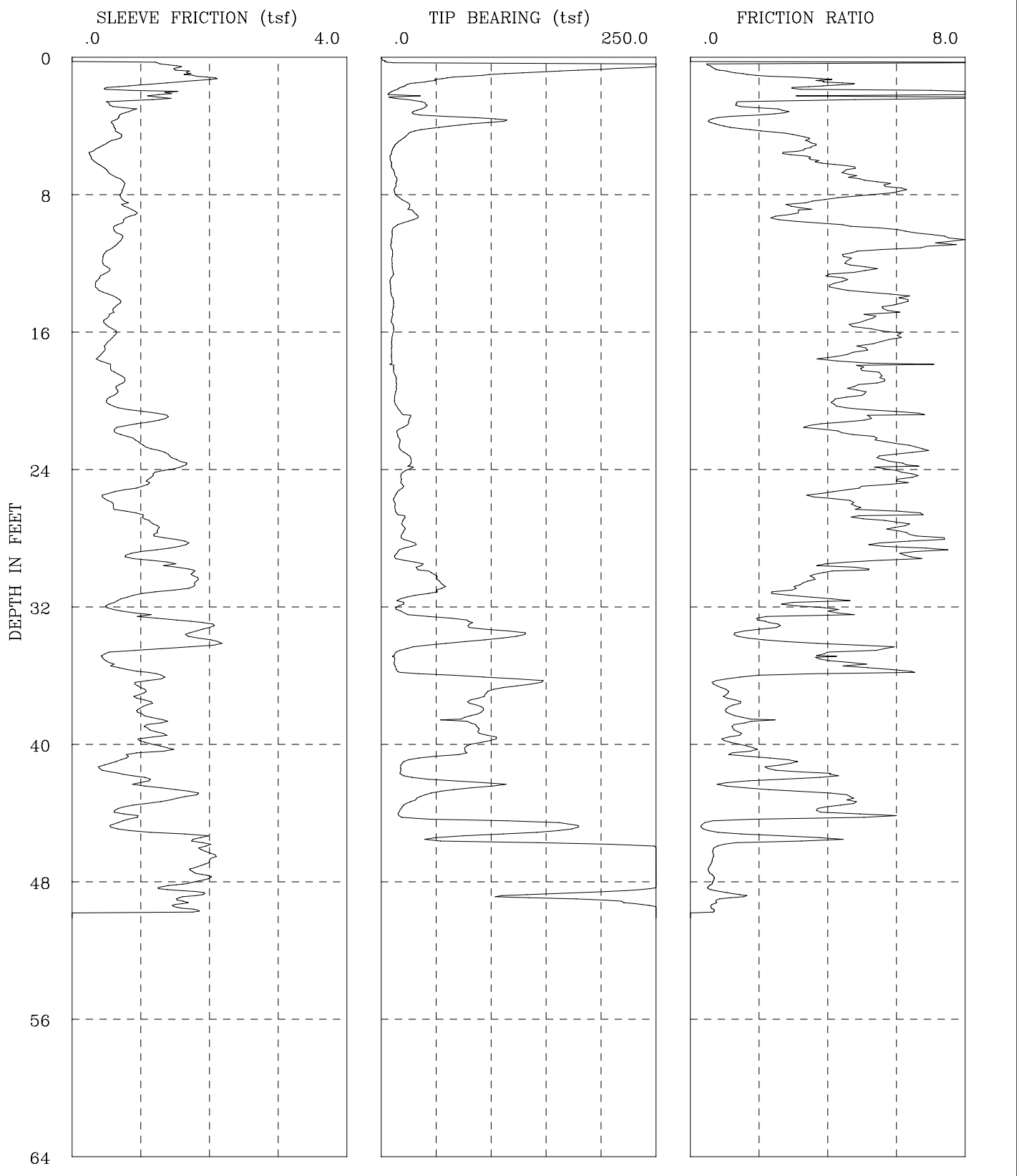
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	146.98	1.92	1.31	0.03	sand to silty sand	>90	>48	35	UNDEFINED
0.60	2	250.76	2.31	0.92	0.09	sand	>90	>48	48	UNDEFINED
0.95	3	86.10	2.78	3.23	0.15	sandy silt to clayey silt	UNDFND	UNDFD	33	5.7
1.25	4	101.03	3.79	3.75	0.22	clayey silt to silty clay	UNDFND	UNDFD	48	6.7
1.55	5	83.75	2.50	2.99	0.28	sandy silt to clayey silt	UNDFND	UNDFD	32	5.5
1.85	6	15.53	0.74	4.75	0.33	clay	UNDFND	UNDFD	15	1.0
2.15	7	9.44	0.71	7.52	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	13.87	0.88	6.31	0.45	clay	UNDFND	UNDFD	13	.8
2.75	9	24.81	0.84	3.39	0.51	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
3.05	10	33.90	1.04	3.08	0.57	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
3.35	11	9.67	0.65	6.72	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	10.71	0.56	5.20	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	9.38	0.50	5.31	0.67	clay	UNDFND	UNDFD	9	.5
4.25	14	5.92	0.33	5.54	0.69	clay	UNDFND	UNDFD	6	.3
4.55	15	6.92	0.44	6.29	0.72	clay	UNDFND	UNDFD	7	.4
4.85	16	8.32	0.37	4.46	0.75	clay	UNDFND	UNDFD	8	.4
5.15	17	11.32	0.58	5.12	0.78	clay	UNDFND	UNDFD	11	.6
5.45	18	11.28	0.50	4.43	0.81	clay	UNDFND	UNDFD	11	.6
5.75	19	13.34	0.60	4.53	0.84	clay	UNDFND	UNDFD	13	.8
6.05	20	17.10	0.68	3.98	0.86	silty clay to clay	UNDFND	UNDFD	11	1.0
6.40	21	29.04	1.12	3.85	0.89	silty clay to clay	UNDFND	UNDFD	19	1.8
6.70	22	16.18	0.61	3.75	0.93	silty clay to clay	UNDFND	UNDFD	10	.9
7.00	23	15.66	0.80	5.13	0.95	clay	UNDFND	UNDFD	15	.9
7.35	24	15.82	0.82	5.21	0.98	clay	UNDFND	UNDFD	15	.9
7.65	25	12.55	0.67	5.36	1.02	clay	UNDFND	UNDFD	12	.7
7.95	26	18.86	0.80	4.26	1.04	clay	UNDFND	UNDFD	18	1.1
8.25	27	18.58	0.84	4.50	1.07	clay	UNDFND	UNDFD	18	1.1
8.55	28	25.43	1.40	5.52	1.10	clay	UNDFND	UNDFD	24	1.5
8.85	29	19.02	0.92	4.84	1.13	clay	UNDFND	UNDFD	18	1.1
9.15	30	27.37	0.66	2.42	1.16	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-41b



CPT-08-110	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-42a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-110
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	129.71	1.27	0.98	0.03	sand to silty sand	>90	>48	31	UNDEFINED
0.60	2	33.10	1.34	4.06	0.09	silty clay to clay	UNDFND	UNDFD	21	2.2
0.95	3	28.14	0.93	3.29	0.15	clayey silt to silty clay	UNDFND	UNDFD	13	1.8
1.25	4	69.97	0.64	0.92	0.22	sand to silty sand	70-80	46-48	17	UNDEFINED
1.55	5	21.21	0.62	2.91	0.28	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
1.85	6	9.26	0.31	3.32	0.33	clay	UNDFND	UNDFD	9	.5
2.15	7	11.41	0.53	4.62	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	12.99	0.74	5.66	0.45	clay	UNDFND	UNDFD	12	.8
2.75	9	23.89	0.80	3.35	0.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.5
3.05	10	22.23	0.73	3.27	0.57	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
3.35	11	9.49	0.68	7.16	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	9.93	0.48	4.80	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	10.00	0.47	4.66	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	8.78	0.43	4.95	0.69	clay	UNDFND	UNDFD	8	.5
4.55	15	10.82	0.64	5.88	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	10.31	0.53	5.13	0.75	clay	UNDFND	UNDFD	10	.6
5.15	17	9.77	0.55	5.63	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	9.26	0.44	4.80	0.81	clay	UNDFND	UNDFD	9	.5
5.75	19	12.38	0.67	5.41	0.84	clay	UNDFND	UNDFD	12	.7
6.05	20	13.07	0.63	4.84	0.86	clay	UNDFND	UNDFD	13	.7
6.40	21	17.76	0.90	5.10	0.89	clay	UNDFND	UNDFD	17	1.1
6.70	22	19.41	0.81	4.18	0.93	silty clay to clay	UNDFND	UNDFD	12	1.2
7.00	23	17.18	1.05	6.13	0.95	clay	UNDFND	UNDFD	16	1.0
7.35	24	25.16	1.49	5.91	0.98	clay	UNDFND	UNDFD	24	1.5
7.65	25	18.43	1.09	5.89	1.02	clay	UNDFND	UNDFD	18	1.1
7.95	26	12.88	0.54	4.23	1.04	clay	UNDFND	UNDFD	12	.7
8.25	27	16.81	0.93	5.55	1.07	clay	UNDFND	UNDFD	16	1.0
8.55	28	19.79	1.27	6.43	1.10	clay	UNDFND	UNDFD	19	1.2
8.85	29	20.83	1.26	6.07	1.13	clay	UNDFND	UNDFD	20	1.2
9.15	30	32.20	1.46	4.53	1.16	silty clay to clay	UNDFND	UNDFD	21	2.0
9.45	31	53.05	1.74	3.28	1.19	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
9.75	32	24.59	0.74	3.01	1.21	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
10.05	33	47.59	1.24	2.61	1.24	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
10.35	34	104.78	1.87	1.78	1.27	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
10.65	35	25.30	1.12	4.42	1.30	silty clay to clay	UNDFND	UNDFD	16	1.5
10.95	36	18.85	0.77	4.09	1.33	silty clay to clay	UNDFND	UNDFD	12	1.1
11.25	37	118.02	1.08	0.92	1.36	sand to silty sand	60-70	40-42	28	UNDEFINED
11.55	38	88.07	1.03	1.17	1.38	sand to silty sand	50-60	38-40	21	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-42b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	81.44	1.13	1.39	1.41	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
12.15	40	94.19	1.14	1.21	1.44	sand to silty sand	50-60	38-40	23	UNDEFINED
12.45	41	64.87	1.07	1.66	1.47	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
12.80	42	21.49	0.66	3.07	1.50	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
13.10	43	71.26	1.38	1.93	1.53	silty sand to sandy silt	50-60	36-38	23	UNDEFINED
13.40	44	22.43	0.98	4.39	1.56	clay	UNDFND	UNDFD	21	1.3
13.75	45	117.51	0.79	0.68	1.59	sand to silty sand	60-70	38-40	28	UNDEFINED
14.05	46	149.05	1.87	1.25	1.62	sand to silty sand	70-80	40-42	36	UNDEFINED
14.35	47	315.50	1.99	0.63	1.65	sand	>90	42-44	>50	UNDEFINED
14.65	48	300.01	1.83	0.61	1.68	sand	>90	42-44	>50	UNDEFINED
14.95	49	193.83	1.57	0.81	1.70	sand	70-80	40-42	37	UNDEFINED
15.25	50	251.82	1.10	0.44	1.73	sand	80-90	42-44	48	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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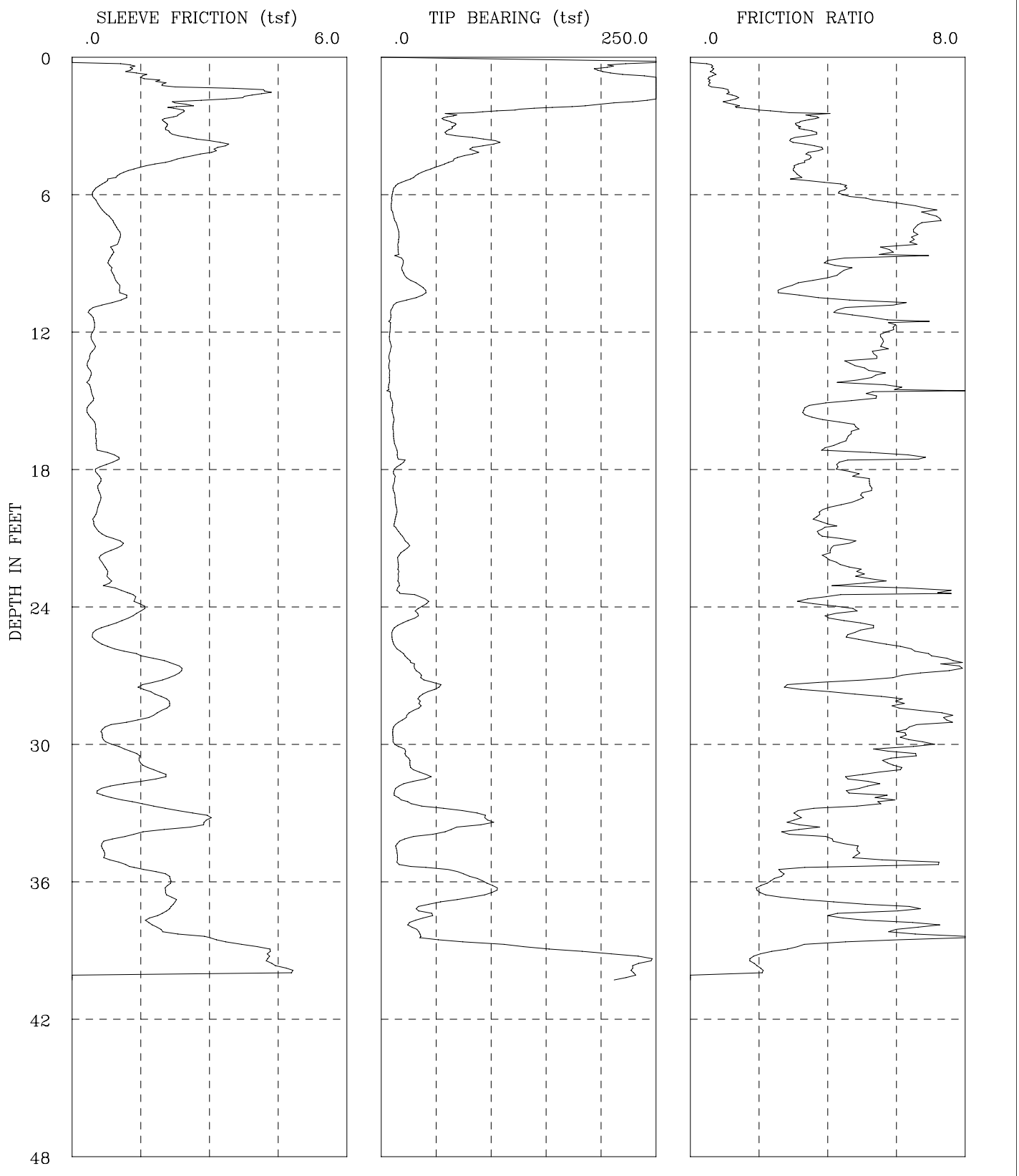
Figure A-42c



CPT-08-111	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-43a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-111
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

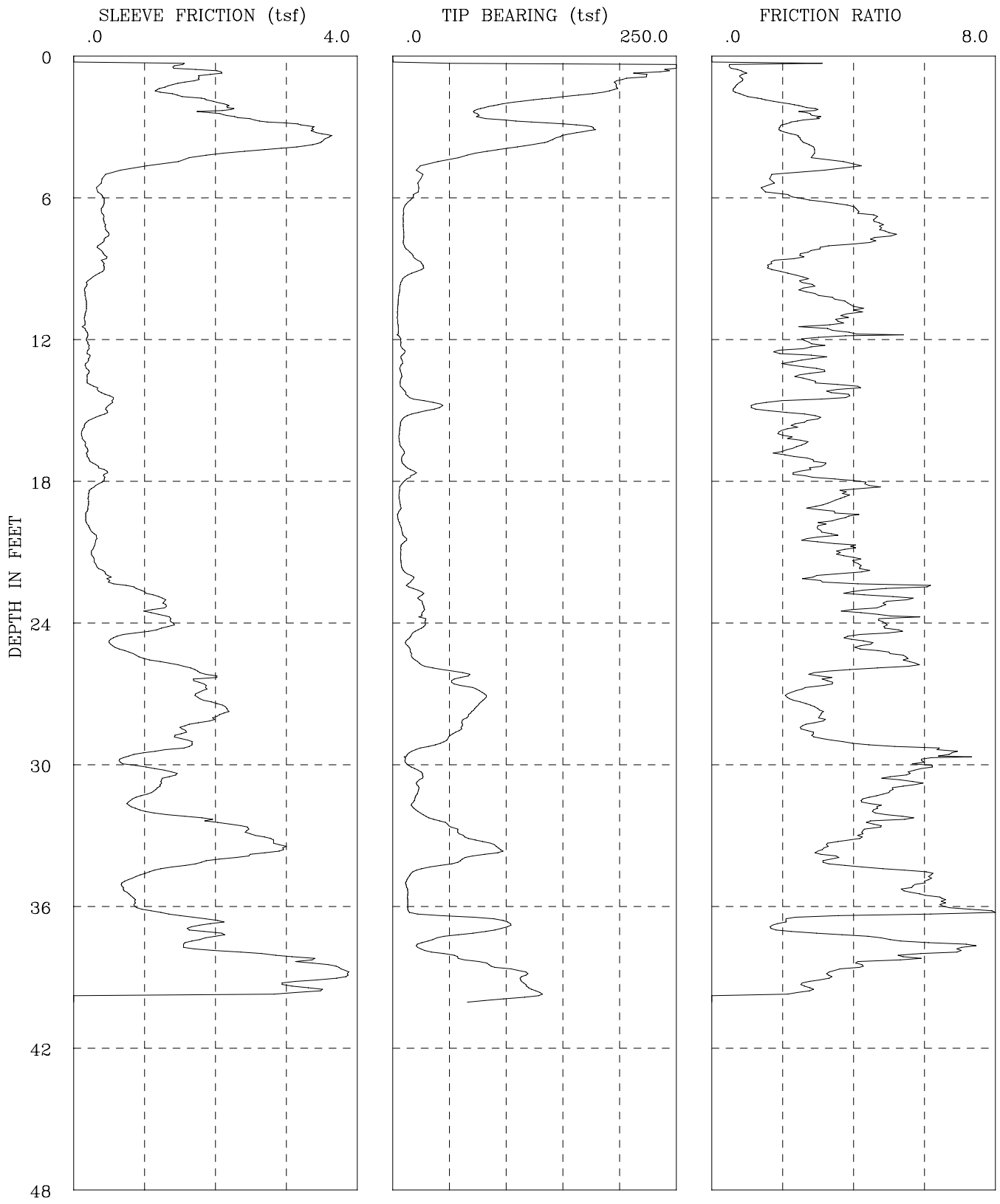
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	243.03	1.20	0.50	0.03	sand	>90	>48	47	UNDEFINED
0.60	2	320.84	3.08	0.96	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	87.57	2.22	2.53	0.15	sandy silt to clayey silt	UNDFND	UNDFD	34	5.8
1.25	4	83.54	2.84	3.40	0.22	sandy silt to clayey silt	UNDFND	UNDFD	32	5.5
1.55	5	55.92	1.83	3.27	0.28	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.85	6	15.89	0.62	3.90	0.33	silty clay to clay	UNDFND	UNDFD	10	1.0
2.15	7	10.12	0.67	6.61	0.39	clay	UNDFND	UNDFD	10	.6
2.45	8	15.27	1.00	6.54	0.45	clay	UNDFND	UNDFD	15	.9
2.75	9	16.64	0.86	5.18	0.51	clay	UNDFND	UNDFD	16	1.0
3.05	10	25.33	0.93	3.69	0.57	silty clay to clay	UNDFND	UNDFD	16	1.6
3.35	11	24.88	0.89	3.58	0.61	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
3.65	12	8.24	0.45	5.47	0.64	clay	UNDFND	UNDFD	8	.5
3.95	13	8.04	0.44	5.52	0.67	clay	UNDFND	UNDFD	8	.4
4.25	14	7.27	0.37	5.14	0.69	clay	UNDFND	UNDFD	7	.4
4.55	15	7.75	0.41	5.29	0.72	clay	UNDFND	UNDFD	7	.4
4.85	16	10.61	0.39	3.66	0.75	clay	UNDFND	UNDFD	10	.6
5.15	17	11.26	0.52	4.61	0.78	clay	UNDFND	UNDFD	11	.6
5.45	18	15.46	0.77	5.00	0.81	clay	UNDFND	UNDFD	15	.9
5.75	19	11.43	0.57	5.02	0.84	clay	UNDFND	UNDFD	11	.6
6.05	20	13.14	0.59	4.47	0.86	clay	UNDFND	UNDFD	13	.7
6.40	21	14.89	0.58	3.88	0.89	silty clay to clay	UNDFND	UNDFD	10	.9
6.70	22	19.77	0.83	4.20	0.93	silty clay to clay	UNDFND	UNDFD	13	1.2
7.00	23	15.67	0.77	4.90	0.95	clay	UNDFND	UNDFD	15	.9
7.35	24	30.16	1.31	4.33	0.98	silty clay to clay	UNDFND	UNDFD	19	1.9
7.65	25	21.12	0.95	4.48	1.02	clay	UNDFND	UNDFD	20	1.3
7.95	26	13.63	0.82	6.03	1.04	clay	UNDFND	UNDFD	13	.8
8.25	27	30.51	2.18	7.15	1.07	clay	UNDFND	UNDFD	29	1.9
8.55	28	43.03	1.78	4.13	1.10	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
8.85	29	26.31	1.78	6.78	1.13	clay	UNDFND	UNDFD	25	1.6
9.15	30	11.25	0.73	6.45	1.16	clay	UNDFND	UNDFD	11	.6
9.45	31	23.99	1.43	5.94	1.19	clay	UNDFND	UNDFD	23	1.4
9.75	32	28.10	1.42	5.04	1.21	clay	UNDFND	UNDFD	27	1.7
10.05	33	37.63	1.49	3.97	1.24	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
10.35	34	75.85	2.37	3.13	1.27	sandy silt to clayey silt	UNDFND	UNDFD	29	4.9
10.65	35	15.60	0.72	4.58	1.30	clay	UNDFND	UNDFD	15	.9
10.95	36	55.23	1.64	2.97	1.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
11.25	37	86.99	2.13	2.45	1.36	sandy silt to clayey silt	UNDFND	UNDFD	33	5.6
11.55	38	34.29	1.88	5.49	1.38	clay	UNDFND	UNDFD	33	2.1
11.85	39	67.62	2.99	4.43	1.41	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
12.15	40	224.63	4.43	1.97	1.44	sand to silty sand	80-90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-43b



CPT−08−113	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-44a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-113
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

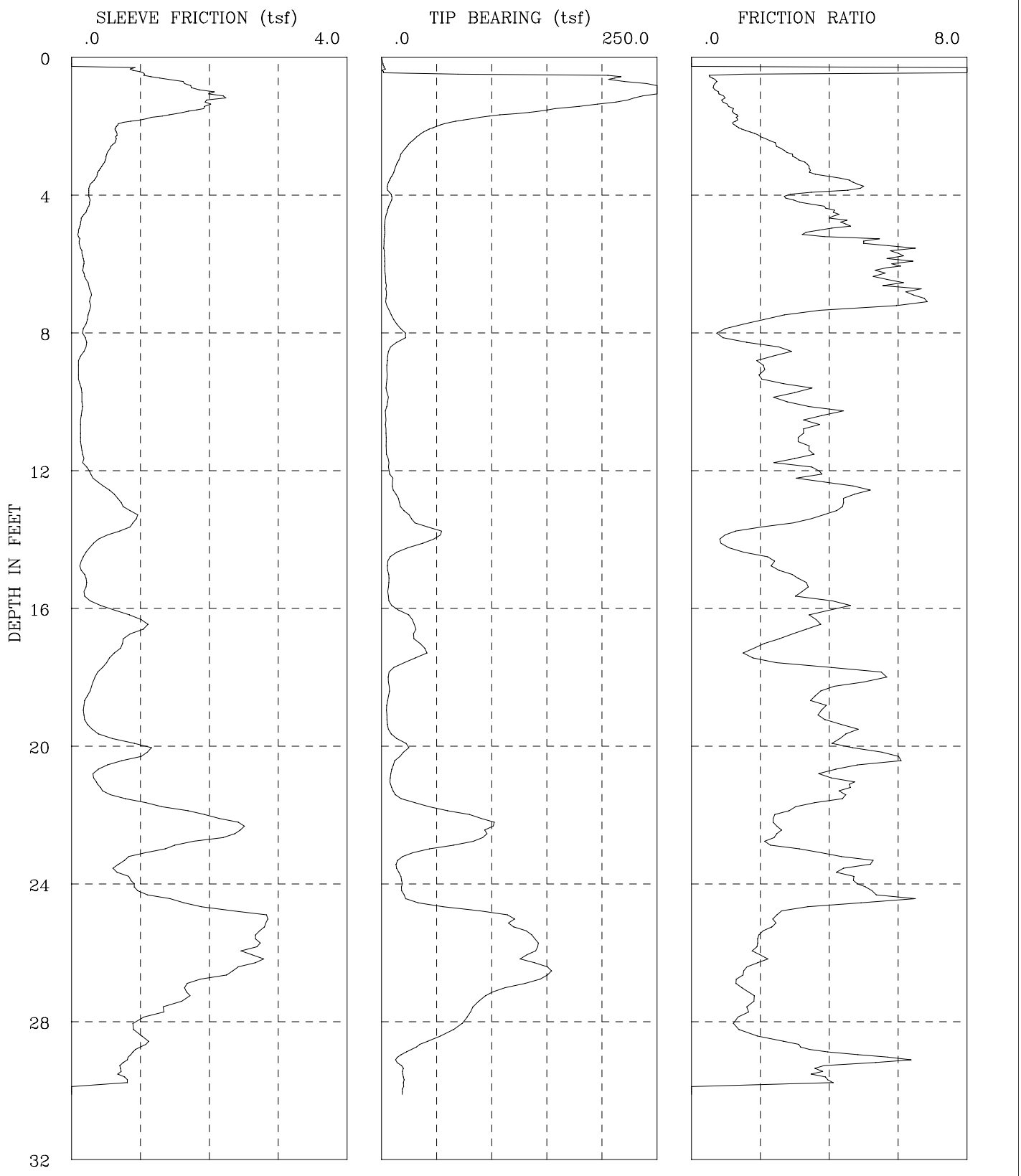
CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	183.30	1.43	0.78	0.03	sand	>90	>48	35	UNDEFINED
0.60	2	164.79	1.54	0.93	0.09	sand	>90	>48	32	UNDEFINED
0.95	3	112.11	2.60	2.32	0.15	silty sand to sandy silt	>90	>48	36	UNDEFINED
1.25	4	121.40	3.14	2.58	0.22	silty sand to sandy silt	>90	>48	39	UNDEFINED
1.55	5	34.19	1.03	3.01	0.28	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
1.85	6	21.04	0.38	1.79	0.33	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
2.15	7	9.87	0.42	4.21	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	9.64	0.43	4.49	0.45	clay	UNDFND	UNDFD	9	.6
2.75	9	20.86	0.42	2.01	0.51	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
3.05	10	9.04	0.22	2.47	0.57	silty clay to clay	UNDFND	UNDFD	6	.5
3.35	11	4.55	0.17	3.78	0.61	clay	UNDFND	UNDFD	4	.2
3.65	12	4.98	0.17	3.36	0.64	clay	UNDFND	UNDFD	5	.2
3.95	13	8.38	0.20	2.44	0.67	silty clay to clay	UNDFND	UNDFD	5	.5
4.25	14	6.96	0.20	2.91	0.69	clay	UNDFND	UNDFD	7	.4
4.55	15	24.18	0.46	1.92	0.72	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
4.85	16	10.00	0.24	2.39	0.75	silty clay to clay	UNDFND	UNDFD	6	.6
5.15	17	7.35	0.16	2.24	0.78	silty clay to clay	UNDFND	UNDFD	5	.4
5.45	18	12.93	0.36	2.78	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	6.51	0.26	3.94	0.84	clay	UNDFND	UNDFD	6	.3
6.05	20	5.71	0.19	3.26	0.86	clay	UNDFND	UNDFD	5	.3
6.40	21	8.61	0.28	3.25	0.89	clay	UNDFND	UNDFD	8	.4
6.70	22	9.29	0.35	3.78	0.93	clay	UNDFND	UNDFD	9	.5
7.00	23	19.80	0.87	4.39	0.95	clay	UNDFND	UNDFD	19	1.2
7.35	24	27.14	1.28	4.70	0.98	clay	UNDFND	UNDFD	26	1.7
7.65	25	15.73	0.71	4.50	1.02	clay	UNDFND	UNDFD	15	.9
7.95	26	29.18	1.29	4.42	1.04	silty clay to clay	UNDFND	UNDFD	19	1.8
8.25	27	67.36	1.82	2.70	1.07	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
8.55	28	71.83	2.03	2.82	1.10	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
8.85	29	54.36	1.59	2.92	1.13	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
9.15	30	17.22	1.01	5.86	1.16	clay	UNDFND	UNDFD	16	1.0
9.45	31	23.25	1.26	5.44	1.19	clay	UNDFND	UNDFD	22	1.4
9.75	32	19.83	0.91	4.61	1.21	clay	UNDFND	UNDFD	19	1.1
10.05	33	47.15	2.16	4.59	1.24	silty clay to clay	UNDFND	UNDFD	30	3.0
10.35	34	80.64	2.70	3.35	1.27	sandy silt to clayey silt	UNDFND	UNDFD	31	5.2
10.65	35	26.66	1.17	4.39	1.30	silty clay to clay	UNDFND	UNDFD	17	1.6
10.95	36	12.95	0.78	6.03	1.33	clay	UNDFND	UNDFD	12	.7
11.25	37	63.62	1.54	2.43	1.36	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
11.55	38	40.09	1.83	4.56	1.38	silty clay to clay	UNDFND	UNDFD	26	2.5
11.85	39	85.57	3.50	4.09	1.41	clayey silt to silty clay	UNDFND	UNDFD	41	5.5
12.15	40	118.55	2.69	2.27	1.44	silty sand to sandy silt	60-70	40-42	38	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-44b



CPT-08-114	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-45a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-114
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

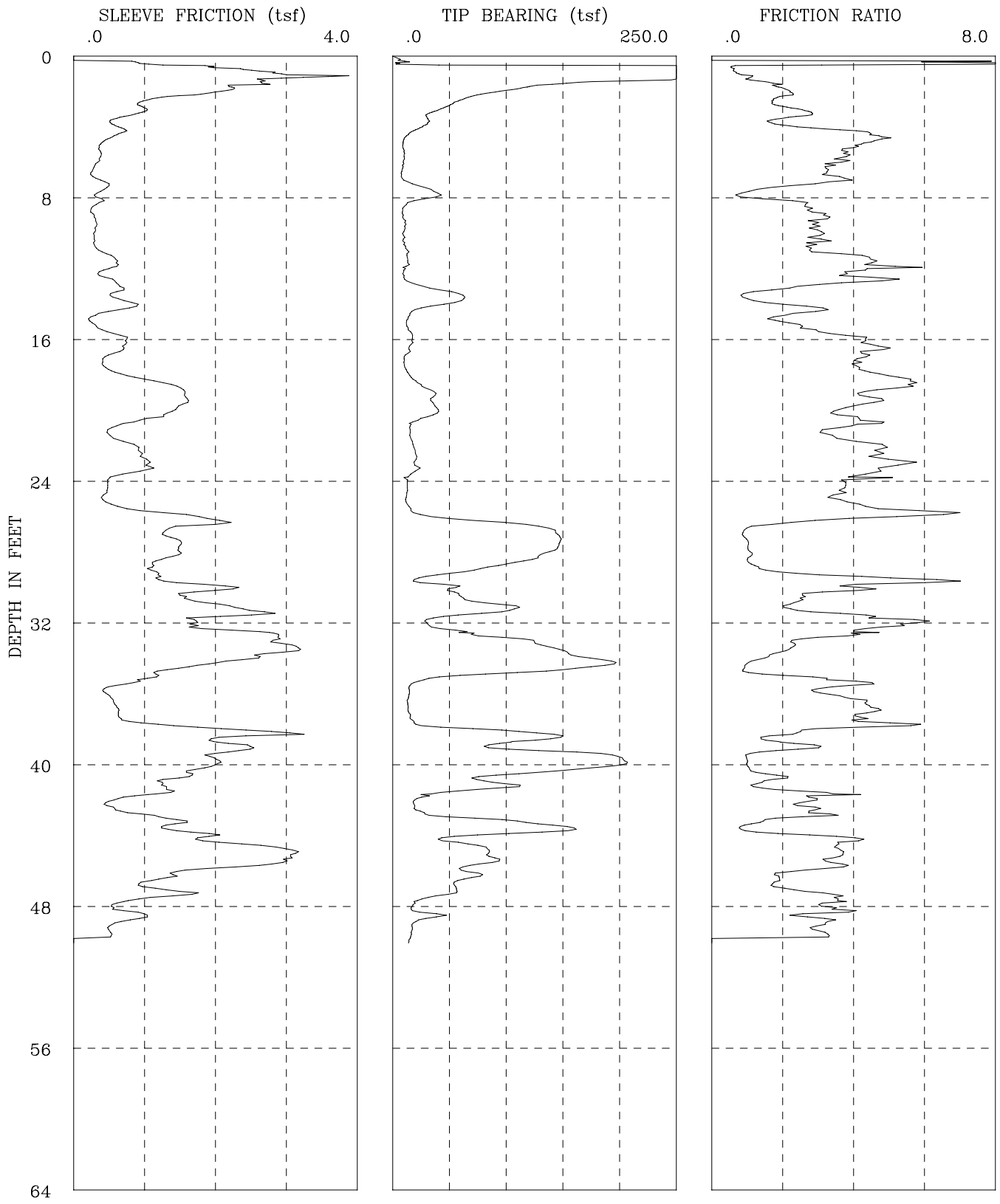
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	139.95	1.19	0.85	0.03	sand to silty sand	>90	>48	34	UNDEFINED
0.60	2	142.04	1.55	1.09	0.09	sand to silty sand	>90	>48	34	UNDEFINED
0.95	3	24.07	0.56	2.34	0.15	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
1.25	4	8.32	0.31	3.69	0.22	clay	UNDFND	UNDFD	8	.5
1.55	5	4.25	0.17	3.91	0.28	clay	UNDFND	UNDFD	4	.2
1.85	6	2.51	0.15	5.80	0.33	organic material	UNDFND	UNDFD	2	.1
2.15	7	3.86	0.24	6.17	0.39	clay	UNDFND	UNDFD	4	.2
2.45	8	12.44	0.22	1.77	0.45	clayey silt to silty clay	UNDFND	UNDFD	6	.7
2.75	9	8.26	0.15	1.87	0.51	clayey silt to silty clay	UNDFND	UNDFD	4	.5
3.05	10	5.04	0.13	2.56	0.57	clay	UNDFND	UNDFD	5	.2
3.35	11	3.91	0.14	3.51	0.61	clay	UNDFND	UNDFD	4	.2
3.65	12	5.37	0.17	3.23	0.64	clay	UNDFND	UNDFD	5	.3
3.95	13	11.98	0.52	4.33	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	36.10	0.77	2.14	0.69	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
4.55	15	14.45	0.20	1.36	0.72	sandy silt to clayey silt	UNDFND	UNDFD	6	.9
4.85	16	6.81	0.25	3.62	0.75	clay	UNDFND	UNDFD	7	.3
5.15	17	27.03	0.88	3.27	0.78	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
5.45	18	25.14	0.55	2.19	0.81	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
5.75	19	6.03	0.25	4.13	0.84	clay	UNDFND	UNDFD	6	.3
6.05	20	8.29	0.35	4.23	0.86	clay	UNDFND	UNDFD	8	.4
6.40	21	13.64	0.68	4.97	0.89	clay	UNDFND	UNDFD	13	.8
6.70	22	33.14	1.02	3.09	0.93	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
7.00	23	84.45	2.08	2.46	0.95	sandy silt to clayey silt	UNDFND	UNDFD	32	5.5
7.35	24	17.60	0.82	4.63	0.98	clay	UNDFND	UNDFD	17	1.0
7.65	25	67.85	2.04	3.01	1.02	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
7.95	26	134.55	2.67	1.99	1.04	silty sand to sandy silt	70-80	42-44	43	UNDEFINED
8.25	27	136.24	2.12	1.55	1.07	sand to silty sand	70-80	42-44	33	UNDEFINED
8.55	28	82.96	1.32	1.59	1.10	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
8.85	29	39.32	0.96	2.44	1.13	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
9.15	30	18.85	0.52	2.77	1.16	clayey silt to silty clay	UNDFND	UNDFD	9	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-45b



CPT-08-117	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-46a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-117
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	203.64	1.58	0.78	0.03	sand	>90	>48	39	UNDEFINED
0.60	2	180.03	2.57	1.43	0.09	sand to silty sand	>90	>48	43	UNDEFINED
0.95	3	56.05	1.15	2.05	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	28.63	0.64	2.25	0.22	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
1.55	5	11.39	0.51	4.47	0.28	clay	UNDFND	UNDFD	11	.7
1.85	6	9.82	0.36	3.68	0.33	clay	UNDFND	UNDFD	9	.6
2.15	7	8.76	0.30	3.39	0.39	clay	UNDFND	UNDFD	8	.5
2.45	8	31.38	0.40	1.29	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
2.75	9	10.80	0.30	2.74	0.51	silty clay to clay	UNDFND	UNDFD	7	.6
3.05	10	10.30	0.31	2.99	0.57	silty clay to clay	UNDFND	UNDFD	7	.6
3.35	11	10.74	0.31	2.87	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	12.68	0.56	4.40	0.64	clay	UNDFND	UNDFD	12	.7
3.95	13	13.56	0.49	3.65	0.67	silty clay to clay	UNDFND	UNDFD	9	.8
4.25	14	53.61	0.66	1.23	0.69	silty sand to sandy silt	50-60	38-40	17	UNDEFINED
4.55	15	18.83	0.47	2.50	0.72	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
4.85	16	14.84	0.48	3.24	0.75	silty clay to clay	UNDFND	UNDFD	9	.9
5.15	17	14.61	0.66	4.50	0.78	clay	UNDFND	UNDFD	14	.9
5.45	18	11.04	0.47	4.22	0.81	clay	UNDFND	UNDFD	11	.6
5.75	19	23.43	1.23	5.23	0.84	clay	UNDFND	UNDFD	22	1.4
6.05	20	36.35	1.55	4.28	0.86	silty clay to clay	UNDFND	UNDFD	23	2.3
6.40	21	25.88	0.99	3.83	0.89	silty clay to clay	UNDFND	UNDFD	17	1.6
6.70	22	16.34	0.63	3.85	0.93	silty clay to clay	UNDFND	UNDFD	10	1.0
7.00	23	19.89	0.98	4.93	0.95	clay	UNDFND	UNDFD	19	1.2
7.35	24	16.25	0.74	4.52	0.98	clay	UNDFND	UNDFD	16	.9
7.65	25	12.31	0.45	3.62	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	22.54	1.12	4.97	1.04	clay	UNDFND	UNDFD	22	1.4
8.25	27	126.63	1.57	1.24	1.07	sand to silty sand	70-80	40-42	30	UNDEFINED
8.55	28	143.98	1.49	1.03	1.10	sand to silty sand	70-80	42-44	34	UNDEFINED
8.85	29	102.15	1.19	1.16	1.13	sand to silty sand	60-70	40-42	24	UNDEFINED
9.15	30	37.71	1.55	4.10	1.16	silty clay to clay	UNDFND	UNDFD	24	2.3
9.45	31	69.29	1.77	2.55	1.19	sandy silt to clayey silt	UNDFND	UNDFD	27	4.4
9.75	32	62.93	2.16	3.43	1.21	clayey silt to silty clay	UNDFND	UNDFD	30	4.0
10.05	33	71.46	2.46	3.44	1.24	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
10.35	34	147.89	2.91	1.96	1.27	silty sand to sandy silt	70-80	40-42	47	UNDEFINED
10.65	35	149.13	1.58	1.06	1.30	sand to silty sand	70-80	40-42	36	UNDEFINED
10.95	36	19.56	0.68	3.50	1.33	silty clay to clay	UNDFND	UNDFD	12	1.1
11.25	37	13.51	0.57	4.23	1.36	clay	UNDFND	UNDFD	13	.7
11.55	38	22.35	0.97	4.32	1.38	silty clay to clay	UNDFND	UNDFD	14	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-46b

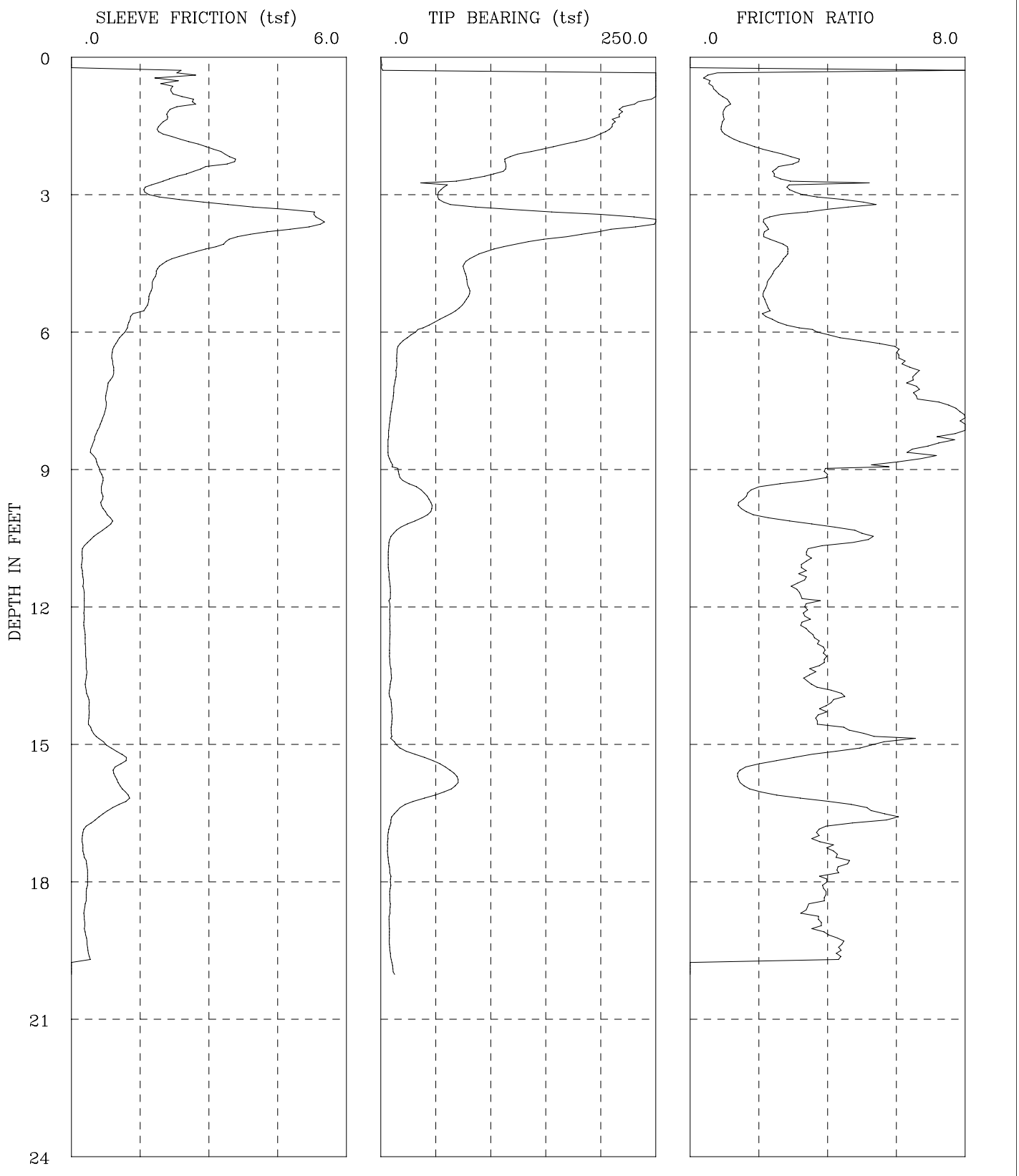
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	117.56	2.39	2.04	1.41	silty sand to sandy silt	60-70	40-42	38	UNDEFINED
12.15	40	168.09	2.14	1.27	1.44	sand to silty sand	70-80	40-42	40	UNDEFINED
12.45	41	128.61	1.65	1.28	1.47	sand to silty sand	60-70	40-42	31	UNDEFINED
12.80	42	59.33	1.08	1.83	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	28.77	0.75	2.61	1.53	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
13.40	44	124.55	1.55	1.24	1.56	sand to silty sand	60-70	40-42	30	UNDEFINED
13.75	45	69.32	2.57	3.70	1.59	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
14.05	46	75.76	2.35	3.11	1.62	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
14.35	47	60.75	1.17	1.92	1.65	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
14.65	48	28.44	0.97	3.42	1.68	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.95	49	26.01	0.79	3.02	1.70	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
15.25	50	15.82	0.34	2.16	1.73	clayey silt to silty clay	UNDFND	UNDFD	8	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-46c



CPT-08-118	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-47a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-118
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	245.53	1.93	0.79	0.03	sand	>90	>48	47	UNDEFINED
0.60	2	197.36	2.25	1.14	0.09	sand	>90	>48	38	UNDEFINED
0.95	3	86.08	2.53	2.93	0.15	sandy silt to clayey silt	UNDFND	UNDFD	33	5.7
1.25	4	173.77	4.39	2.53	0.22	silty sand to sandy silt	>90	>48	>50	UNDEFINED
1.55	5	80.63	2.00	2.48	0.28	sandy silt to clayey silt	UNDFND	UNDFD	31	5.3
1.85	6	55.94	1.39	2.49	0.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
2.15	7	14.85	0.90	6.09	0.39	clay	UNDFND	UNDFD	14	.9
2.45	8	9.87	0.72	7.32	0.45	clay	UNDFND	UNDFD	9	.6
2.75	9	8.71	0.52	5.98	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	36.57	0.69	1.89	0.57	sandy silt to clayey silt	UNDFND	UNDFD	14	2.4
3.35	11	11.58	0.45	3.93	0.61	clay	UNDFND	UNDFD	11	.7
3.65	12	8.06	0.26	3.24	0.64	clay	UNDFND	UNDFD	8	.4
3.95	13	8.18	0.29	3.54	0.67	clay	UNDFND	UNDFD	8	.4
4.25	14	8.54	0.33	3.81	0.69	clay	UNDFND	UNDFD	8	.5
4.55	15	10.09	0.45	4.48	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	51.54	1.02	1.97	0.75	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
5.15	17	20.99	0.76	3.61	0.78	silty clay to clay	UNDFND	UNDFD	13	1.3
5.45	18	7.21	0.29	4.09	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	8.26	0.31	3.72	0.84	clay	UNDFND	UNDFD	8	.4
6.05	20	8.66	0.29	3.30	0.86	clay	UNDFND	UNDFD	8	.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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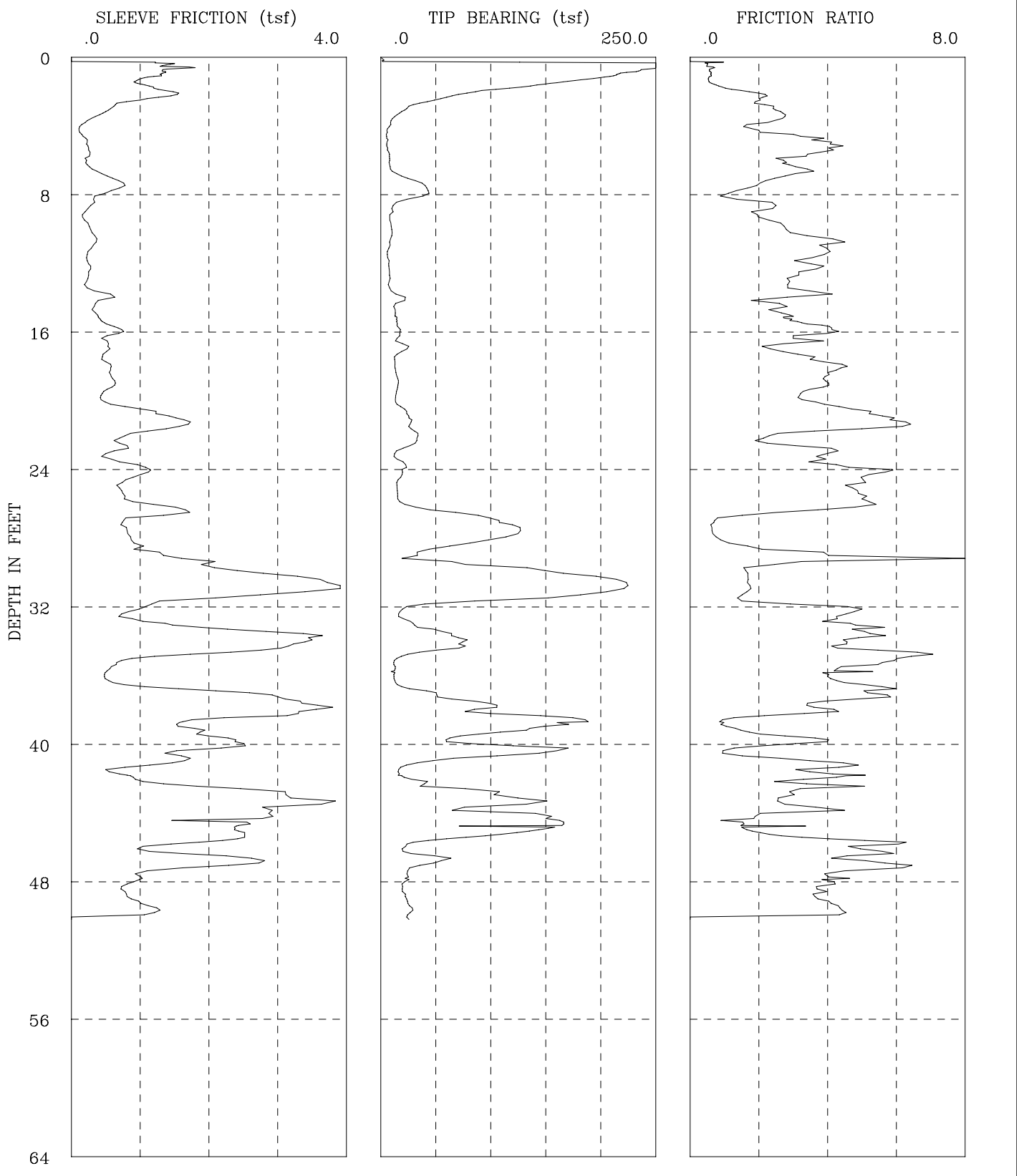
Figure A-47b



CPT-08-119	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-48a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-119
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	208.56	1.12	0.54	0.03	sand	>90	>48	40	UNDEFINED
0.60	2	148.63	1.12	0.76	0.09	sand	>90	>48	28	UNDEFINED
0.95	3	42.63	0.91	2.14	0.15	sandy silt to clayey silt	UNDFND	UNDFD	16	2.8
1.25	4	10.65	0.25	2.39	0.22	silty clay to clay	UNDFND	UNDFD	7	.6
1.55	5	5.54	0.18	3.28	0.28	clay	UNDFND	UNDFD	5	.3
1.85	6	7.18	0.24	3.36	0.33	clay	UNDFND	UNDFD	7	.4
2.15	7	13.63	0.39	2.87	0.39	silty clay to clay	UNDFND	UNDFD	9	.8
2.45	8	39.78	0.62	1.56	0.45	silty sand to sandy silt	50-60	40-42	13	UNDEFINED
2.75	9	15.21	0.28	1.81	0.51	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.05	10	8.90	0.22	2.45	0.57	silty clay to clay	UNDFND	UNDFD	6	.5
3.35	11	9.19	0.34	3.70	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	6.36	0.23	3.62	0.64	clay	UNDFND	UNDFD	6	.3
3.95	13	7.59	0.25	3.25	0.67	clay	UNDFND	UNDFD	7	.4
4.25	14	14.21	0.40	2.81	0.69	clayey silt to silty clay	UNDFND	UNDFD	7	.8
4.55	15	10.43	0.32	3.04	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	15.48	0.54	3.48	0.75	silty clay to clay	UNDFND	UNDFD	10	.9
5.15	17	18.47	0.54	2.94	0.78	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
5.45	18	14.88	0.50	3.33	0.81	silty clay to clay	UNDFND	UNDFD	10	.9
5.75	19	14.32	0.58	4.08	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	14.45	0.51	3.51	0.86	silty clay to clay	UNDFND	UNDFD	9	.8
6.40	21	20.25	1.00	4.92	0.89	clay	UNDFND	UNDFD	19	1.2
6.70	22	29.01	1.35	4.66	0.93	clay	UNDFND	UNDFD	28	1.8
7.00	23	25.76	0.70	2.73	0.95	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
7.35	24	18.18	0.81	4.47	0.98	clay	UNDFND	UNDFD	17	1.1
7.65	25	16.19	0.80	4.95	1.02	clay	UNDFND	UNDFD	16	.9
7.95	26	17.67	0.90	5.08	1.04	clay	UNDFND	UNDFD	17	1.0
8.25	27	79.04	1.23	1.56	1.07	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
8.55	28	119.58	0.81	0.68	1.10	sand to silty sand	70-80	40-42	29	UNDEFINED
8.85	29	44.72	1.05	2.35	1.13	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
9.15	30	105.39	2.14	2.03	1.16	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
9.45	31	228.13	3.95	1.73	1.19	sand to silty sand	80-90	42-44	>50	UNDEFINED
9.75	32	97.81	1.66	1.69	1.21	silty sand to sandy silt	60-70	40-42	31	UNDEFINED
10.05	33	19.22	0.77	4.03	1.24	silty clay to clay	UNDFND	UNDFD	12	1.1
10.35	34	57.80	2.92	5.05	1.27	silty clay to clay	UNDFND	UNDFD	37	3.7
10.65	35	47.68	2.39	5.01	1.30	clay	UNDFND	UNDFD	46	3.0
10.95	36	11.98	0.59	4.94	1.33	clay	UNDFND	UNDFD	11	.6
11.25	37	20.70	1.05	5.06	1.36	clay	UNDFND	UNDFD	20	1.2
11.55	38	78.53	3.27	4.17	1.38	clayey silt to silty clay	UNDFND	UNDFD	38	5.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

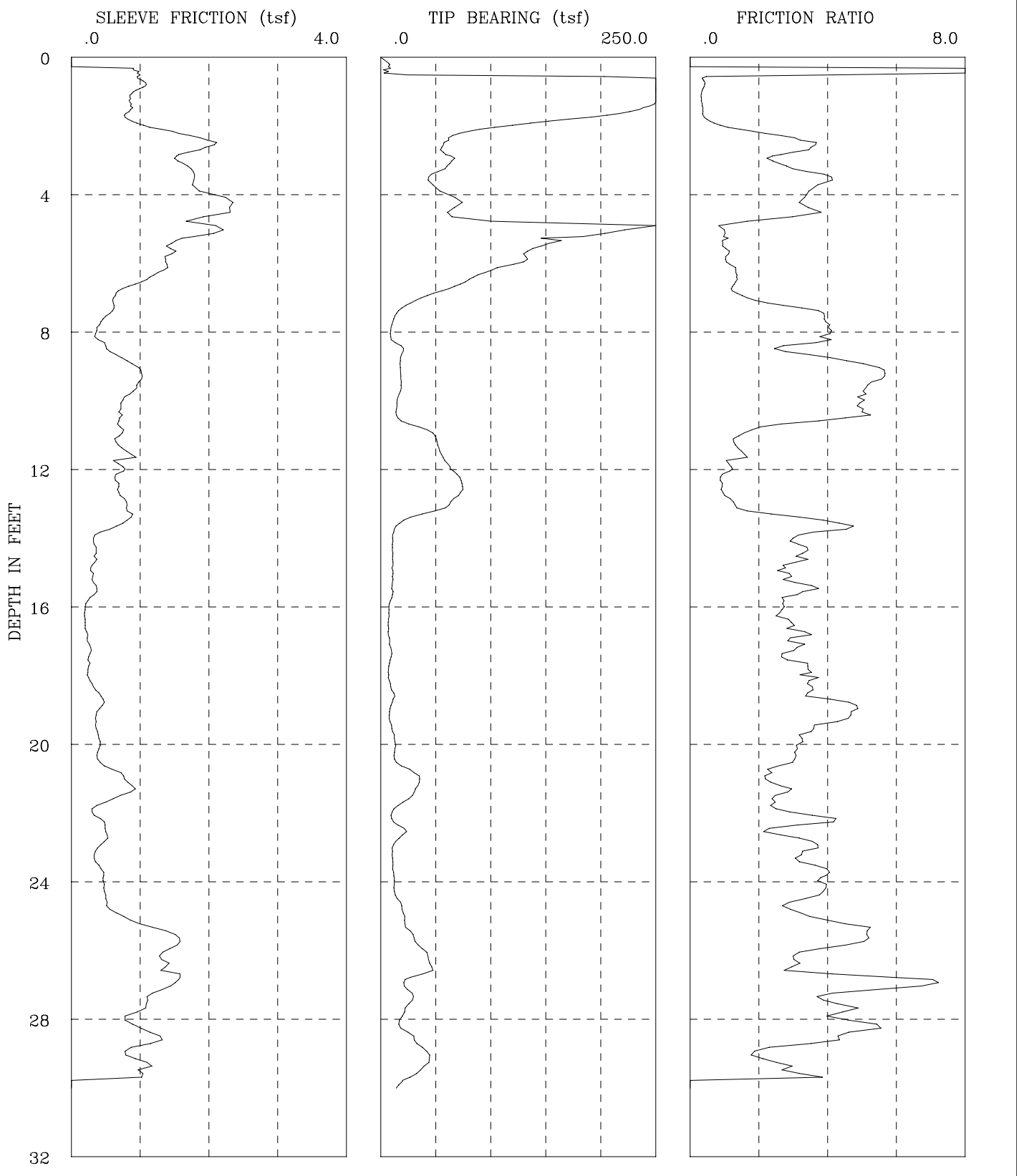
Figure A-48b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	143.15	2.38	1.66	1.41	sand to silty sand	70-80	40-42	34	UNDEFINED
12.15	40	91.91	2.05	2.23	1.44	silty sand to sandy silt	50-60	38-40	29	UNDEFINED
12.45	41	121.87	1.84	1.51	1.47	sand to silty sand	60-70	40-42	29	UNDEFINED
12.80	42	23.01	0.93	4.02	1.50	silty clay to clay	UNDFND	UNDFD	15	1.3
13.10	43	72.75	2.25	3.10	1.53	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
13.40	44	112.15	3.22	2.87	1.56	sandy silt to clayey silt	UNDFND	UNDFD	43	7.3
13.75	45	146.17	2.54	1.73	1.59	sand to silty sand	70-80	40-42	35	UNDEFINED
14.05	46	47.25	1.80	3.80	1.62	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
14.35	47	42.67	2.22	5.20	1.65	clay	UNDFND	UNDFD	41	2.6
14.65	48	23.89	1.05	4.38	1.68	silty clay to clay	UNDFND	UNDFD	15	1.4
14.95	49	21.26	0.80	3.76	1.70	silty clay to clay	UNDFND	UNDFD	14	1.2
15.25	50	25.99	0.98	3.76	1.73	silty clay to clay	UNDFND	UNDFD	17	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-48c



CPT-08-121	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-49a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-121
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	137.74	0.82	0.59	0.03	sand	>90	>48	26	UNDEFINED
0.60	2	211.26	0.87	0.41	0.09	sand	>90	>48	40	UNDEFINED
0.95	3	64.09	1.71	2.67	0.15	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.25	4	53.29	1.89	3.54	0.22	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
1.55	5	125.87	2.11	1.68	0.28	silty sand to sandy silt	>90	46-48	40	UNDEFINED
1.85	6	138.02	1.46	1.06	0.33	sand to silty sand	>90	46-48	33	UNDEFINED
2.15	7	66.57	0.90	1.36	0.39	silty sand to sandy silt	60-70	42-44	21	UNDEFINED
2.45	8	13.36	0.48	3.56	0.45	silty clay to clay	UNDFND	UNDFD	9	.8
2.75	9	16.74	0.65	3.89	0.51	silty clay to clay	UNDFND	UNDFD	11	1.0
3.05	10	17.31	0.91	5.27	0.57	clay	UNDFND	UNDFD	17	1.1
3.35	11	26.34	0.71	2.69	0.61	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
3.65	12	56.16	0.76	1.34	0.64	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.95	13	70.37	0.70	0.99	0.67	sand to silty sand	60-70	40-42	17	UNDEFINED
4.25	14	26.09	0.67	2.57	0.69	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
4.55	15	10.86	0.33	3.06	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	10.00	0.30	3.03	0.75	silty clay to clay	UNDFND	UNDFD	6	.6
5.15	17	7.20	0.21	2.88	0.78	clay	UNDFND	UNDFD	7	.4
5.45	18	8.28	0.26	3.09	0.81	clay	UNDFND	UNDFD	8	.4
5.75	19	9.55	0.37	3.85	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	9.74	0.37	3.84	0.86	clay	UNDFND	UNDFD	9	.5
6.40	21	20.01	0.52	2.58	0.89	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
6.70	22	23.31	0.61	2.61	0.93	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
7.00	23	15.08	0.47	3.10	0.95	silty clay to clay	UNDFND	UNDFD	10	.9
7.35	24	11.32	0.41	3.64	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	17.72	0.60	3.36	1.02	silty clay to clay	UNDFND	UNDFD	11	1.0
7.95	26	31.58	1.39	4.40	1.04	silty clay to clay	UNDFND	UNDFD	20	2.0
8.25	27	35.23	1.42	4.03	1.07	silty clay to clay	UNDFND	UNDFD	23	2.2
8.55	28	23.55	1.00	4.27	1.10	silty clay to clay	UNDFND	UNDFD	15	1.4
8.85	29	31.56	1.03	3.26	1.13	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-49b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-01**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	26	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	25											**Silty, Clayey Sand (SC)** dry, brown, fine grained with scattered medium grains and few subrounded granite gravel up to 1" moist
			B-1				RV	56	30:10			**Lean Clay with Sand (CL)** moist, dark brown, some fine grains
												Sandy Silt (ML) moist, olive brown, fine grained
5												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	20											
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-50

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-02**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	27	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Sandy Silt (ML) dry, gray brown, fine to coarse grained with scattered fine gravel
												Poorly Graded Sand with Silt (SP-SM) dry, yellow-brown, fine to coarse grained with fine grains dominant and few scattered fine gravel
	25		B-1				RV	55	28:09			**Sandy Lean Clay to Lean Clay with Sand (CL)** dry, olive brown, fine grained with scattered medium grains
												moist, with some silt
5												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	20											
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-51

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-03**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	28	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1				RV	69	32:13			**Sandy Lean Clay (CL)** dry, light orange-brown, fine grained
	25											**Lean Clay (CL)** moist, dark brown, scattered fine grains with pieces of bark and small rootlets with some silt
5												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	20											
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-52

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **HA-08-04**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 10/8/2008	**FINISH** 10/8/2008	**SHEET NO.** 1 of 1
DRILLING COMPANY GDC	**DRILLING METHOD** Hand Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Hand Auger	**BORING DIA. (in)** 3"	**TOTAL DEPTH (ft)** 5	**GROUND ELEV (ft)** 43	**DEPTH *ELEV.* GROUND WATER (ft)** ▼ Not Encountered / *na*
SAMPLING METHOD Bulk			**NOTES**

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Aggregate Base (AB)
												Sandy Silt (ML) dry, light gray, fine to coarse grained
	40		B-1				RV	57	30:09			**Sandy Lean Clay (CL)** dry, light orange-brown, fine grained with some fine gravel few scattered subrounded granite gravel up to 1.5
5												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	35											
10												
	30											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-53

LOG OF TEST BORING

PROJECT NAME		**PROJECT NUMBER**	**BORING**
SR-22 West Orange County Connectors		I-436	**HA-08-05**
SITE LOCATION	**START**	**FINISH**	**SHEET NO.**
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	**DRILLING METHOD**	**LOGGED BY**	**CHECKED BY**
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	**BORING DIA. (in)**	**TOTAL DEPTH (ft)**	**GROUND ELEV (ft)**	**DEPTH *ELEV.* GROUND WATER (ft)**
Hand Auger	3"	5	24.9	▼ Not Encountered / *na*

SAMPLING METHOD	**NOTES**
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Clayey Sand (SC) dry, brown, fine grained with scattered medium grains and scattered fine pea-sized gravel up to 1", organics
												orange brown
			B-1				RV	56	30:13			**Sandy Lean Clay (CL)** dry-moist, dark brown, some fine grains
												dry
5	20											Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
10	15											
	10											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-54

LOG OF TEST BORING

PROJECT NAME	SR-22 West Orange County Connectors	**PROJECT NUMBER**	I-436
BORING	**HA-08-06**		
SITE LOCATION	Cities of Seal Beach, Westminster, and Garden Grove, California	**START**	10/8/2008
FINISH	10/8/2008	**SHEET NO.**	1 of 1
DRILLING COMPANY	GDC	**DRILLING METHOD**	Hand Auger
LOGGED BY	A. Tucker	**CHECKED BY**	C. Scheyhing
DRILLING EQUIPMENT	Hand Auger	**BORING DIA. (in)**	3"
TOTAL DEPTH (ft)	5	**GROUND ELEV (ft)**	29
DEPTH *ELEV.* GROUND WATER (ft)	▼ Not Encountered / *na*		
SAMPLING METHOD	Bulk	**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silty Sand (SM) moist, light red brown, fine to coarse grained with few scattered 3/4" gravel, rootlets in upper 6"
												Sandy Silt (ML) moist, olive gray, fine to coarse grained with few scattered 3/4" gravel, some clay
			B-1				RV	51	28:10			
												Sandy Lean Clay (CL) moist, olive brown, fine grained, low to moderate plasticity
	25											
5												**Silty Sand (SM)** moist, olive brown, fine grained, some clay, grading coarser and drier
												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	20											
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-55

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-07**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	28.5	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silty Sand (SM) dry, brown, fine grained with occasional piece of broken subrounded granite gravel up to 3/4", grading finer moist
			B-1				RV	40	27:10			**Sandy Lean Clay to Clayey Sand (CL/SC)** moist, brown, fine grained with occasional piece of broken subrounded granite gravel up to 1", with chunks of sandy clay
5	25											Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
10	20											
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-56

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-08**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/4/2006	10/4/2006	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	20	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1				RV	53	33:16			**Sandy Lean Clay (CL)** dry, olive brown, fine grained with occasional coarse grain and pea-sized gravel with few 2" subrounded granite gravel, with chunks of clay and some silt moist, coarser
												Clayey Sand to Sandy Lean Clay (SC/CL) moist to wet, orange-brown, fine grained, with chunks of clay
5	15											Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
10	10											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-57

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples were then transported to the laboratory for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of moisture content and dry unit weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Consolidation, R-Value, and Soil Corrosivity. A summary of laboratory test results are included in Table B-1. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The USCS soil classifications are presented on key for soil classification and on the boring logs in Figures A-1a through A-17d and Figures A-50 through A-57 of Appendix A and summarized in Table B-1.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented in Table B-1 and on the boring logs in Figures A-2a through A-17d of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a and A-17d and Figures A-50

through A-57 of Appendix A and in Table B-1 and in Figures B-1a through B-1f of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided in Figure B-2 and Table B-1 of this appendix. The relative proportion (or percentage) by dry weight percent fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a through A-17d and Figures A-50 through A-57 of Appendix A.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under two additional normal loads for selected samples. The test results are presented in Tables B-2a and B-2b and Figures B-3a through B-3d of this appendix.

B.7 Consolidation Test

One-dimensional consolidation test was performed on selected undisturbed samples in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation tests are graphically shown in Figures B-4a to B-4e and consolidation parameters are summarized in Table B-3 of this appendix.

B.8 R-Value

A Resistance or R-Value test was performed on selected bulk samples of the subgrade soils encountered under proposed pavement locations. The test was conducted in general accordance with CTM 301. The test results are summarized in Table B-4 of this appendix.

B.9 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included minimum resistivity and soil pH (Caltrans method 643), water-soluble chlorides (Caltrans Test Method 422), water-soluble sulfates (Caltrans Test Method 417) and electrical resistivity (Caltrans Test Method 643). The test results are summarized in Table B-5.

B.10 List of Attached Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table B-1	Summary of Index Test Results
Table B-2a	Summary of Single Point Direct Shear Test Results
Table B-2b	Summary of Direct Shear Test Results
Table B-3	Summary of Consolidation Test Results
Table B-4	Summary of R-Value Test Results
Table B-5	Summary of Corrosion Test Results

List of Figures

Figures B-1a to B-1f	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figures B-3a to B-3d	Direct Shear Test Results
Figures B-4a to B-4e	Consolidation Test Results

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-101	B-1	1.0-4	SC	-	12	-	-	37	31	20	11	-
A-08-101	R-2	2.5	SC	110.3	15	-	-	-	-	-	-	-
A-08-101	S-3	5	CL	-	24	-	-	86	-	-	-	-
A-08-101	R-4	10	CL	91.3	29	-	-	-	-	-	-	2
A-08-101	S-5	15	CL	-	28	-	-	72	-	-	-	1.25
A-08-101	R-6	20	CL	93.5	28	-	-	-	-	-	-	1.25
A-08-103	B-1	0.8-5	SC	-	-	-	-	-	-	-	-	-
A-08-103	R-2	5	SM	88.8	26	-	-	-	-	-	-	-
A-08-103	S-3	10	CL	-	31	-	-	-	-	-	-	0.5
A-08-103	R-4	15	CL	96.1	28	-	-	65	-	-	-	1.5
A-08-103	S-5	20	CL	-	24	-	-	-	-	-	-	1.25
A-08-103	R-6	25	CL	101.7	24	-	-	-	-	-	-	2.75
A-08-103	S-7	30	SM	-	29	-	-	45	-	-	-	-
A-08-105	B-1	1.2-5	SC	-	11	-	-	27	28	14	14	-
A-08-105	R-2	10	CL	99.2	23	-	-	62	-	-	-	1
A-08-105	R-3	20	SC	105.4	22	-	-	-	-	-	-	-
A-08-105	R-4	30	SM	107.2	18	-	-	-	-	-	-	-
A-08-105	R-5	40	SM	104.6	22	-	-	35	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-112	B-1	1.2-5	SC	-	11	-	-	45	-	-	-	-
A-08-112	S-2	5	CL	-	31	-	-	-	-	-	-	-
A-08-112	R-3	10	ML	88.8	33	-	-	62	-	-	-	1
A-08-112	S-4	15	ML	-	32	-	-	77	NP	-	-	0.75
A-08-112	R-5	20	ML	101.8	24	-	-	-	-	-	-	1.2
A-08-112	S-6	25	ML	-	24	-	-	-	-	-	-	1.25-1.5
A-08-112	R-7	30	CL	93.8	26	-	-	-	-	-	-	2.0-3.0
A-08-112	S-8	35	CL	-	44	-	-	-	-	-	-	-
A-08-112	R-9	40	ML	95.2	27	-	-	-	-	-	-	3.5
A-08-115	B-1	1.1-5	CL/SC	-	24	-	-	75	-	-	-	-
A-08-115	R-2	5	CL	89.6	29	-	-	80	-	-	-	2
A-08-115	S-3	10	CL	-	29	-	-	-	-	-	-	1.25
A-08-115	R-4	15	CL	94	27	-	-	-	-	-	-	1.7
A-08-116	B-1	1.0-5	SW-SM	-	4	13	80	8	-	-	-	-
A-08-116	R-2	5	CL	99	23	-	-	86	37	20	17	2
A-08-116	S-3	11	CL	-	29	-	-	-	-	-	-	1
A-08-116	R-4	15	SM	96.7	27	-	-	-	-	-	-	2.1-2.6
A-08-119	B-1	0.8-5	SC	-	15	-	-	36	32	20	12	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-119	S-2	5	SC	-	-	-	-	-	-	-	-	-
A-08-119	R-3	10	CL	88.3	31	-	-	-	-	-	-	1
A-08-119	S-4	15	CL	-	27	-	-	72	-	-	-	1.75-2.0
A-08-119	R-5	20	CL	99.4	26	-	-	-	-	-	-	-
A-08-119	S-6	25	CL	-	24	-	-	-	-	-	-	1.5-2.0
A-08-119	R-7	30	CL	99.1	26	-	-	-	-	-	-	1.25
A-08-120	B-1	1.0-5	CL & SM	-	9	-	-	27	-	-	-	-
A-08-120	R-2	5	SM	103.7	11.0	-	-	-	-	-	-	-
A-08-120	S-3	10	SC	-	21.0	-	-	-	-	-	-	-
A-08-120	R-4	15	CL	-	29.0	-	-	72	36	19	17	0.5
A-08-120	S-5	20	CL	-	26.0	-	-	-	-	-	-	2.0-2.25
A-08-120	R-6	25	SC	99.2	25.0	-	-	-	-	-	-	-
A-08-120	S-7	30	ML	-	24.0	-	-	-	-	-	-	-
A-08-120	R-8	35	ML	100.3	25.0	-	-	55	NP	-	-	-
A-08-120	S-9	40	ML	-	21.0	-	-	-	-	-	-	-
A-08-120	R-10	45	SC	97.1	27.0	-	-	19	-	-	-	-
A-08-120	S-11	50	SC	-	28.0	-	-	-	-	-	-	-
A-08-122	B-1	1.2-5	SC	-	7	-	-	23	26	15	11	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-122	R-2	5	SC	107.6	18	-	-	-	-	-	-	-
A-08-122	S-3	10	SC	-	13	-	-	40	-	-	-	-
A-08-122	R-4	15	SM	100	23	-	-	26	-	-	-	-
A-08-122	S-5	20	CL	-	-	-	-	-	-	-	-	1
A-08-122	R-6	25	CL	87.2	31	-	-	88	-	-	-	1.5-1.75
A-08-122	S-7	30	SM	-	26	-	-	-	-	-	-	-
A-08-122	R-8	35	SM	96.8	28	-	-	26	-	-	-	-
A-08-122	S-9A	40	SC/SM	-	30	-	-	-	-	-	-	-
A-08-122	S-9B	40.75	CL	-	-	-	-	-	-	-	-	2.0-2.5
A-08-122	R-10	45	CL	86.4	35	-	-	-	-	-	-	2.0-2.75
A-08-122	S-11	50	SM/ML	-	27	-	-	-	-	-	-	-
R-08-004	B-1	1.3-3.5	CL	-	16	-	-	66	29	17	12	-
R-08-004	R-2	3.5	CL	117.1	16	-	-	-	-	-	-	4.5+
R-08-004	S-3	10	ML	-	22	-	-	66	-	-	-	4.5+
R-08-004	R-4	15	SM	100.5	24	-	-	27	-	-	-	-
R-08-004	S-5	20	CL	-	31	-	-	66	-	-	-	1
R-08-004	R-6	25	CL	91.1	31	-	-	-	-	-	-	1.25-1.5
R-08-004	S-7	30	CL	-	29	-	-	55	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-004	R-8	35	CL	92.3	30	-	-	-	-	-	-	1.5-2.2
R-08-004	S-9	40	CL	-	32	-	-	-	-	-	-	2
R-08-004	R-10	45	SM/ML	105.2	22	-	-	51	-	-	-	4.5
R-08-004	S-11	50	CL	-	32	-	-	86	-	-	-	-
R-08-004	R-12	55	ML	109.6	19	-	-	-	-	-	-	4.5+
R-08-004	S-13	60	ML	-	26	-	-	56	-	-	-	-
R-08-005	B-1	1.9-5	CL	-	16	-	-	63	29	20	9	-
R-08-005	R-1	5	CL	108.3	19	7	40	53	32	19	13	4.5+
R-08-005	S-2	10	SM	-	26	0	82	18	-	-	-	-
R-08-005	R-3	15	CL	98	27	-	-	65	-	-	-	-
R-08-005	S-4	20	SM	-	29	-	-	-	-	-	-	-
R-08-005	R-5	25	SM	97.6	26	-	-	24	-	-	-	-
R-08-005	S-6	30	CL	-	41	-	-	97	46	26	20	1.25
R-08-005	S-7	40	CL	-	31	-	-	-	39	19	20	1.5
R-08-005	R-8	50	ML	103	23	-	-	86	-	-	-	4.5
R-08-005	R-9	70	CL	-	45	-	-	75	43	24	19	4.5
R-08-005	R-10	105	CL	82.4	39	-	-	-	-	-	-	2.5
R-08-005	S-11	135	CL	-	27	-	-	-	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-011	S-1	5	SC	-	19	-	-	47	33	19	14	-
R-08-011	R-2	10	SC	96.9	19	-	-	-	-	-	-	-
R-08-011	S-3	15	CL	-	31	-	-	-	-	-	-	0.5
R-08-011	R-4	20	CL	94.6	24	-	-	52	34	16	18	1
R-08-011	S-5	25	CL	-	46	-	-	-	-	-	-	-
R-08-011	R-6	30	ML	93.2	30	-	-	-	-	-	-	1.5
R-08-011	S-7	35	ML	-	28	-	-	68	-	-	-	1
R-08-011	R-8	40	CL	97.9	25	-	-	80	-	-	-	4
R-08-011	S-9	45	ML	-	33	-	-	-	-	-	-	-
R-08-011	R-10	50	ML	83.9	35	-	-	-	-	-	-	3.5
R-08-011	S-11	60	SW-SM	-	15	4	89	7	-	-	-	-
R-08-011	R-12	70	CL	114.8	17	-	-	-	31	15	16	3.5
R-08-011	S-13	80	SC	-	17	-	-	45	-	-	-	-
R-08-011	R-14	90	SM	-	24	-	-	29	-	-	-	-
R-08-011	S-15	100	CL	-	40	-	-	-	-	-	-	-
R-08-011	R-16	120	SM	-	24	-	-	27	-	-	-	-
R-08-012	R-1	5	CL	95.8	28	-	-	80	47	20	27	2.4
R-08-012	S-2	10	CL	-	39	-	-	-	-	-	-	0.75

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-012	R-3	15	CL	102.1	24	-	-	58	-	-	-	2.75
R-08-012	S-4	20	CL	-	27	-	-	-	-	-	-	1.1
R-08-012	R-5	25	CL	92.7	29	-	-	80	33	21	12	2.25
R-08-012	S-6	30	CL	-	34	-	-	-	-	-	-	1.25-1.5
R-08-012	R-7	35	CL	93.9	30	-	-	-	-	-	-	4
R-08-012	S-8	40	ML	-	28	-	-	-	-	-	-	-
R-08-012	R-9	45	ML	99	26	-	-	70	26	23	3	-
R-08-012	S-10	50	CL	-	38	-	-	-	-	-	-	3.3
R-08-012	R-11	55	CL	88.5	33	-	-	96	-	-	-	2.8
R-08-012	S-12	60	CL	-	29	-	-	-	-	-	-	3.75
R-08-012	R-13	67	CL	107.1	21	-	-	61	-	-	-	3
R-08-012	S-14	72	CL	-	21	-	-	-	-	-	-	1.5
R-08-012	R-15	80	CL	97.9	31	-	-	57	-	-	-	-
R-08-012	S-16	90	No Recovery									
R-08-012	S-17	91.5	ML/CL	-	31	-	-	89	-	-	-	-
R-08-012	R-18	100	SC	134.9	18	-	-	-	-	-	-	-
R-08-017	S-1	5	CL/SC	-	-	-	-	-	-	-	-	3
R-08-017	R-2	10	CL	89.3	32	-	-	82	35	21	14	2.5

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-017	S-3	15	CL	-	27	-	-	55	34	20	14	1.25
R-08-017	R-4	20	CL	108.8	19	-	-	-	-	-	-	4.5+
R-08-017	S-5	25	CL	-	20	-	-	63	-	-	-	4.5+
R-08-017	R-6	30	CL	109.3	15	-	-	-	-	-	-	4
R-08-017	S-7	35	ML	-	34	-	-	57	-	-	-	-
R-08-017	R-8	40	CL	96.2	28	-	-	-	39	20	19	-
R-08-017	S-9	45	CL	-	36	-	-	-	-	-	-	1.2
R-08-017	R-10	50	ML	100	25	-	-	-	-	-	-	3
R-08-017	S-11	60	CL	-	31	-	-	82	-	-	-	2
R-08-017	R-12	70	ML	96.7	27	-	-	-	-	-	-	-
R-08-017	S-13	80	SM	-	19	-	-	22	-	-	-	-
R-08-017	R-14	90	SW	111.4	18	-	-	-	-	-	-	-
R-08-017	S-15	100	CL	-	-	-	-	-	-	-	-	1.5
R-08-019	S-1	5	CL	-	20	-	-	59	34	20	14	4
R-08-019	R-2	10	CL	114.3	17	-	-	-	39	20	19	4.5+
R-08-019	S-3	15	ML	-	27	-	-	57	-	-	-	-
R-08-019	R-4	20	CL	110.8	15	-	-	-	-	-	-	4.5+
R-08-019	S-5	25	SM/ML	-	18	-	-	-	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-019	R-6	30	CL	107.6	19	-	-	71	33	21	12	4.5+
R-08-019	S-7	35	SM	-	29	-	-	-	-	-	-	-
R-08-019	R-8	40	CL	103.8	23	-	-	-	-	-	-	1.25
R-08-019	S-9	50	SM	-	-	-	-	31	-	-	-	-
R-08-019	R-10	60	ML	100.2	24	-	-	-	-	-	-	4.5
R-08-019	S-11	70	SP-SM	-	-	-	-	-	-	-	-	-
R-08-019	R-12	76	SP-SM	103.8	23	-	-	-	-	-	-	-
R-08-019	R-13	85	SP-SM	94.4	29	-	-	12	-	-	-	-
R-08-023	R-1	5	CL	115.8	10	-	-	54	32	19	13	4.5+
R-08-023	S-2	10	SC	-	23	-	-	-	-	-	-	-
R-08-023	R-3	15	CL	113.8	15	-	-	55	-	-	-	4.5
R-08-023	S-4	20	CL	-	22	-	-	61	-	-	-	3.25
R-08-023	R-5	25	CL	88.7	31	-	-	-	-	-	-	1.5
R-08-023	S-6	30	CL	-	34	-	-	-	-	-	-	-
R-08-023	R-7	35	CL	-	28	-	-	-	-	-	-	1.0-1.25
R-08-023	S-8	40	SC/CL	-	24	-	-	49	29	19	10	2
R-08-023	R-9	45	SP-SM	107.8	19	0	89	11	-	-	-	-
R-08-023	S-10	55	ML	98.8	26	-	-	84	-	-	-	2

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-023	R-11	65	CL	-	40	-	-	-	-	-	-	-
R-08-023	S-12	75	SP	106.8	21	-	-	2	-	-	-	-
R-08-023	R-13	80	SP	-	25	-	-	-	-	-	-	-
R-08-023	S-14	85	SW-SM	108.1	19	-	-	8	-	-	-	-
R-08-023	R-15	95	SP	101.4	23	-	-	4	-	-	-	-
HA-08-01	B-1	0-5	SC, CL & ML	-	-	6	38	56	30	20	10	-
HA-08-02	B-1	0-5	ML, SP-SM & CL	-	-	10	35	55	28	19	9	-
HA-08-03	B-1	0-5	CL	-	-	1	30	69	32	19	13	-
HA-08-04	B-1	0.6-5	ML & CL	-	-	11	32	57	30	21	9	-
HA-08-05	B-1	1.0-5	SC & CL	-	-	1	43	56	30	17	13	-
HA-08-06	B-1	0.5-5	SM, ML & CL	-	-	4	45	51	28	18	10	-
HA-08-07	B-1	0-5	SM & CL/SC	-	-	7	53	40	27	17	10	-
HA-08-08	B-1	0-5	CL & SC/CL	-	-	14	33	53	33	17	16	-

TABLE B-2a:
SUMMARY OF SINGLE POINT DIRECT SHEAR TEST RESULTS

Boring No.	Sample No.	Sample Depth (ft.)	Description	Shear Rate (in./min.)	Normal Stress (psf)	Peak Shear Stress (psf)	Shear Stress at 0.25 in.(psf)
R-08-004	R-6	25-26.5	Lean Clay (CL)	0.0042	1500	1200 @ 0.095 in.	1100
R-08-005	R-3	16-16.5	Silty Clay with Sand (CL)	0.0042	800	780 @ 0.11 in.	700
R-08-005	R-3	16-16.5	Silty Clay with Sand (CL)	0.0042	5000	3350 @ 0.185 in.	3320
R-08-012	R-3	15-16.5	Sandy Lean Clay (CL)	0.0042	4000	2540 @ 0.245 in.	2530
R-08-019	R-8	41-41.5	Sandy Lean Clay (CL)	0.0042	3000	2140 @ 0.15 in.	1970
R-08-019	R-8	41-41.5	Sandy Lean Clay (CL)	0.0042	7000	4880 @ 0.20 in.	4730
R-08-023	R-7	36-36.5	Lean Clay (CL)	0.0042	2000	1340 @ 0.09 in.	1180

TABLE B-2b:
SUMMARY OF DIRECT SHEAR TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Peak		Ultimate	
				Shear Strength (psf)	Friction Angle (deg)	Shear Strength (psf)	Friction Angle (deg)
R-08-004	R-2	3.5	CL	600	35	150	33
R-08-017	R-2	10	CL	750	24	350	20
R-08-019	R-2	10	CL	900	32	300	32
R-08-023	R-5	25	CL	400	30	250	30

TABLE B-3:
SUMMARY OF CONSOLIDATION TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Atterberg Limits			Consolidation Parameters					
				LL	PL	PI	Cc	Cr	Ccε	Crε	e_0	σ'_p (psf)
A-08-120	R-4	16	CL	36	19	17	0.280	0.026	0.155	0.015	0.809	3800
A-08-122	R-2	6	SC	-	-	-	0.096	0.025	0.064	0.016	0.503	6500
R-08-005	R-1	6	CL	32	19	13	0.136	0.023	0.090	0.015	0.510	5900
R-08-011	R-4	21	CL	34	16	18	0.228	0.022	0.137	0.013	0.667	3700
R-08-017	R-8	41	CL	39	20	19	0.300	0.038	0.170	0.022	0.744	4800

Note: The value of C_v was based on available correlations.

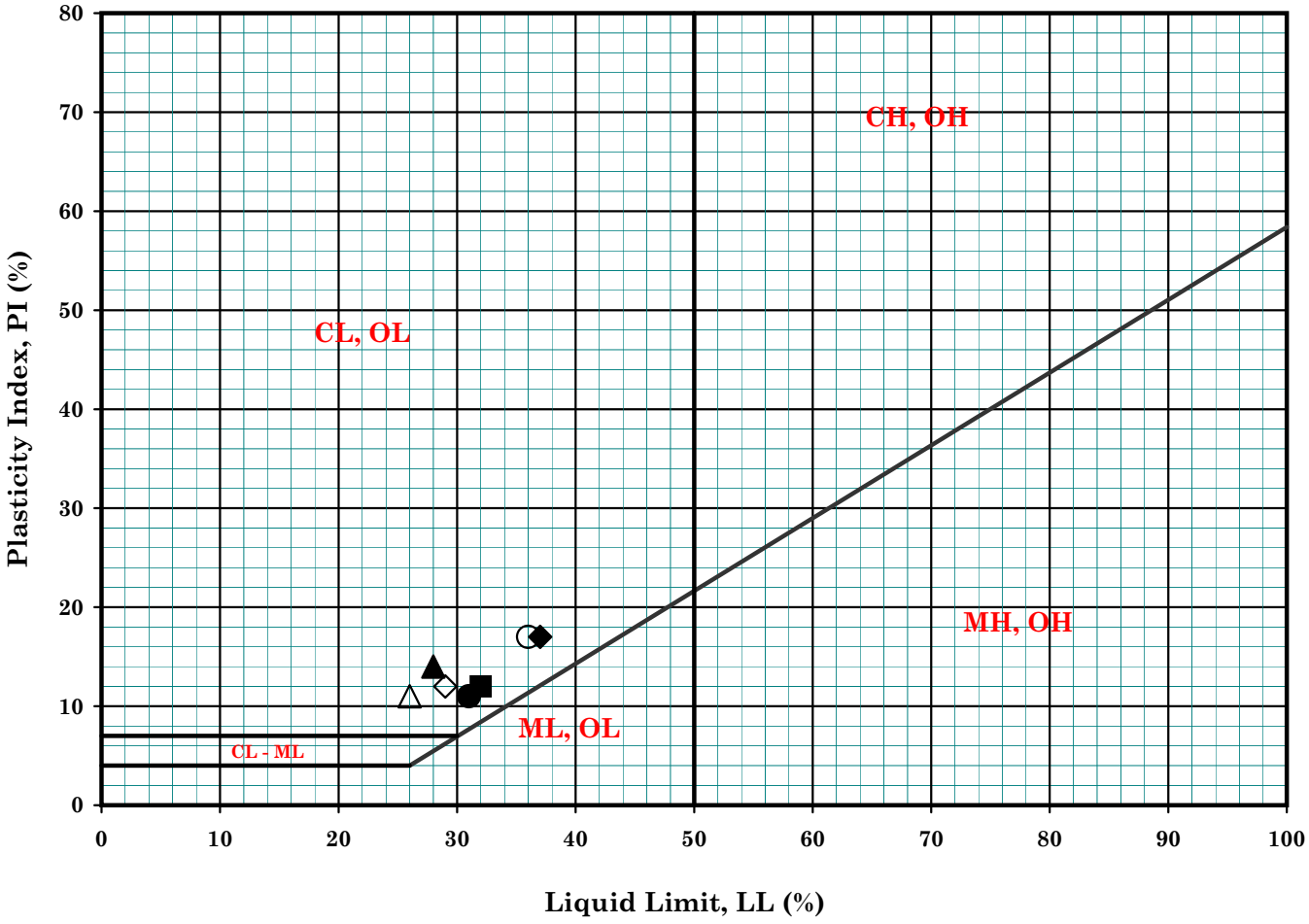
TABLE B-4:
SUMMARY OF R-VALUE TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	R-Value
A-08-101	B-1	1 - 5	SC	21
A-08-103	B-1	1 - 5	SC	46
A-08-115	B-1	1 - 5	CL/SC	34
A-08-120	B-1	1 - 5	SM	54
HA-08-01	B-1	0-5	CL	35
HA-08-02	B-1	0-5	CL	29
HA-08-03	B-1	0-5	CL	17
HA-08-04	B-1	0.5-5	CL	43
HA-08-05	B-1	1-5	CL	27
HA-08-06	B-1	0.5-5	CL/SC	15
HA-08-07	B-1	0-5	SC	29
HA-08-08	B-1	0-5	CL	23
R-08-004	B-1	1.5-3.5	CL	39
R-08-005	B-1	2 - 5	CL	25

TABLE B-5:
SUMMARY OF CORROSION TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-101	B-1	1-4	SC	2000	8.5	100	30
A-08-105	R-2	10-11.5	CL	NA	9.3	74	218
A-08-112	B-1	1.2-5	SC	<500	8.2	3900	626
A-08-116	S-3	11-11.5	CL	NA	8.3	4720	388
A-08-119	R-5	20-21.5	CL	NA	7.9	1140	96
A-08-122	B-1	1.2-5	SC	2750	8.3	132	163
R-08-004	B-1	1.3-3.5	CL	1350	9.1	465	604
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20-21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35-36.5	ML	NA	8.8	576	255
R-08-019	S-7	35-36.5	SM	NA	8.5	538	336
R-08-023	S-4	20-21.5	CL	NA	7.8	2432	2897
R-08-023	S-6	30-31.5	CL	NA	8.0	490	25

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-101	B-1	1.0	2.5	0.3	0.8	12	31	20	11	-0.73	Brown Clayey Sand (SC)
▲	A-08-105	B-1	1.2	5.0	0.4	1.5	11	28	14	14	-0.21	Brown Clayey Sand (SC)
◆	A-08-116	R-2	6.0	6.5	1.8	2.0	23	37	20	17	0.18	Olive Brown Lean Clay (CL)
■	A-08-119	B-1	1.0	5.0	0.3	1.5	15	32	20	12	-0.42	Olive Brown Clayey Sand (SC)
○	A-08-120	R-4	16.0	16.5	4.9	5.0	29	36	19	17	0.59	Dark Brown Lean Clay with Sand (CL)
△	A-08-122	B-1	1.0	5.0	0.3	1.5	7	26	15	11	-0.73	Light Brown Clayey Sand (SC)
◇	R-08-004	B-1	1.3	3.5	0.4	1.1	16	29	17	12	-0.08	Dark Brown Sandy Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

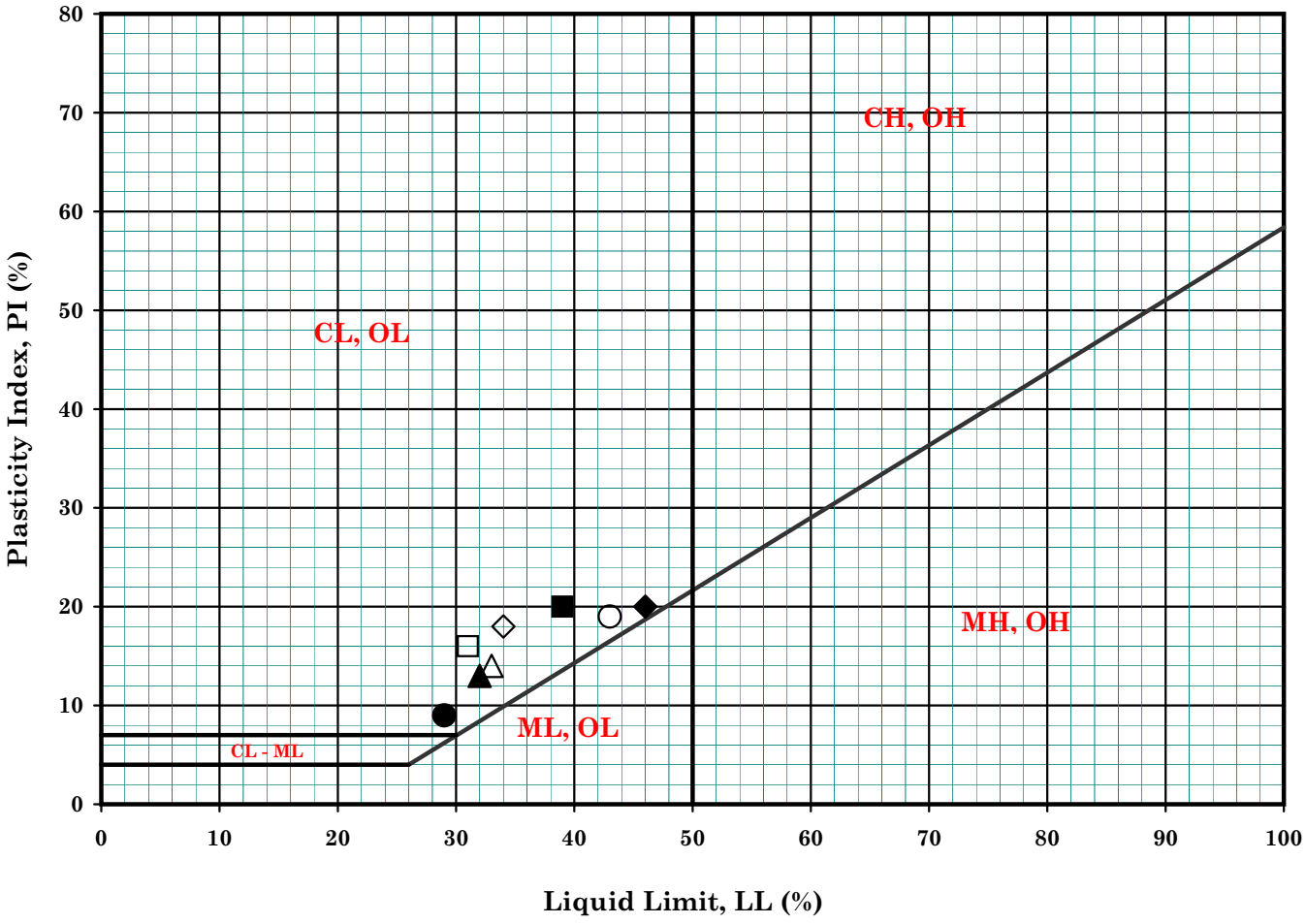
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1a

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-005	B-1	2.0	5.0	0.6	1.5	16	29	20	9	-0.44	Gray Sandy Lean Clay (CL)
▲	R-08-005	R-1	6.0	6.5	1.8	2.0	19	32	19	13	0.00	Dark Gray Sandy Lean Clay (CL)
◆	R-08-005	S-6	30.0	32.0	9.2	9.8	41	46	26	20	0.75	Gray Brown Lean Clay (CL)
■	R-08-005	S-7	40.0	41.5	12.2	12.7	31	39	19	20	0.60	Gray Brown Lean Clay (CL)
○	R-08-005	R-9	71.0	71.5	21.7	21.8	45	43	24	19	1.11	Lean Clay with Sand (CL)
△	R-08-011	S-1	5.0	6.5	1.5	2.0	19	33	19	14	0.00	Olive Brown Clayey Sand (SC)
◇	R-08-011	R-4	21.0	21.5	6.4	6.6	24	34	16	18	0.44	Olive Brown Sandy Lean Clay (CL)
□	R-08-011	R-12	71.0	71.5	21.7	21.8	17	31	15	16	0.13	Light Brown Gray Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

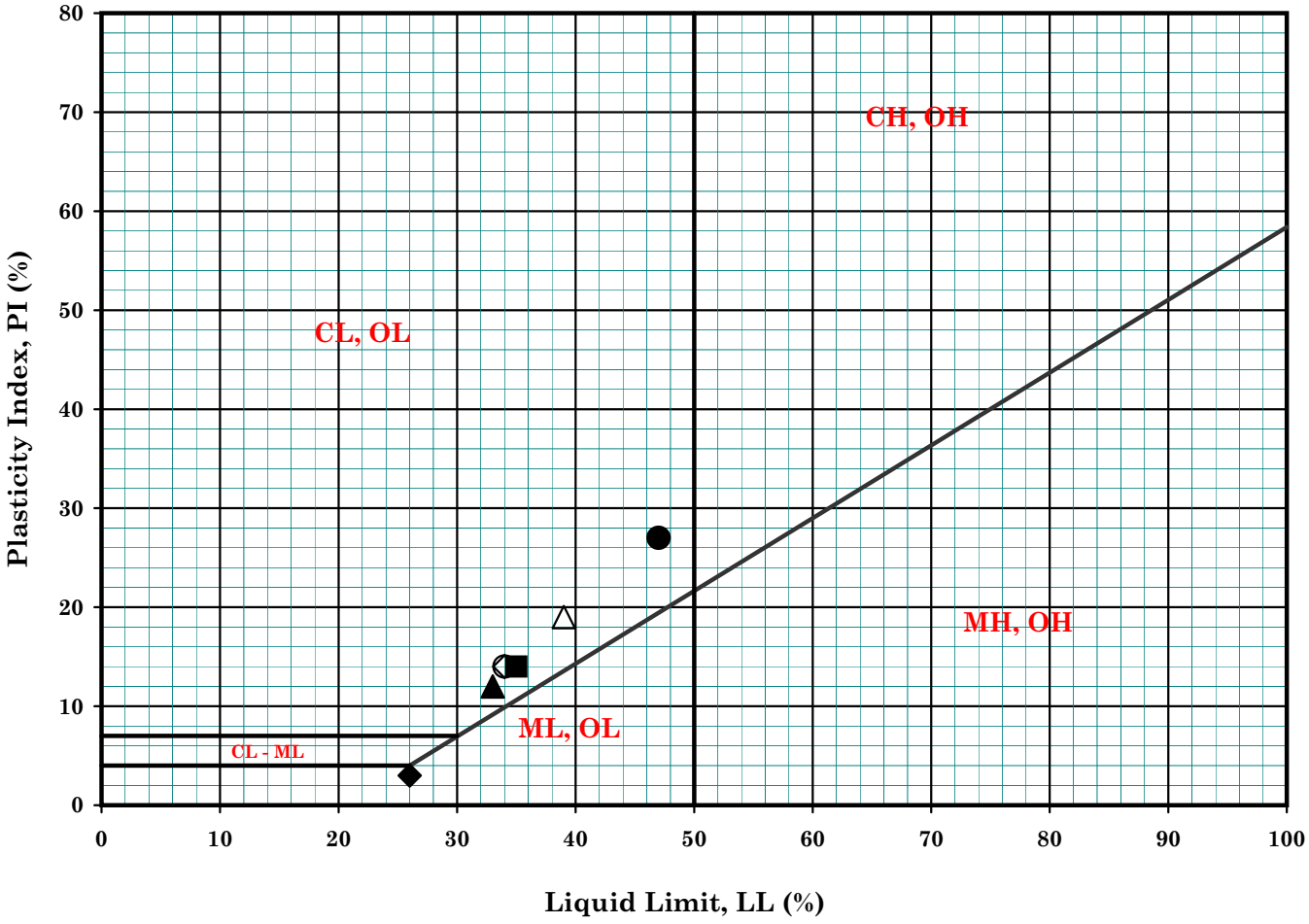
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1b

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-012	R-1	6.0	6.5	1.8	2.0	28	47	20	27	0.30	Dark Brown Lean Clay with Sand (CL)
▲	R-08-012	R-5	26.0	26.5	7.9	8.1	29	33	21	12	0.67	Dark Brown Lean Clay with Sand (CL)
◆	R-08-012	R-9	46.0	46.5	14.0	14.2	26	26	23	3	1.00	Dark Brown Sandy Silt (ML)
■	R-08-017	R-2	11.0	11.5	3.4	3.5	32	35	21	14	0.79	Dark Brown Lean Clay with Sand (CL)
○	R-08-017	S-3	15.0	16.5	4.6	5.0	27	34	20	14	0.50	Light Brown Sandy Lean Clay (CL)
△	R-08-017	R-8	41.0	41.5	12.5	12.7	28	39	20	19	0.42	Gray Brown Lean Clay (CL)
◇	R-08-019	S-1	5.0	6.5	1.5	2.0	20	34	20	14	0.00	Red Brown Sandy Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

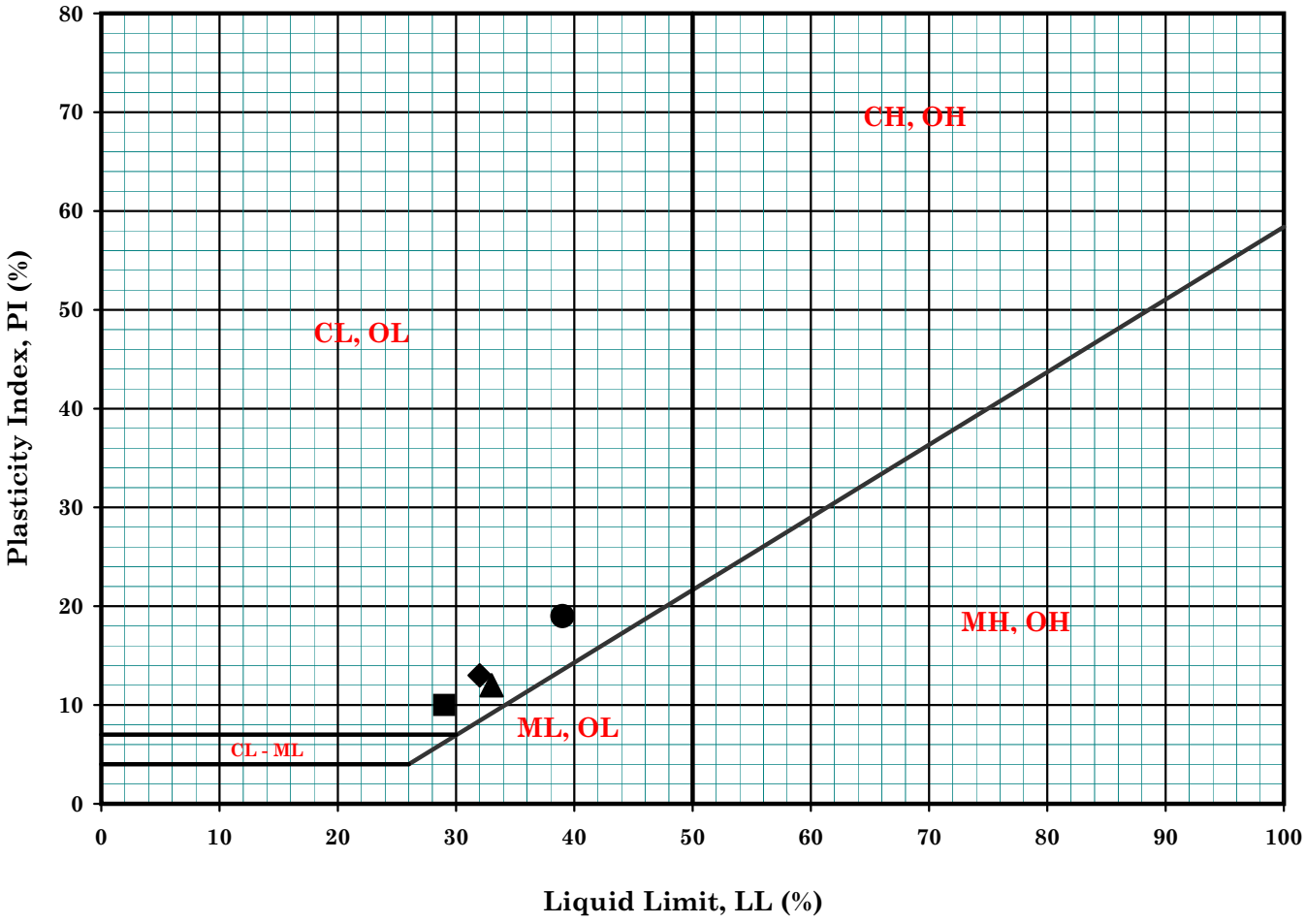
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1c

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-019	R-2	11.0	11.5	3.4	3.5	17	39	20	19	-0.16	Brown Yellow Clayey Sand (SC)
▲	R-08-019	R-6	31.0	31.5	9.5	9.6	19	33	21	12	-0.17	Gray Brown Lean Clay (CL)
◆	R-08-023	R-1	6.0	6.5	1.8	2.0	10	32	19	13	-0.69	Red Brown Sandy Lean Clay (CL)
■	R-08-023	S-8	40.0	41.5	12.2	12.7	24	29	19	10	0.50	Light Brown Gray Clayey Sand/Sandy Lean Clay (SC/CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

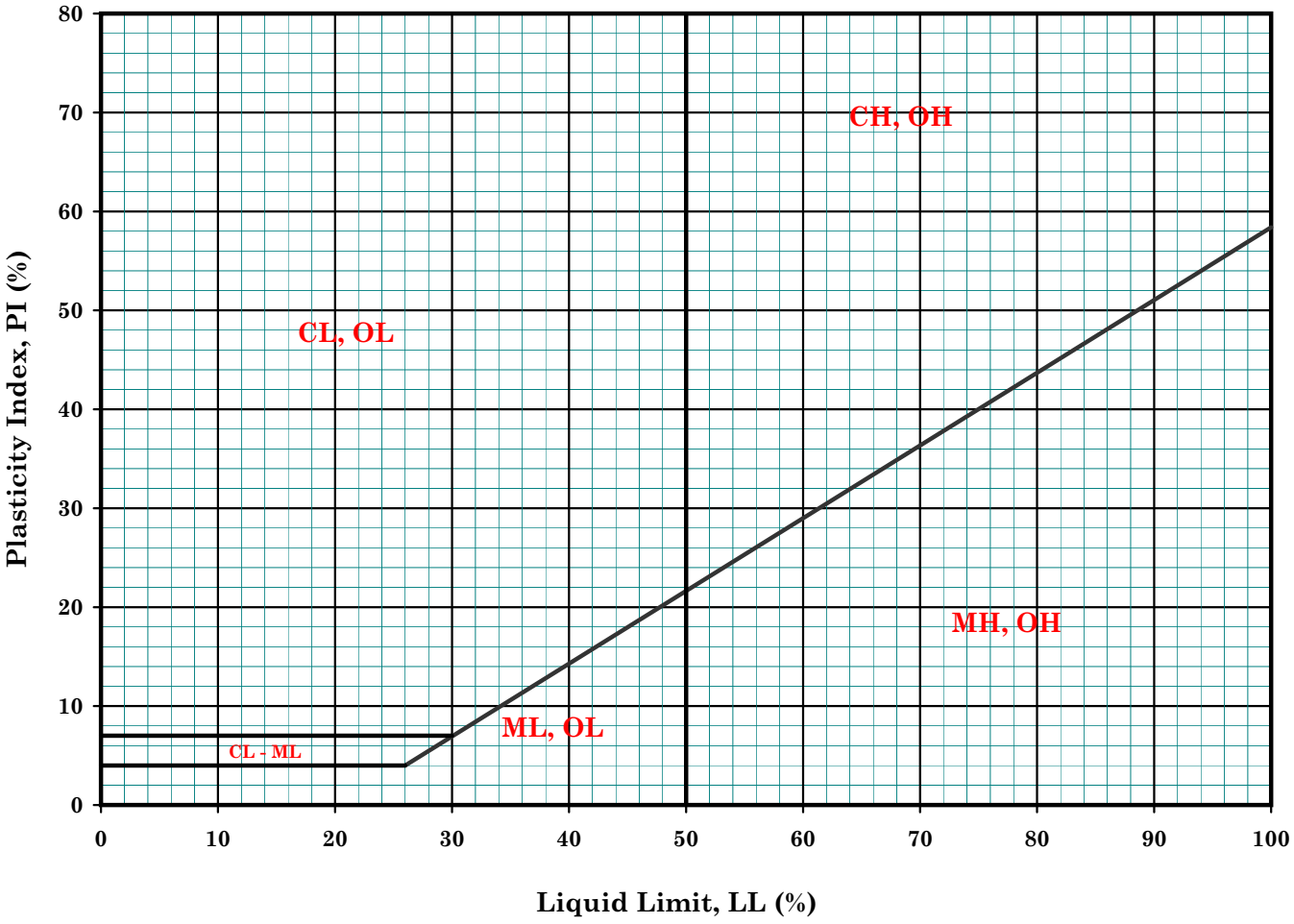
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1d

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-105	R-5	41.0	41.5	12.5	12.7	22	Non-Plastic			-	Olive Brown Silty Sand (SM)
▲	A-08-112	S-4	15.0	16.5	4.6	5.0	32	Non-Plastic			-	Olive Gray Silt with Sand (ML)
◆	A-08-120	R-8	36.0	36.5	11.0	11.1	25	Non-Plastic			-	Dark Brown Sandy Silt (ML)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

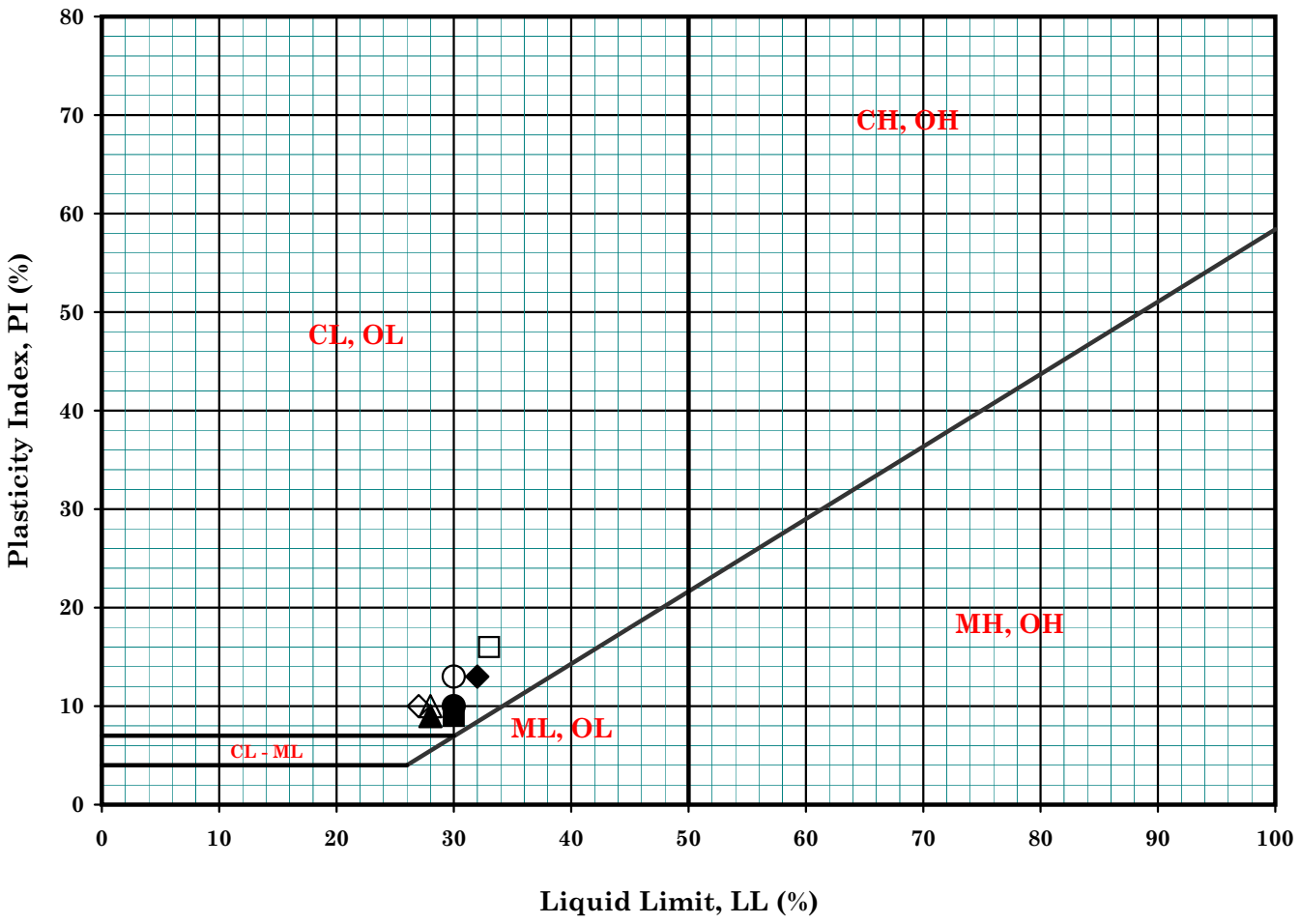
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1e

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	HA-08-01	B-1	0.0	5.0	0.0	1.5	N/A	30	20	10	N/A	Light Brown Sandy CLAY (CL)
▲	HA-08-02	B-1	0.0	5.0	0.0	1.5	N/A	28	19	9	N/A	Grayish Brown Sandy CLAY (CL)
◆	HA-08-03	B-1	0.0	5.0	0.0	1.5	N/A	32	19	13	N/A	Grayish Brown Sandy CLAY (CL)
■	HA-08-04	B-1	0.0	5.0	0.0	1.5	N/A	30	21	9	N/A	Brown Sandy CLAY (CL)
○	HA-08-05	B-1	0.0	5.0	0.0	1.5	N/A	30	17	13	N/A	Grayish Brown Sandy CLAY (CL)
△	HA-08-06	B-1	0.0	5.0	0.0	1.5	N/A	28	18	10	N/A	Dark Brown Sandy CLAY (CL)
◇	HA-08-07	B-1	0.0	5.0	0.0	1.5	N/A	27	17	10	N/A	Light Brown Clayey SAND (SC)
□	HA-08-08	B-1	0.0	5.0	0.0	1.5	N/A	33	17	16	N/A	Dark Brown Sandy CLAY (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22

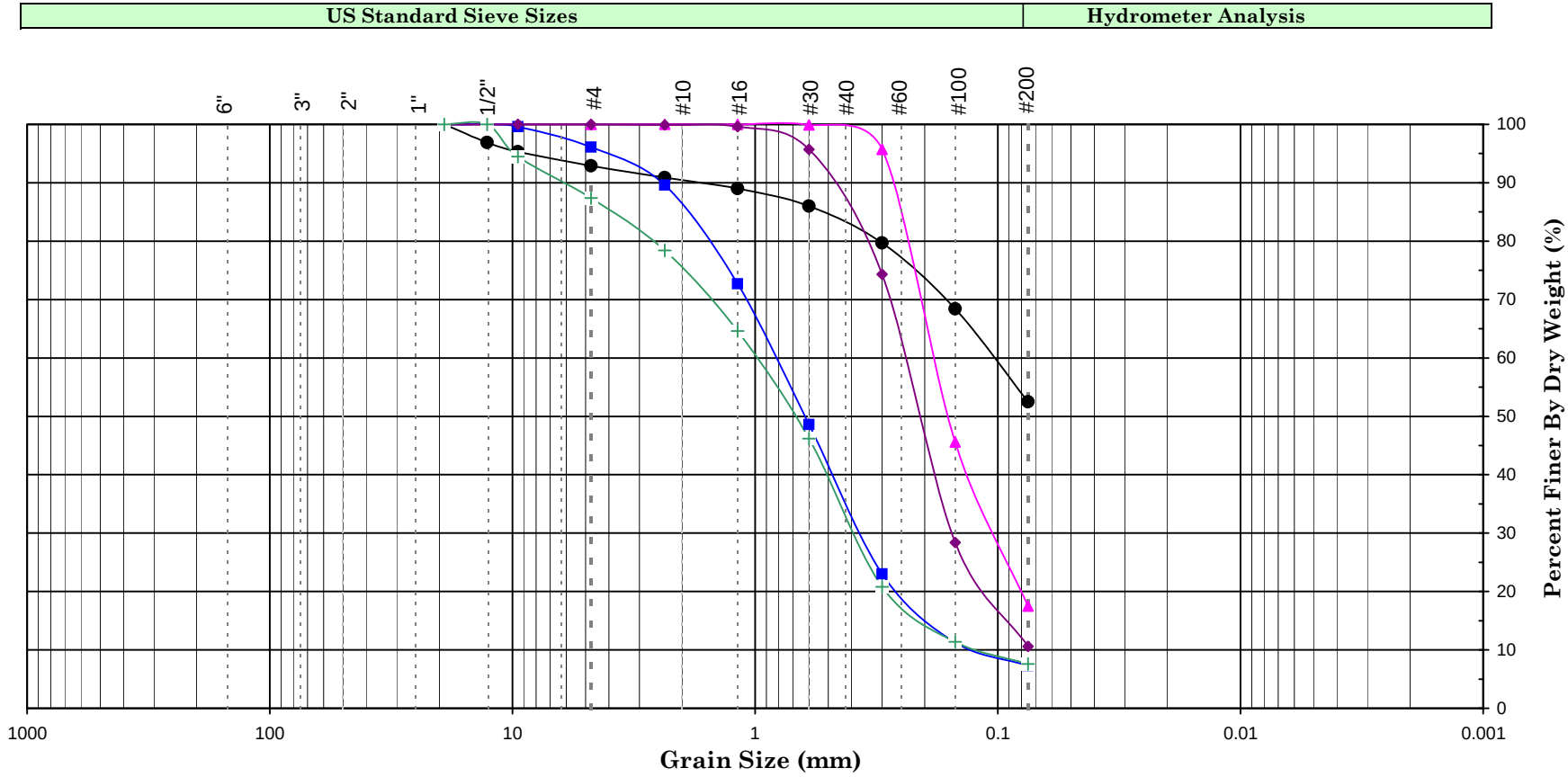
Project No. : I-436

Date : 10/14/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1f



Boulders	Cobbles	Gravel		Sand			Fines (Silt / Clay)
		Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Sample Depth [from/to] (ft)		Sample Depth [from/to] (m)		Grain Size Percentage Gravel	Sand	Fines	Atterberg Limits LL	PI	Soil Description	U.S.C.S.
●	R-08-005	R-1	5.0	6.5	1.52	1.98	7	40	53	32	13	Sandy Lean Clay	CL
▲	R-08-005	S-2	10.0	11.5	3.05	3.51	0	83	18			Silty Sand	SM
■	R-08-011	S-11	60.0	61.3	18.29	18.68	4	89	7			Well Graded Sand with Silt	SW-SM
◆	R-08-023	S-9	45.0	46.5	13.72	14.17	0	89	11			Poorly Graded Sand with Silt	SP-SM
+	A-08-116	B-1	1.0	5.0	0.30	1.52	13	80	8			Well Graded Sand with Silt	SW-SM

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

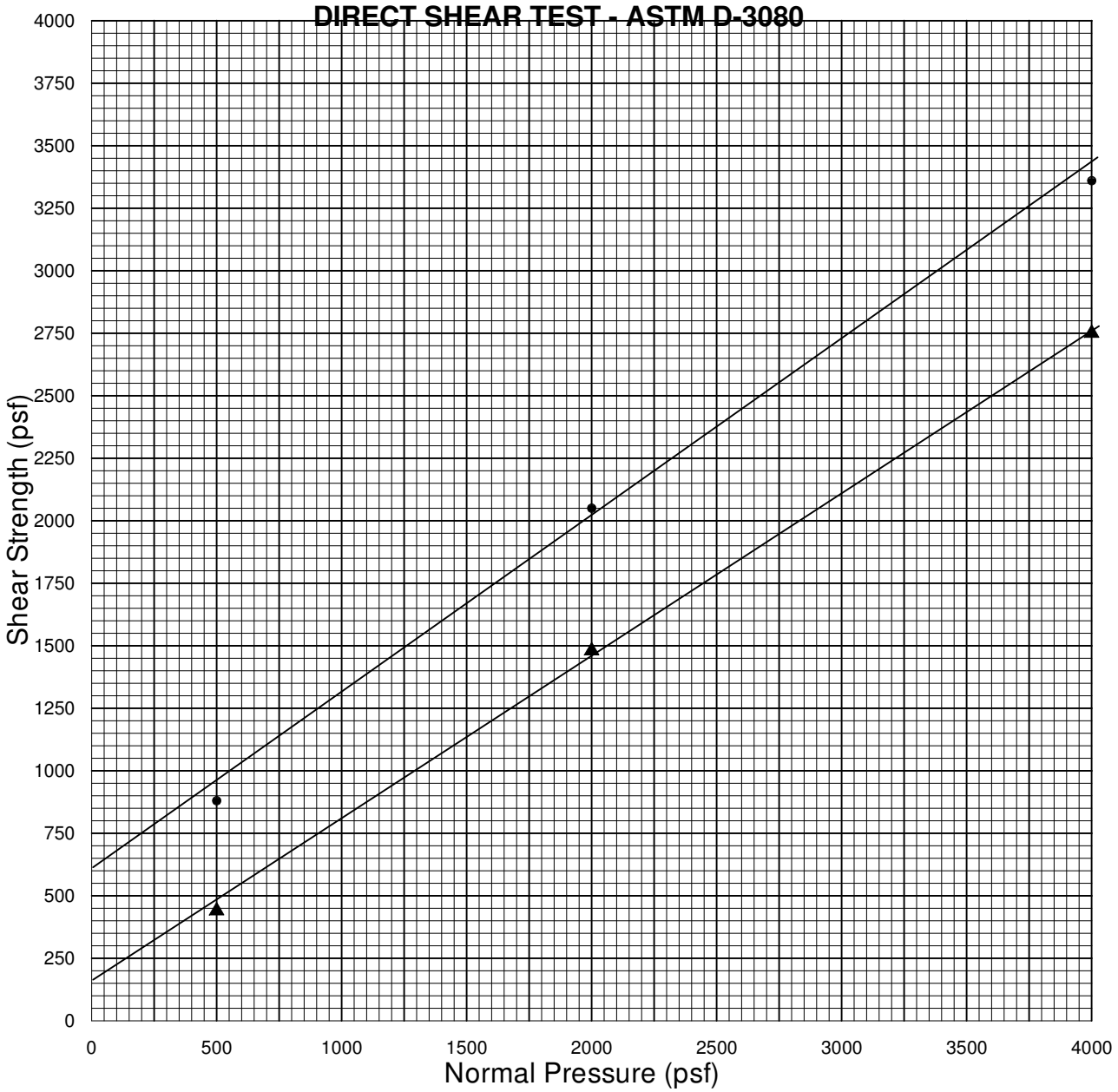
Project No. : I-436

Date : 05/30/08

GRAIN SIZE ANALYSIS

(ASTM D-422)

Figure No. : B-2



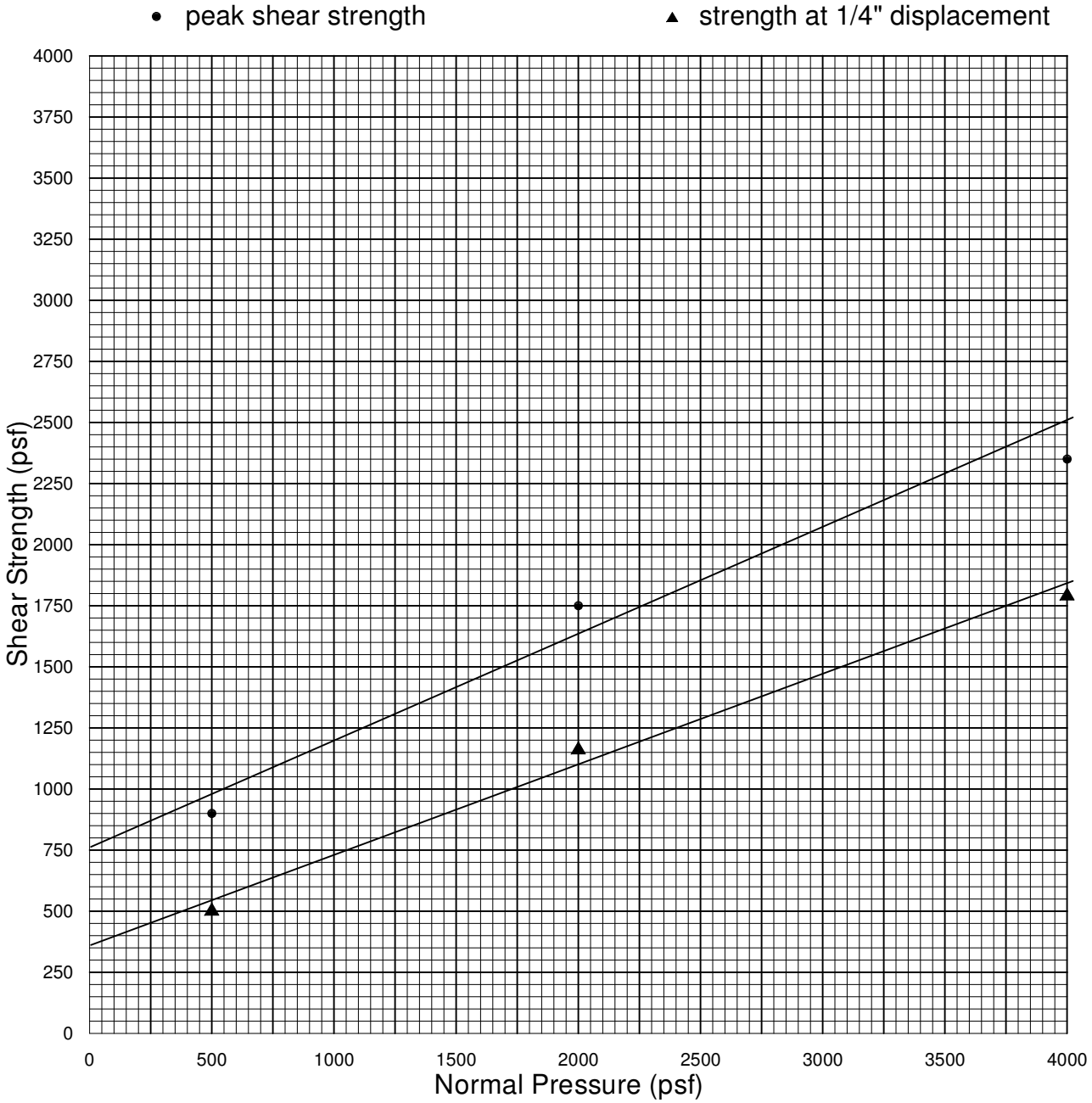
Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-004 @ 3'-5'	Undisturbed & Saturated	Sandy Lean Clay	120.4	10.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	880 @ 0.0750"	440
2000	2050 @ 0.1000"	1480
4000	3360 @ 0.1050"	2750
	C = 600 psf	C = 150 psf
	ϕ = 35 deg.	ϕ = 33 deg.

FIGURE B-3a

DIRECT SHEAR TEST - ASTM D-3080



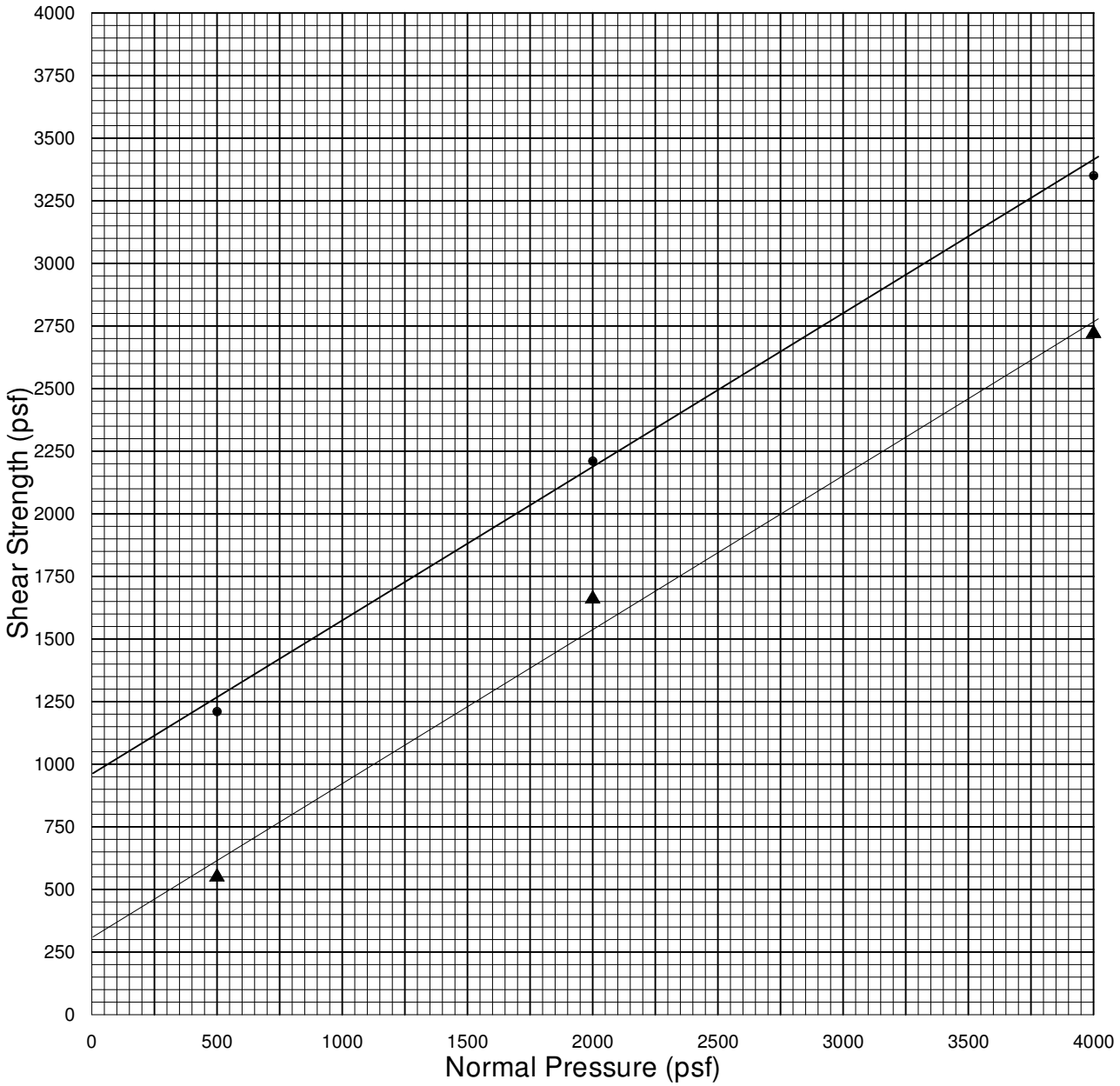
Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-017 @ 10'-11.5'	Undisturbed & Saturated	Lean Clay w/Sand	92.4	25.8

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	900 @ 0.0500"	500
2000	1750 @ 0.0550"	1160
4000	2350 @ 0.0650"	1790
	C = 750 psf	C = 350 psf
	ϕ = 24 deg.	ϕ = 20 deg.

FIGURE B-3b

DIRECT SHEAR TEST - ASTM D-3080

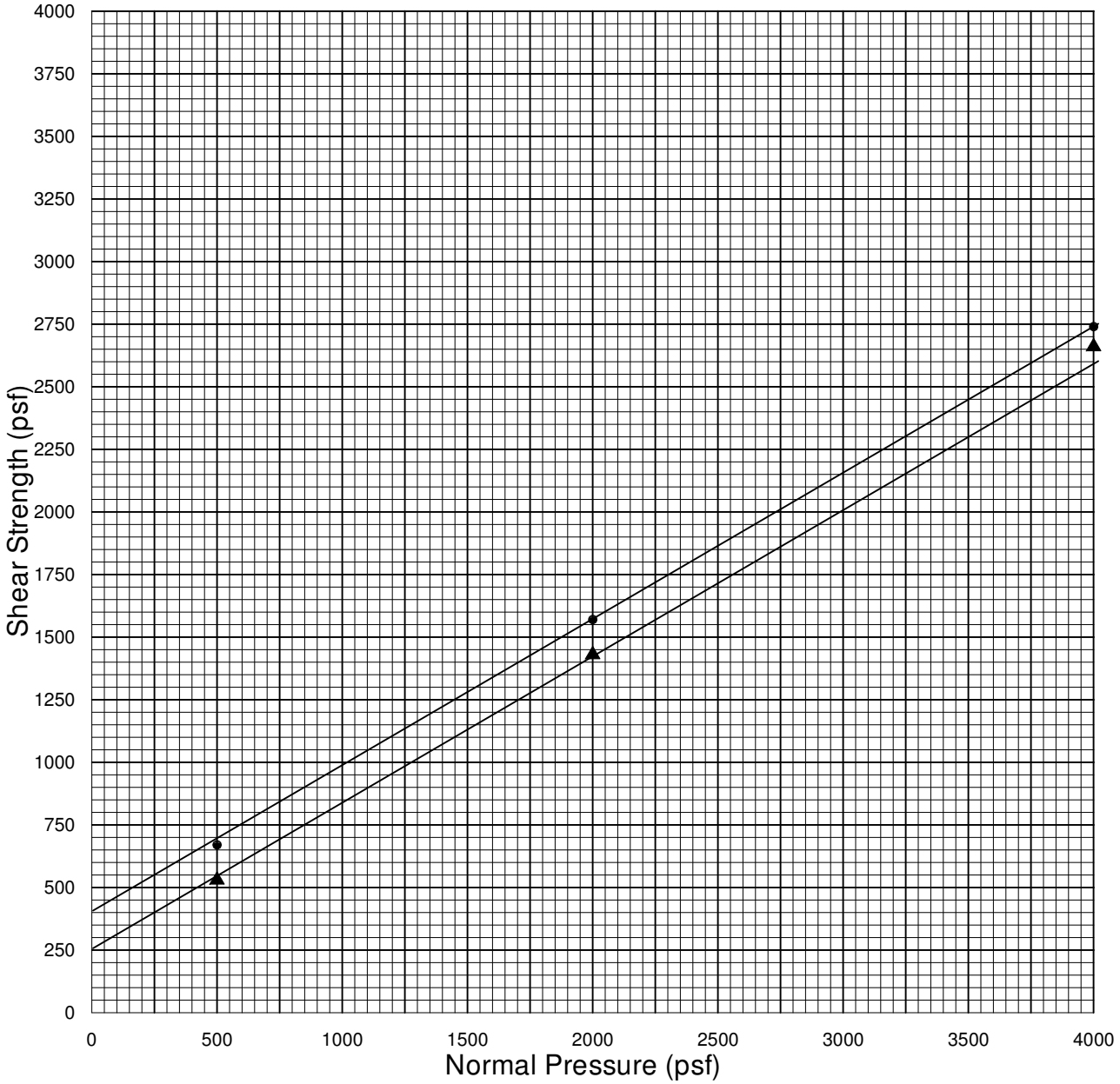


Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-019 @ 10'-11.5'	Undisturbed & Saturated	Sandy Lean Clay	115.5	15.9

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	1210 @ 0.0600"	550
2000	2210 @ 0.0900"	1660
4000	3350 @ 0.0800"	2720
	C = 900 psf	C = 300 psf
	ϕ = 32 deg.	ϕ = 32 deg.

Figure B-3c



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-023 @ 26'-26.5'	Undisturbed & Saturated	Sandy Lean Clay/ Lean Clay w/Sand	94.6	28.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	670 @ 0.1000"	530
2000	1570 @ 0.1200"	1430
4000	2740 @ 0.2000"	2660
	C = 400 psf	C = 250 psf
	ϕ = 30 deg.	ϕ = 30 deg.

Figure B-3d

Boring / Sample No.	R-08-005	Depth:	5' - 6.5'	Date	05-13-08

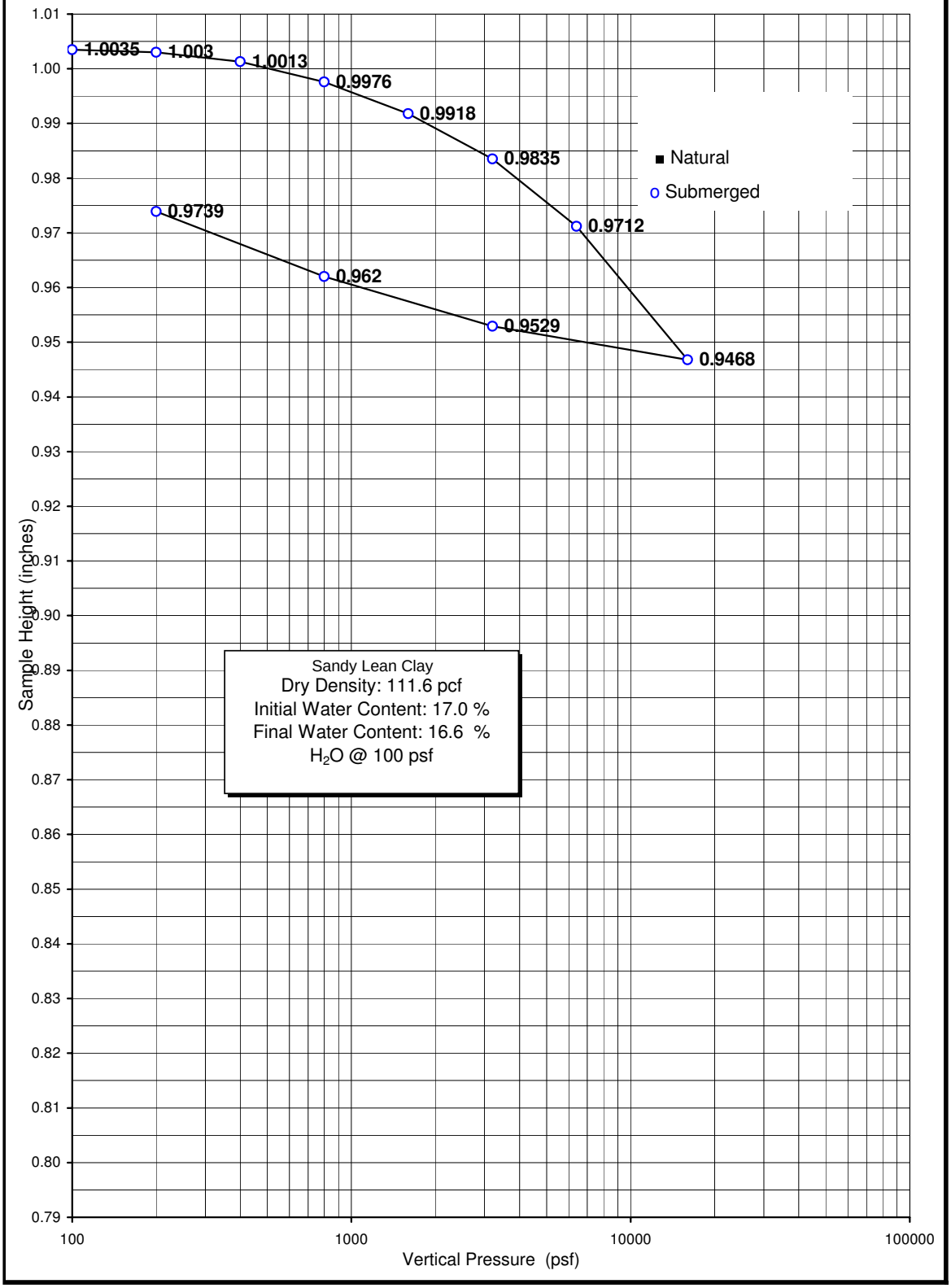


Figure No. B-4a

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-011	Depth:	20' - 21.5'	Date	05-13-08

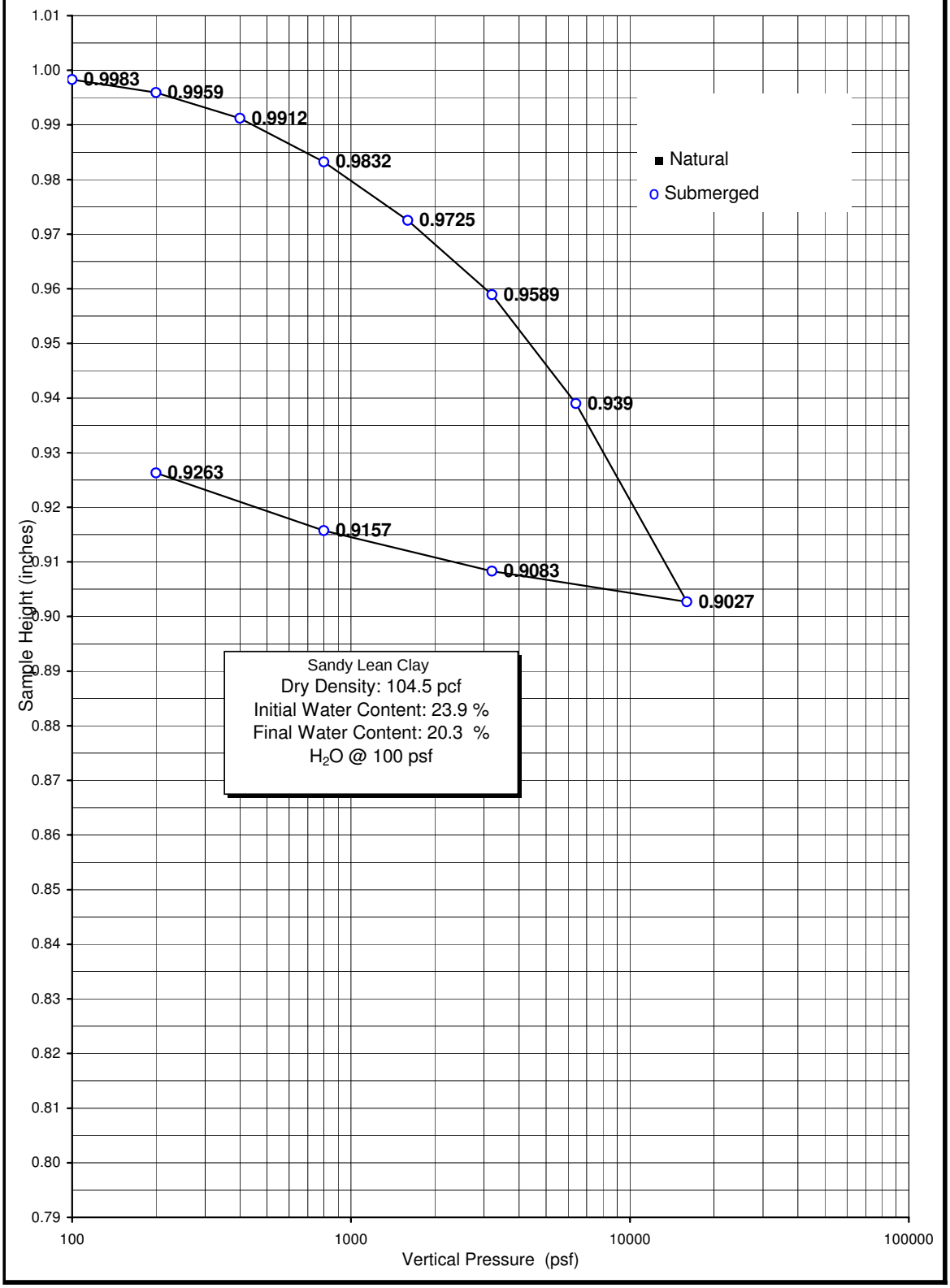


Figure No. B-4b

Boring / Sample No.	R-08-017	Depth:	40' - 41.5'	Date	05-13-08

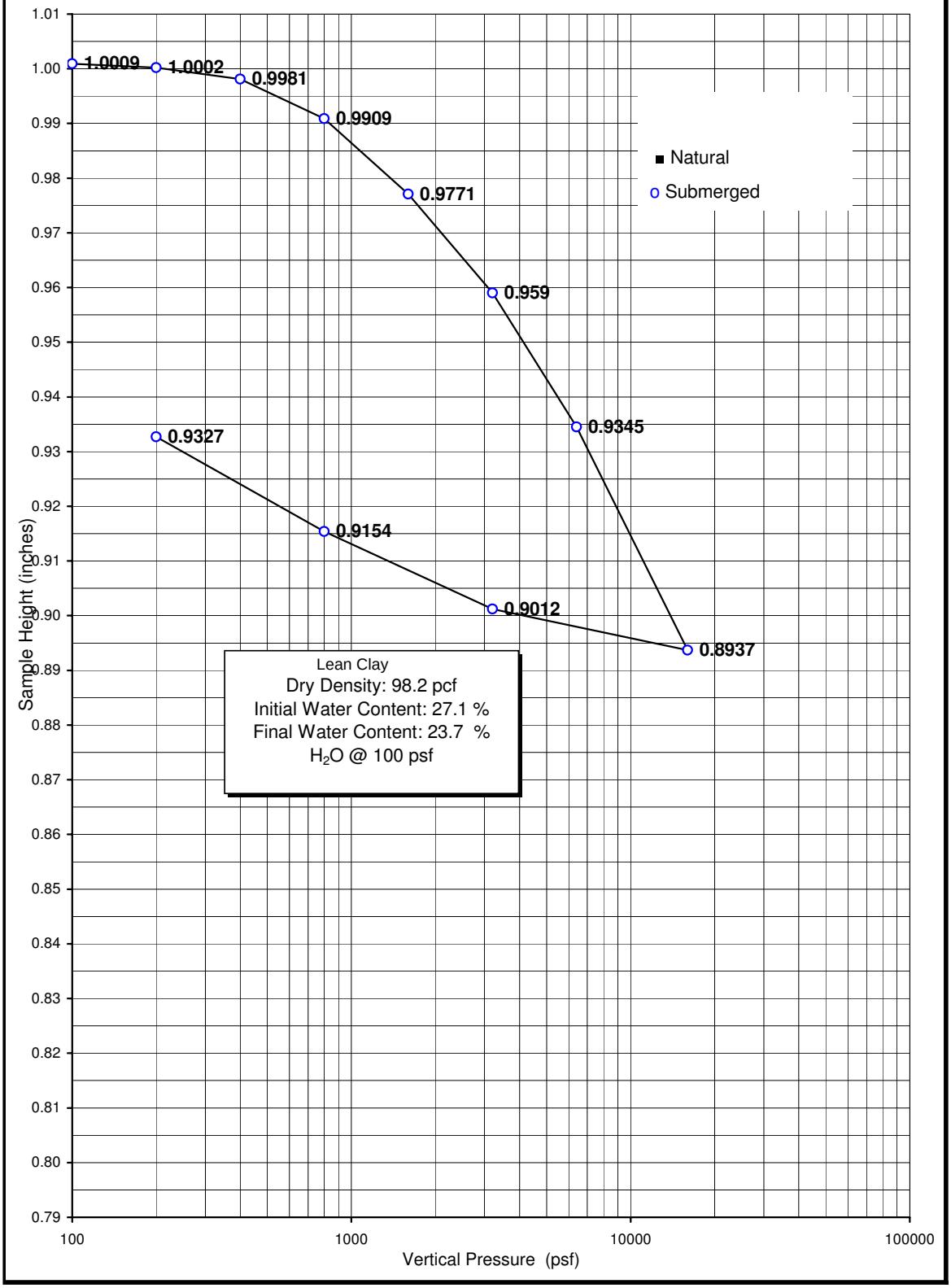


Figure No. B-4c

Boring / Sample No.	A-08-122	Depth:	5' - 6.5'	Date	05-13-08

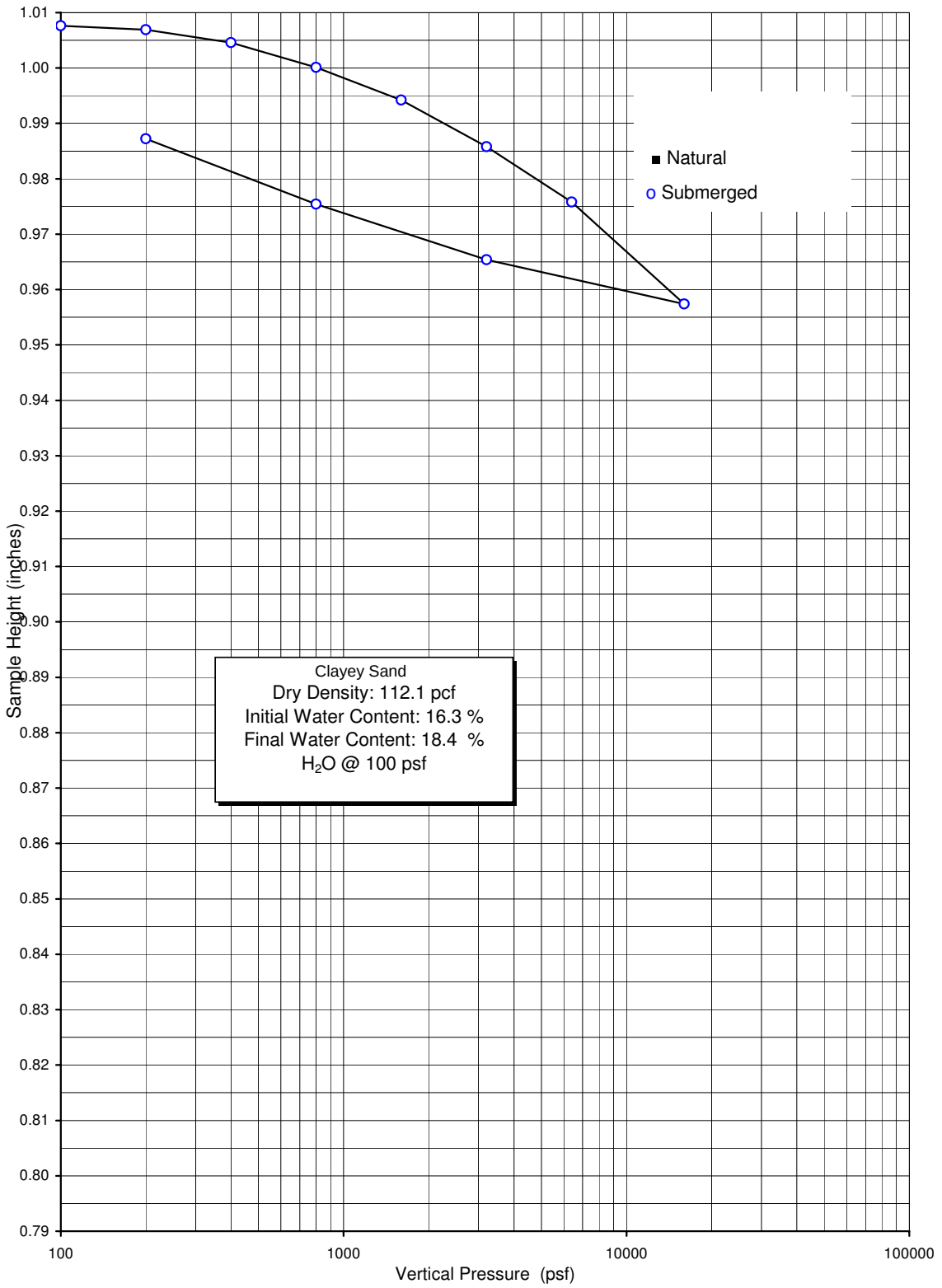


Figure No. B-4d

Geo**L**ogic **A**ssociates

Boring / Sample No.	A-08-120	Depth:	15' - 16.5'	Date	05-13-08

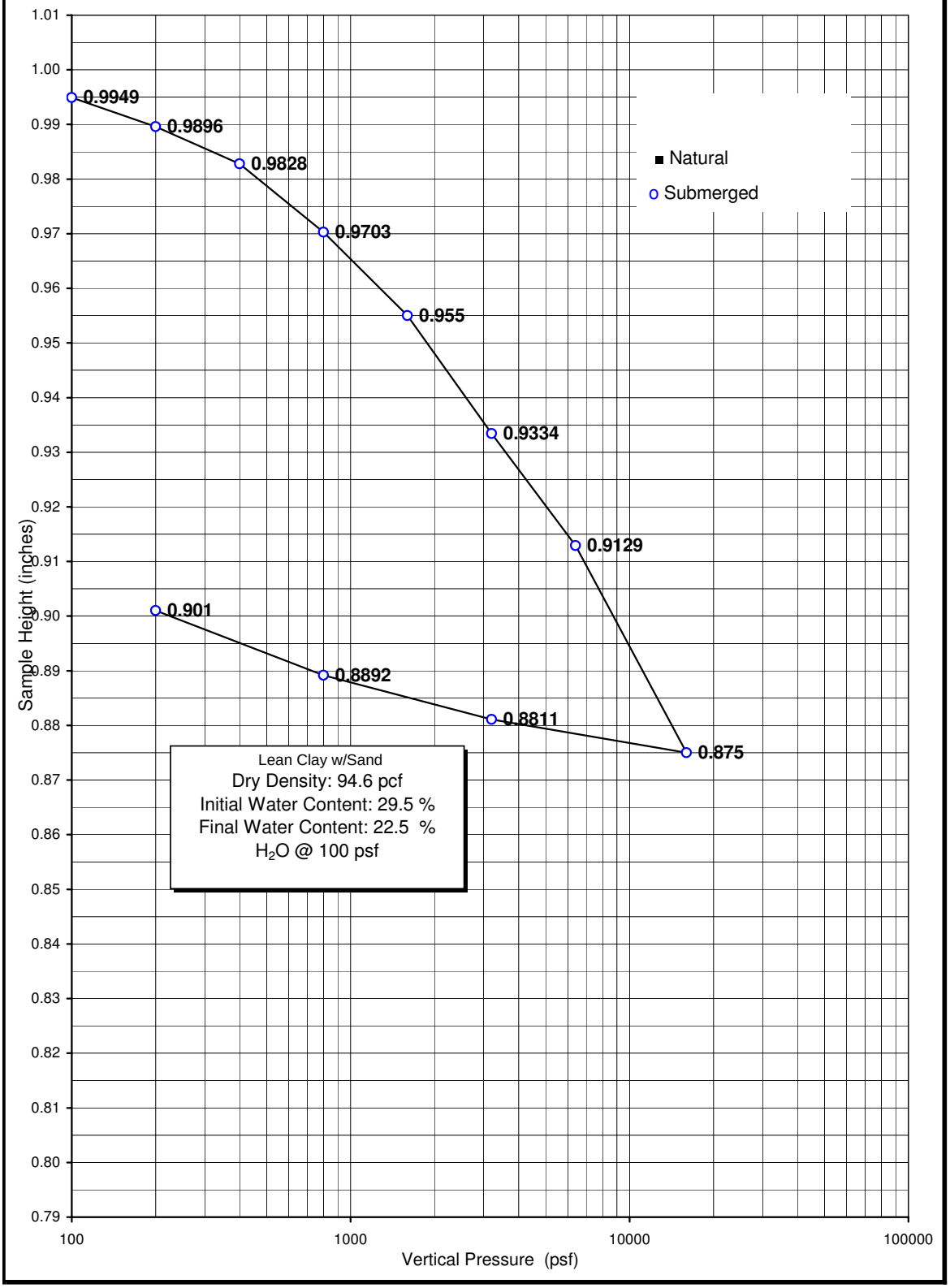


Figure No. 4-e

Geo**L**ogic **A**ssociates

APPENDIX C
PROFILE GRADE SHEETS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. Exp. CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

PARSONS
2201 DUPONT DRIVE
SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

NOTE: ALL ELEVATIONS SHOWN ARE AT 25' INTERVAL UNLESS OTHERWISE NOTED.

+10% +5% 0% -5% -10%

R=2960' L+

300+91.25 BC

+00

+4% R+ ETW & ES

AXIS OF ROTATION @ JOIN LINE

MATCH LINE Sta 310+50 SEE SHEET PS-2

306+00
Elev 31.40
Elev 31.48
Elev 31.55
Elev 31.61
Elev 31.64
Elev 31.69
Elev 31.74
Elev 31.78
Elev 31.81
Elev 31.81
Elev 31.81
Elev 31.79
Elev 31.77
Elev 31.74
Elev 31.69
Elev 31.64
Elev 31.57
Elev 31.49
Elev 31.46

0.32% 0.28% 0.24% 0.12% 0.20% 0.20% 0.16% 0.12% 0.00% -0.00% 0.08% -0.08% 0.12% -0.20% 0.20% -0.28% 0.32% -0.12%

OG - 60' R+ "NB405" LINE

PG (R+) - 60' R+ "NB405" LINE

SUPERELEVATION DIAGRAM

"NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE

"NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-1

50 40 30 20

STATION 1 2 3 4 305 6 7 8 9 310 TOTAL

CY Exc
Emb

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Gibbons

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:14:57 PM
c07162fa001.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa001.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. Exp. CIVIL — STATE OF CALIFORNIA

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SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

REVISED BY | DATE REVISED

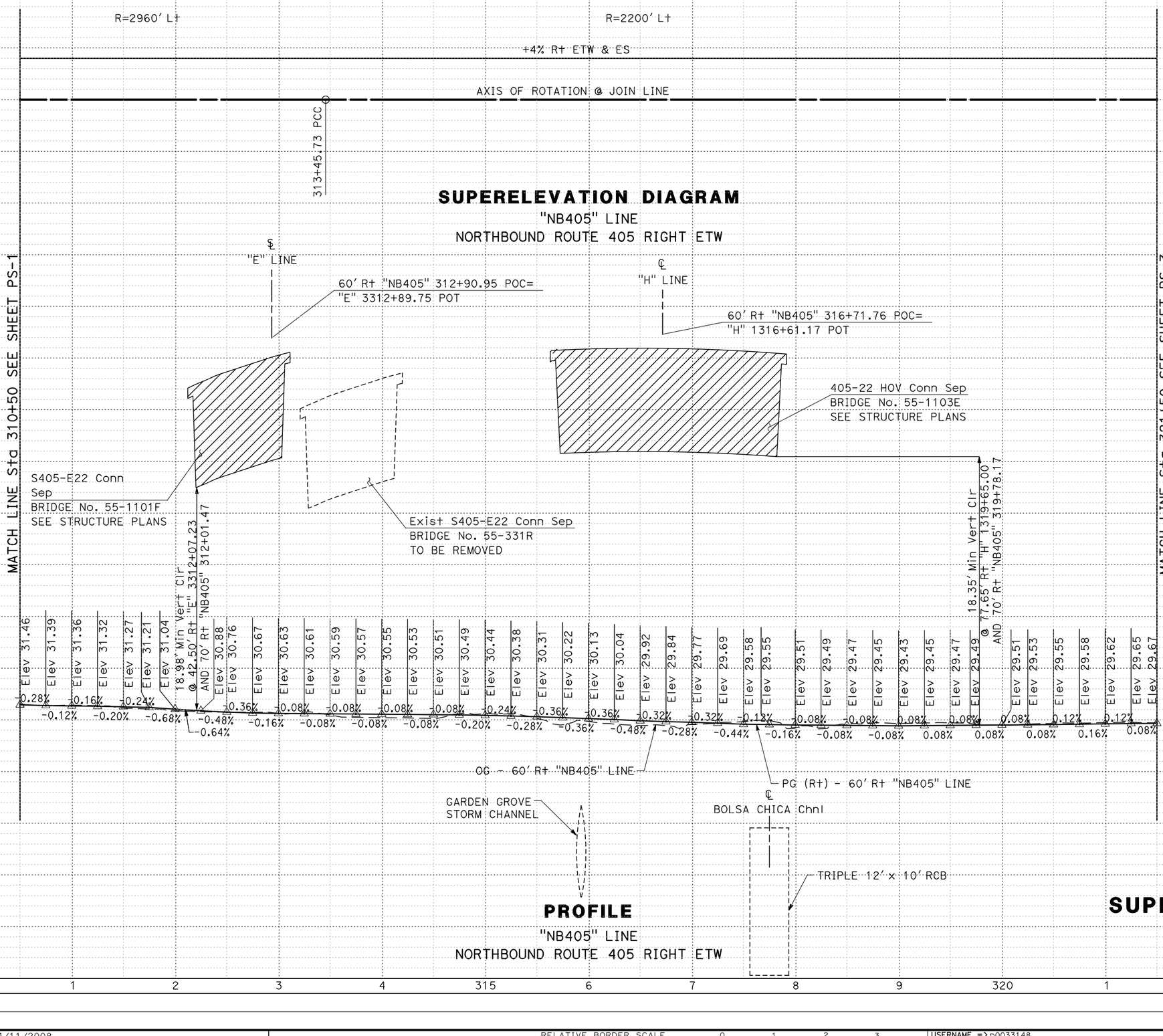
CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW



PROFILE

"NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-2

STATION	1	2	3	4	315	6	7	8	9	320	1	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
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BORDER LAST REVISED 4/11/2008

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CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

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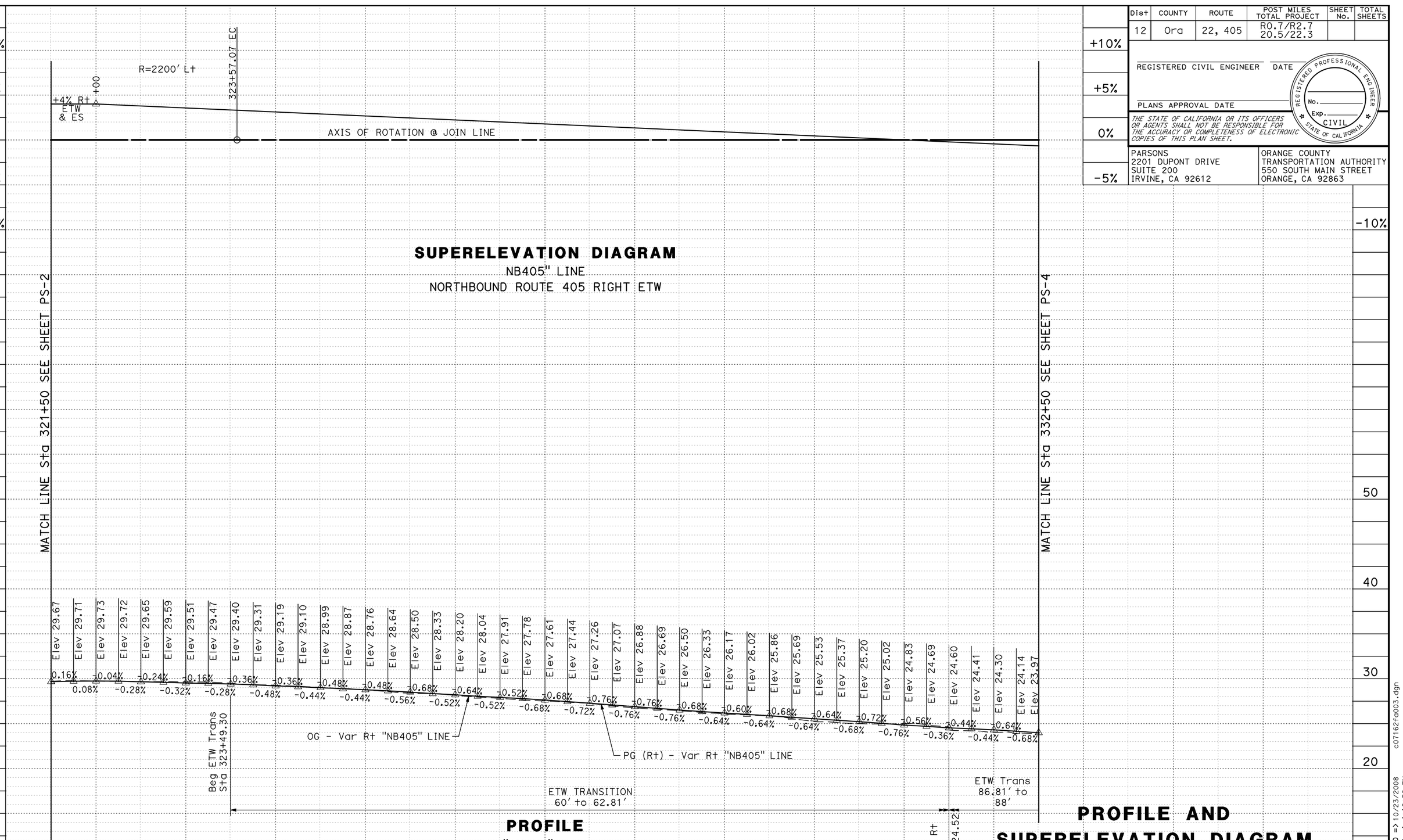
CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW



PROFILE

"NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-3

STATION	2	3	4	325	6	7	8	9	330	1	2	TOTAL
CY Exc												
CY Emb												

c07162fa003.dgn

LAST REVISION 10/23/2008 DATE PLOTTED => 10/23/2008 TIME PLOTTED => 4:16:50 PM

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => p0033148 DGN FILE => c07162fa003.dgn | CU 12235 | EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. Exp. CIVIL — STATE OF CALIFORNIA

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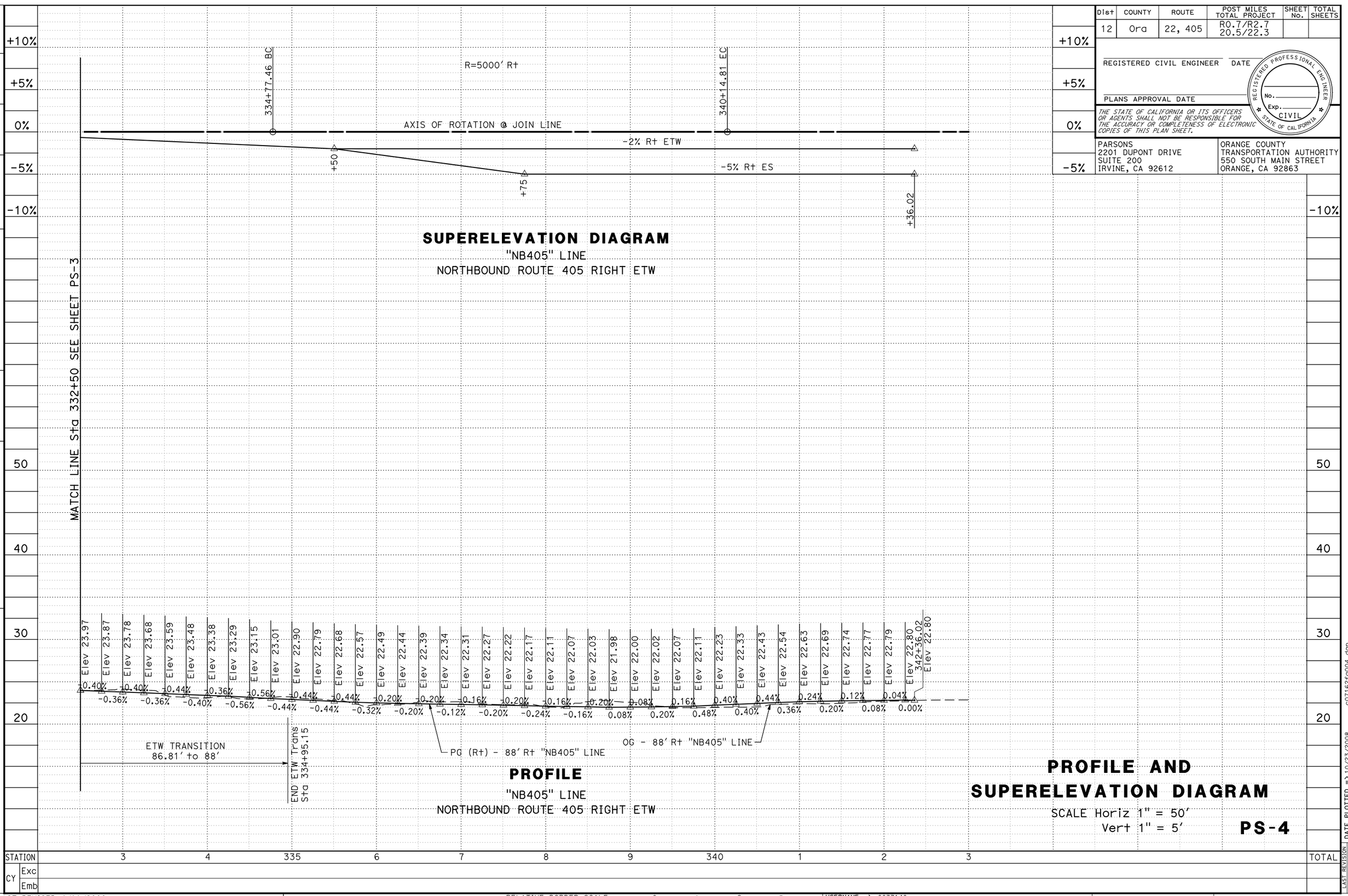
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION



SUPERELEVATION DIAGRAM
"NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE
"NB405" LINE
NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-4

c07162fa004.dgn
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:17:43 PM
LAST REVISION 10/23/2008

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USERNAME => p0033148
DGN FILE => c07162fa004.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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+10%
+5%
0%
-5%
-10%

AXIS OF ROTATION @ JOIN LINE

-2% Rt ETW

-5% Rt ES

+36.02

SUPERELEVATION DIAGRAM

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW

MATCH LINE "A" LINE Sta 351+50 SEE SHEET PS-6

342+36.02
Elev 22.80 -0.14%
Elev 22.78 -0.12%
Elev 22.75 -0.28%
Elev 22.68 -0.16%
Elev 22.64 -0.24%
Elev 22.58 -0.20%
Elev 22.53 -0.20%
Elev 22.48 -0.20%
Elev 22.43 -0.04%
Elev 22.42 -0.12%
Elev 22.39 -0.20%
Elev 22.34 -0.20%
Elev 22.29 -0.20%
Elev 22.24 -0.16%
Elev 22.20 -0.12%
Elev 22.17 -0.20%
Elev 22.14 -0.16%
Elev 22.09 -0.24%
Elev 22.05 -0.20%
Elev 21.99 -0.24%
Elev 21.93 -0.20%
Elev 21.88 -0.12%
Elev 21.82 -0.08%
Elev 21.79 -0.16%
Elev 21.77 -0.12%
Elev 21.75 -0.16%
Elev 21.72 -0.16%
Elev 21.68 -0.20%
Elev 21.64 -0.28%
Elev 21.60 -0.20%
Elev 21.55 -0.04%
Elev 21.48 -0.08%
Elev 21.41
Elev 21.36
Elev 21.35
Elev 21.34
Elev 21.32
Elev 21.30

OG - 111' Rt "A" LINE

PG (Rt) - 111' Rt "A" LINE

PROFILE

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-5

STATION	2	3	4	345	6	7	8	9	350	1	TOTAL
CY Exc											
CY Emb											

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DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:18:41 PM

c07162fa005.dgn

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa005.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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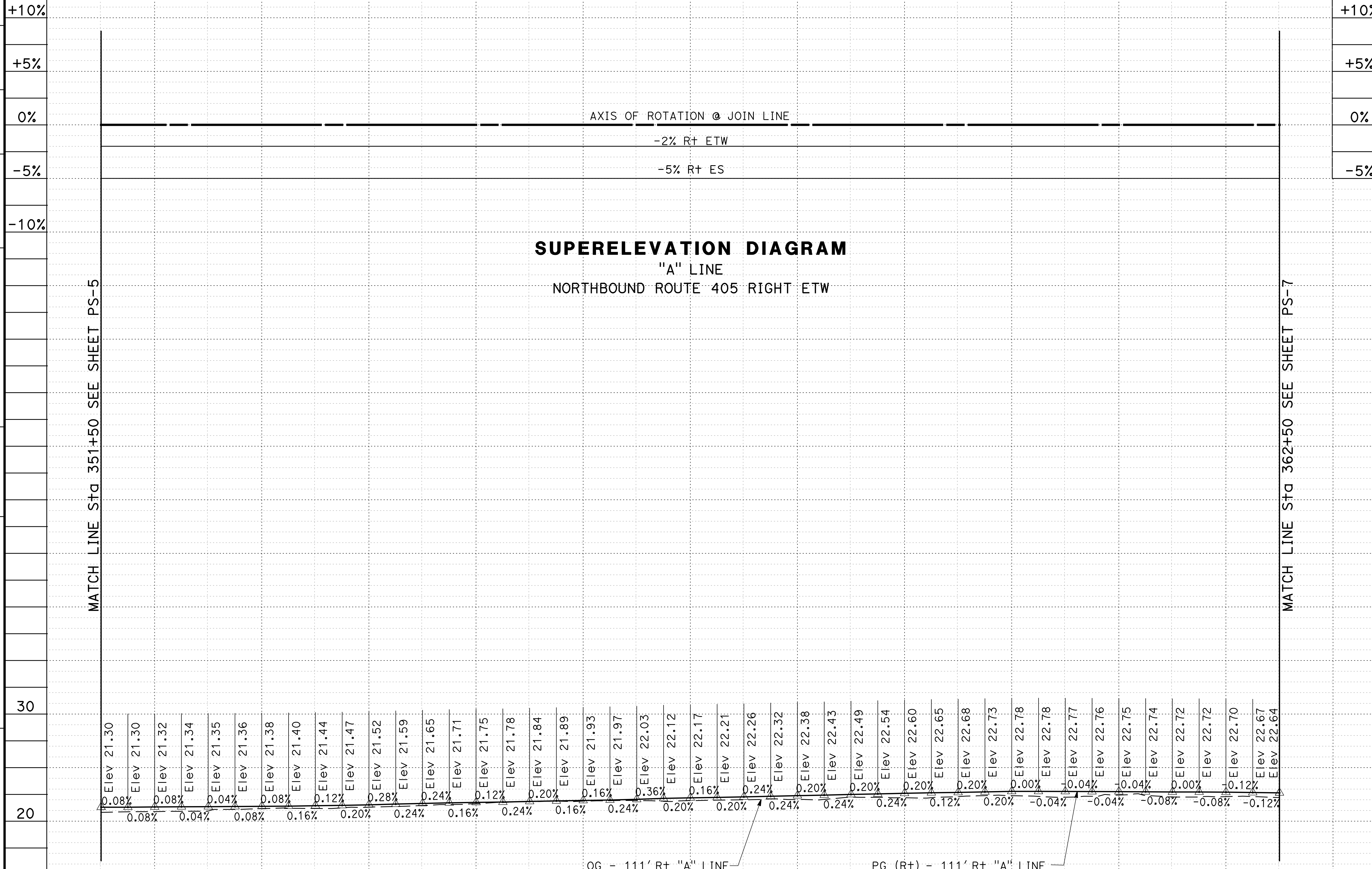

PROFILE

"A" LINE
NORTHBOUND ROUTE 405 RIGHT ETW

STATION	2	3	4	355	6	7	8	9	360	1	2	TOTAL
CY Exc												
CY Emb												

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-6

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA
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LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:19:36 PM
c07162fa006.dgn

BORDER LAST REVISED 4/11/2008
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
USERNAME => p0033148
DGN FILE => c07162fa006.dgn
CU 12235
EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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CONSULTANT FUNCTIONAL SUPERVISOR

CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

-2% Rt ETW

-5% Rt ES

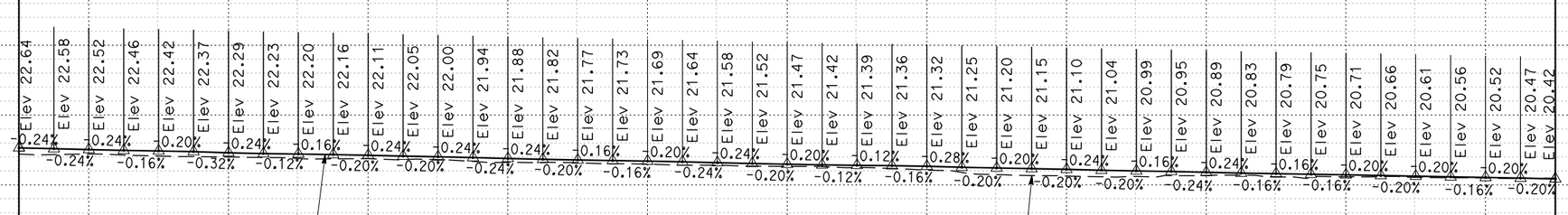
MATCH LINE Sta 362+50 SEE SHEET PS-6

MATCH LINE Sta 373+50 SEE SHEET PS-8

SUPERELEVATION DIAGRAM

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW



PROFILE

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-7

STATION	3	4	365	6	7	8	9	370	1	2	3	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:20:31 PM

c07162fa007.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa007.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW

+10% / +5% / 0% / -5% / -10%

AXIS OF ROTATION @ JOIN LINE

-2% Rt ETW

-5% Rt ES

MATCH LINE Sta 373+50 SEE SHEET PS-7

MATCH LINE Sta 384+50 SEE SHEET PS-9

30 / 20

Elev 20.42 Elev 20.38 Elev 20.35 Elev 20.28 Elev 20.23 Elev 20.19 Elev 20.15 Elev 20.10 Elev 20.05 Elev 20.00 Elev 19.95 Elev 19.90 Elev 19.86 Elev 19.84 Elev 19.82 Elev 19.80 Elev 19.70 Elev 19.65 Elev 19.61 Elev 19.59 Elev 19.57 Elev 19.54 Elev 19.50 Elev 19.49 Elev 19.49 Elev 19.49 Elev 19.51 Elev 19.53 Elev 19.57 Elev 19.60 Elev 19.64 Elev 19.67 Elev 19.71 Elev 19.75 Elev 19.85 Elev 19.91 Elev 19.93 Elev 19.95 Elev 19.98 Elev 20.00 Elev 20.05 Elev 20.10 Elev 20.16 Elev 20.25

0.16% -0.12% -0.28% -0.20% -0.16% -0.16% -0.20% -0.20% -0.20% -0.20% -0.16% -0.08% -0.08% -0.40% -0.20% -0.16% -0.08% -0.08% -0.12% -0.16% -0.04% 0.00% 0.00% 0.00% 0.08% 0.16% 0.12% 0.16% 0.12% 0.16% 0.16% 0.40% 0.24% 0.08% 0.12% 0.08% 0.20% 0.24% 0.36%

OG - 111' Rt "A" LINE

PG (Rt) - 111' Rt "A" LINE

PROFILE

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-8

STATION	4	375	6	7	8	9	380	1	2	3	4	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:21:26 PM

c07162fa008.dgn

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa008.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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CONSULTANT FUNCTIONAL SUPERVISOR

CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

-2% Rt ETW

-5% Rt ES

395+50.02

SUPERELEVATION DIAGRAM

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW

MATCH LINE Sta 384+50 SEE SHEET PS-8

30 20

Elev 20.25 0.16% Elev 20.29 0.08% Elev 20.31 0.24% Elev 20.33 0.04% Elev 20.39 0.04% Elev 20.40 0.04% Elev 20.41 0.04% Elev 20.42 0.04% Elev 20.43 0.04% Elev 20.44 0.08% Elev 20.43 0.08% Elev 20.41 0.16% Elev 20.39 0.12% Elev 20.35 0.24% Elev 20.31 0.28% Elev 20.28 0.32% Elev 20.24 0.40% Elev 20.18 0.40% Elev 20.10 0.36% Elev 20.03 0.20% Elev 19.93 0.28% Elev 19.85 0.24% Elev 19.75 0.64% Elev 19.65 0.36% Elev 19.56 0.36% Elev 19.48 0.32% Elev 19.43 0.32% Elev 19.36 0.40% Elev 19.29 0.32% Elev 19.21 0.44% Elev 19.15 0.28% Elev 19.07 0.48% Elev 18.91 0.32% 395+50.02 Elev 18.76 0.60% Elev 18.67 0.44% Elev 18.56 0.36% Elev 18.47 0.36% Elev 18.38 0.32% Elev 18.30 0.40% Elev 18.20 0.32% Elev 18.12 0.44% Elev 18.05 0.28% Elev 17.94 0.48% Elev 17.82 0.32% Elev 17.74

OG - 111′ Rt "A" LINE

PG (Rt) - 111′ Rt "A" LINE

PROFILE

"A" LINE

NORTHBOUND ROUTE 405 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50′
Vert 1" = 5′

PS-9

STATION	385	6	7	8	9	390	1	2	3	4	395	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:22:21 PM

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BORDER LAST REVISED 4/11/2008

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USERNAME => p0033148
DGN FILE => c07162fa009.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. Exp. CIVIL — STATE OF CALIFORNIA

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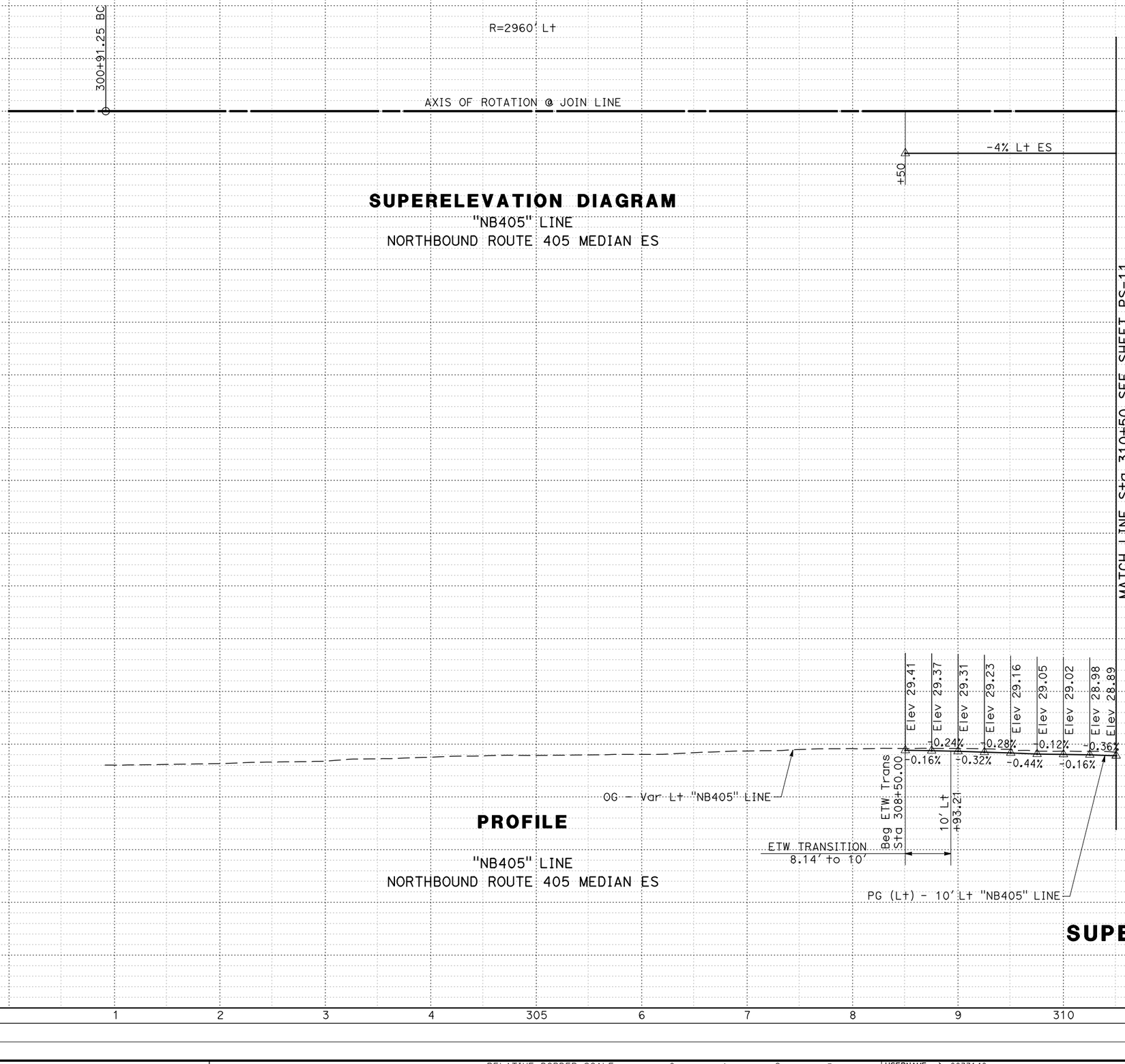
CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"NB405" LINE
NORTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"NB405" LINE
NORTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-10

STATION: 1 2 3 4 305 6 7 8 9 310 TOTAL

CY: Exc | Emb

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:23:15 PM
c07162fa010.dgn

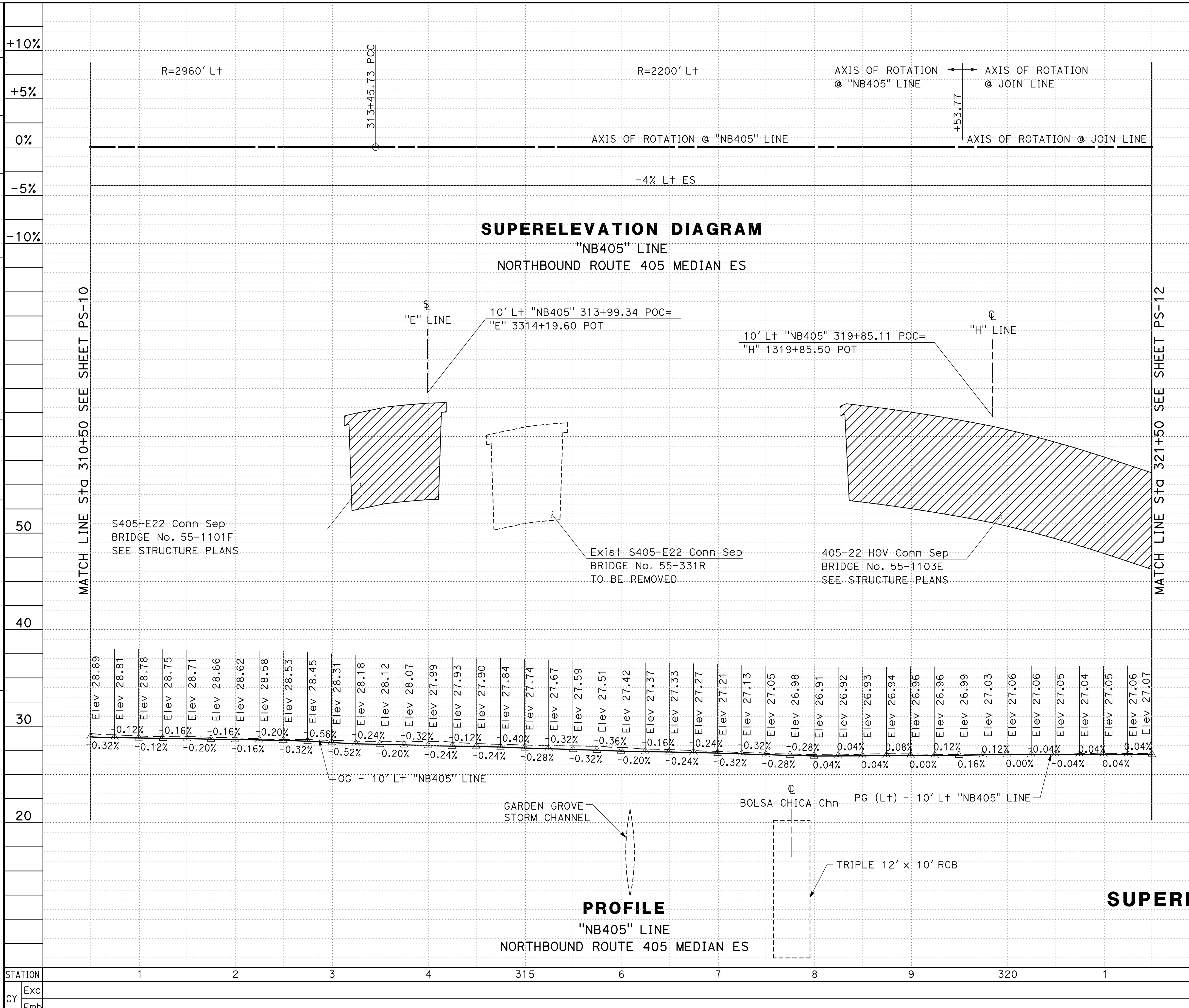
BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa010.dgn

CU 12235

EA 071621



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50′
Vert 1" = 5′

PS-11

TOTAL

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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TIME PLOTTED => 4:24:13 PM

LAST REVISION 10/23/2008

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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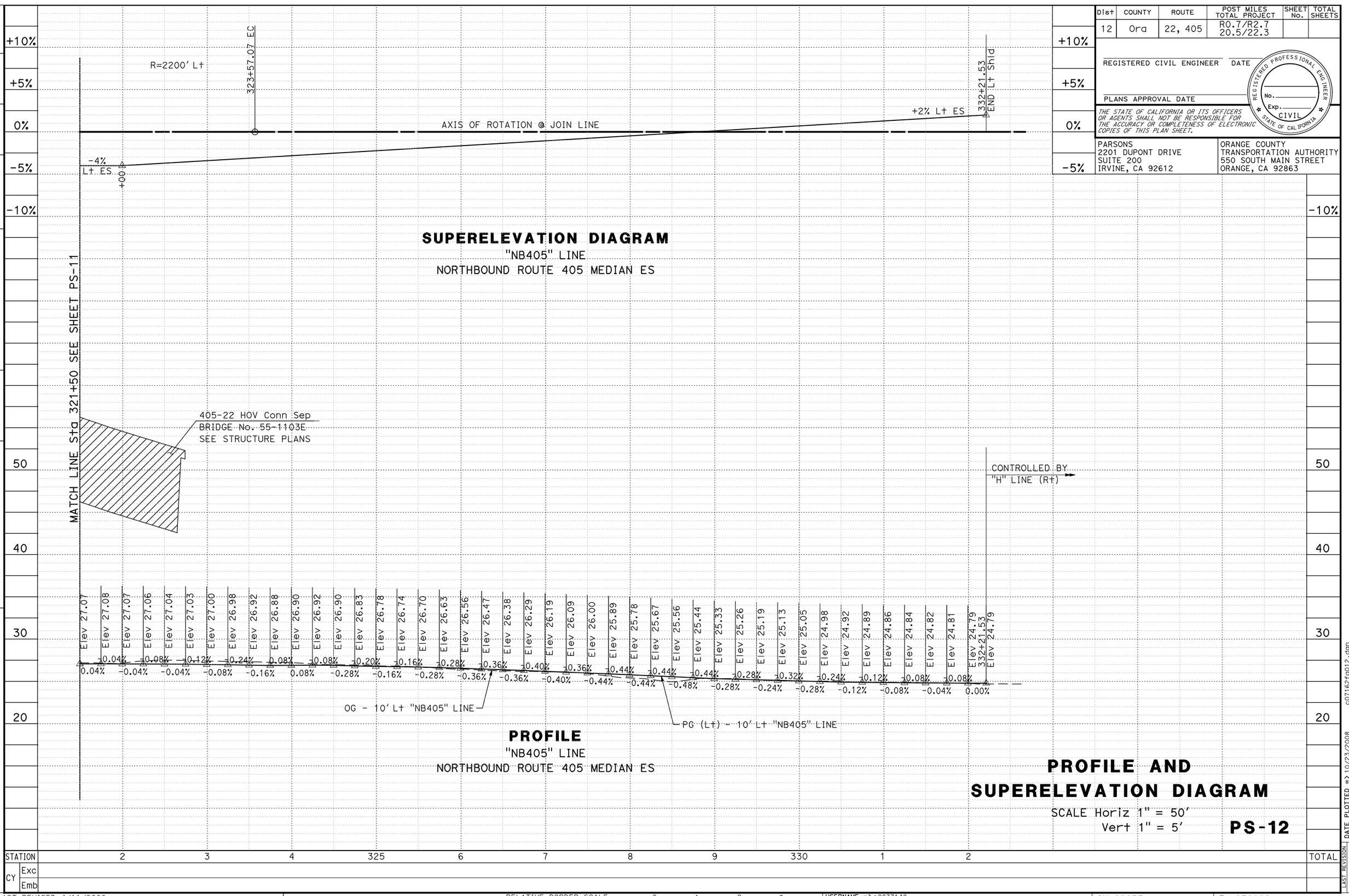

SUPERELEVATION DIAGRAM
"NB405" LINE
NORTHBOUND ROUTE 405 MEDIAN ES

PROFILE
"NB405" LINE
NORTHBOUND ROUTE 405 MEDIAN ES

STATION	2	3	4	325	6	7	8	9	330	1	2	TOTAL
CY Exc												
CY Emb												

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-12

LAST REVISION DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:25:17 PM

c07162fa012.dgn

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa012.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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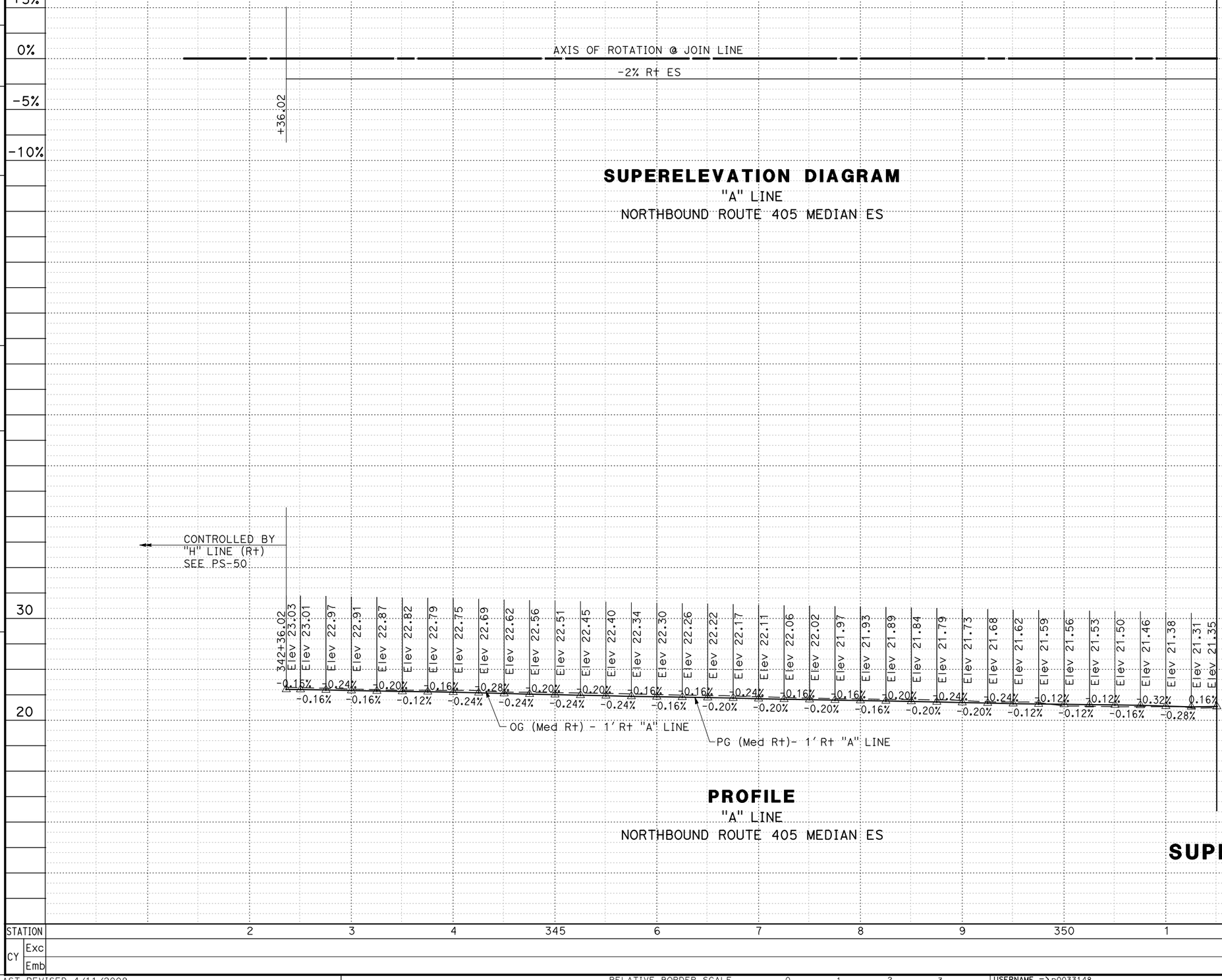
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"A" LINE

NORTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"A" LINE

NORTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-13

STATION	2	3	4	345	6	7	8	9	350	1	TOTAL
CY Exc											
CY Emb											

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:26:31 PM
c07162fa013.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa013.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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ORANGE, CA 92863

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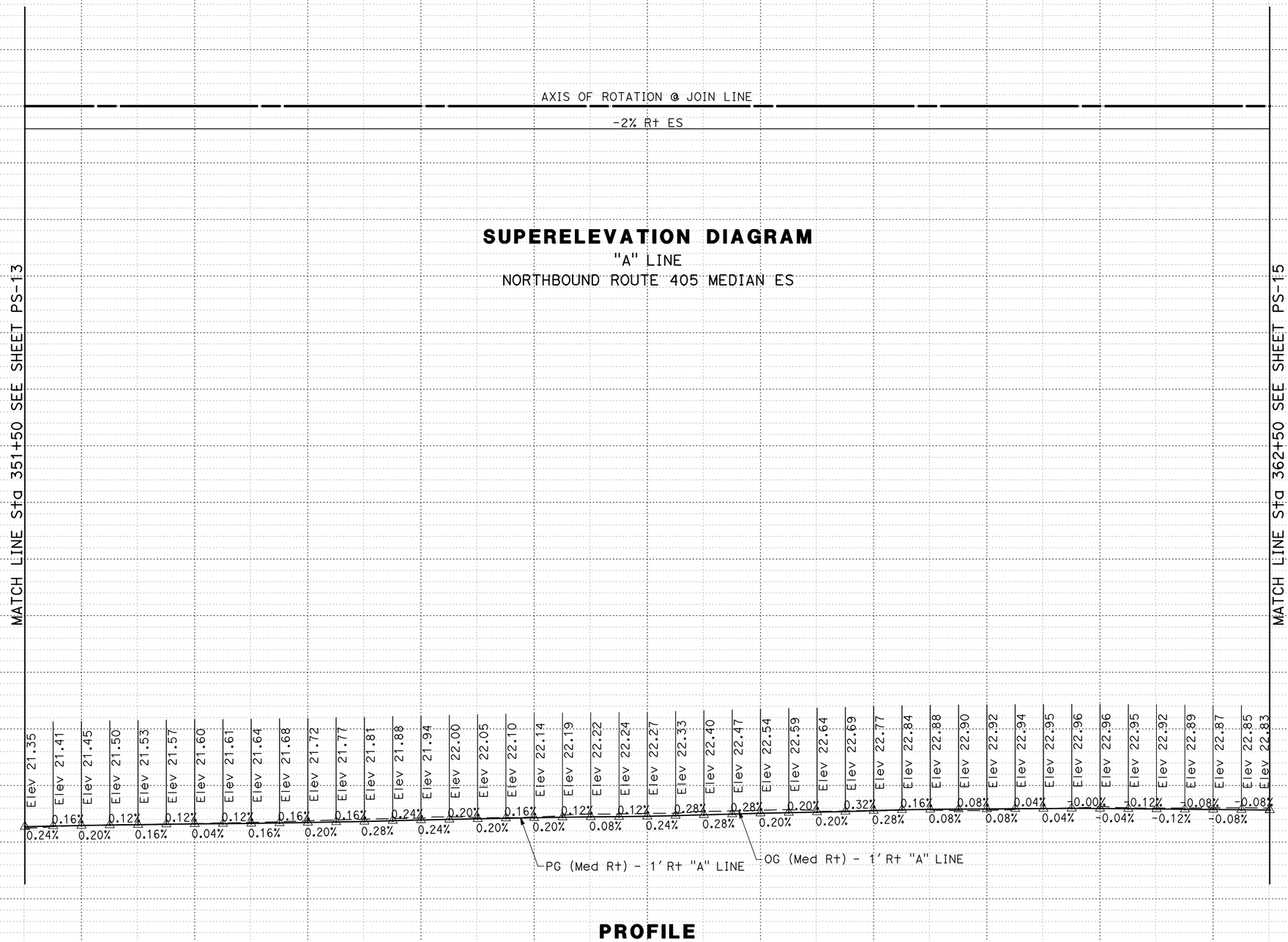
CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"A" LINE
NORTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"A" LINE
NORTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-14

STATION	2	3	4	355	6	7	8	9	360	1	2	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:27:41 PM
c07162fa014.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa014.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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ORANGE COUNTY
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550 SOUTH MAIN STREET
ORANGE, CA 92863

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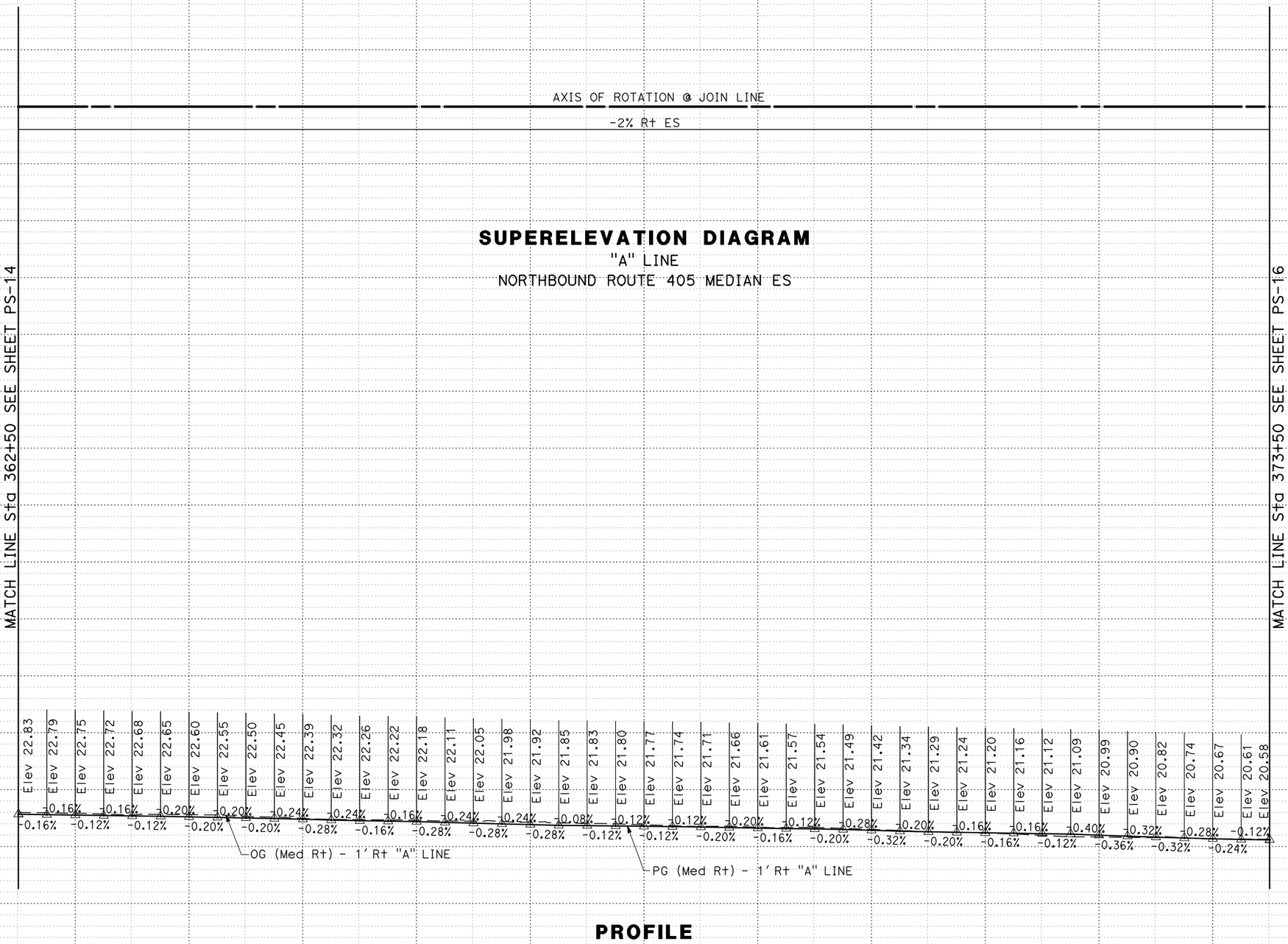
CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"A" LINE

NORTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"A" LINE

NORTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-15

STATION	3	4	365	6	7	8	9	370	1	2	3	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:28:37 PM
c07162fa015.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa015.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

-2% Rt ES

MATCH LINE

LINE Sta 373+50 SEE SHEET PS-15

LINE Sta 384+50 SEE SHEET PS-17

MATCH LINE

SUPERELEVATION DIAGRAM

"A" LINE

NORTHBOUND ROUTE 405 MEDIAN ES

30 20

Elev 20.58 Elev 20.55 Elev 20.52 Elev 20.48 Elev 20.45 Elev 20.38 Elev 20.32 Elev 20.26 Elev 20.20 Elev 20.13 Elev 20.05 Elev 20.02 Elev 19.99 Elev 19.96 Elev 19.93 Elev 19.90 Elev 19.88 Elev 19.83 Elev 19.78 Elev 19.73 Elev 19.69 Elev 19.65 Elev 19.62 Elev 19.59 Elev 19.61 Elev 19.63 Elev 19.66 Elev 19.69 Elev 19.73 Elev 19.78 Elev 19.82 Elev 19.86 Elev 19.90 Elev 19.93 Elev 19.99 Elev 20.04 Elev 20.09 Elev 20.11 Elev 20.14 Elev 20.20 Elev 20.27 Elev 20.33 Elev 20.38 Elev 20.43 Elev 20.49

-0.12% -0.12% -0.16% -0.12% -0.28% -0.24% -0.24% -0.28% -0.32% -0.12% -0.12% -0.12% -0.12% -0.08% -0.20% -0.20% -0.16% -0.12% -0.16% -0.12% -0.12% 0.08% 0.12% 0.16% 0.20% 0.16% 0.16% 0.12% 0.24% 0.20% 0.08% 0.12% 0.24% 0.28% 0.24% 0.20%

PG (Med Rt) - 1' Rt "A" LINE

OG (Med Rt) - 1' Rt "A" LINE

PROFILE

"A" LINE

NORTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-16

STATION	4	375	6	7	8	9	380	1	2	3	4	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:29:35 PM
c07162fa016.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa016.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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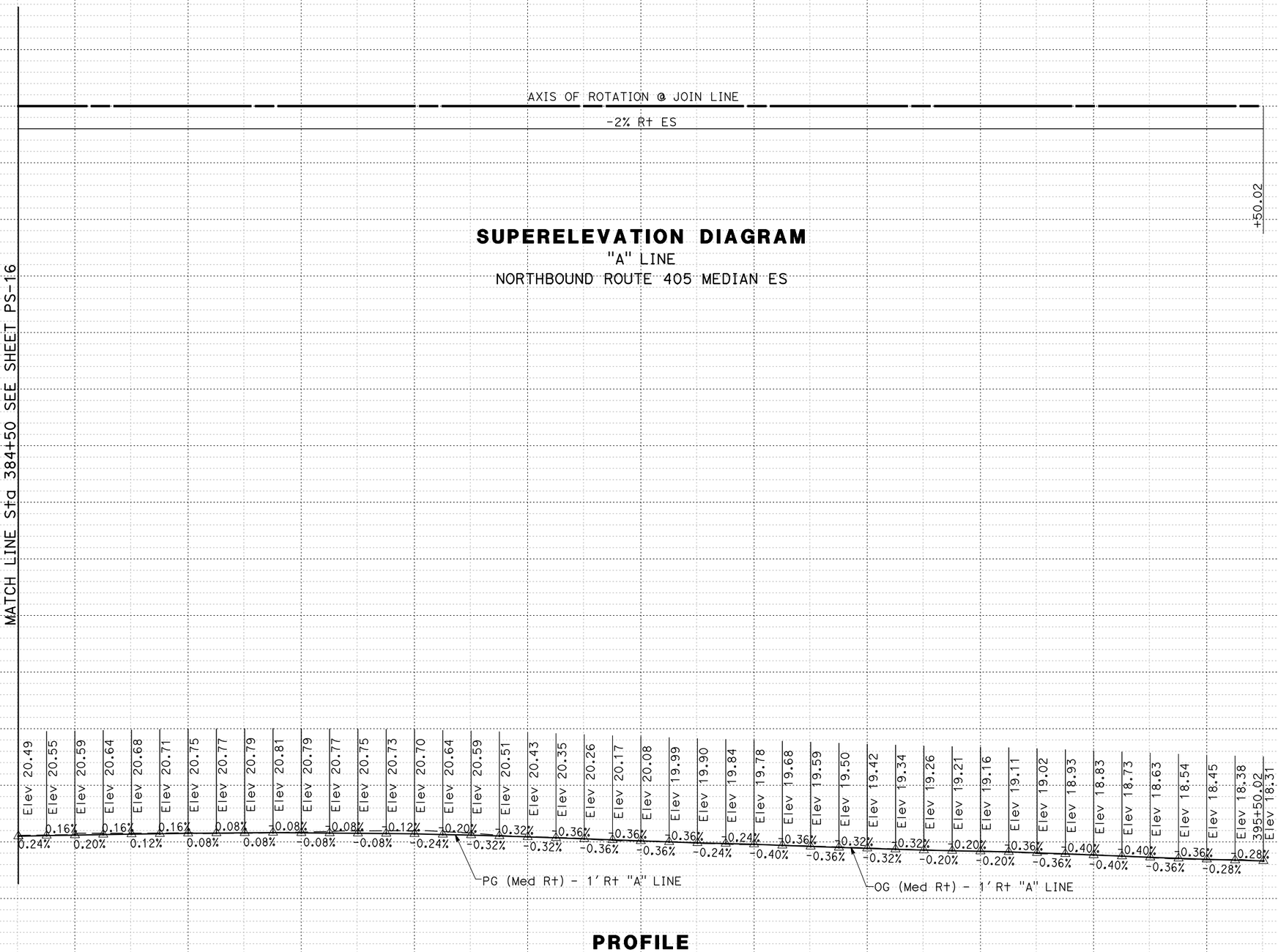
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

SUPERELEVATION DIAGRAM

"A" LINE
NORTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"A" LINE
NORTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-17

STATION	385	6	7	8	9	390	1	2	3	4	395	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:30:44 PM
c07162fa017.dgn

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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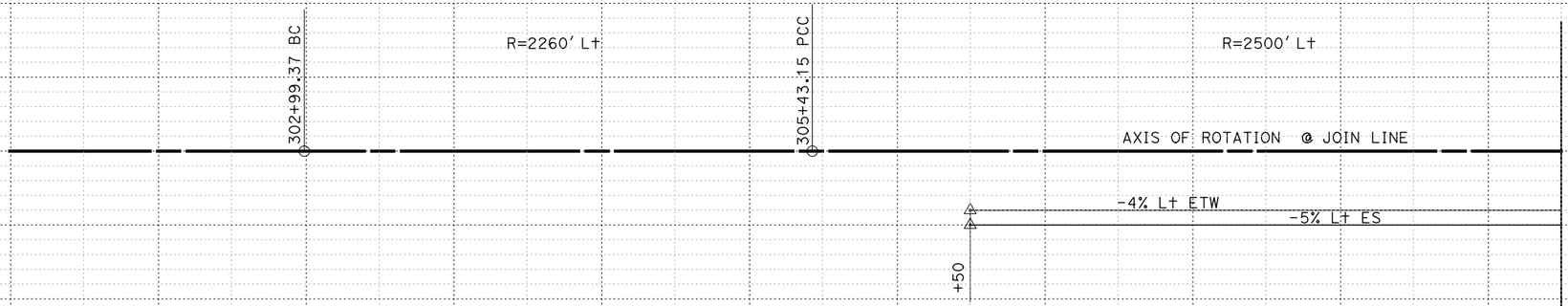
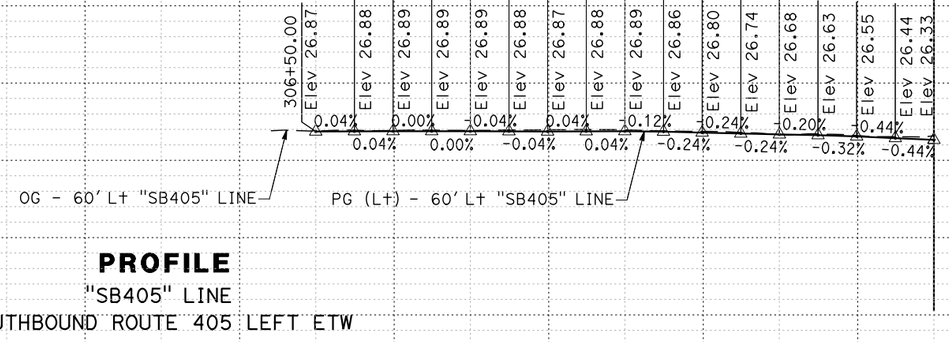


SUPERELEVATION DIAGRAM

"SB405" LINE
SOUTHBOUND ROUTE 405 LEFT ETW



PROFILE

"SB405" LINE
SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-18

STATION 1 2 3 4 305 6 7 8 9 310 TOTAL

CY Exc
CY Emb

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TIME PLOTTED => 4:31:52 PM
c07162fa018.dgn

BORDER LAST REVISED 4/11/2008
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
USERNAME => p0033148
DGN FILE => c07162fa018.dgn
CU 12235
EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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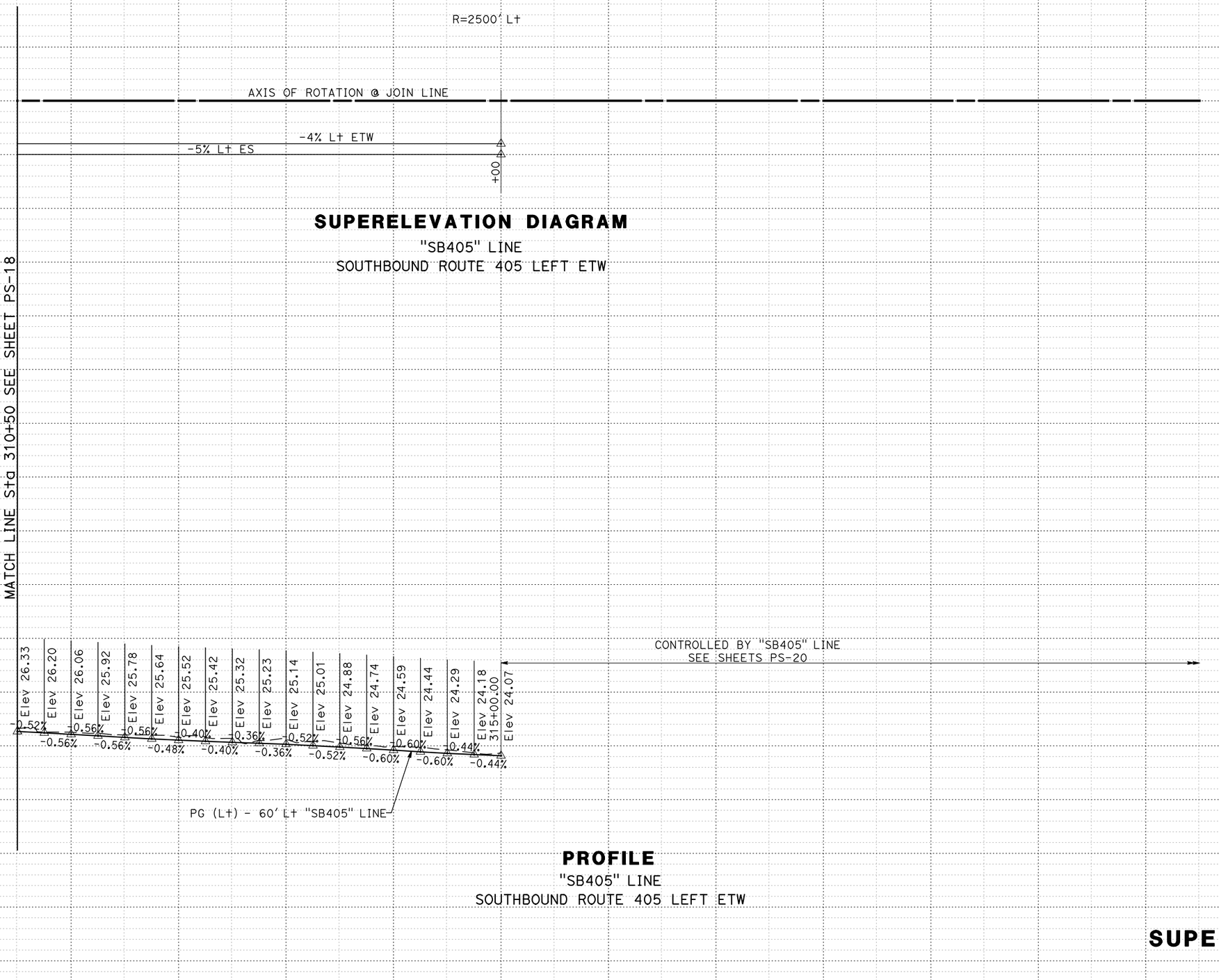

SUPERELEVATION DIAGRAM

"SB405" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE

"SB405" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-19

STATION	1	2	3	4	315	TOTAL
CY Exc						
CY Emb						

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:32:46 PM
c07162fa019.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa019.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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+10% +5% 0% -5% -10%

+00 Beg R+ Shld
+00
3.91%
5% R+ ES
AXIS OF ROTATION @ "SB405" LINE
-3.91%
+00
-5%
L+ ETW & ES
+95
R=2500' L+
323+45.29 EC
+65
2% R+ ES
-2% L+ ETW
-5% L+ ES
+95

SUPERELEVATION DIAGRAM

"SB405" LINE
SOUTHBOUND ROUTE 405

℄ "E" LINE

60' L+ "SB405" 316+32.65 POC= "E" 3316+54.08 POT

S405-E22 Conn Sep
BRIDGE No. 55-1101F
SEE STRUCTURE PLANS

Exist S405-E22 Conn Sep
BRIDGE No. 55-331R
TO BE REMOVED

MATCH LINE Sta 325+50 SEE SHEET PS-21

60 50 40 30 20

LVC=200'
315+00.00 BVC Elev 26.44
316+00.00 PVI Elev 26.04
317+00.00 PVRC Elev 26.74
319+00.00 PVI Elev 28.15
321+00.00 EVC Elev 27.11
325+00.00 BVC Elev 25.03
-0.40% 0.70%
-0.52%
LVC=400'
200' VC

℄ BOLSA CHICA Chnl
PG - "SB405" LINE
OG - "SB405" LINE
GARDEN GROVE STORM CHANNEL
TRIPLE 12' x 10' RCB

PROFILE

"SB405" LINE
SOUTHBOUND ROUTE 405

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-20

STATION	315	6	7	8	9	320	1	2	3	4	325	TOTAL
CY Exc												
CY Emb												

c07162fa020.dgn
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:33:43 PM
LAST REVISION 10/23/2008

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USERNAME => p0033148
DGN FILE => c07162fa020.dgn

CU 12235 | EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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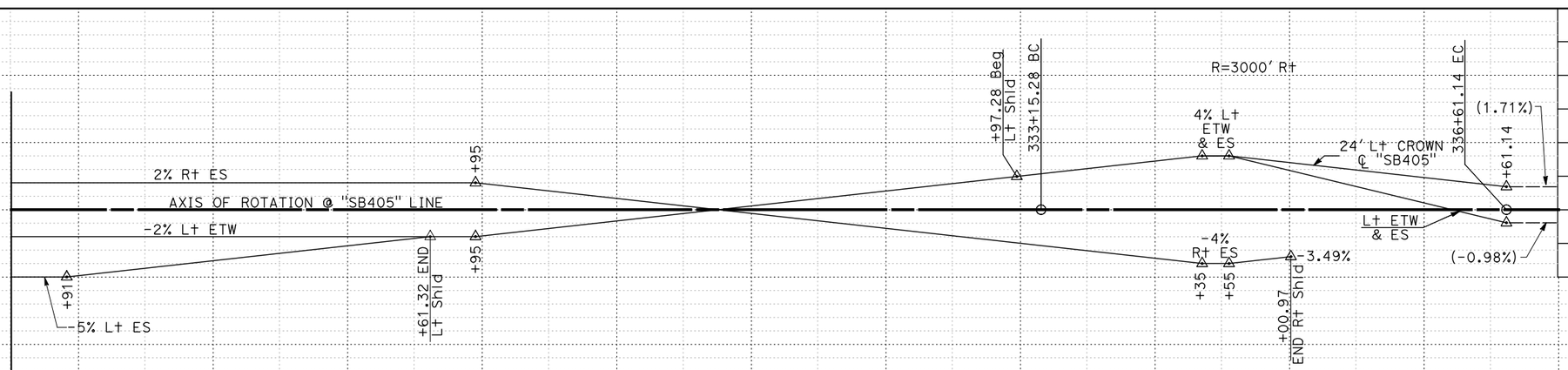
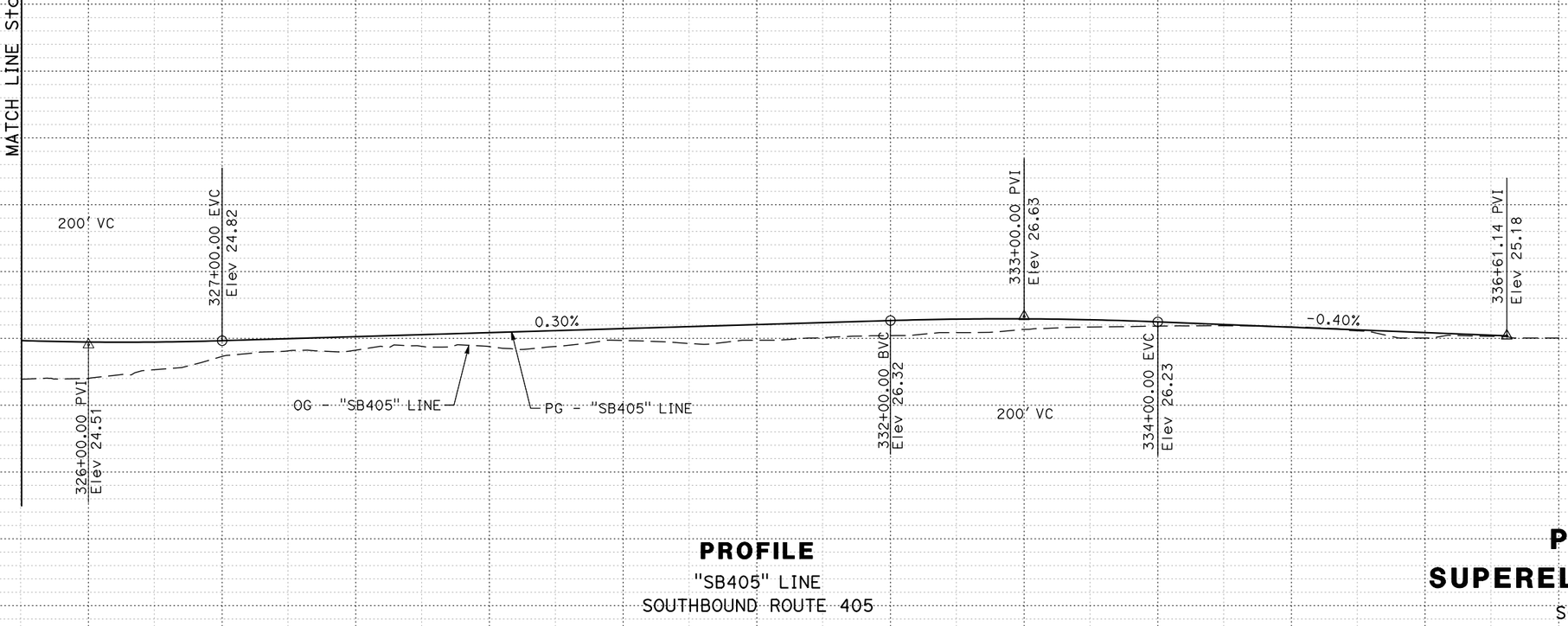


SUPERELEVATION DIAGRAM

"SB405" LINE
SOUTHBOUND ROUTE 405

NOTES: SEE SHT C-41 FOR DETAILS



PROFILE

"SB405" LINE
SOUTHBOUND ROUTE 405

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-21

STATION	6	7	8	9	330	1	2	3	4	335	6	TOTAL
CY Exc												
CY Emb												

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa021.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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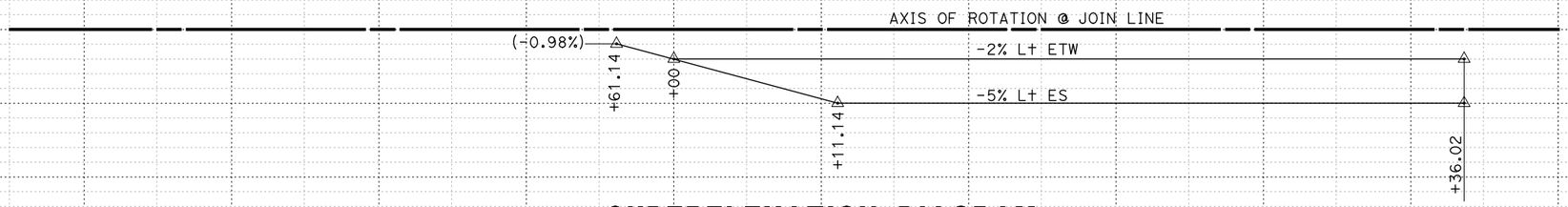
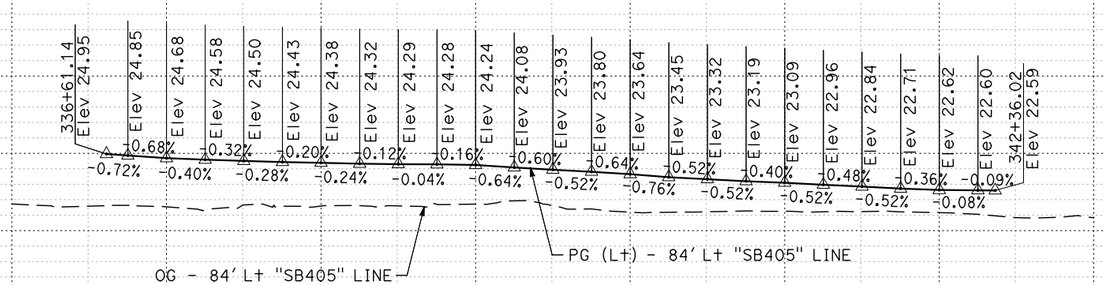


SUPERELEVATION DIAGRAM

"SB405" LINE
SOUTHBOUND ROUTE 405 LEFT ETW



PROFILE

"SB405" LINE
SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-22

STATION	6	7	8	9	340	1	2	3	TOTAL
CY Exc									
CY Emb									

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:35:31 PM
c07162fa022.dgn

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => p0033148 DGN FILE => c07162fa022.dgn | CU 12235 | EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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Caltrans

+10% +5% 0% -5% -10%

342+36.02

AXIS OF ROTATION @ JOIN LINE

-2% Lt ETW

-5% Lt ES

LINE Sta 351+50 SEE SHEET PS-24

MATCH LINE

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

30 20

Elev 22.59 Elev 22.57 Elev 22.52 Elev 22.44 Elev 22.39 Elev 22.33 Elev 22.29 Elev 22.26 Elev 22.22 Elev 22.17 Elev 22.14 Elev 22.11 Elev 22.10 Elev 22.07 Elev 22.04 Elev 21.99 Elev 21.94 Elev 21.88 Elev 21.82 Elev 21.75 Elev 21.68 Elev 21.63 Elev 21.58 Elev 21.55 Elev 21.51 Elev 21.43 Elev 21.36 Elev 21.35 Elev 21.31 Elev 21.26 Elev 21.22 Elev 21.17 Elev 21.11 Elev 21.04 Elev 20.98 Elev 20.96 Elev 20.96 Elev 20.98

-0.20% -0.20% -0.16% -0.16% -0.12% -0.04% -0.12% -0.20% -0.24% -0.28% -0.20% -0.12% -0.28% -0.16% -0.28% -0.04% -0.16% -0.16% -0.24% -0.24% 0.00%

-0.14% -0.32% -0.24% -0.12% -0.20% -0.12% -0.12% -0.20% -0.24% -0.28% -0.20% -0.12% -0.32% -0.04% -0.20% -0.20% -0.28% -0.08% -0.08%

Beg ETW Trans Sta 342+36.02

ETW TRANSITION 107.96' to 107'

107' Lt +50

PG (Lt) - 107' Lt "A" LINE

OG - 107' Lt "A" LINE

PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-23

STATION	2	3	4	345	6	7	8	9	350	1	TOTAL
CY Exc											
CY Emb											

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:36:25 PM

c07162fa023.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa023.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

-2% Lt ETW

-5% Lt ES

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

MATCH LINE Sta 351+50 SEE SHEET PS-23

MATCH LINE Sta 362+50 SEE SHEET PS-25

30 20

Elev 20.98 Elev 20.99 Elev 21.00 Elev 21.01 Elev 21.02 Elev 21.07 Elev 21.12 Elev 21.16 Elev 21.20 Elev 21.24 Elev 21.28 Elev 21.43 Elev 21.58 Elev 21.64 Elev 21.67 Elev 21.71 Elev 21.75 Elev 21.80 Elev 21.88 Elev 21.91 Elev 21.89 Elev 21.92 Elev 21.98 Elev 22.04 Elev 22.11 Elev 22.17 Elev 22.23 Elev 22.30 Elev 22.36 Elev 22.41 Elev 22.44 Elev 22.46 Elev 22.49 Elev 22.52 Elev 22.56 Elev 22.58 Elev 22.60 Elev 22.60 Elev 22.58 Elev 22.56 Elev 22.53 Elev 22.50 Elev 22.48 Elev 22.46 Elev 22.42

0.04% 0.04% 0.04% 0.20% 0.20% 0.16% 0.16% 0.16% 0.60% 0.60% 0.24% 0.12% 0.16% 0.16% 0.20% 0.32% 0.12% -0.08% 0.12% 0.24% 0.24% 0.28% 0.24% 0.24% 0.28% 0.20% 0.12% 0.08% 0.12% 0.16% 0.08% 0.00% -0.08% -0.08% -0.12% -0.12% -0.08% -0.08% -0.16%

PG (Lt) - 107' Lt "A" LINE

OG - 107' Lt "A" LINE

PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-24

STATION	2	3	4	355	6	7	8	9	360	1	2	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:37:19 PM

c07162fa024.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa024.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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ORANGE, CA 92863

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CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

-2% Lt ETW

-5% Lt ES

LINE Sta 362+50 SEE SHEET PS-24

LINE Sta 373+50 SEE SHEET PS-26

MATCH LINE

MATCH LINE

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

30

20

Elev 22.42 -0.16% Elev 22.38 -0.32% Elev 22.30 -0.24% Elev 22.24 -0.16% Elev 22.20 -0.20% Elev 22.15 -0.16% Elev 22.11 -0.20% Elev 22.06 -0.24% Elev 22.00 -0.20% Elev 21.95 -0.24% Elev 21.89 -0.20% Elev 21.84 -0.20% Elev 21.79 -0.24% Elev 21.73 -0.24% Elev 21.67 -0.28% Elev 21.60 -0.12% Elev 21.57 -0.16% Elev 21.54 -0.16% Elev 21.50 -0.28% Elev 21.46 -0.20% Elev 21.39 -0.24% Elev 21.33 -0.20% Elev 21.28 -0.24% Elev 21.23 -0.32% Elev 21.17 -0.20% Elev 21.11 -0.08% Elev 21.03 -0.12% Elev 20.98 -0.12% Elev 20.96 -0.12% Elev 20.93 -0.12% Elev 20.90 -0.16% Elev 20.86 -0.12% Elev 20.83 -0.16% Elev 20.80 -0.32% Elev 20.77 -0.44% Elev 20.73 -0.16% Elev 20.78 -0.28% Elev 20.86 -0.64% Elev 20.82 -0.28% Elev 20.71 -0.72% Elev 20.64 Elev 20.60 Elev 20.44 Elev 20.26 Elev 20.19

OG - 107' Lt "A" LINE

PG (Lt) - 107' Lt "A" LINE

PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-25

STATION	3	4	365	6	7	8	9	370	1	2	3	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:38:18 PM
c07162fa025.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa025.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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Caltrans

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

-2% Lt ETW

-5% Lt ES

MATCH LINE

LINE Sta 373+50 SEE SHEET PS-25

LINE Sta 384+50 SEE SHEET PS-27

MATCH LINE

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

30 20

Elev 20.19 Elev 20.14 Elev 20.08 Elev 20.01 Elev 19.95 Elev 19.91 Elev 19.88 Elev 19.82 Elev 19.77 Elev 19.72 Elev 19.67 Elev 19.60 Elev 19.53 Elev 19.49 Elev 19.45 Elev 19.42 Elev 19.39 Elev 19.36 Elev 19.33 Elev 19.30 Elev 19.26 Elev 19.25 Elev 19.24 Elev 19.23 Elev 19.23 Elev 19.24 Elev 19.24 Elev 19.24 Elev 19.25 Elev 19.29 Elev 19.33 Elev 19.36 Elev 19.41 Elev 19.45 Elev 19.50 Elev 19.56 Elev 19.62 Elev 19.68 Elev 19.74 Elev 19.79 Elev 19.86 Elev 19.88 Elev 19.83 Elev 19.89 Elev 19.97

-0.20% -0.24% -0.28% -0.24% -0.16% -0.24% -0.12% -0.20% -0.20% -0.20% -0.28% -0.28% -0.16% -0.16% -0.12% -0.12% -0.12% -0.12% -0.16% -0.12% -0.04% -0.04% -0.04% 0.00% 0.04% 0.00% 0.04% 0.16% 0.16% 0.20% 0.12% 0.16% 0.20% 0.24% 0.24% 0.24% 0.20% 0.28% 0.08% -0.20% 0.24% 0.32%

PG (Lt) - 107' Lt "A" LINE

OG - 107' Lt "A" LINE

PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-26

STATION	4	375	6	7	8	9	380	1	2	3	4	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:39:13 PM

c07162fa026.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa026.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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CARLOS A. CADENA

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Caltrans

+10%
+5%
0%
-5%
-10%

AXIS OF ROTATION @ JOIN LINE

-2% Lt ETW

-5% Lt ES

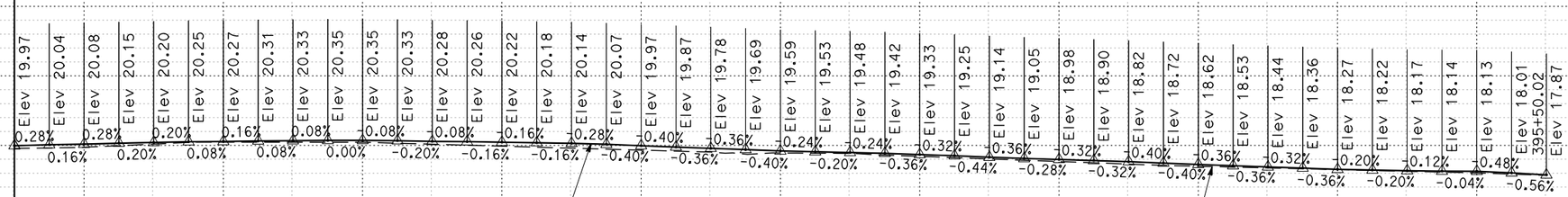
+50.02

MATCH LINE Sta 384+50 SEE SHEET PS-26

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW



PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 LEFT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-27

STATION	385	6	7	8	9	390	1	2	3	4	395	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:40:07 PM

c07162fa027.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa027.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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+10% +5% 0% -5% -10%

R=2260' Lt

305+43.15 PCC

R=2500' Lt

AXIS OF ROTATION

SUPERELEVATION DIAGRAM

"SB405" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES

℄ "E" LINE

10' Rt "SB405" 314+77.53 POC=
"E" 3314+85.35 POT

S405-E22 Conn Sep
BRIDGE No. 55-1101F
SEE STRUCTURE PLANS

Sta 315+00 TO 336+61.41
CONTROLLED BY
"SB405" LINE SEE PS-20

313+32.57 Elev 27.69 -0.49%
Elev 27.61 -0.48%
Elev 27.49 -0.52%
Elev 27.36 -0.56%
Elev 27.22 -0.64%
Elev 27.06 -0.76%
Elev 26.87 -0.56%
315+00.00 Elev 26.73

PG (Rt) - 10' Rt "SB405" LINE

OG - 10' Rt "SB405" LINE

PROFILE

"SB405" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-28

STATION	6	7	8	9	310	1	2	3	4	315	TOTAL
CY Exc											
CY Emb											

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LAST REVISION 10/23/2008

DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:41:04 PM

c07162fa028.dgn

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => p0033148 DGN FILE => c07162fa028.dgn | CU 12235 | EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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Caltrans

+10% +5% 0% -5% -10%

+36.02

AXIS OF ROTATION @ JOIN LINE

-2% Lt ES

LINE Sta 351+50 SEE SHEET PS-30

MATCH LINE

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES

Sta 336+50.59 TO 342+36.02
CONTROLLED BY "H" LINE (Lt)
SEE PS-49

342+36.02 Elev 23.32 -0.29% | Elev 23.28 -0.24% | Elev 23.22 -0.20% | Elev 23.17 -0.24% | Elev 23.11 -0.20% | Elev 23.06 -0.16% | Elev 23.02 -0.12% | Elev 22.99 -0.28% | Elev 22.92 -0.24% | Elev 22.86 -0.16% | Elev 22.82 -0.12% | Elev 22.79 -0.20% | Elev 22.74 -0.20% | Elev 22.69 -0.24% | Elev 22.63 -0.16% | Elev 22.59 -0.16% | Elev 22.55 -0.20% | Elev 22.51 -0.16% | Elev 22.46 -0.24% | Elev 22.40 -0.20% | Elev 22.36 -0.16% | Elev 22.31 -0.16% | Elev 22.27 -0.12% | Elev 22.23 -0.20% | Elev 22.20 -0.20% | Elev 22.15 -0.24% | Elev 22.10 -0.24% | Elev 22.04 -0.20% | Elev 21.98 -0.16% | Elev 21.92 -0.12% | Elev 21.88 -0.16% | Elev 21.83 -0.16% | Elev 21.80 -0.16% | Elev 21.76 -0.16% | Elev 21.72 -0.08% | Elev 21.68 | Elev 21.64 | Elev 21.66

PG (Med Lt)- 1' Lt "A" LINE

OG (Med Lt) - 1' Lt "A" LINE

PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-29

STATION	2	3	4	345	6	7	8	9	350	1	TOTAL
CY Exc											
CY Emb											

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:42:02 PM
c07162fa029.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa029.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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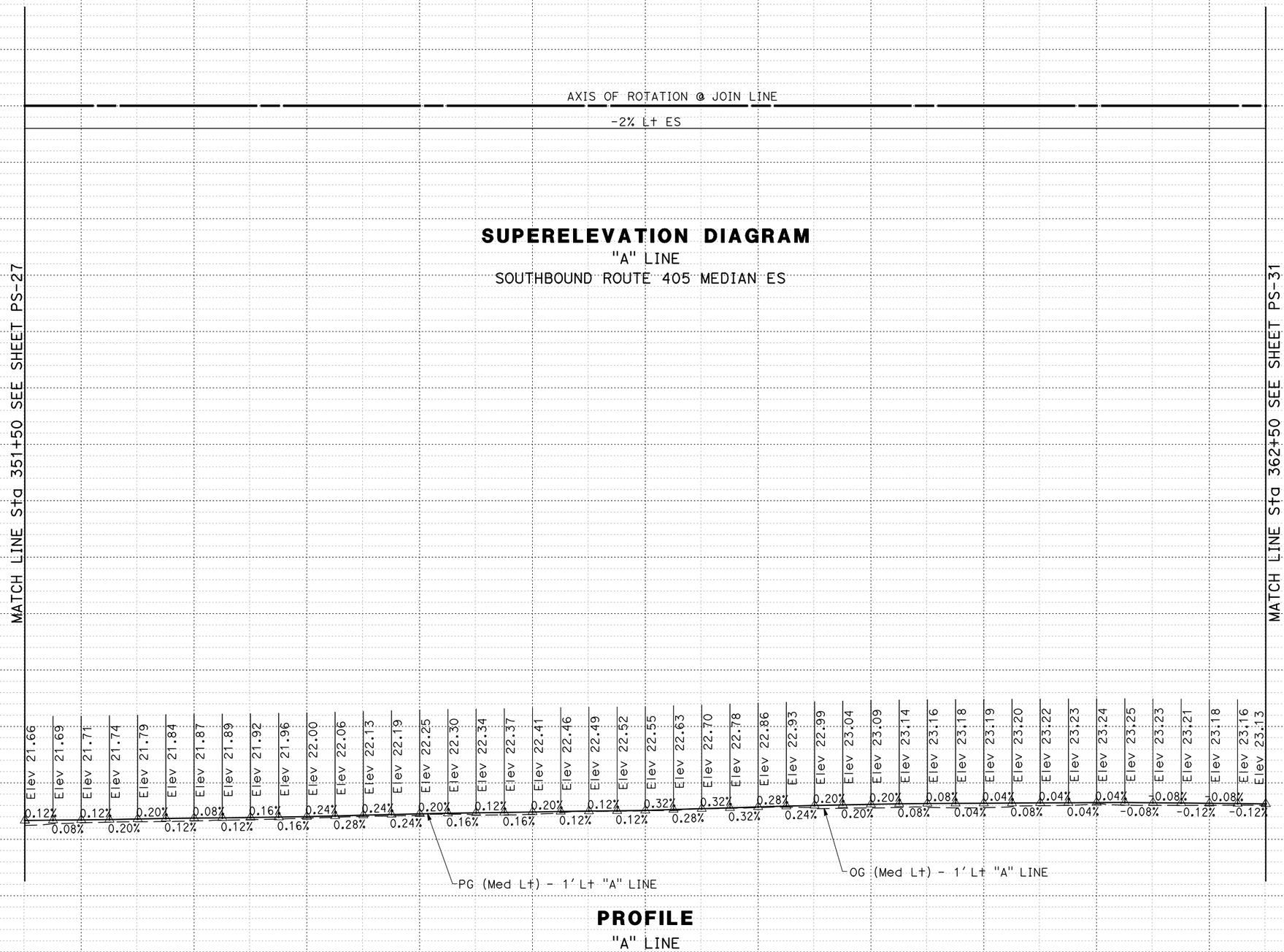
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-30

STATION	2	3	4	355	6	7	8	9	360	1	2	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:42:57 PM
c07162fa030.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa030.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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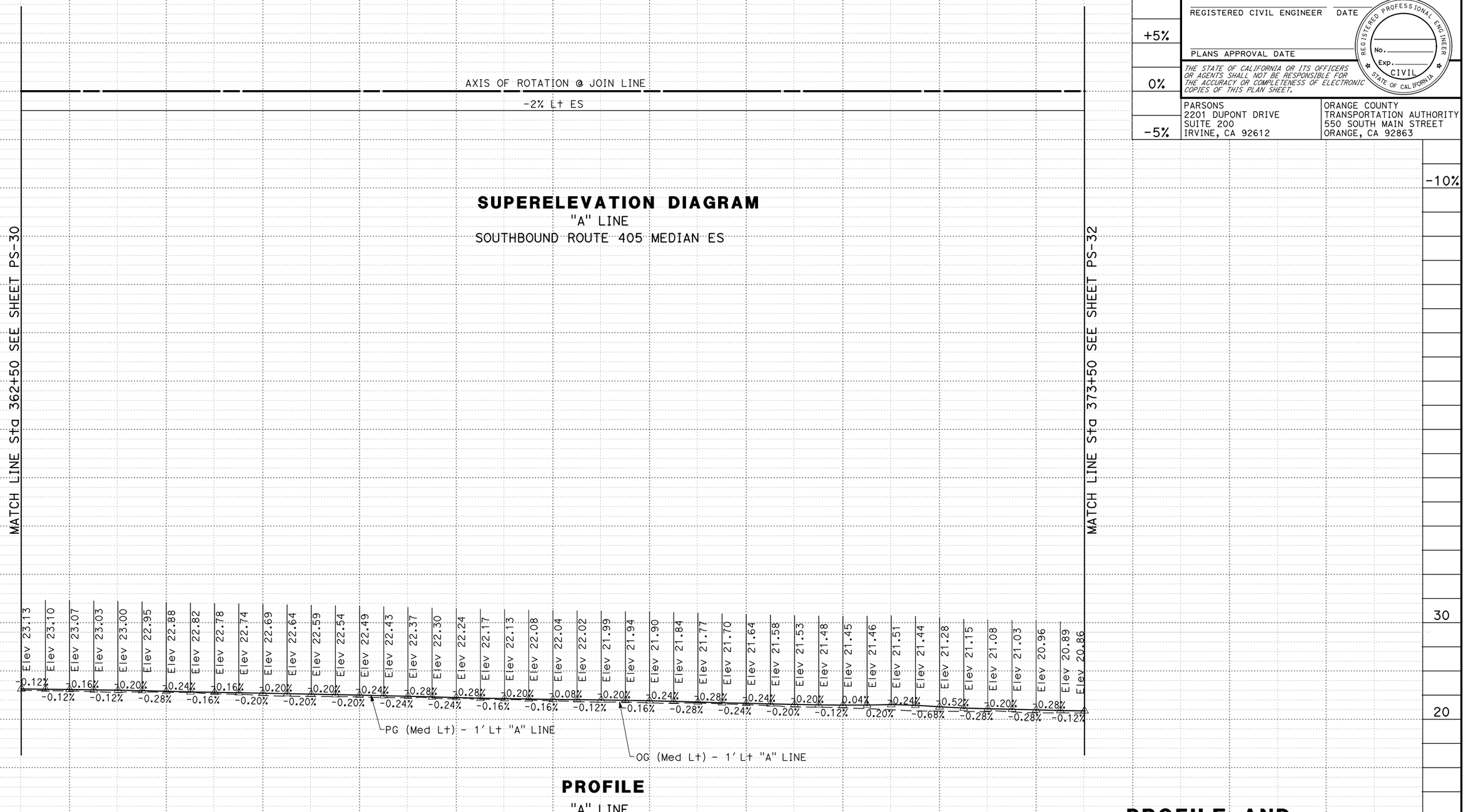
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

"A" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-31

STATION	3	4	365	6	7	8	9	370	1	2	3	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:43:54 PM
c07162fa031.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa031.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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CARLOS A. CADENA

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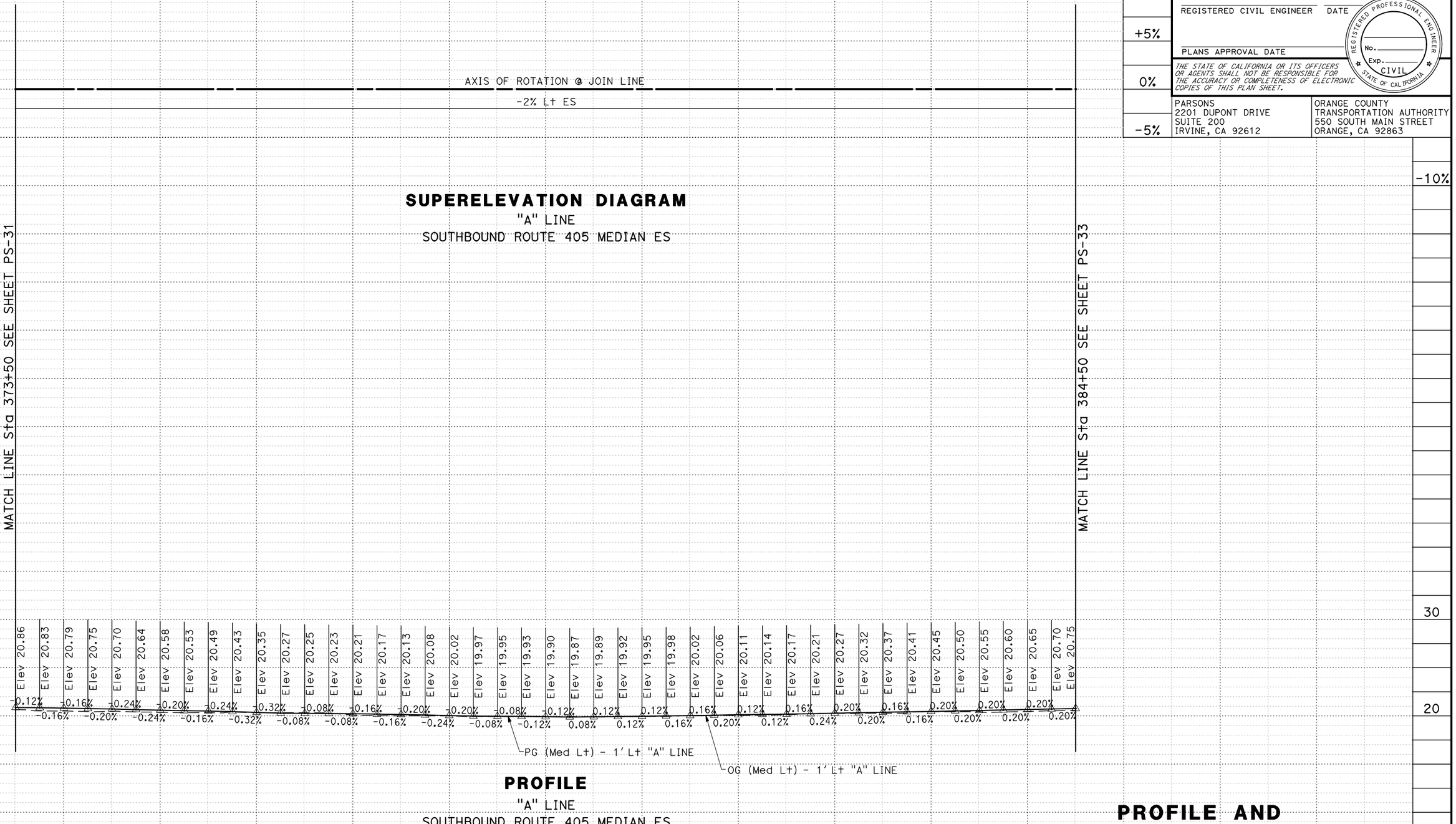
Caltrans

SUPERELEVATION DIAGRAM

"A" LINE
SOUTHBOUND ROUTE 405 MEDIAN ES



PROFILE

"A" LINE
SOUTHBOUND ROUTE 405 MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-32

STATION	4	375	6	7	8	9	380	1	2	3	4	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:44:49 PM
c07162fa032.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa032.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

-2% Lt ES

+50.02

MATCH LINE Sta 384+50 SEE SHEET PS-32

30 20

Elev 20.75 Elev 20.81 Elev 20.85 Elev 20.89 Elev 20.92 Elev 20.94 Elev 20.96 Elev 20.98 Elev 20.99 Elev 21.00 Elev 20.99 Elev 20.98 Elev 20.95 Elev 20.91 Elev 20.87 Elev 20.81 Elev 20.75 Elev 20.68 Elev 20.59 Elev 20.50 Elev 20.40 Elev 20.30 Elev 20.21 Elev 20.12 Elev 20.02 Elev 19.92 Elev 19.81 Elev 19.76 Elev 19.67 Elev 19.58 Elev 19.49 Elev 19.40 Elev 19.31 Elev 19.25 Elev 19.20 Elev 19.14 Elev 19.05 Elev 18.96 Elev 18.85 Elev 18.74 Elev 18.62 Elev 18.48 Elev 18.39 Elev 18.35 395+50.02 Elev 18.26

0.24% 0.16% 0.08% 0.08% 0.04% 0.04% 0.16% 0.24% 0.28% 0.36% 0.40% 0.36% 0.40% 0.40% 0.20% 0.36% 0.36% 0.24% 0.24% 0.36% 0.44% 0.56% 0.16%

-0.16% -0.12% -0.08% -0.04% -0.04% -0.12% -0.16% -0.24% -0.36% -0.40% -0.36% -0.40% -0.44% -0.36% -0.36% -0.36% -0.20% -0.36% -0.44% -0.48% -0.36% -0.36%

PG (Med Lt) - 1' Lt "A" LINE

OG (Med Lt) - 1' Lt "A" LINE

PROFILE

"A" LINE

SOUTHBOUND ROUTE 405 MEDIAN ES

STATION	385	6	7	8	9	390	1	2	3	4	395	TOTAL
CY Exc												
CY Emb												

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-33

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:45:44 PM
c07162fa033.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa033.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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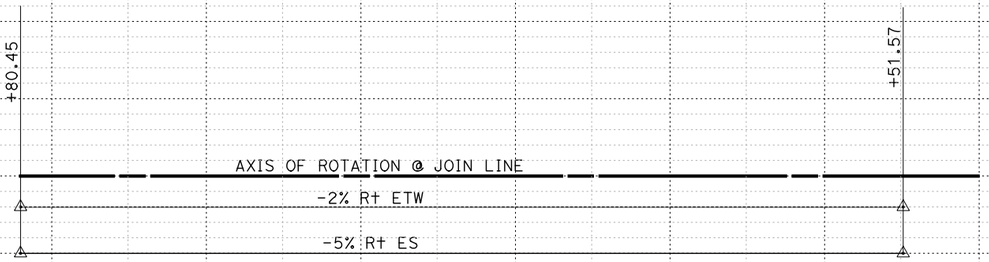
CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

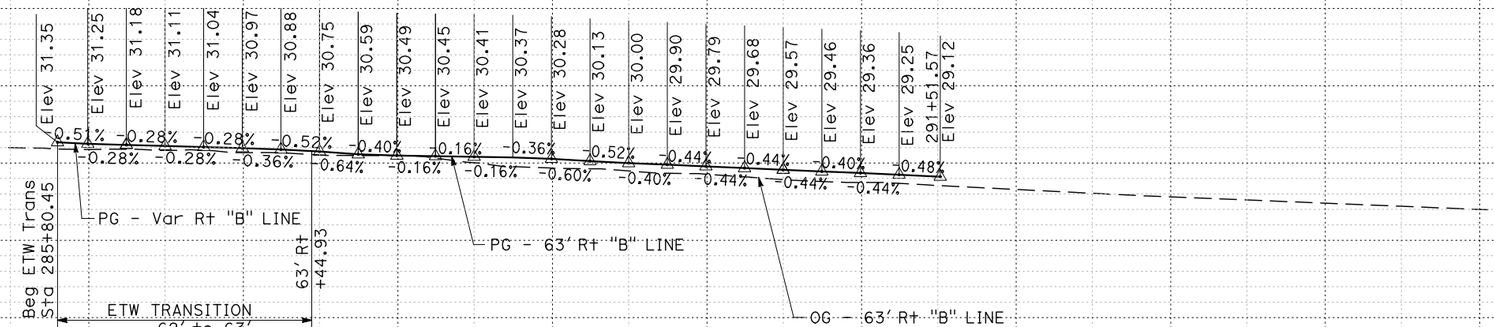
+10% +5% 0% -5% -10%



SUPERELEVATION DIAGRAM

"B" LINE

WESTBOUND ROUTE 22 RIGHT ETW



PROFILE

"B" LINE

WESTBOUND ROUTE 22 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-34

STATION	285	6	7	8	9	290	1	2	TOTAL
CY Exc									
CY Emb									

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:46:40 PM

c07162fa034.dgn

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USERNAME => p0033148
DGN FILE => c07162fa034.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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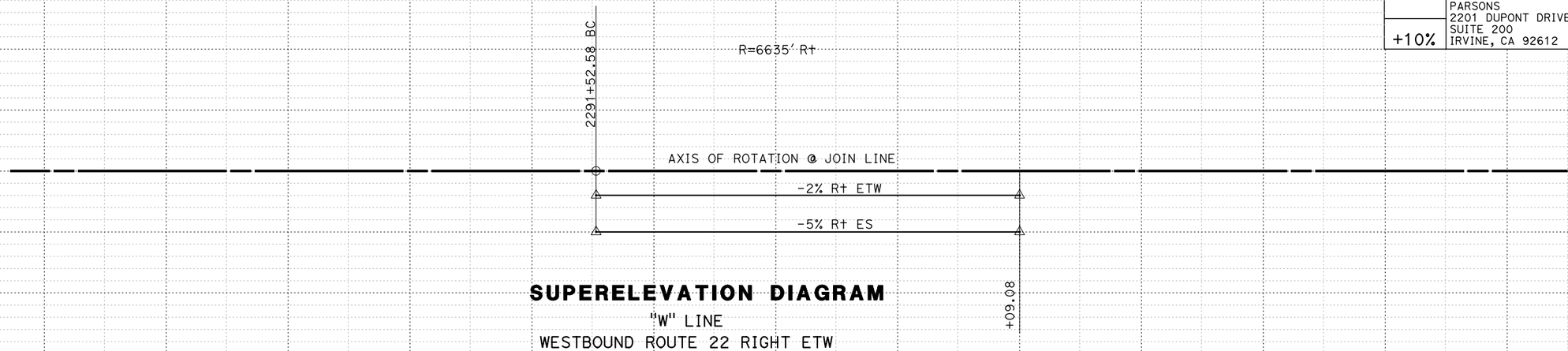
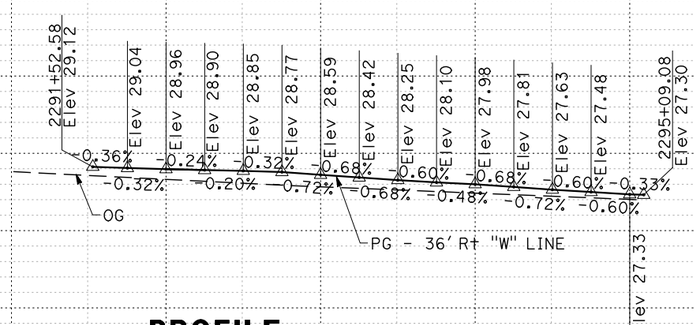
+10% +5% 0% -5% -10%



SUPERELEVATION DIAGRAM
"W" LINE
WESTBOUND ROUTE 22 RIGHT ETW



PROFILE
"W" LINE
WESTBOUND ROUTE 22 RIGHT ETW

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-35

STATION	1	2	3	4	2295	6	TOTAL
CY Exc							
CY Emb							

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:47:38 PM
c07162fa035.dgn

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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Caltrans

+10% | +5% | 0% | -5% | -10%

R=6635' Rt

2300+28.45 EC
+45.75 Beg
Lt Shld

2% Lt ES

AXIS OF ROTATION @ "W" LINE

-2% Rt ETW

-5% Rt ES

+09.08

+27.25 Beg
Rt Shld

℄
"VV" LINE
"VV" 43+27.26=
"W" 2301+56.58

BOLSA CHICA ROAD OC
BRIDGE No. 55-1102
SEE STRUCTURE PLANS

SEE SHEET PS-37
MATCH LINE STA 2303+50

SUPERELEVATION DIAGRAM

"W" LINE
W22-N405 Conn

2295+09.08 Elev 28.01 | Elev 27.95 | Elev 27.83 | Elev 27.67 | Elev 27.52 | Elev 27.38 | Elev 27.26 | Elev 27.15 | Elev 27.04 | Elev 26.91 | Elev 26.81 | Elev 26.71 | Elev 26.61 | Elev 26.48 | Elev 26.31 | 2298+57.88 Elev 26.29 | 2298+85.00 BVC Elev 26.19

-0.38% -0.64% -0.56% -0.44% -0.52% -0.40% -0.52% -0.34%
-0.48% -0.60% -0.48% -0.44% -0.40% -0.40% -0.68%

200' VC

2299+85.00 PVI Elev 25.85

2300+85.00 EVC Elev 26.65

0.80%

2301+00.00 BVC Elev 26.77

2302+00.00 PVI Elev 27.58

PG

OG

200' VC

2303+00.00 EVC Elev 27.27

-0.30%

Elev 27.12

PROFILE

"W" LINE
W22-N405 Conn

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-36

STATION	1	2	3	4	2295	6	7	8	9	2300	1	2	3	TOTAL
CY Exc														
CY Emb														

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:48:32 PM

c07162fa036.dgn

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CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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PLANS APPROVAL DATE

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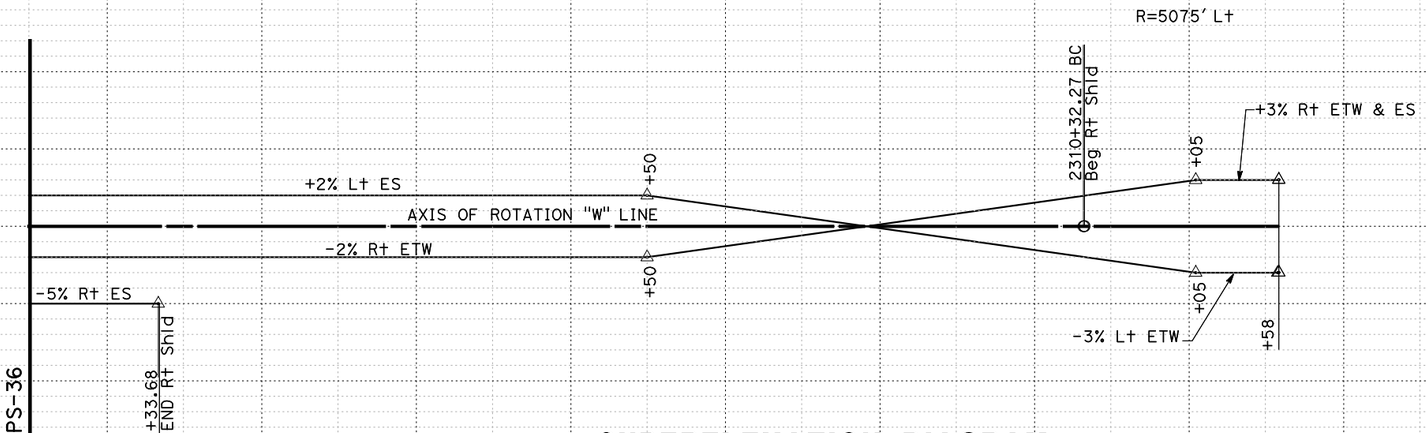
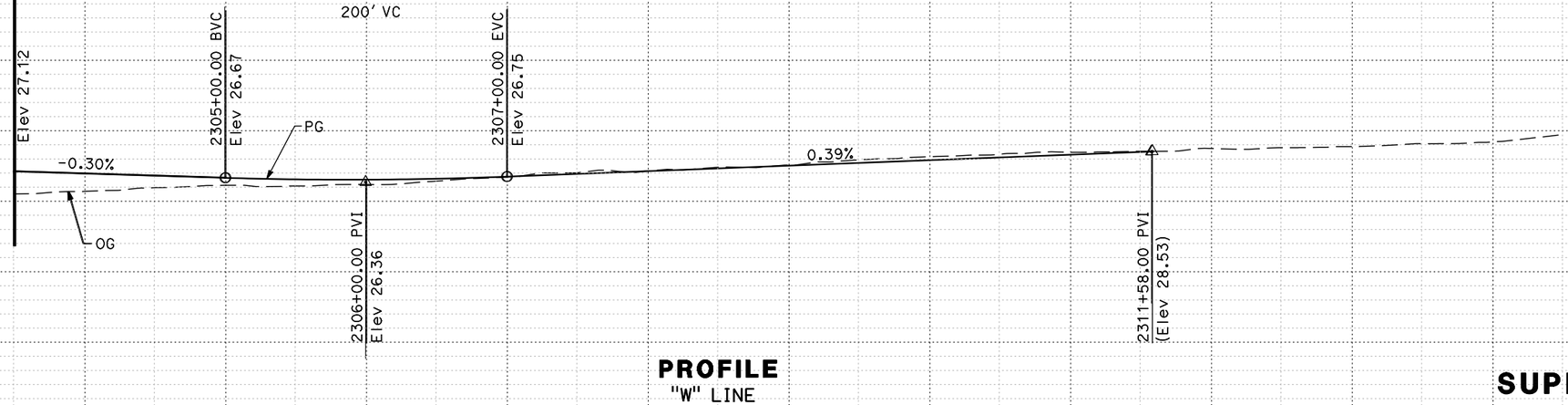


SUPERELEVATION DIAGRAM

"W" LINE
W22-N405 Conn



PROFILE

"W" LINE
W22-N405 Conn

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-37

STATION	4	2305	6	7	8	9	2310	1	TOTAL
CY Exc									
CY Emb									

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Caltrans

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DGN FILE => c07162fa037.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

SUPERELEVATION DIAGRAM

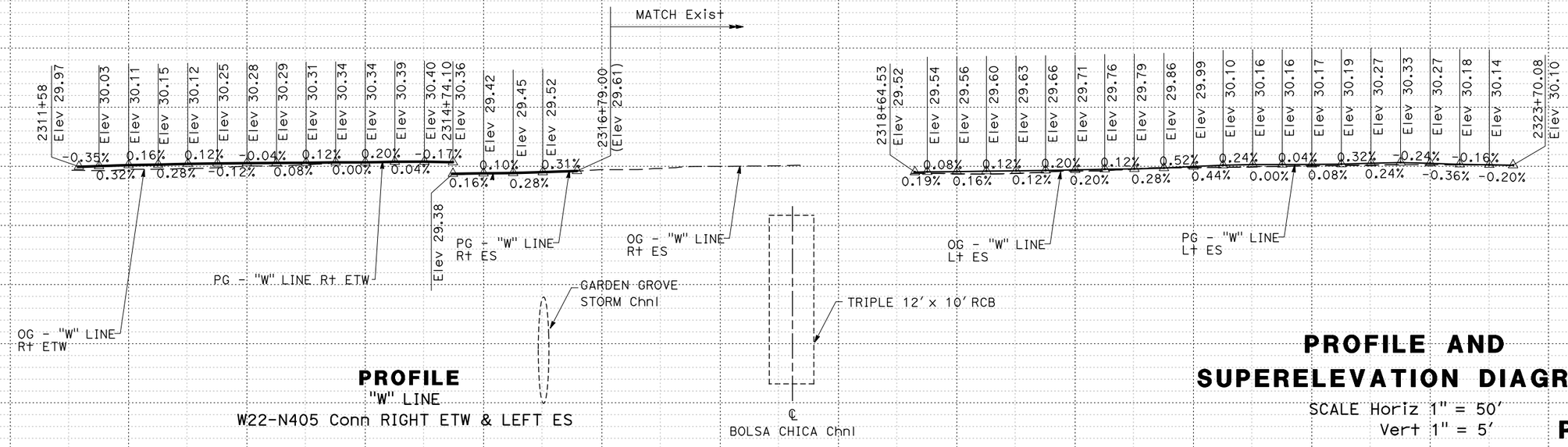
"W" LINE

W22-N405 Conn RIGHT ETW & LEFT ES

PROFILE

"W" LINE

W22-N405 Conn RIGHT ETW & LEFT ES



PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-38

STATION	1	2	3	4	2315	6	7	TOTAL
CY Exc								
CY Emb								

LAST REVISION DATE PLOTTED => 10/24/2008
TIME PLOTTED => 4:18:53 AM

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DGN FILE => c07162fa038.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
XXXXX
No. XXXXX
Exp. XX/XX/XX
CIVIL
STATE OF CALIFORNIA

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

+10% +5% 0% -5% -10%

AXIS OF ROTATION @ JOIN LINE

AXIS OF ROTATION @ "E" LINE

+93.24 | 3295+93.75 BC | R=4816′ Rt | +26.73 | +2% Lt ETW & ES | +20 | 3300+70.20 PCC | R=20016′ Rt | R=2000′ Lt

3302+40.00 END Lt Shld

3305+09.45 Beg Lt Shld | 3305+53.66 PRC | +20 | +6% Lt ETW & ES

SUPERELEVATION DIAGRAM
"E" LINE
S405-E22 Conn

"E" 3302+44.18 POC= "VV" 42+26.70 POT

℄ "VV" LINE

BOLSA CHICA ROAD OC
BRIDGE No. 55-1102
SEE STRUCTURE PLANS

MATCH LINE Sta 3306+50 SEE SHEET PS-40

1293+93.24 Elev 29.86 | Elev 29.82 | Elev 29.69 | Elev 29.57 | Elev 29.46 | Elev 29.38 | Elev 29.30 | Elev 29.26 | Elev 29.20 | Elev 29.11 | Elev 29.01 | Elev 28.96 | Elev 28.90 | Elev 28.81 | Elev 28.70 | Elev 28.59 | Elev 28.49 | Elev 28.43 | Elev 28.36 | Elev 27.56 | Elev 27.46 | Elev 27.37 | Elev 27.27 | Elev 27.26 | Elev 27.32 | Elev 27.37 | Elev 27.48 | Elev 27.55 | Elev 27.68 | Elev 27.87 | Elev 28.09 | Elev 28.38 | Elev 28.71 | Elev 29.09 | Elev 29.53 | Elev 30.03 | Elev 30.57 | Elev 31.17 | Elev 31.82 | Elev 32.62 | Elev 33.47 | Elev 34.38 | Elev 35.35 | Elev 36.35 | Elev 37.41 | Elev 38.47 | Elev 39.53 | 3305+53.66 PVI Elev 40.77 | PG | Elev 44.82

-0.46% -0.49% -0.44% -0.44% -0.26% -0.16% -0.24% -0.36% -0.40% -0.20% -0.24% -0.36% -0.44% -0.40% -0.24% -0.26% 0.30% -0.36% -0.40% -0.44% 0.24% 0.02% 0.20% 0.44% 0.28% 0.52% 0.76% 0.88% 1.16% 1.32% 1.52% 1.76% 2.00% 2.16% 2.40% 2.60% 3.20% 3.40% 3.64% 3.88% 4.00% 4.24% 4.24% 4.32% 4.24% 4.21%

3294+93.75 "E" = 1294+92.82 "H"

3298+26.73 Elev 27.63

OG

"H" LINE
EB ROUTE 22
Lt ETW

"E" LINE
EB ROUTE 22
Lt ETW

"E" LINE

PROFILE
"E" LINE
S405-E22 Conn

PROFILE AND SUPERELEVATION DIAGRAM
SCALE Horiz 1" = 50′
Vert 1" = 5′

PS-39

STATION: 4 | 3295 | 6 | 7 | 8 | 9 | 3300 | 1 | 2 | 3 | 4 | 3305 | 6 | TOTAL

CY Exc | Emb

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:51:16 PM
c07162fa039.dgn

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CU 12235 | EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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Caltrans

+10% +5% 0% -5% -10%

+92.55 Beg Rt Shld
R=2000' Lt
+6% Rt ES
+65
3312+77.93 EC
AXIS OF ROTATION @ "E" LINE
-6% Lt ETW & ES
+65
3314+00.00 PVI
Elev 76.37

SUPERELEVATION DIAGRAM

"E" LINE
S405-E22 Conn

MATCH LINE Sta 3306+50 SEE SHEET PS-39
Elev 44.82
4.21%
3308+00.00 BVC
Elev 51.13
3311+80.35 BB
ELEV 61.96
PG
9.5'
S405-E22 Conn Sep
BRIDGE No. 55-1103E
SEE STRUCTURE PLANS
15.5'
Elev 61.09
MATCH LINE Sta 3316+50 SEE SHEET PS-41
1200' VC
18.98' Min Vert Clr @ 42.50' Rt "E" 3312+07.23 AND 70' Rt "NB405" 312+01.47
℄ "NB405" LINE
℄ "SB405" LINE
OG
"E" 3314+00.47 POT= "NB405" 313+83.02 POC
"E" 3315+08.13 POT= "SB405" 314+97.96 POC
GARDEN GROVE STORM CHANNEL

PROFILE

"E" LINE
S405-E22 Conn

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-40

STATION	6	7	8	9	3310	1	2	3	4	3315	6	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008 | DATE PLOTTED => 10/23/2008 TIME PLOTTED => 4:52:08 PM

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CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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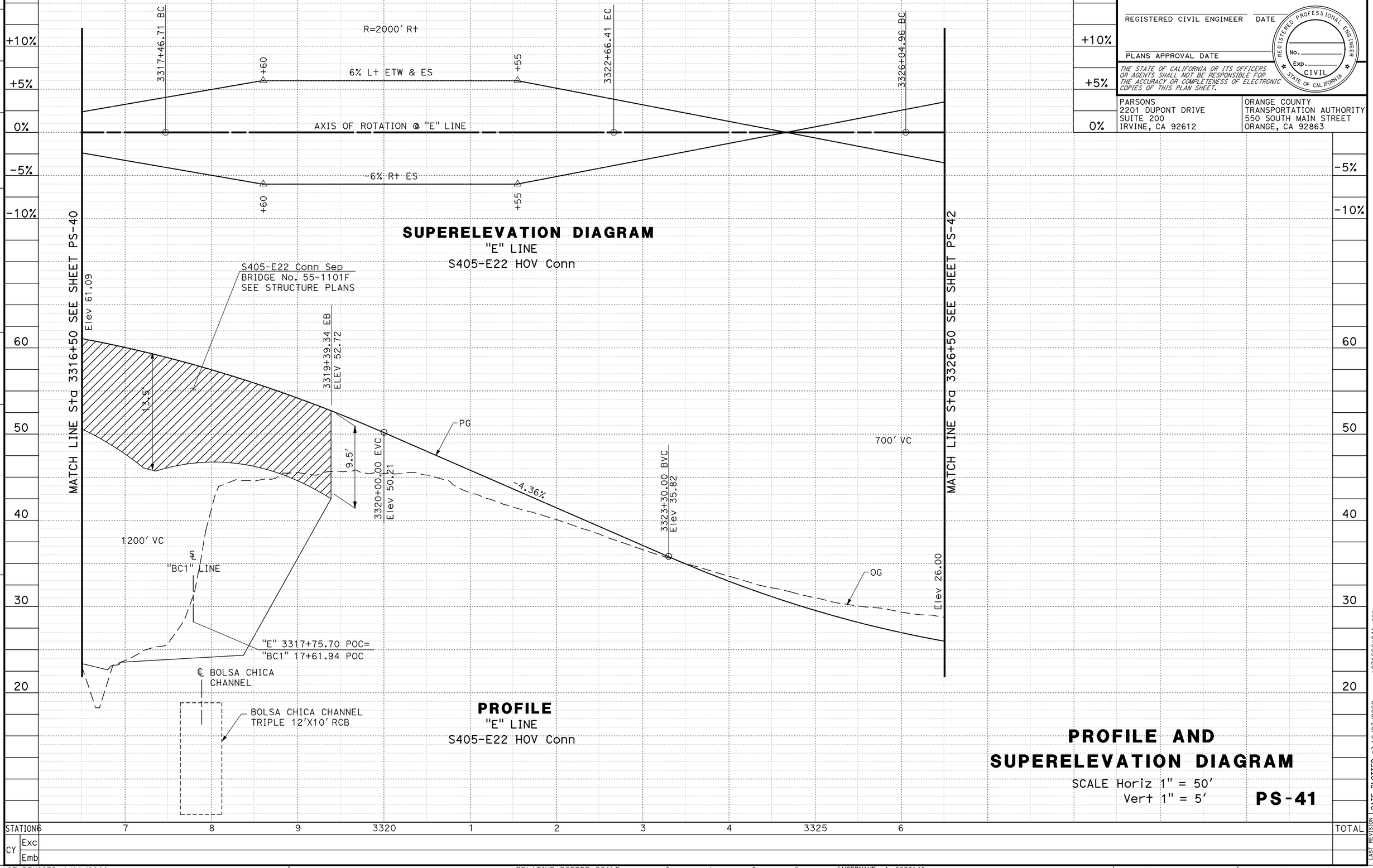

SUPERELEVATION DIAGRAM
"E" LINE
S405-E22 HOV Conn

PROFILE
"E" LINE
S405-E22 HOV Conn

STATION	6	7	8	9	3320	1	2	3	4	3325	6	TOTAL
CY Exc												
CY Emb												

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-41

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
XXXXX
No. XXXXX
Exp. XX/XX/XX
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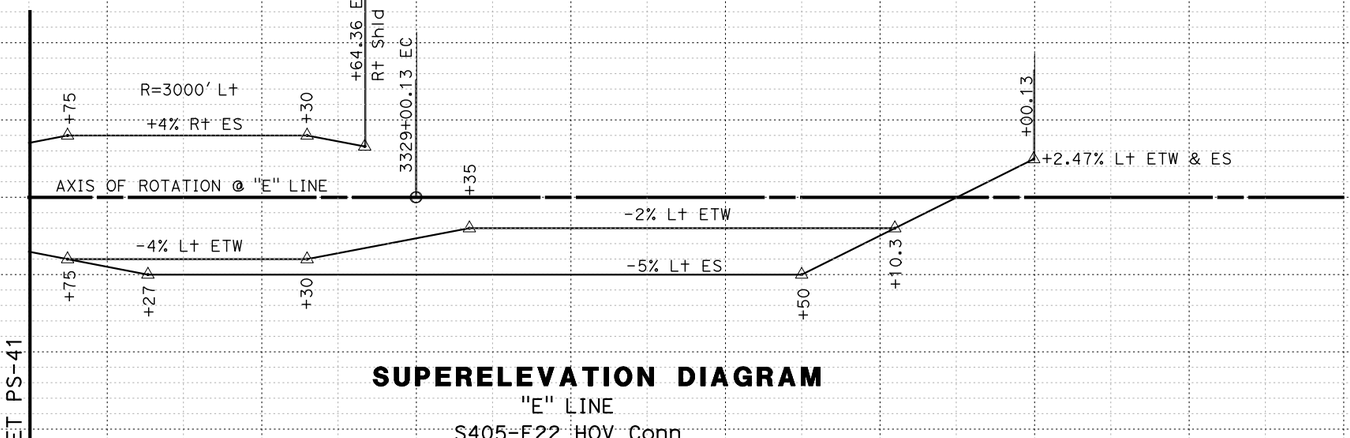
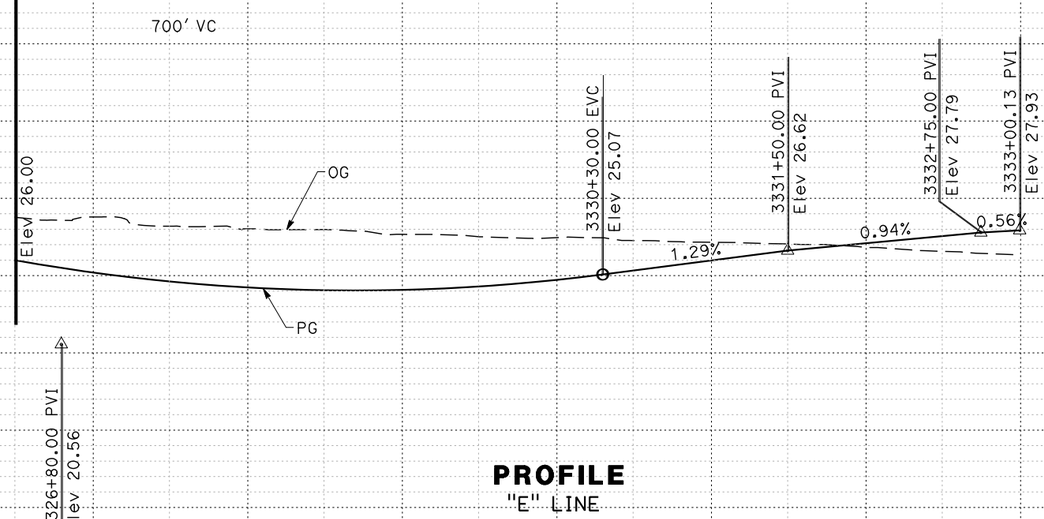


SUPERELEVATION DIAGRAM

"E" LINE

S405-E22 HOV Conn



PROFILE

"E" LINE

S405-E22 HOV Conn

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-42

STATION	7	8	9	3330	1	2	3	TOTAL
CY Exc								
CY Emb								

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
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CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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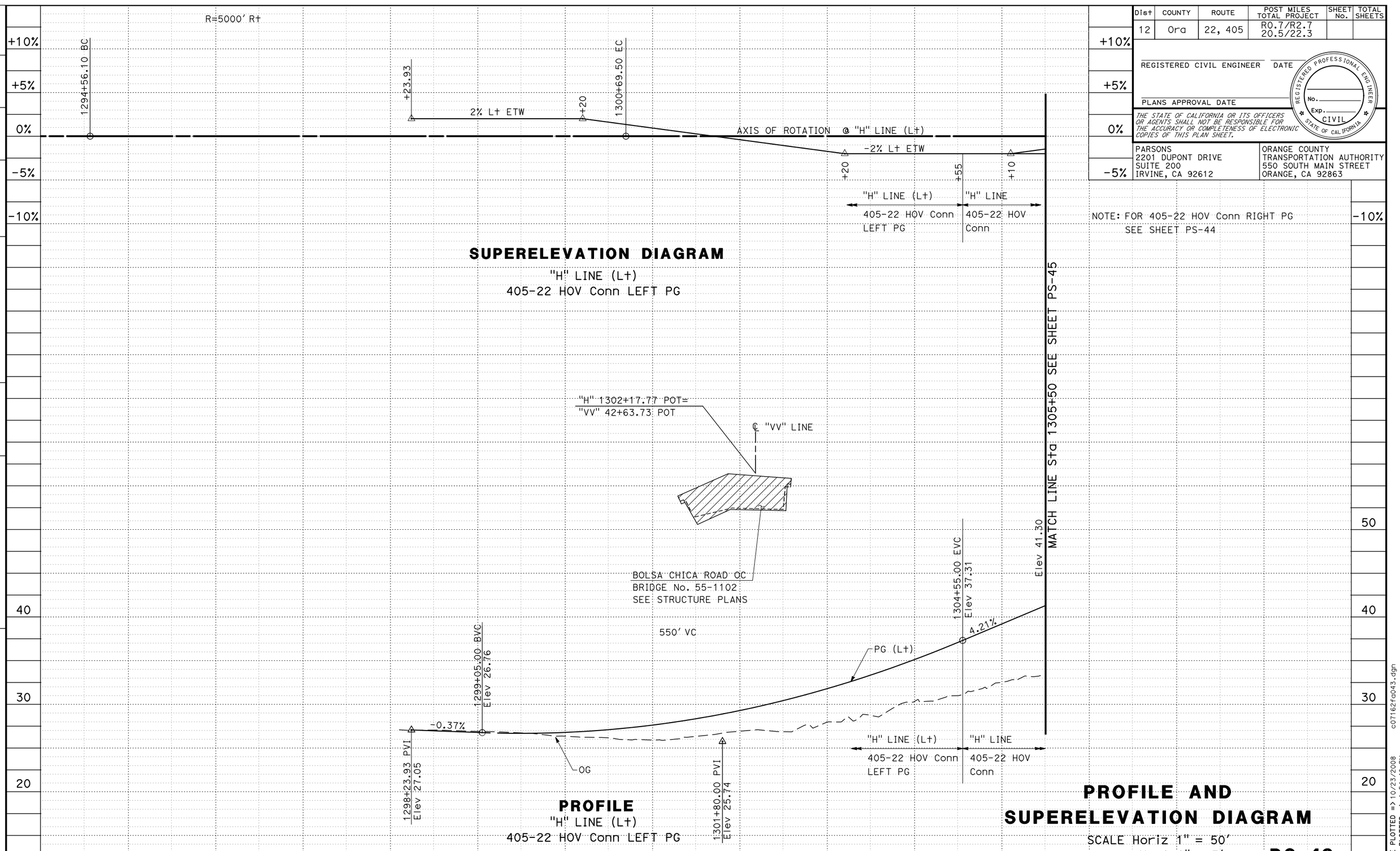

SUPERELEVATION DIAGRAM

"H" LINE (Lt)
405-22 HOV Conn LEFT PG

PROFILE

"H" LINE (Lt)
405-22 HOV Conn LEFT PG

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-43

STATION	1295	6	7	8	9	1300	1	2	3	4	1305	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:54:46 PM
c07162fa043.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162fa043.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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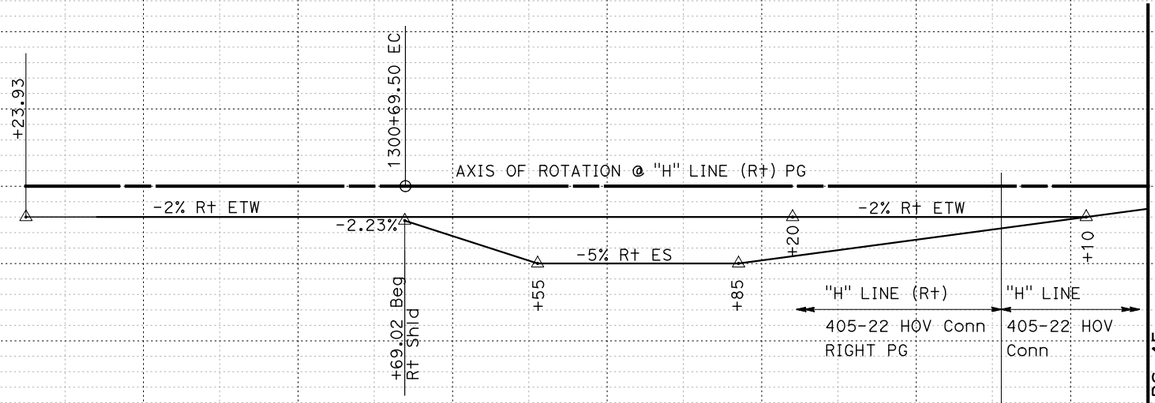
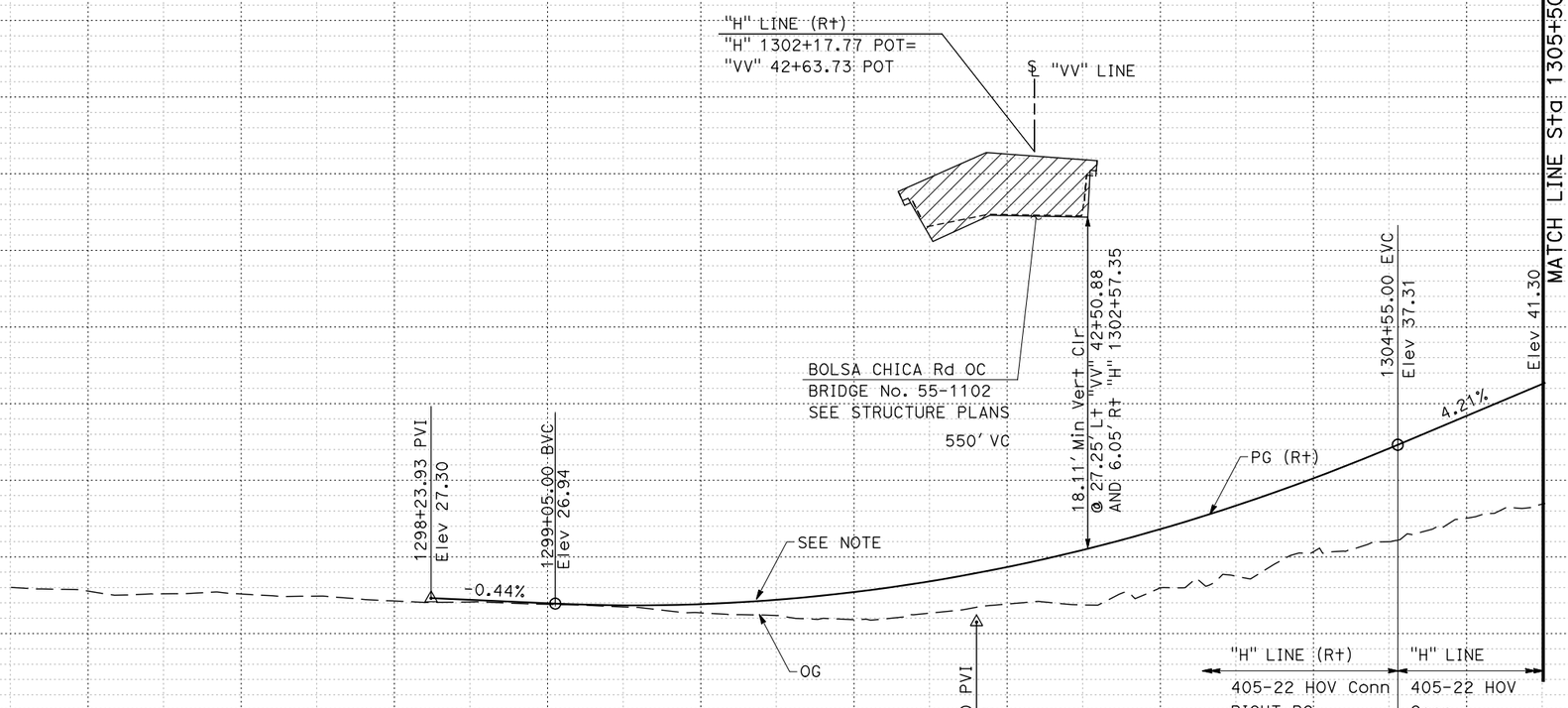
+10% +5% 0% -5% -10%



NOTE:
FOR 405-22 HOV Conn LEFT PG
SEE SHEET PS-43

SUPERELEVATION DIAGRAM

"H" LINE (R+)
405-22 HOV Conn RIGHT PG



PROFILE

"H" LINE (R+)
405-22 HOV Conn RIGHT PG

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-44

STATION	1295	6	7	8	9	1300	1	2	3	4	1305	TOTAL
CY Exc												
CY Emb												

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:55:48 PM
c07162fa044.dgn

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USERNAME => p0033148
DGN FILE => c07162fa044.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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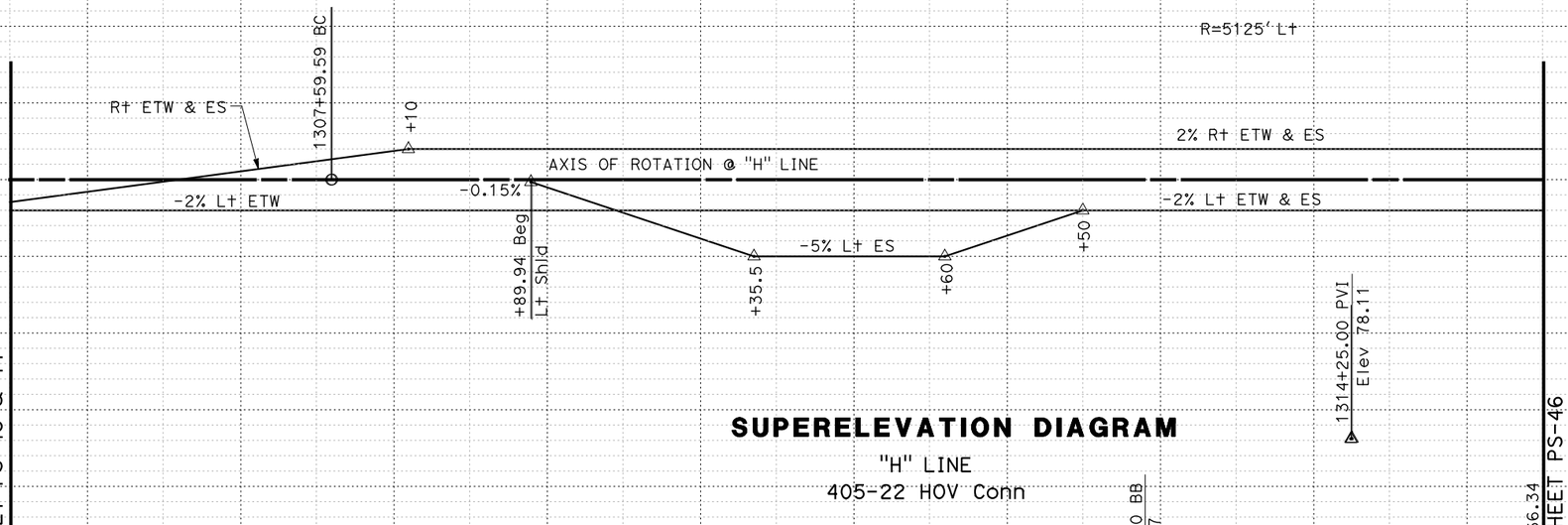
SUPERELEVATION DIAGRAM

"H" LINE
405-22 HOV Conn



PROFILE

"H" LINE
405-22 HOV Conn

STATION	6	7	8	9	1310	1	2	3	4	1315	6	TOTAL
CY Exc												
CY Emb												

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-45

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:56:49 PM
c07162fa045.dgn

BORDER LAST REVISED 4/11/2008

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USERNAME => p0033148
DGN FILE => c07162fa045.dgn

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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Caltrans

R=5125' Lt

+10% +5% 0% -5% -10%

2% Rt ETW & ES

AXIS OF ROTATION @ "H" LINE

-2% Lt ETW & ES

+85 1319+35.59 EC

+85 -2% Lt & Rt, ETW & ES

SUPERELEVATION DIAGRAM

"H" LINE
405-22 HOV Conn

MATCH LINE STA 1315+50 SEE SHEET PS-45

Elev 66.34

1321+00.00 EVC
Elev 58.01

PG

-2.98%

MATCH LINE Sta 1323+50 SEE SHEET PS-47 & 48

Elev 50.57

10.0'

405-22
HOV Conn Sep
BRIDGE No. 55-1103E
SEE STRUCTURE PLANS

1350' VC

18.35' Min Vert Clr @ 77.65' Rt "H" 1319+65.00 AND 70' Rt "NB405" 319+78.17

"H" 1319+29.90 POC=
"NB405" 319+30.32 POC

"NB405" LINE

℄ BOLSA CHICA CHANNEL

OG

GARDEN GROVE STORM CHANNEL

BOLSA CHICA CHANNEL TRIPLE 12'X10' RCB

PROFILE

"H" LINE
405-22 HOV Conn

70 60 50 40 30 20

STATION 6 7 8 9 1320 1 2 3 TOTAL

CY Exc

CY Emb

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-46

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 4:57:42 PM

c07162fa046.dgn

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USERNAME => p0033148
DGN FILE => c07162fa046.dgn

CU 12235

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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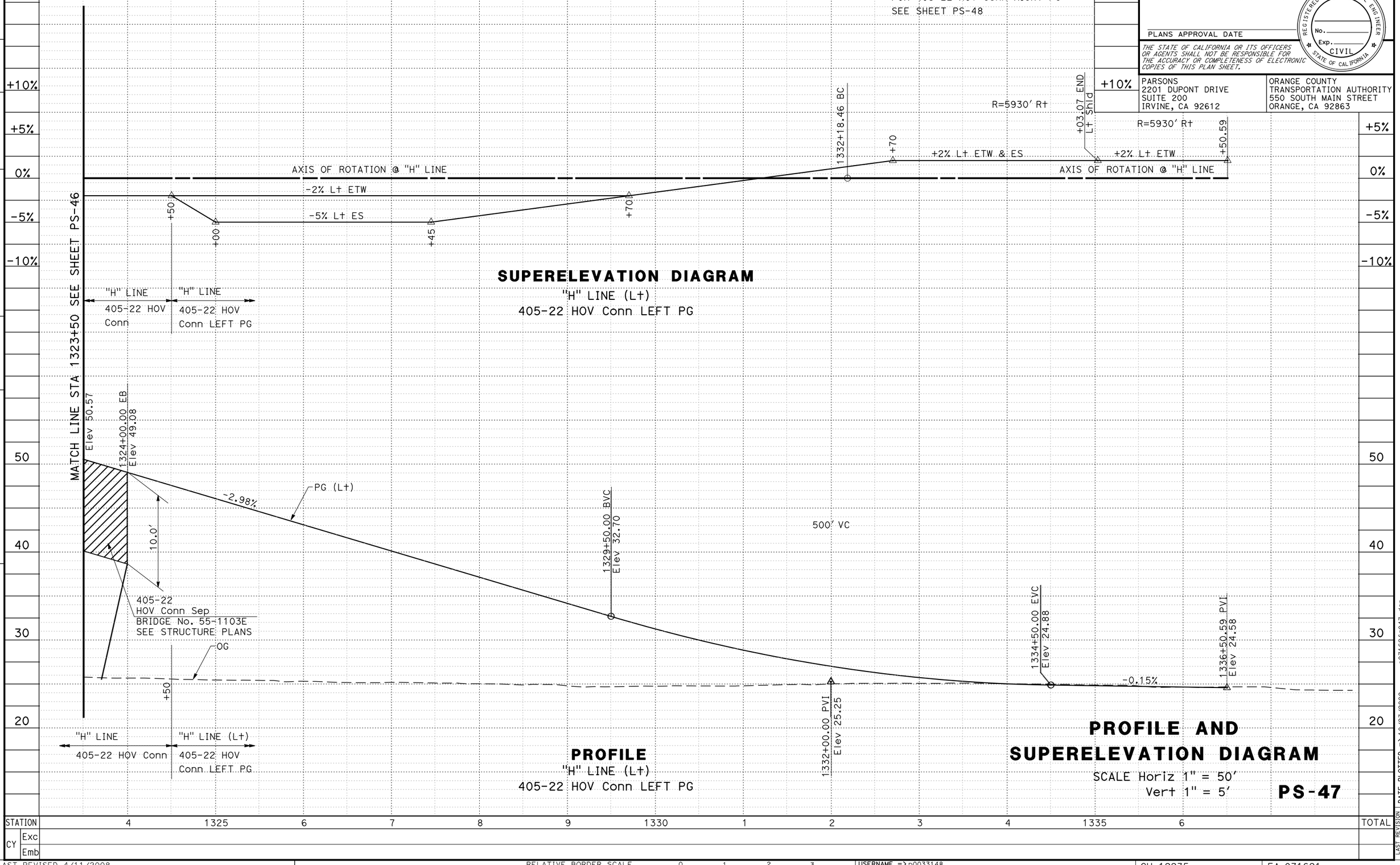
NOTE:
FOR 405-22 HOV Conn RIGHT PG
SEE SHEET PS-48



SUPERELEVATION DIAGRAM
"H" LINE (Lt)
405-22 HOV Conn LEFT PG

PROFILE
"H" LINE (Lt)
405-22 HOV Conn LEFT PG

STATION	4	1325	6	7	8	9	1330	1	2	3	4	1335	6	TOTAL
CY Exc														
CY Emb														

PROFILE AND SUPERELEVATION DIAGRAM
SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-47

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TIME PLOTTED => 4:58:33 PM
c07162fa047.dgn

BORDER LAST REVISED 4/11/2008
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USERNAME => p0033148
DGN FILE => c07162fa047.dgn
CU 12235
EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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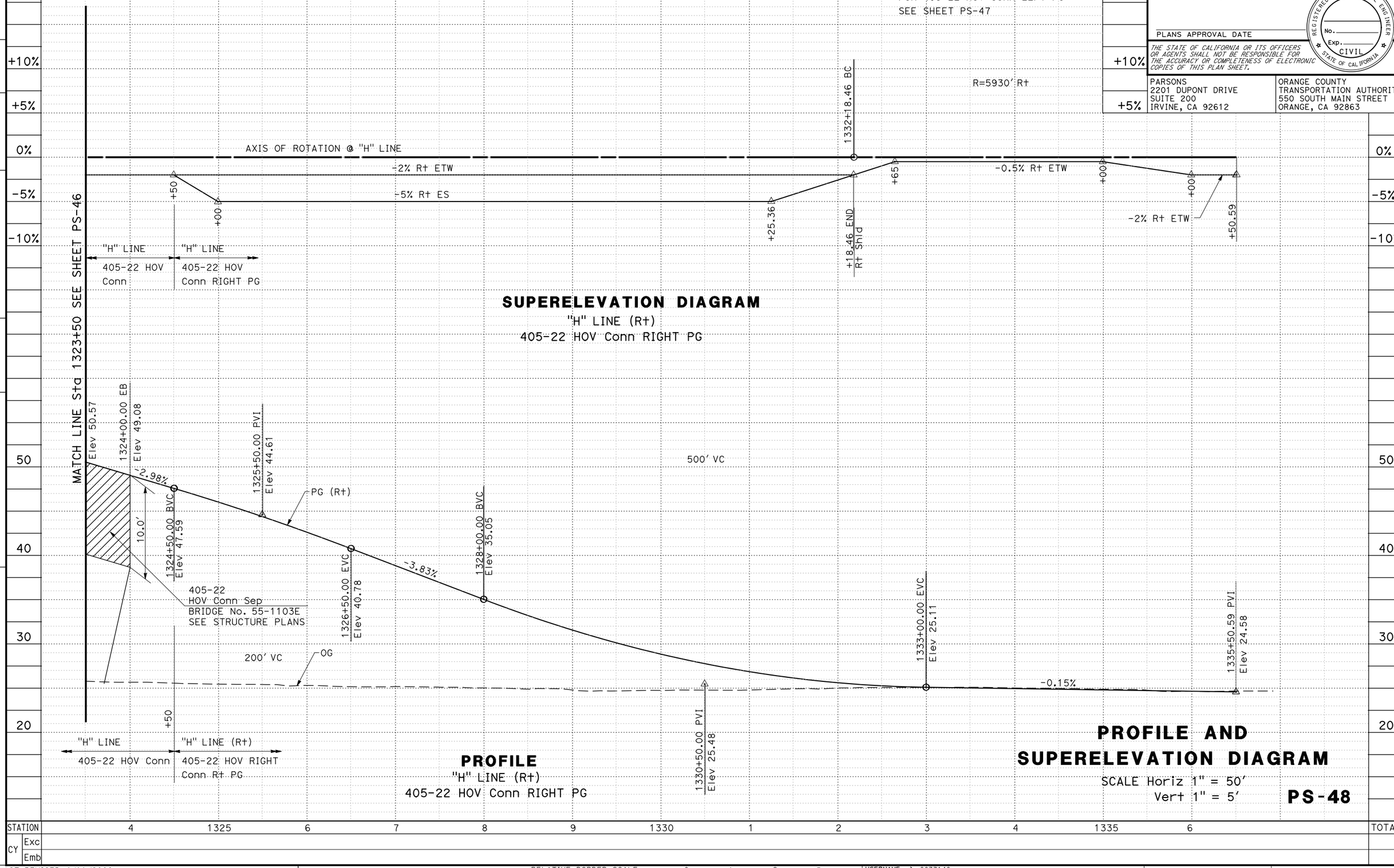
NOTE:
FOR 405-22 HOV Conn LEFT PG
SEE SHEET PS-47



SUPERELEVATION DIAGRAM
"H" LINE (R+)
405-22 HOV Conn RIGHT PG

PROFILE
"H" LINE (R+)
405-22 HOV Conn RIGHT PG

PROFILE AND SUPERELEVATION DIAGRAM
SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-48

STATION	4	1325	6	7	8	9	1330	1	2	3	4	1335	6	TOTAL
CY Exc														
CY Emb														

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12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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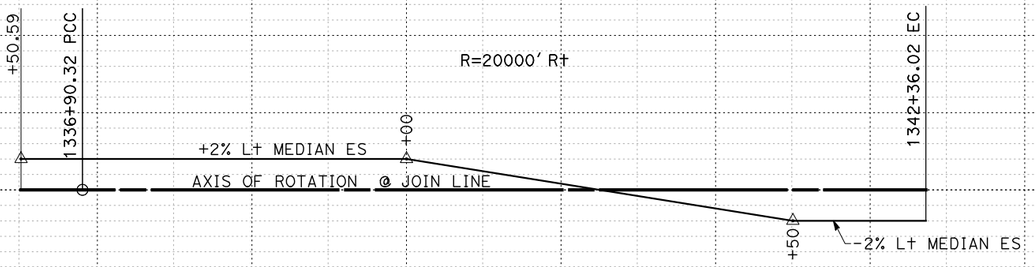
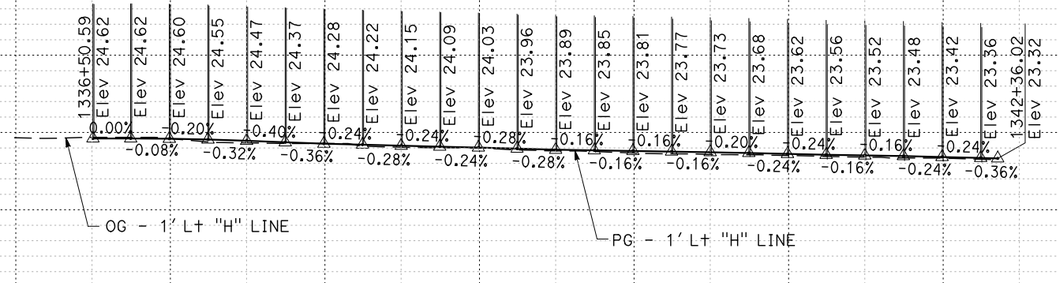


SUPERELEVATION DIAGRAM

"H" LINE (Lt)

SOUTHBOUND 405-22 HOV Conn MEDIAN ES



PROFILE

"H" LINE (Lt)

SOUTHBOUND 405-22 HOV Conn MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-49

STATION	1335	6	7	8	9	1340	1	2	TOTAL
CY Exc									
CY Emb									

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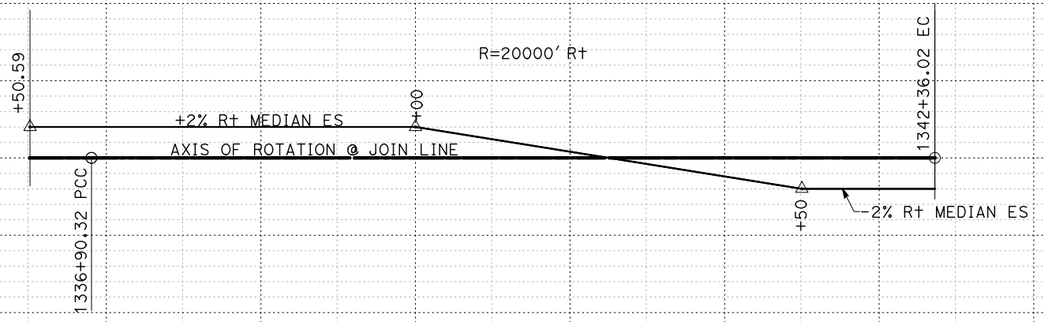
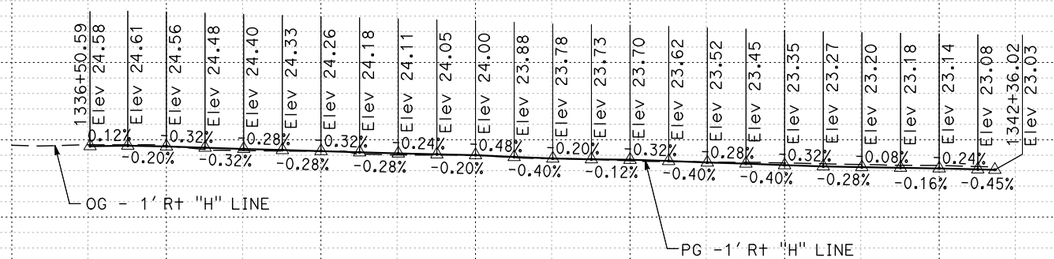


SUPERELEVATION DIAGRAM

"H" LINE (Rt)

NORTHBOUND 405-22 HOV Conn MEDIAN ES



PROFILE

"H" LINE (Rt)

NORTHBOUND 405-22 HOV Conn MEDIAN ES

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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STATION	1335	6	7	8	9	1340	1	2	TOTAL
CY Exc									
CY Emb									

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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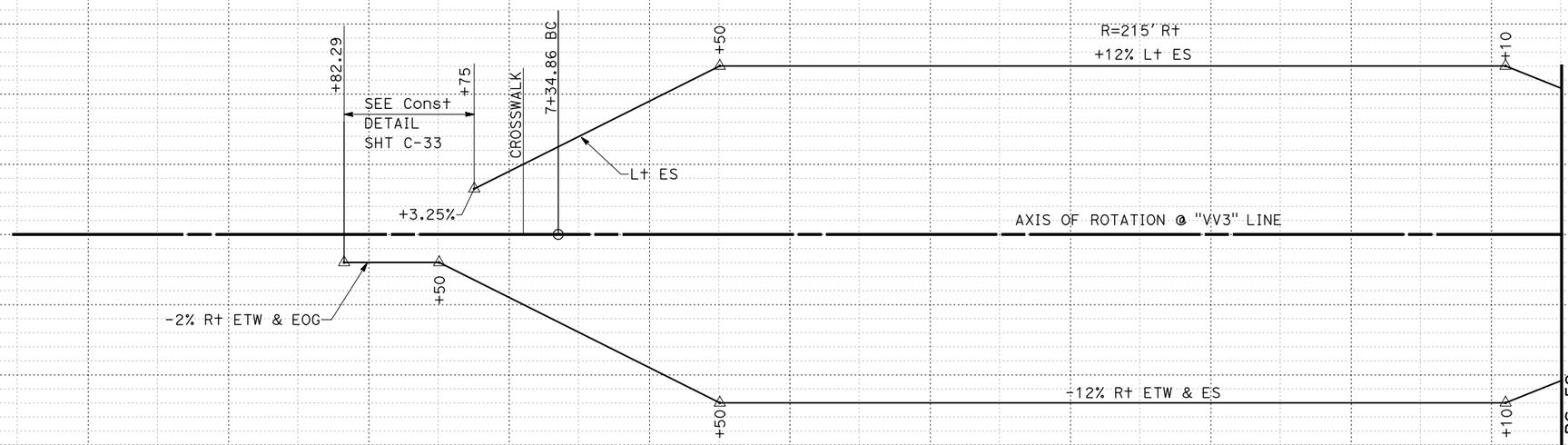
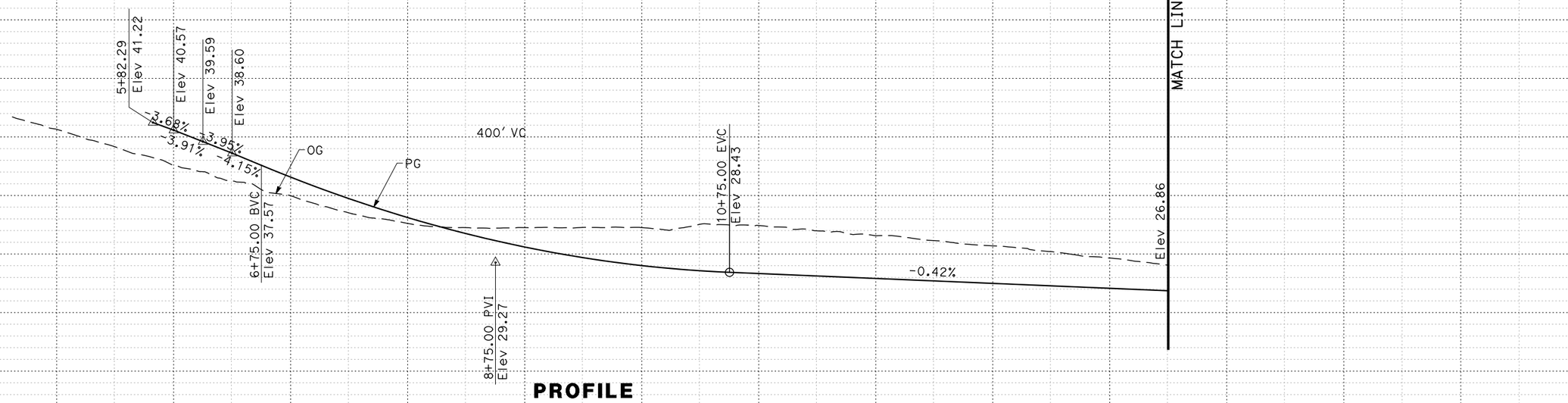


SUPERELEVATION DIAGRAM

"VV3" LINE

WB VALLEY VIEW St LOOP ON-RAMP



PROFILE

"VV3" LINE

WB VALLEY VIEW St LOOP ON-RAMP

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-51

STATION	5	6	7	8	9	10	1	2	3	4	TOTAL
CY Exc											
CY Emb											

LAST REVISION 10/23/2008 DATE PLOTTED => 10/23/2008 TIME PLOTTED => 5:02:19 PM

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CU 12235

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
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No. XXXXX
Exp. XX/XX/XX
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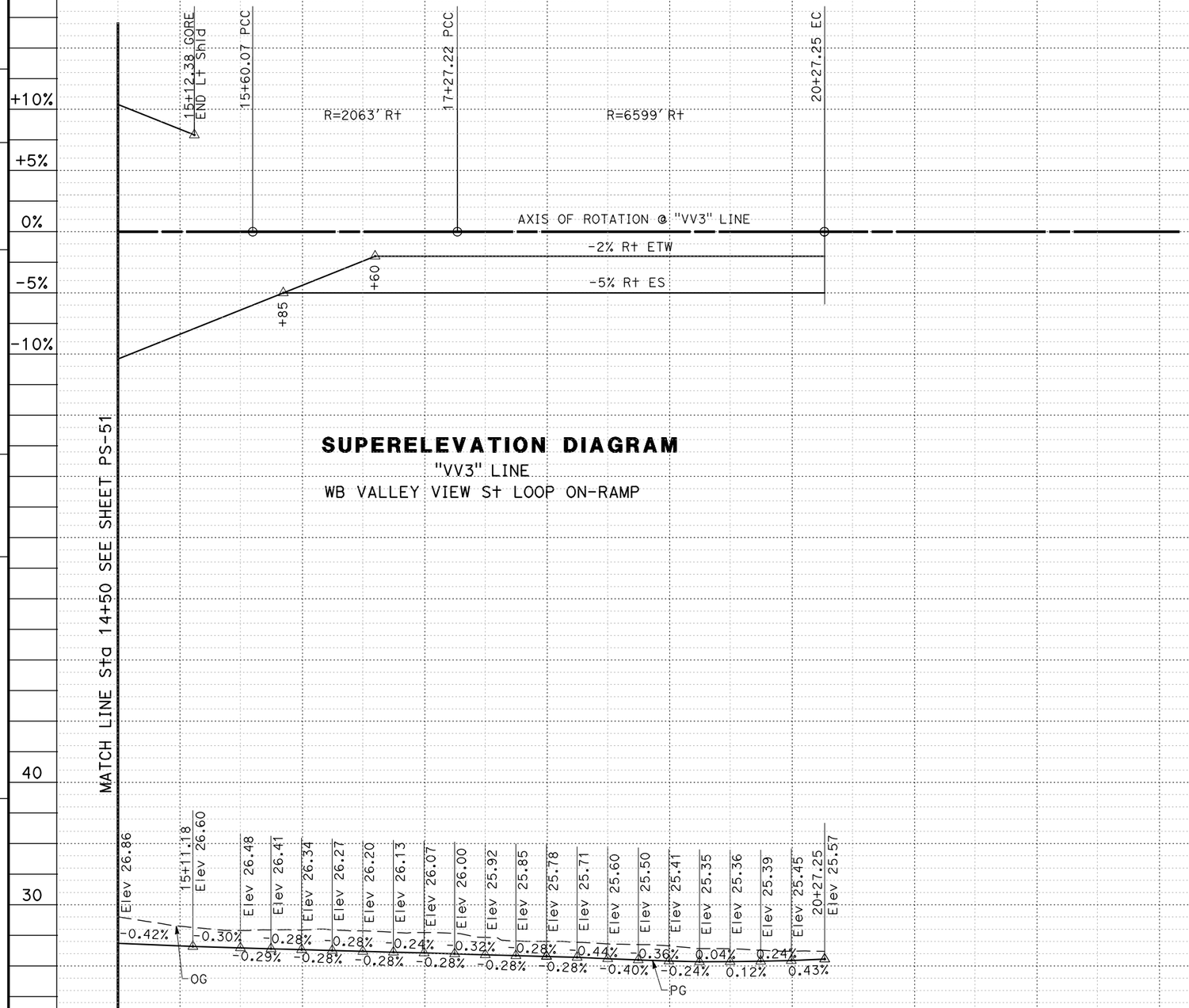

SUPERELEVATION DIAGRAM
"VV3" LINE
WB VALLEY VIEW St LOOP ON-RAMP

PROFILE
"VV3" LINE
WB VALLEY VIEW St LOOP ON-RAMP

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-52

STATION	15	6	7	8	9	20	TOTAL
CY Exc							
CY Emb							

LAST REVISION 10/23/2008
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 5:03:29 PM
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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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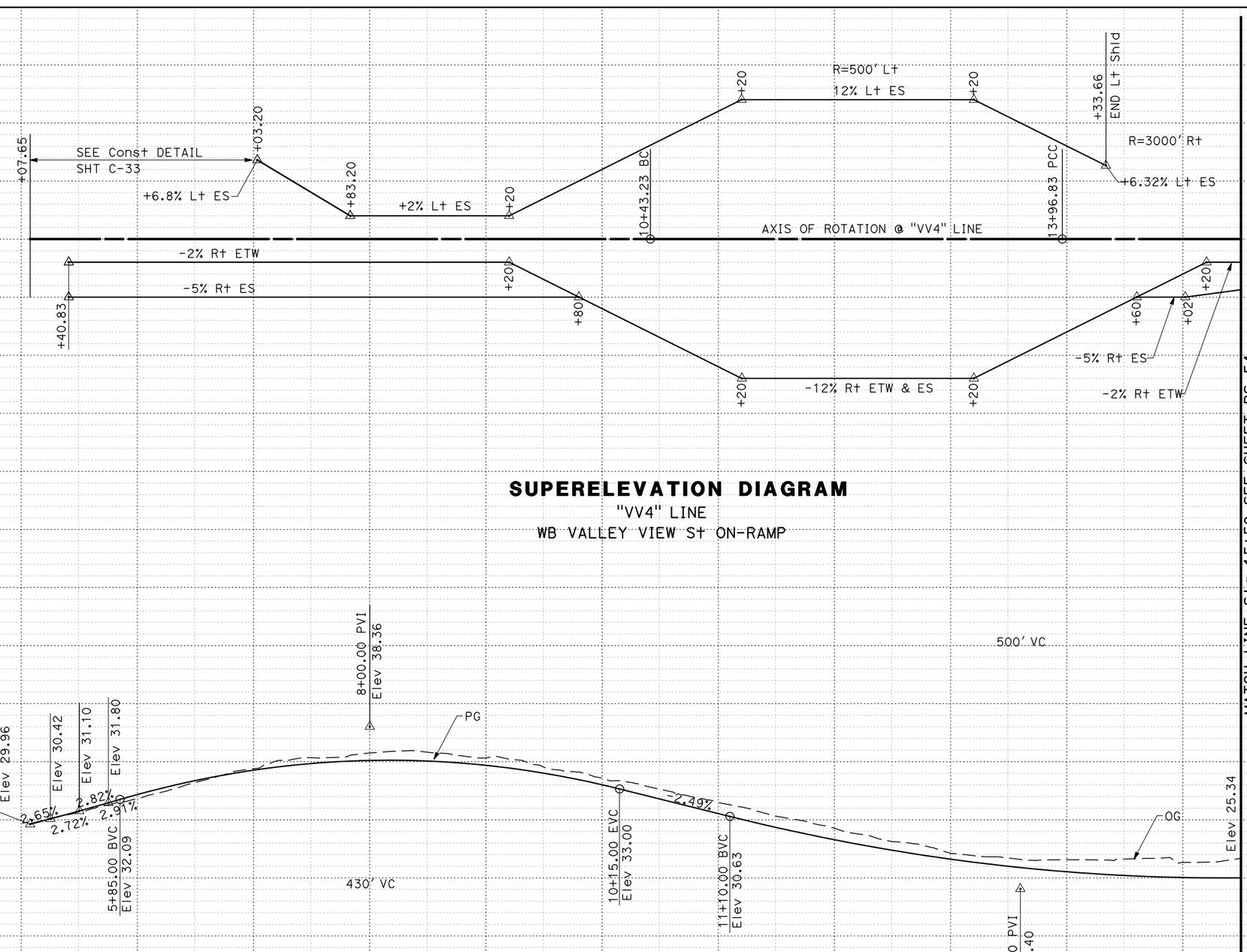

SUPERELEVATION DIAGRAM

"VV4" LINE

WB VALLEY VIEW St ON-RAMP

PROFILE

"VV4" LINE

WB VALLEY VIEW St ON-RAMP

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-53

STATION	5	6	7	8	9	10	1	2	3	4	15	TOTAL
CY Exc												
CY Emb												

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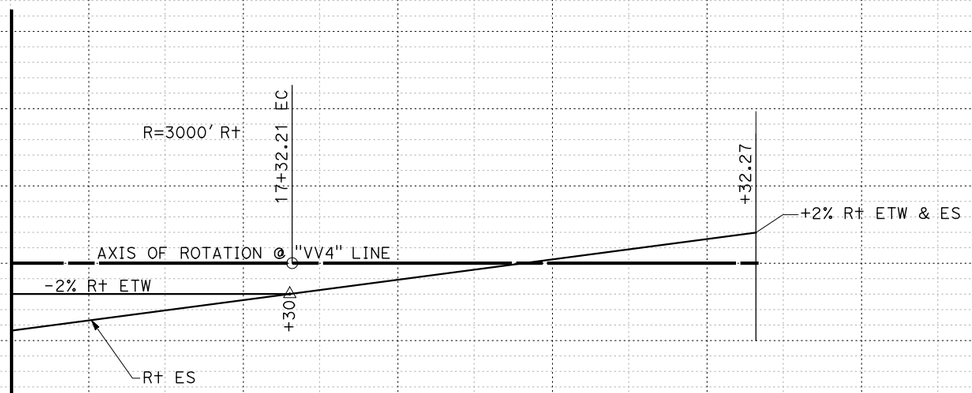
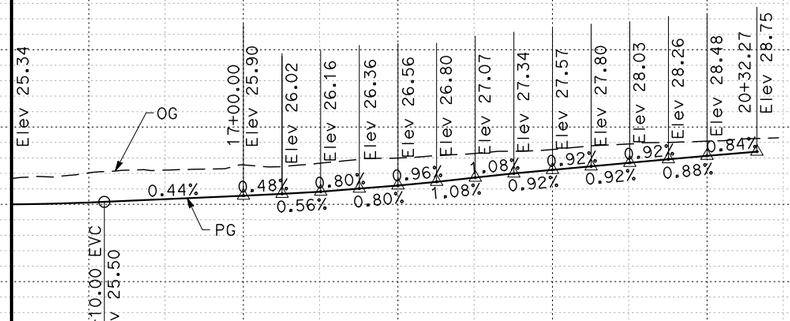


SUPERELEVATION DIAGRAM

"VV4" LINE
WB VALLEY VIEW St ON-RAMP



PROFILE

"VV4" LINE
WB VALLEY VIEW St ON-RAMP

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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STATION	15	6	7	8	9	20	TOTAL
CY Exc							
CY Emb							

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-54

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EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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ORANGE COUNTY
TRANSPORTATION AUTHORITY
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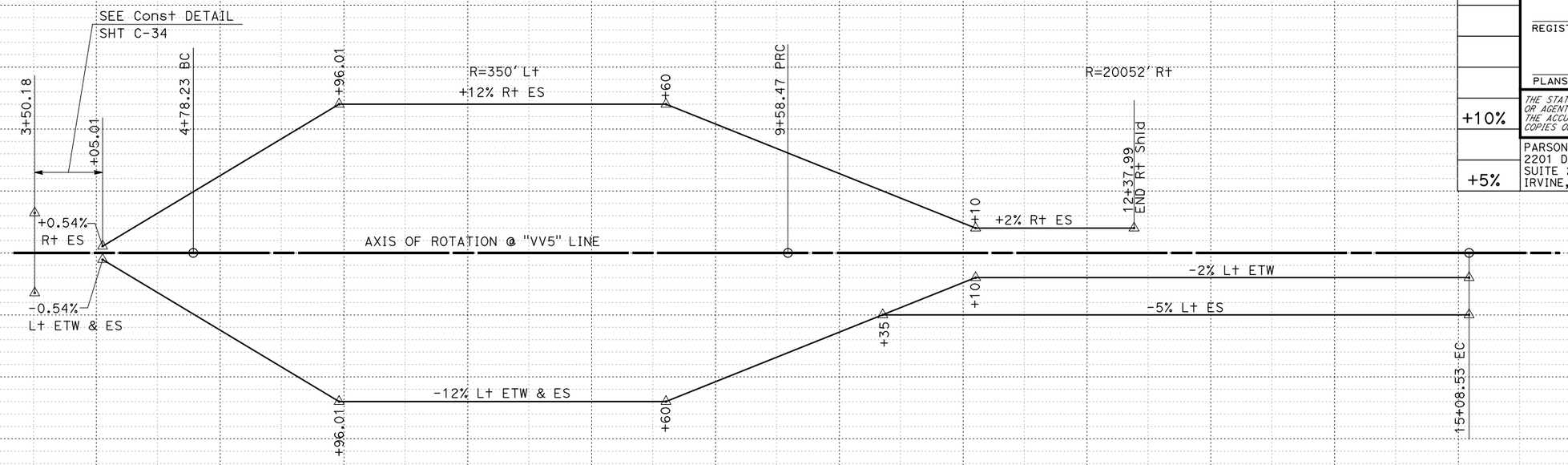
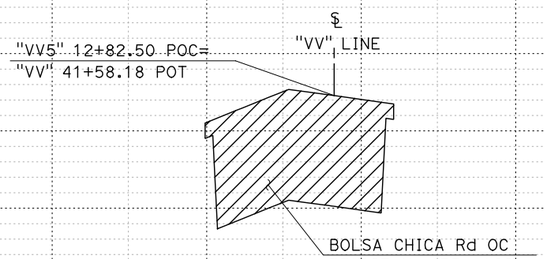
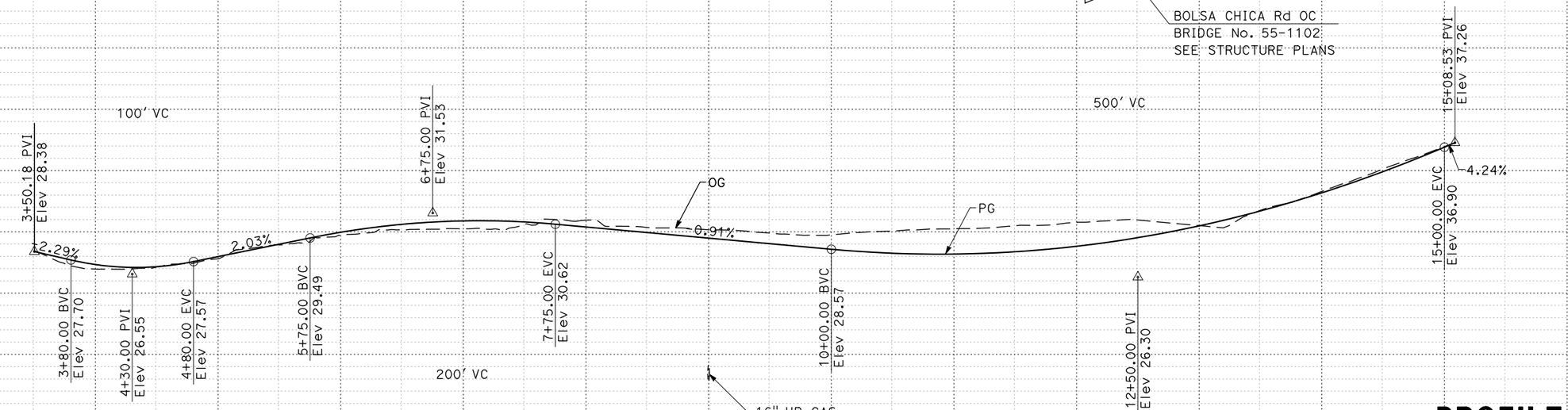


SUPERELEVATION DIAGRAM

"VV5" LINE
EB VALLEY VIEW St OFF-RAMP





PROFILE

"VV5" LINE
EB VALLEY VIEW St OFF-RAMP

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-55

STATION	4	5	6	7	8	9	10	1	2	3	4	15	TOTAL
CY Exc													
CY Emb													

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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+10%
+5%
0%
-5%
-10%

+84.80 MATCH Exist
+2% Rt ES
50
-2% Lt ETW
-5% Lt ES
50
+10
+50
R=400' Lt
+12% Rt ES
11+68.70 BC
AXIS OF ROTATION @ "BC1" LINE
+00
14+97.18 PCC
+50
R=1100' Lt
+9% Rt ES
+80
+29.93 END Rt Shld
19+29.59 PCC
R=2440' Lt
+30
-5% Lt ETW & ES
22+00.49 EC
+50
-12% Lt ETW & ES
+00
+50
-9% Lt ETW & ES
+80

SUPERELEVATION DIAGRAM

"BC1" LINE
SB BOLSA CHICA Rd OFF-RAMP

℄ "E" LINE

"BC1" 17+61.94 POC=
"E" 3317+75.70 POC

S405-E22 Conn Sep
BRIDGE No. 55-1101F
SEE STRUCTURE PLANS

Exist S405-E22 Conn Sep
BRIDGE No. 55-331R
TO BE REMOVED

9+84.80 PVI
Elev 32.21
MATCH EXIST

0.30%

12+50.00 BVC
Elev 33.01

14+50.00 PVI
Elev 33.61

OG

PG

18.98' Mip Vert Clr
@ 42.50' Rt "E" 3312+07.23
AND 70' Rt "NB405" 312+01.47

-2.19%

GARDEN GROVE
STORM Chnl

16+50.00 EVC
Elev 29.22

17+05.00 BVC
Elev 28.01

400' VC

BOLSA CHICA Chnl

500' VC

21+55.00 EVC
Elev 23.53

22+00.49 PVI
Elev 23.63

0.20%

19+30.00 PVI
Elev 23.07

16" HP GAS

TRIPLE 12' x 10' RCB

PROFILE

"BC1" LINE
SB BOLSA CHICA Rd OFF-RAMP

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-56

STATION	10	1	2	3	4	15	6	7	8	9	20	1	2	TOTAL
CY Exc														
CY Emb														

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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+10% +5% 0% -5% -10%

AXIS OF ROTATION @ "VV" LINE (CROWN)*

+86 Lt ETW

-2% Lt & Rt ETW & EOG

SEE Const DETAILS Sht C-32

-2% Lt & Rt ETW & EOG

+68.33

+81.86 INTERSECTION

+54.37 INTERSECTION

SUPERELEVATION DIAGRAM

* SEE LAYOUT PLANS FOR "VV" LINE (CROWN) LOCATION

"VV" LINE
VALLEY VIEW St/BOLSA CHICA Rd

"VV" 39+62.26 POT=
"GG" 274+53.35 PI

℄ "GG" LINE

37+68.33 PVI (Elev 53.88) MATCH Exist

PG

1.86%

BOLSA CHICA Rd OC

OG

40+84.23 BB Elev 57.53

41+90.00 PVI Elev 61.30

BOLSA CHICA ROAD OC
BRIDGE No. 55-1102
SEE STRUCTURE PLANS

Elev 54.58

7'-2"

650' VC

MATCH LINE St a 43+50 SEE SHEET PS-58

℄ "SB405" LINE ℄ "NB405" LINE

38+65.00 BVC Elev 55.67

"VV" 41+58.18 POT=
"VV5" 12+82.50 POC

℄ "VV5" LINE

18'-4" Min Vert Clr

℄ "E" LINE

18.11' Min Vert Clr @ 27.25' Lt "VV" 42+50.88 AND 6.05' Rt "H" 1302+67.35

℄ "H" LINE

℄ "W" LINE

"VV" 42+26.70 POT=
"E" 3302+44.18 POC

"VV" 42+63.73 POT=
"H" 1302+17.77 POT

"VV" 43+27.26 POT=
"W" 2301+56.58 POT

PROFILE

"VV" LINE
VALLEY VIEW St/BOLSA CHICA Rd

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-57

STATION	3	4	35	6	7	8	9	40	1	2	3	TOTAL
CY Exc												
CY Emb												

60 50 40 30 20

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
XXXXX
No. XXXXX
Exp XX/XX/XX
CIVIL
STATE OF CALIFORNIA

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+10% +5% 0% -5% -10%

AXIS OF ROTATION @ "VV" LINE (CROWN)*

-2% Lt & Rt ETW & EOG

-2% Lt & Rt ETW

+54.30 END Rt EOG

+18.58

-6.2%

+88.58 END Lt EOG

+00

SEE Const DETAIL
Sht C-33

SUPERELEVATION DIAGRAM

* SEE LAYOUT PLANS FOR "VV" LINE (CROWN) LOCATION

"VV" LINE
VALLEY VIEW St/BOLSA CHICA Rd

BOLSA CHICA ROAD OC
BRIDGE No. 55-1102
SEE STRUCTURE PLANS

MATCH LINE Sta 43+50 SEE SHEET PS-57

Elev 54.58

44+40.22 EB
Elev 52.29

7'-2"

18'-4"
Min Vert Clr

650' VC

45+15.00 EVC
Elev 49.89

PG

OG

-3.51%

49+00.00 BVC
Elev 36.38

200' VC

51+00.00 EVC
(Elev 30.11)
MATCH Exist

-2.76%

50+00.00 PVI
Elev 32.87

60 50 40 30 20

PROFILE

"VV" LINE
VALLEY VIEW St/BOLSA CHICA Rd

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-58

STATION	4	45	6	7	8	9	50	1	2	TOTAL
CY Exc										
CY Emb										

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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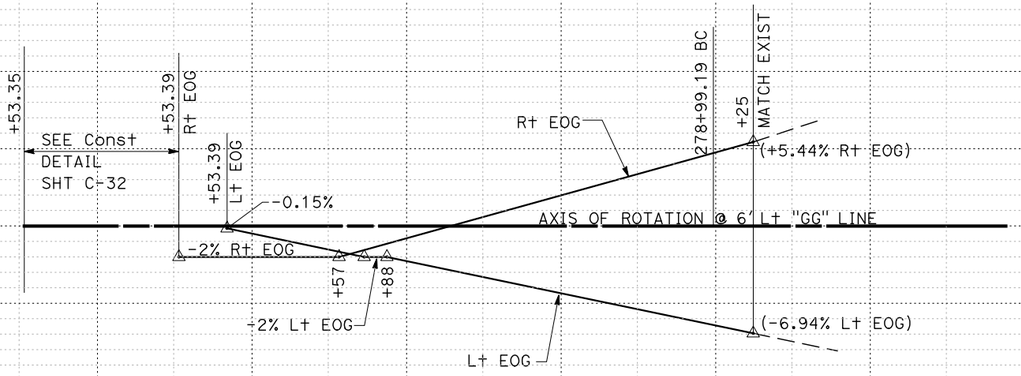
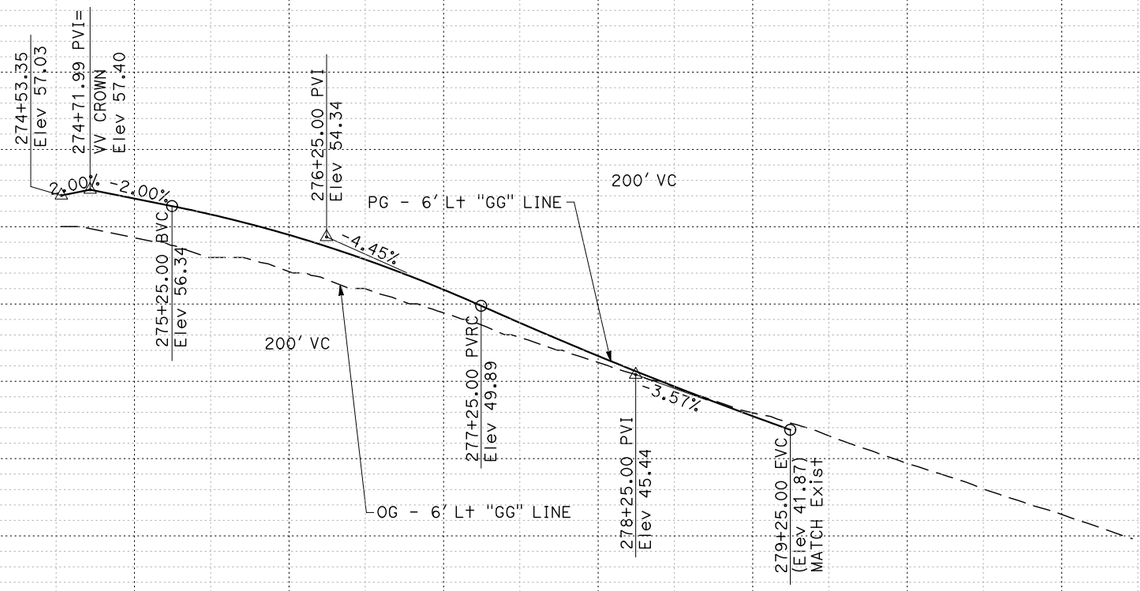


SUPERELEVATION DIAGRAM

"GG" LINE

GARDEN GROVE Blvd



PROFILE

"GG" LINE

GARDEN GROVE Blvd

PROFILE AND SUPERELEVATION DIAGRAM

SCALE Horiz 1" = 50'
Vert 1" = 5'

PS-59

STATION		4	275	6	7	8	9	TOTAL
CY	Exc							
	Emb							

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APPENDIX D
CONTOUR GRADE SHEETS

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

ABBREVIATIONS

C	CUT
F	FILL
C|F	CUT / FILL LIMIT
OCFCD	ORANGE COUNTY FLOOD CONTROL DISTRICT

LEGEND

- ROCK BLANKET
- CUT SLOPE
- FILL SLOPE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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CONTOUR GRADING

SCALE 1" = 50'

G-1

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SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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GARDEN GROVE Blvd "GG" LINE

CITY OF WESTMINSTER
CITY OF GARDEN GROVE

EB ROUTE 22

WB ROUTE 22

"B" LINE

"E" LINE S405-E22 Conn

"H" LINE 405-22 HOV Conn

"W" LINE W22-N405 Conn

"VV3" LINE

"VV5" LINE

MATCH LINE Sta 286+50 "B" LINE
SEE SHEET G-1

MATCH LINE Sta 1298+50 "H" LINE
SEE SHEET G-3

MATCH LINE Sta 8+50 "VV5" LINE
SEE SHEET G-3

MATCH LINE Sta 12+50 "VV3" LINE
SEE SHEET G-5

CONTOUR GRADING

SCALE 1" = 50'

G-2

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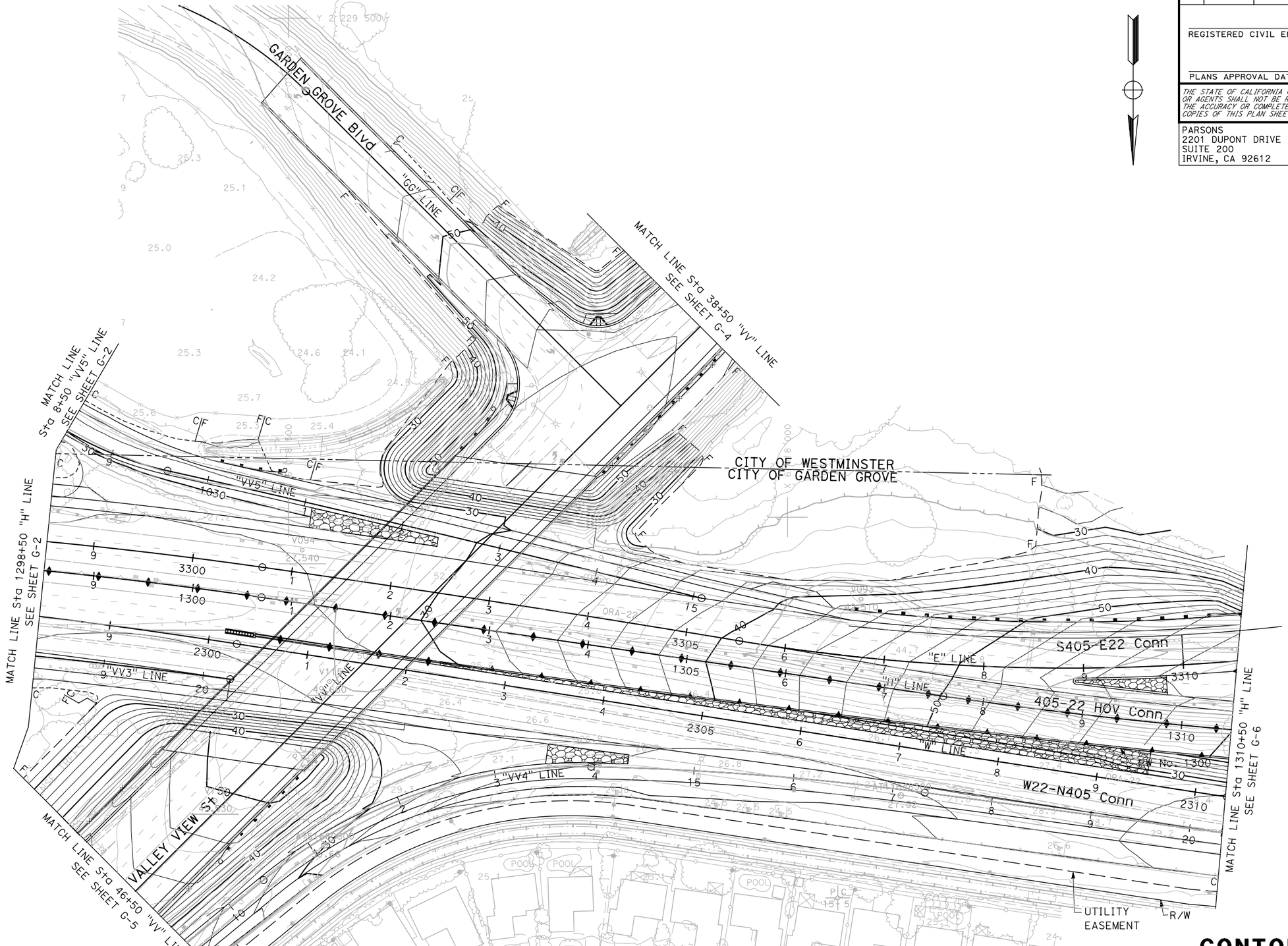

CONTOUR GRADING

SCALE 1" = 50'

G-3

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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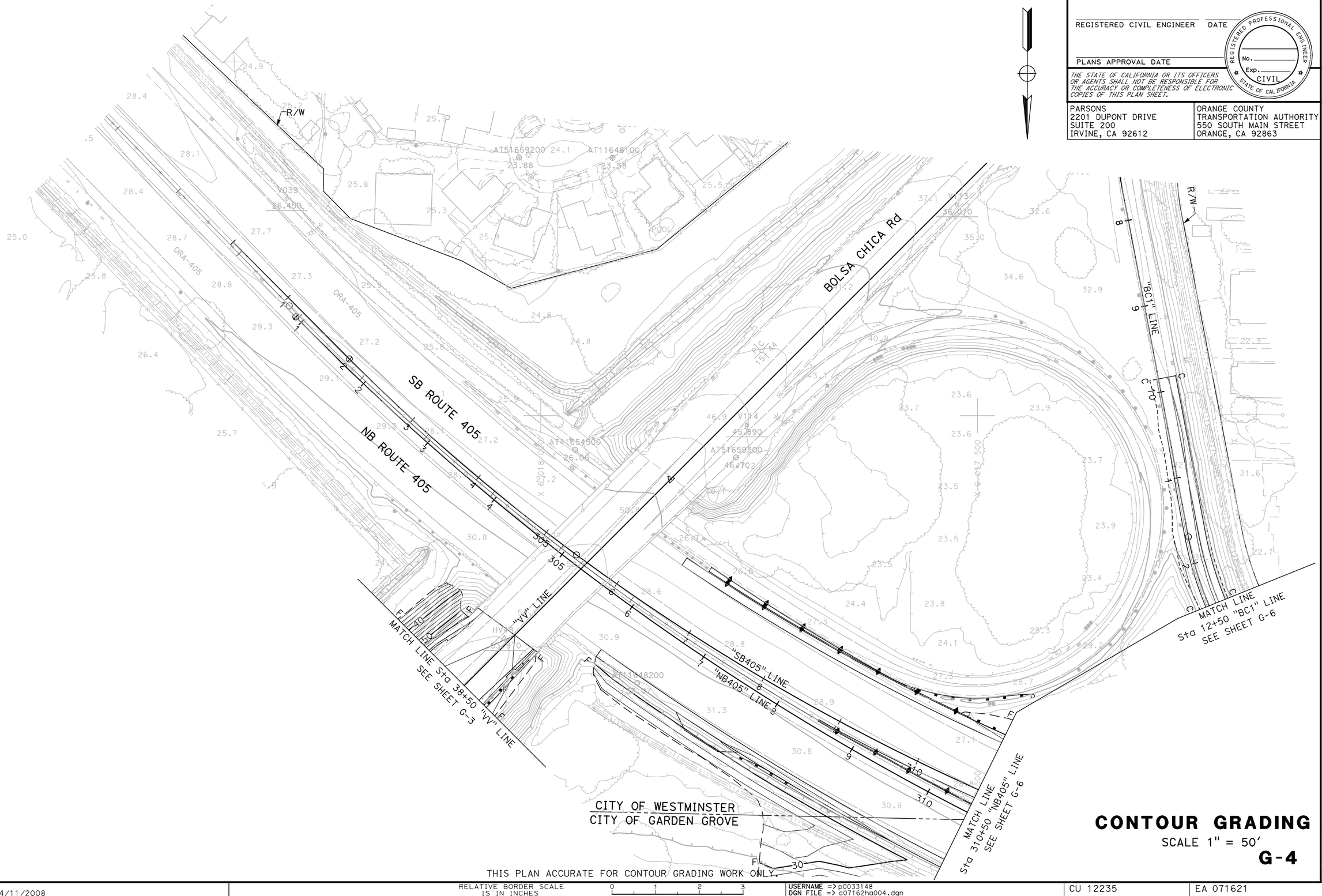

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CONTOUR GRADING

SCALE 1" = 50'

G-4

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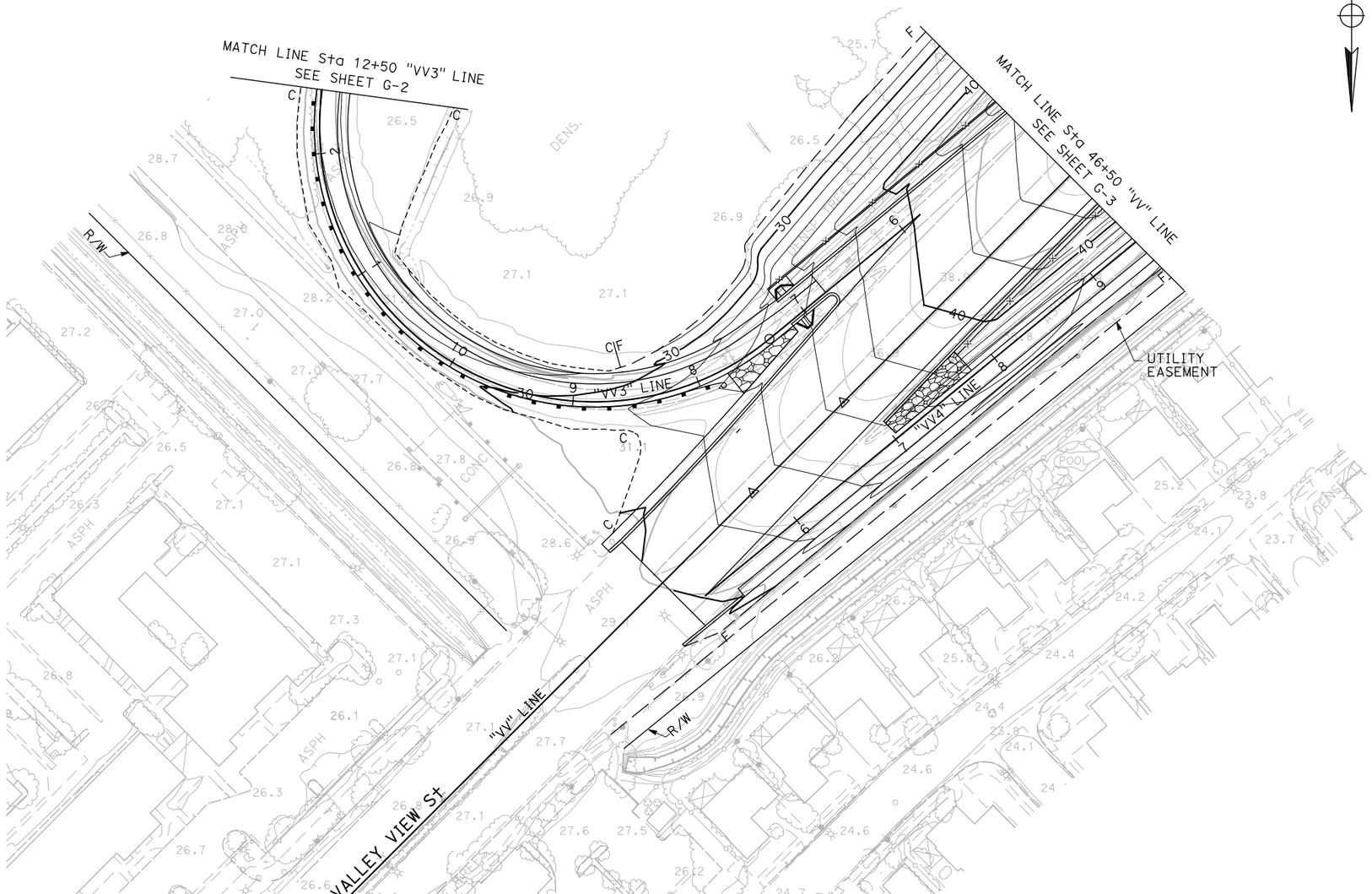

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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CONTOUR GRADING

SCALE 1" = 50'

G-5

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CU 12235

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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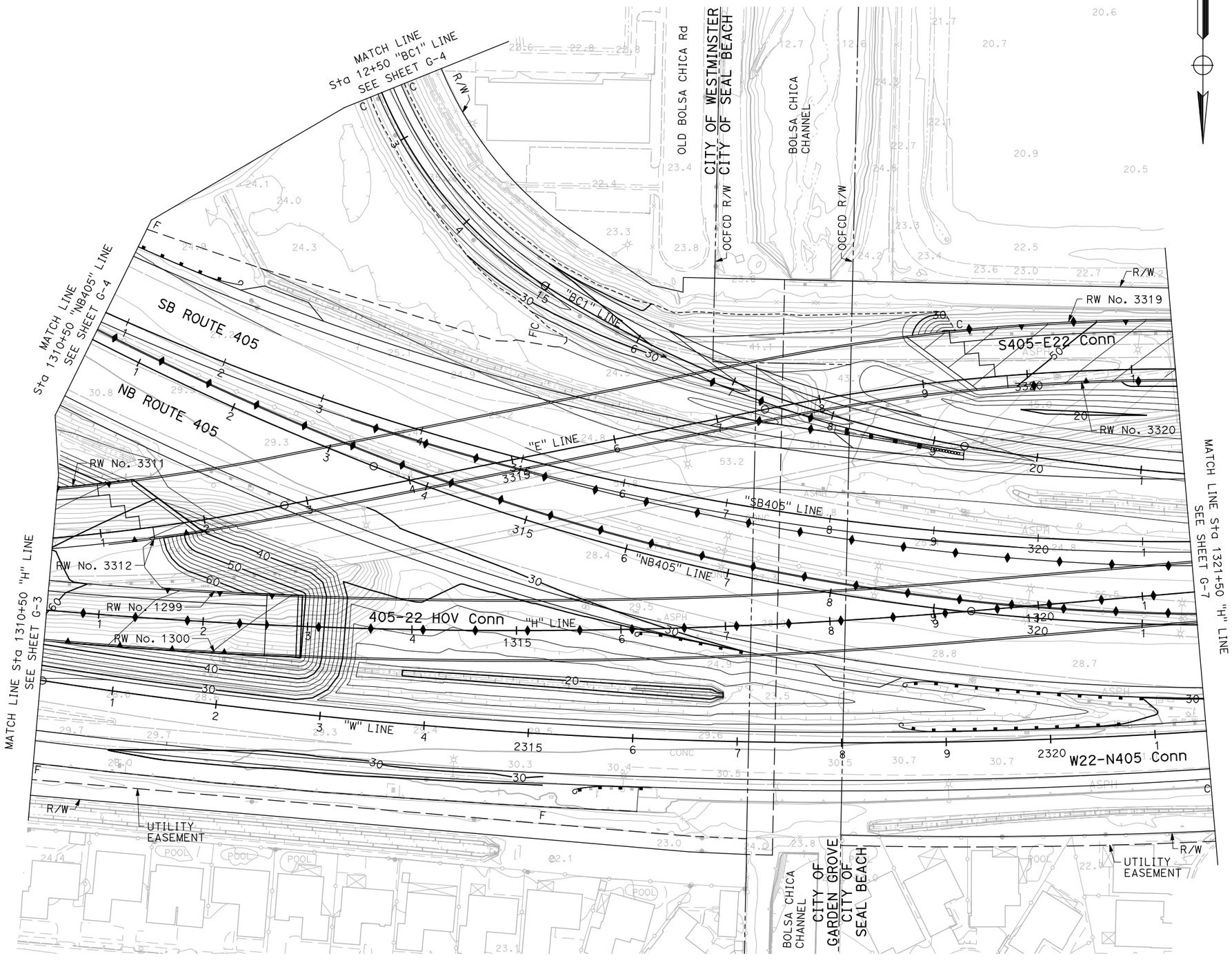

CONTOUR GRADING

SCALE 1" = 50'

G-6

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DATE PLOTTED => 10/23/2008
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BORDER LAST REVISED 4/11/2008

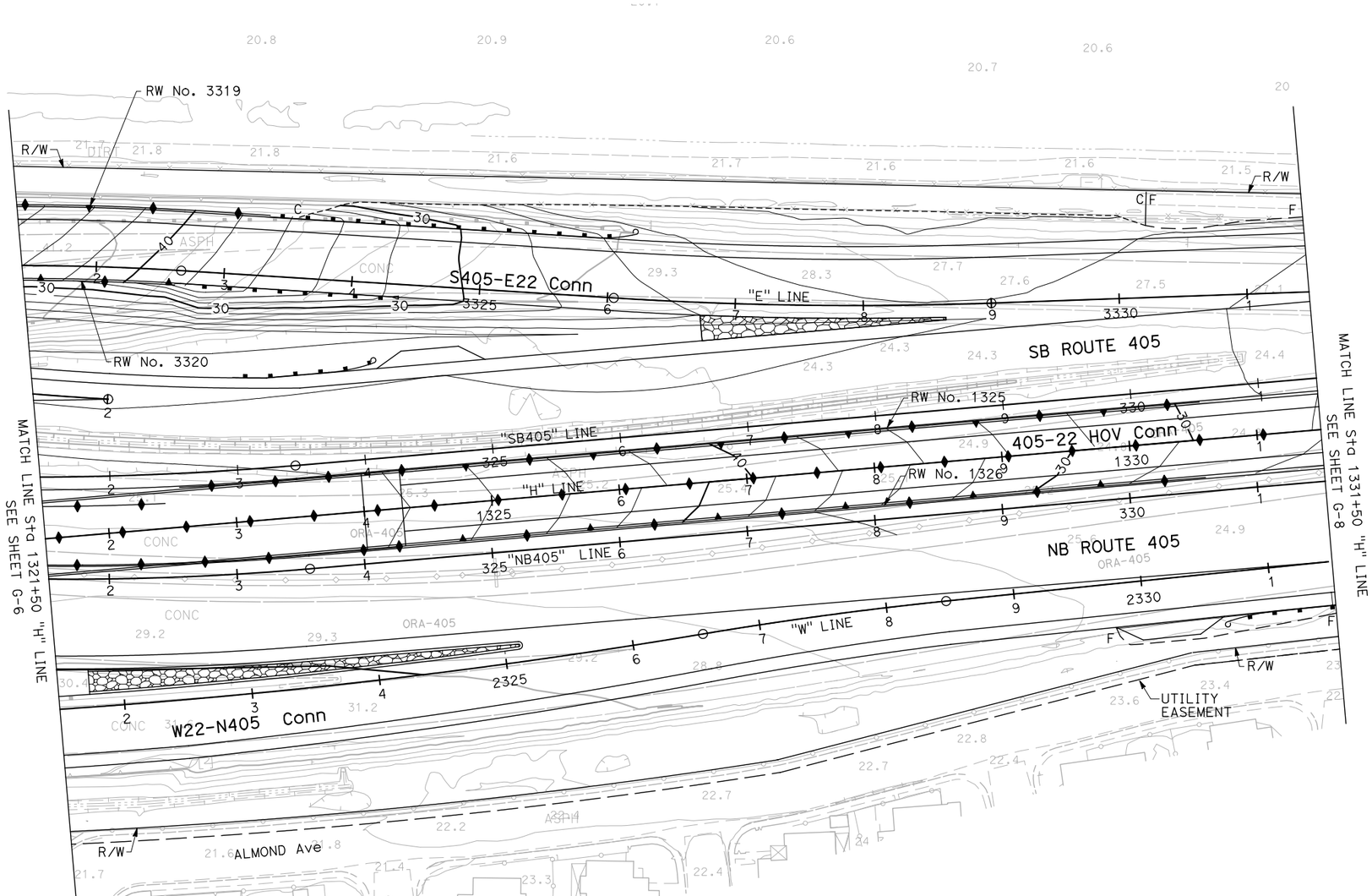
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c07162ha006.dgn

CU 12235

EA 071621

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
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Exp.
CIVIL
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ORANGE COUNTY
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CONTOUR GRADING

SCALE 1" = 50'

G-7

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USERNAME => p0033148
DGN FILE => c07162na007.dgn

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EA 071621

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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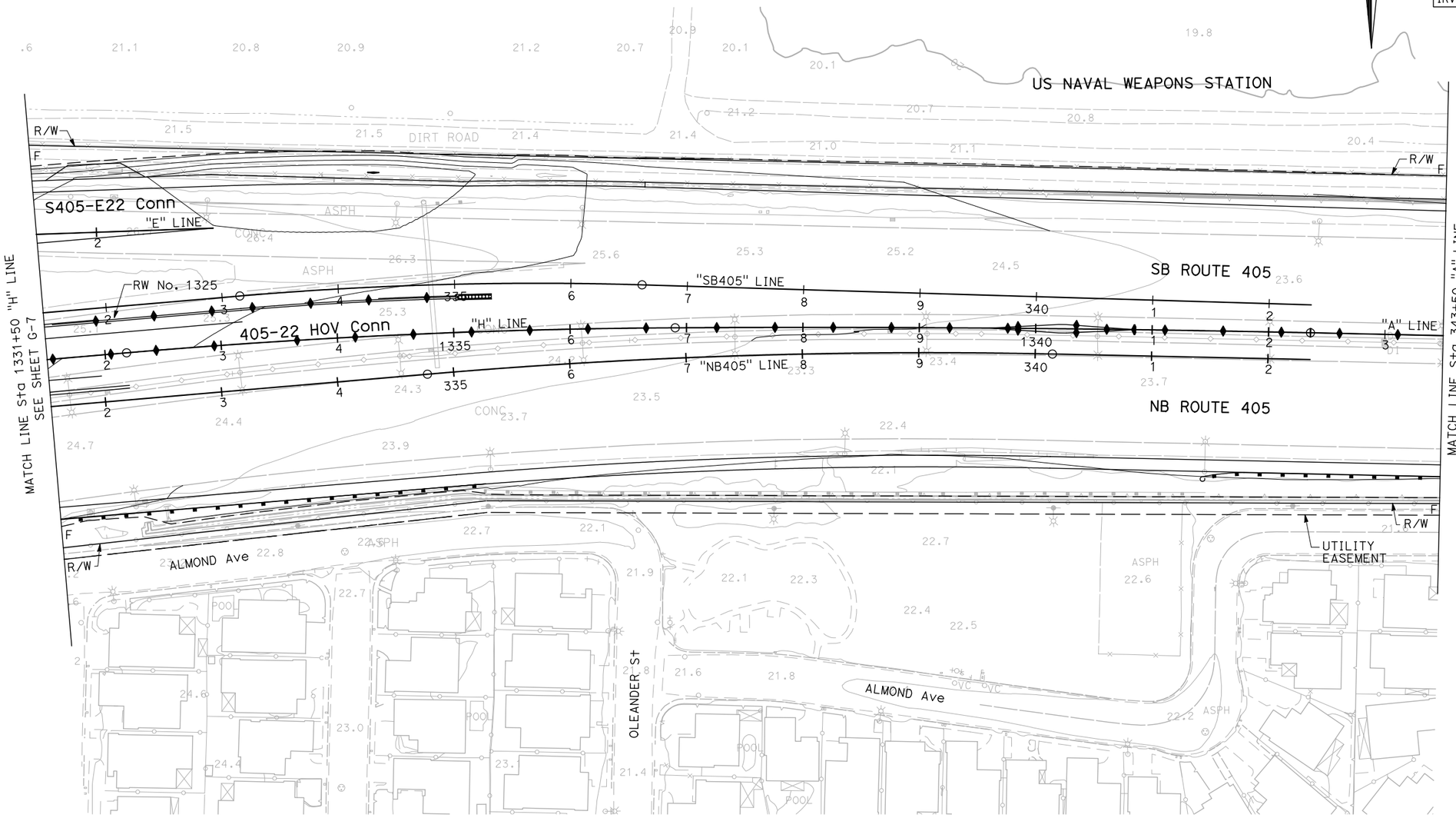

CONTOUR GRADING

SCALE 1" = 50'

G-8

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TIME PLOTTED => 1:16:22 PM

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USERNAME => p0033148
DGN FILE => c07162ha008.dgn

CU 12235

EA 071621

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SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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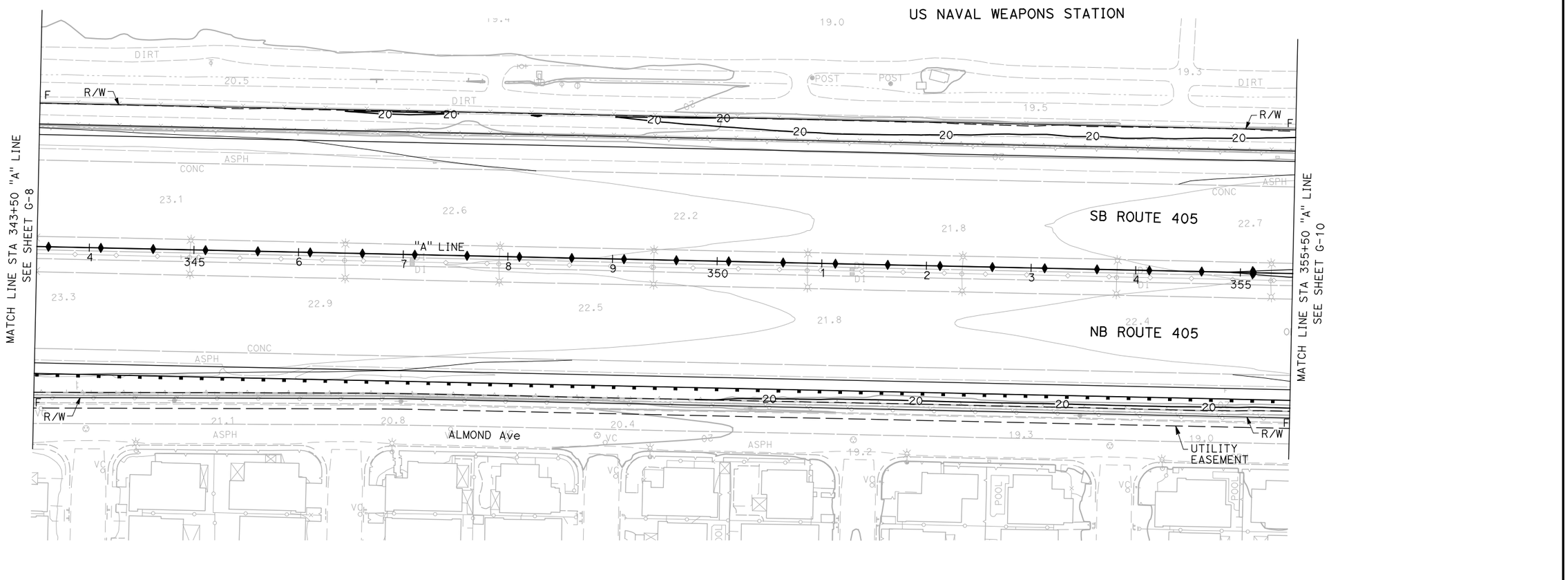

CONTOUR GRADING

SCALE 1" = 50'

G-9

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TIME PLOTTED => 1:16:26 PM

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DGN FILE => c07162hg009.dgn
CU 12235
EA 071621

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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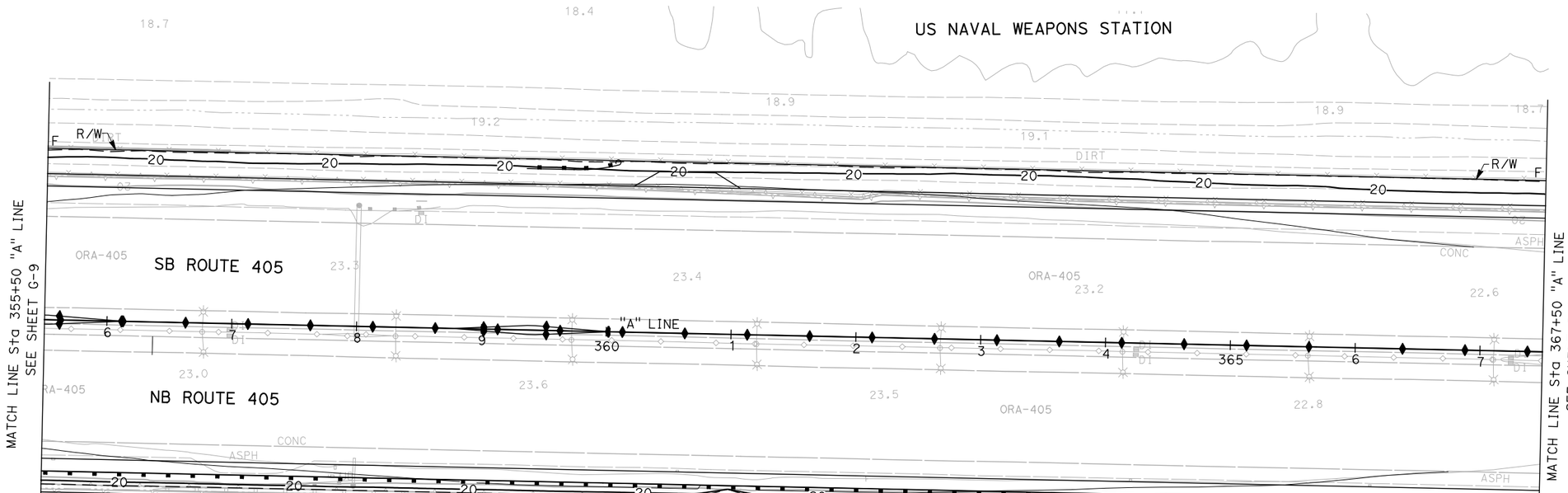
ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863



CONTOUR GRADING

SCALE 1" = 50'

G-10

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Gibbs

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BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => p0033148 | DGN FILE => c07162ha010.dgn | CU 12235 | EA 071621

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
No. _____
Exp. _____
CIVIL
STATE OF CALIFORNIA

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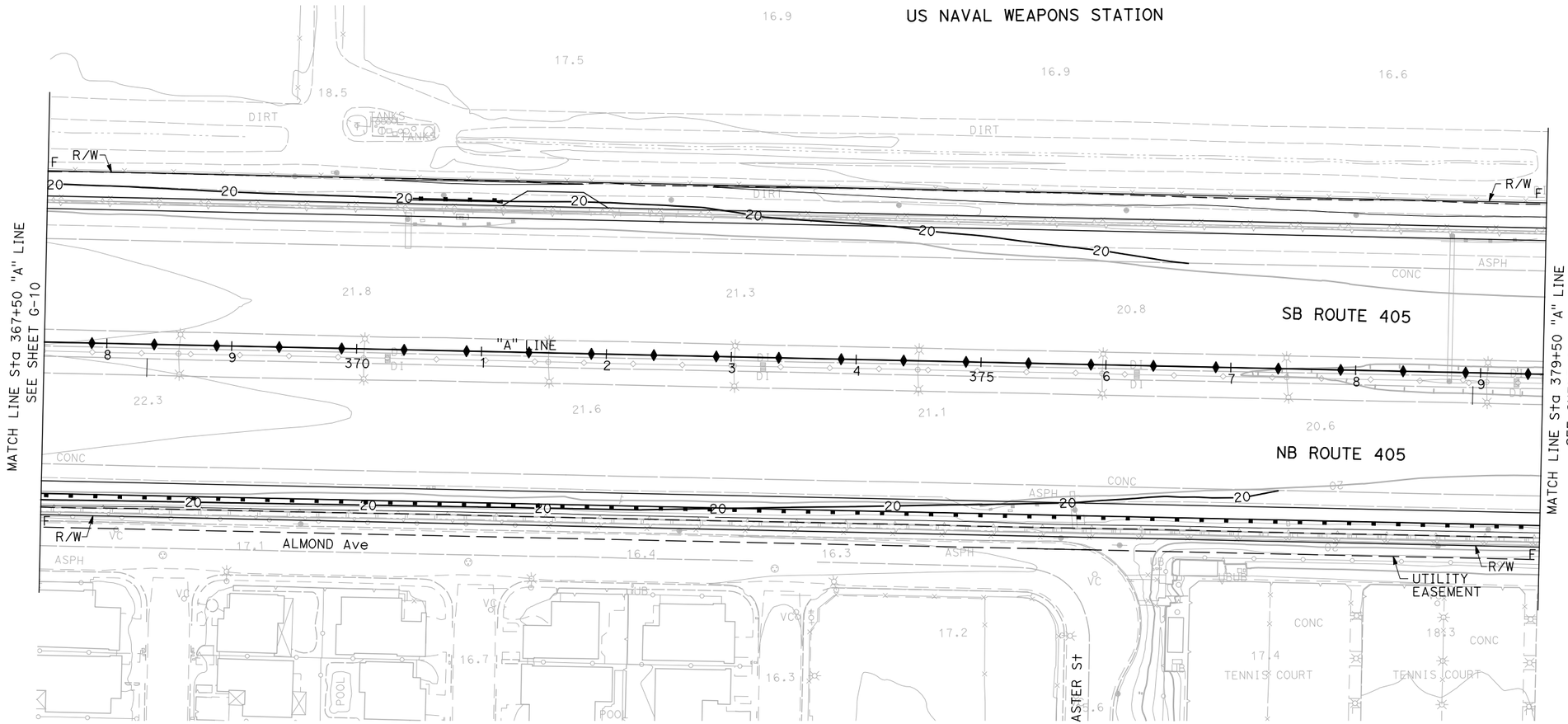
SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863



CONTOUR GRADING

SCALE 1" = 50'

G-11

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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DGN FILE => c07162na011.dgn

CU 12235

EA 071621

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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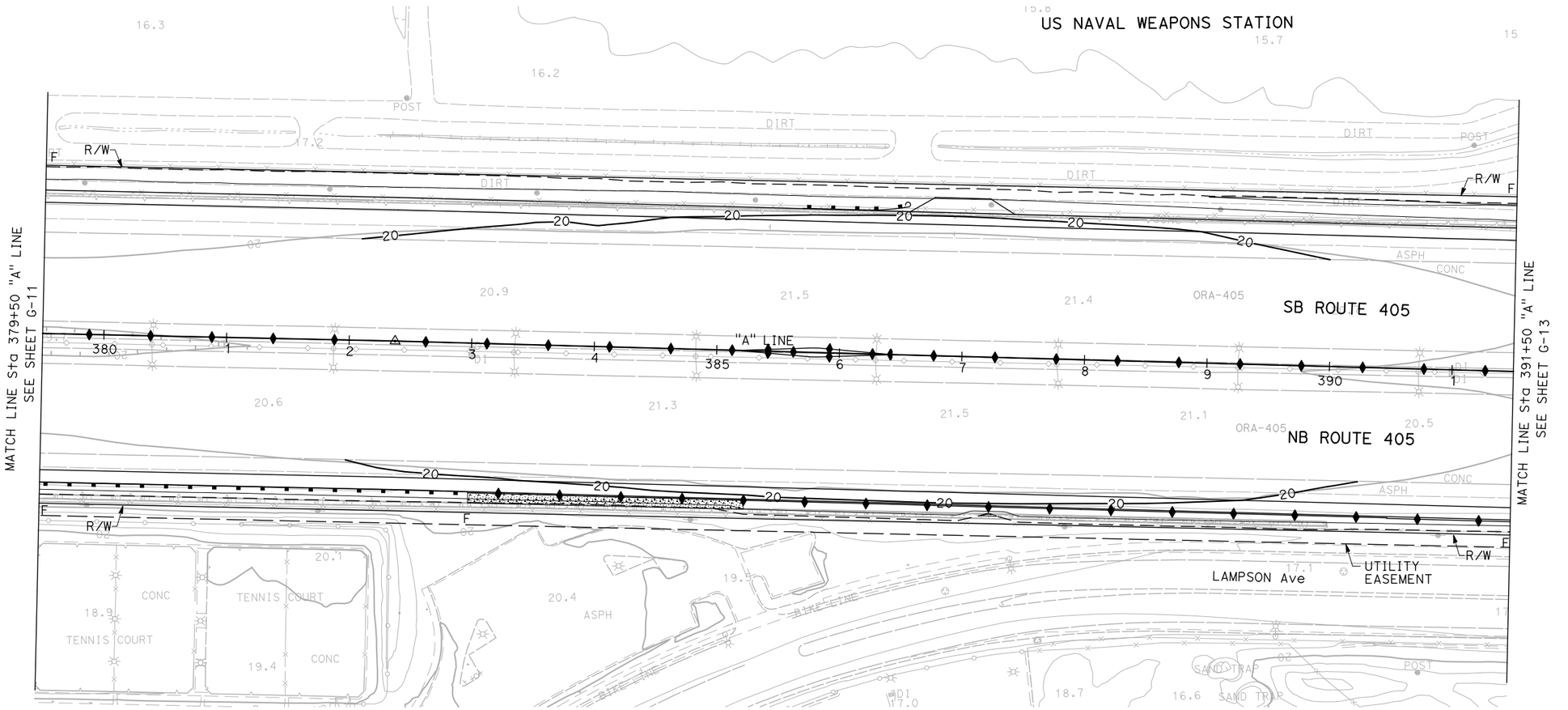
SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863



CONTOUR GRADING

SCALE 1" = 50'

G-12

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CU 12235

EA 071621

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

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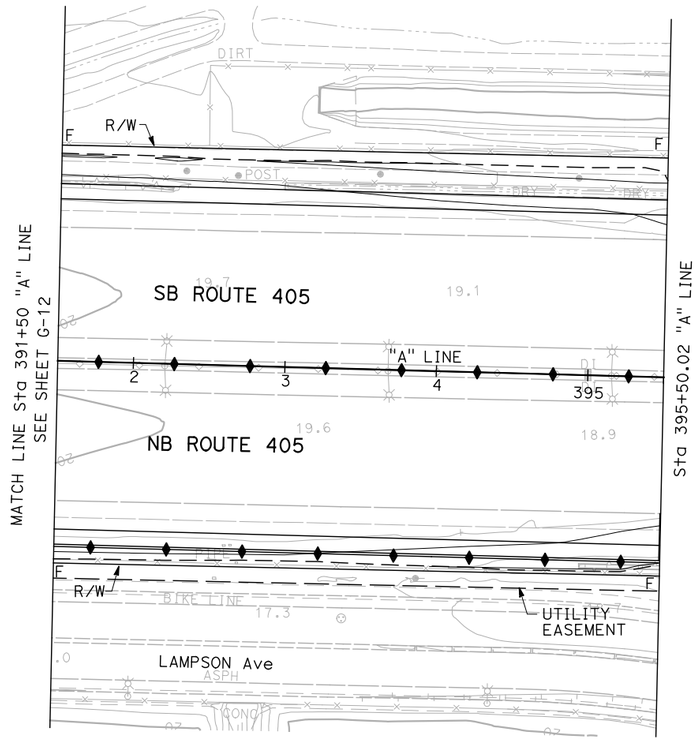
SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

US NAVAL WEAPONS STATION



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CONTOUR GRADING

SCALE 1" = 50'

G-13

LAST REVISION 10-27-08
DATE PLOTTED => 10/23/2008
TIME PLOTTED => 1:16:42 PM

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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DGN FILE => c07162ha013.dgn

CU 12235

EA 071621

APPENDIX E
SITE PHOTOGRAPHS

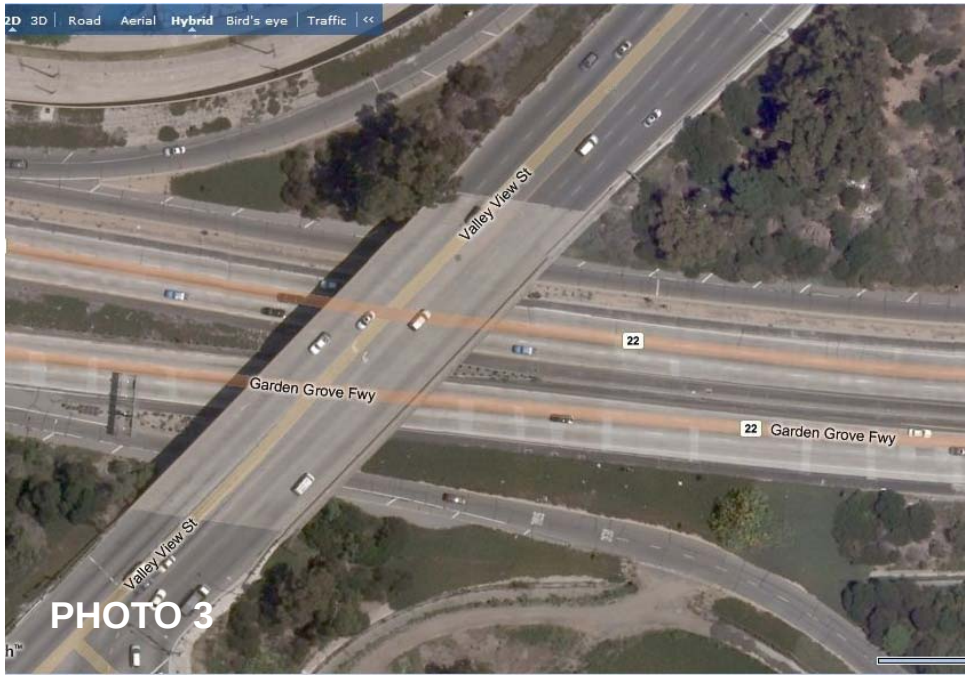
APPENDIX E

List of Photographs

Photograph No.	Description
1	Aerial photo: West Abutment existing Rte 22/405 Separation
2	Boring R-08-012, Proposed S405-E22 Conn. Sep. (looking east)
3	Aerial photo: exist. Bolsa Chica Rd OC / SR-22 (aka Valley View)
4	Aerial photo: exist east abut Rte 22/405 Separation, and proposed east abut of S405-E22 Conn. Sep and 405-22 HOV Conn. Sep
5	Exist. Rte 22/405 Sep. ramp @ Bolsa Chica Rd. off-ramp in vicinity of CPT-08-006 and CPT-08-008 (looking east)
6	NB I-405 below exist. Rte 22/405 Sep. bridge in vicinity of CPT-08-013 (looking west)
7	NB I-405 near "A" 373+00 in vicinity of CPT-08-106 (looking west)
8	Bolsa Chica Channel from Rte 22/405 ramp / Bolsa Chica Road off-ramp (looking south)
9	Proposed fill embankment and surcharge area for proposed east abutment S405-E22 Conn. Sep. ("E" 3307+00 looking west)
10	WB SR-22 across freeway from CPT-08-015 ("W" 2313+00 looking east), Ret. Wall RW1300 proposed at bottom of embankment slope, Bolsa Chica Rd OC in background
11	Drainage ditch at base of slope in vicinity of CPT-08-015 & proposed east abutment 405-22 HOV Conn. Sep.
12	Existing Rte 22/405 Separation east abutment, proposed 405-22 HOV Conn. Sep. east abutment and RW1300, near CPT-08-015
13	WB SR-22 @ SB Valley View – WB22 on-ramp ("W" 2303+00 looking west), proposed RW1300 is at base of embankment slope across the freeway
14	SB I-405 near west end of project (looking east)
15	WB SR-22 ("W" 2308+00 looking east), Bolsa Chica Rd OC in background, proposed RW1300 at base of slope on right
16	SB I-405 near "SB405" 321+00 (Looking east at exist. Rte 22/405 Separation)
17	Rte 22 / 405 Sep ramp near "E" 3326+00 (driving east)
18	EB SR-22 @ Bolsa Chica Rd. OC (driving east)
19	SB I-405 @ Rte 22/405 Sep. Ramp near "SB405" 336+00 (driving east)
20	West abutment existing Rte 22/405 Separation (driving east)
21	WB SR-22 approaching merge w/ NB I-405 in vicinity of boring A-08-122 ("W" 2321+00 driving west)

2D 3D | Road Aerial Hybrid Bird's eye | Traffic
22
Garden Grove Fwy
22
Garden Grove Fwy
Seal Beach
PHOTO 1

PHOTO 2
04 04 2008 09:28


2D 3D | Road Aerial Hybrid Bird's eye | Traffic
Valley View St
22
Garden Grove Fwy
22
Garden Grove Fwy
Valley View St
PHOTO 3

22
Garden Grove Fwy
22
San Diego Fwy
405
Garden Grove Fwy
Garden Grove Fwy
22
405
San Diego Fwy
San Diego Fwy
PHOTO 4

EXIT
5A
CALL
BOX
30'
150'
PHOTO 5
03.02.2008 23:45

PHOTO 6
12.24.2007 23:26

PHOTO 7
12.25.2007 05:56

PHOTO 8
03.02.2008 23:46

PHOTO 9
12.25.2007 02:42

PHOTO 10
12.25.2007 04:50

PHOTO 11
12.24.2007 23:29

PHOTO 12
12.25.2007 04:50

PHOTO 13

PHOTO 14

PHOTO 15

PHOTO 16

PHOTO 17
08/07/07 13:50

PHOTO 18
08/07/07 13:51

Garden Grove Fwy
Garden Grove
EAST
22
EXIT
21
PHOTO 19
08/07/07 13:50

PHOTO 20
08/07/07 13:51

PHOTO 21
08/07/07 13:55

APPENDIX F
CALCULATIONS

Appendix F.1	EQFAULT / Deterministic Seismic Calculations
Appendix F.2	Liquefaction Calculations
Appendix F.3	Slope Stability Calculations
Appendix F.4	Settlement Calculations
Appendix F.5	Type I Wall Calculations (bearing capacity, earth pressure, sliding resistance, overall stability)

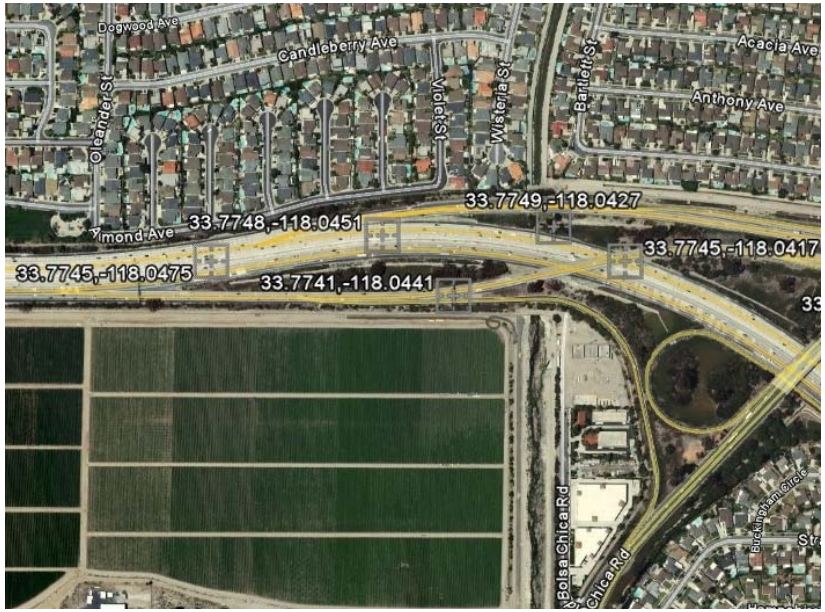
Appendix F.1
EQFAULT / Deterministic Seismic Calculations

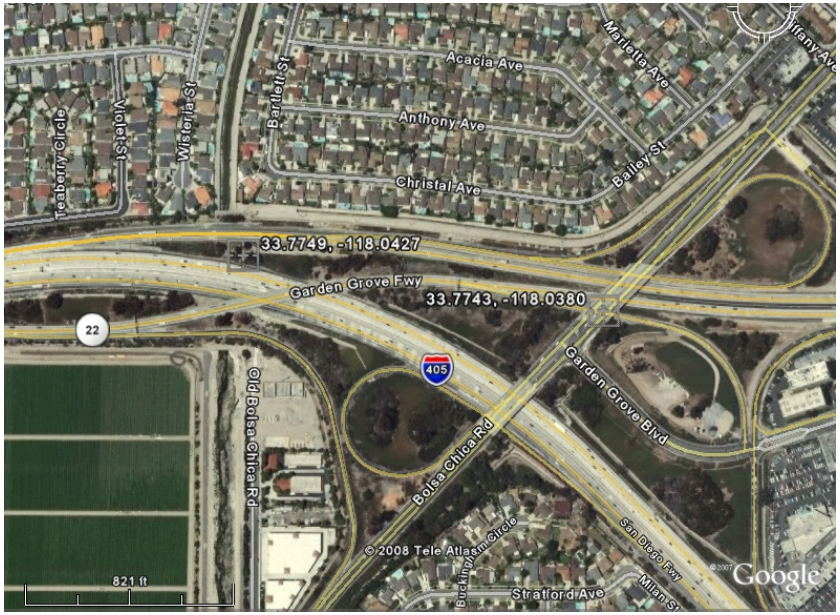
TABLE 2
SUMMARY OF NEARBY FAULTS AND SEISMICITY

Fault Name	Fault Type	Mw	LOCATION																	
			Bolsa Chica Road OC			405/22 HOV Conn. Separation			Middle RW3319 & 3320			W. End RW1325 & 1326			Closest to Los Alamitos Fault			W. End Project		
			Lat. 33.7743 Lon. 118.0380			Lat. 33.7749 Lon. 118.0427			Lat. 33.7741 Lon. 118.0441			Lat. 33.7745 Lon. 118.0475			Lat. 33.7743 Lon. 118.0587			Lat. 33.7743 Lon. 118.0681		
			Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA
Newport-Inglewood	Strike Slip	7.00	5.50	0.50	0.41	5.20	0.51	0.42	5.00	0.52	0.42	4.80	0.53	0.43	4.10	0.56	0.45	3.40	0.59	0.47
Los Alamitos	Reverse	6.00	2.00	0.57	0.48	1.70	0.59	0.50	1.60	0.60	0.50	1.20	0.63	0.52	0.90	0.65	0.54	1.90	0.58	0.49
San Joaquin Hills	Blind Thrust	7.00	13.30	0.37	0.35	13.60	0.36	0.35	13.70	0.36	0.34	13.90	0.36	0.34	14.70	0.34	0.33	15.40	0.33	0.32
Puente Hills	Blind Thrust	7.25	18.20	0.32	0.32	18.10	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.30	0.32	0.31

33.7743,-118.0531
33.7743,-118.0587
22
Google

Elder Ave
Almond Ave
33.7743,-118.0587
405
33.7745,-118.0475
33.7748,-118.0451
33.7741,-118.0441
© 2008 Tele Atlas
Google


Dogwood Ave
Candleberry Ave
Acacia Ave
Oleander St
Violet St
Wisteria St
Bartlett St
Anthony Ave
33.7749,-118.0427
33.7748,-118.0451
33.7745,-118.0417
33.7745,-118.0475
33.7741,-118.0441
Bolsa Chica Rd


Teaberry Circle
Violet St
Wisteria St
Bartlett St
Acacia Ave
Marietta Ave
Anthony Ave
Christal Ave
Bailey St
33.7749, -118.0427
Garden Grove Fwy
33.7743, -118.0380
22
405
Old Bolsa Chica Rd
Bolsa Chica Rd
Garden Grove Blvd
Buckingham Circle
San Diego Fwy
Stratford Ave
Milan St
821 ft
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Google

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**********************
*                    *
*    E Q F A U L T   *
*                    *
*    Version 3.00    *
*                    *
**********************

DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: West End of Project St "A" 395+50

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7743
   SITE LONGITUDE:  118.0681

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
```

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.1(3.4)	7.0	0.585	X
SAN JOAQUIN HILLS	9.6(15.4)	7.0	0.328	IX
PALOS VERDES	10.7(17.2)	7.0	0.249	IX
PUENTE HILLS BLIND THRUST	11.4(18.3)	7.3	0.317	IX
WHITTIER	14.6(23.5)	6.8	0.166	VIII
NEWPORT-INGLEWOOD (Offshore)	15.4(24.8)	7.0	0.175	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.6)	7.0	0.154	VIII
SAN JOSE	21.3(34.3)	6.4	0.095	VII
CHINO-CENTRAL AVE. (Elsinore)	23.1(37.2)	6.7	0.106	VII
RAYMOND	24.0(38.7)	7.5	0.171	VIII
VERDUGO	25.2(40.5)	6.9	0.109	VII
ELSINORE (GLEN IVY)	25.4(40.8)	6.8	0.084	VII
HOLLYWOOD	25.6(41.2)	7.5	0.159	VIII
SIERRA MADRE	27.0(43.4)	7.2	0.123	VII
CLAMSHELL-SAWPIT	28.1(45.3)	6.5	0.069	VI
SANTA MONICA	28.3(45.5)	6.6	0.074	VII
CUCAMONGA	31.1(50.1)	6.9	0.081	VII
MALIBU COAST	32.0(51.5)	6.7	0.067	VI
CORONADO BANK	35.9(57.7)	7.6	0.092	VII
SIERRA MADRE (San Fernando)	37.2(59.8)	6.7	0.053	VI
NORTHRIDGE (E. Oak Ridge)	37.4(60.2)	7.0	0.067	VI
ANACAPA-DUME	38.8(62.5)	7.5	0.093	VII
SAN GABRIEL	39.5(63.5)	7.2	0.060	VI
ELSINORE (TEMECULA)	42.3(68.1)	6.8	0.039	V
SANTA SUSANA	45.2(72.8)	6.7	0.039	V
SAN JACINTO-SAN BERNARDINO	45.7(73.6)	7.5	0.061	VI
SAN ANDREAS - Cho-Moj M-1b-1	47.0(75.6)	7.8	0.074	VII
SAN ANDREAS - Mojave M-1c-3	47.0(75.6)	7.4	0.054	VI
SAN ANDREAS - 1857 Rupture M-2a	47.0(75.6)	7.8	0.074	VII
SAN ANDREAS - Whole M-1a	47.0(75.6)	8.0	0.085	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.3(77.8)	7.7	0.066	VI
SAN ANDREAS - San Bernardino M-1	48.3(77.8)	7.5	0.056	VI
SAN ANDREAS - SB-Coach. M-2b	48.3(77.8)	7.7	0.066	VI
CLEGHORN	50.8(81.7)	6.5	0.022	IV
HOLSER	50.8(81.7)	6.5	0.027	V
SAN JACINTO-SAN JACINTO VALLEY	50.8(81.7)	7.5	0.052	VI
SIMI-SANTA ROSA	51.1(82.3)	7.0	0.041	V
OAK RIDGE (Onshore)	55.3(89.0)	7.0	0.036	V
ROSE CANYON	58.3(93.8)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	59.3(95.4)	7.2	0.038	

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.1 MILES (3.4 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5850 g

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*    E Q F A U L T   *
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*    Version 3.00    *
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     DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: West End of Project St "A" 395+50

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7743
   SITE LONGITUDE:  118.0681

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  20) Sadigh et al. (1997) Horiz. - Soil
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.1(3.4)	7.0	0.465	X
SAN JOAQUIN HILLS	9.6(15.4)	7.0	0.319	IX
PALOS VERDES	10.7(17.2)	7.0	0.230	IX
PUENTE HILLS BLIND THRUST	11.4(18.3)	7.3	0.313	IX
WHITTIER	14.6(23.5)	6.8	0.162	VIII
NEWPORT-INGLEWOOD (Offshore)	15.4(24.8)	7.0	0.172	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.6)	7.0	0.171	VIII
SAN JOSE	21.3(34.3)	6.4	0.109	VII
CHINO-CENTRAL AVE. (Elsinore)	23.1(37.2)	6.7	0.124	VII
RAYMOND	24.0(38.7)	7.5	0.192	VIII
VERDUGO	25.2(40.5)	6.9	0.128	VIII
ELSINORE (GLEN IVY)	25.4(40.8)	6.8	0.093	VII
HOLLYWOOD	25.6(41.2)	7.5	0.181	VIII
SIERRA MADRE	27.0(43.4)	7.2	0.144	VIII
CLAMSHELL-SAWPIT	28.1(45.3)	6.5	0.086	VII
SANTA MONICA	28.3(45.5)	6.6	0.091	VII
CUCAMONGA	31.1(50.1)	6.9	0.101	VII
MALIBU COAST	32.0(51.5)	6.7	0.085	VII
CORONADO BANK	35.9(57.7)	7.6	0.106	VII
SIERRA MADRE (San Fernando)	37.2(59.8)	6.7	0.070	VI
NORTHRIDGE (E. Oak Ridge)	37.4(60.2)	7.0	0.087	VII
ANACAPA-DUME	38.8(62.5)	7.5	0.117	VII
SAN GABRIEL	39.5(63.5)	7.2	0.073	VII
ELSINORE (TEMECULA)	42.3(68.1)	6.8	0.050	VI
SANTA SUSANA	45.2(72.8)	6.7	0.054	VI
SAN JACINTO-SAN BERNARDINO	45.7(73.6)	7.5	0.076	VII
SAN ANDREAS - Cho-Moj M-1b-1	47.0(75.6)	7.8	0.090	VII
SAN ANDREAS - Mojave M-1c-3	47.0(75.6)	7.4	0.068	VI
SAN ANDREAS - 1857 Rupture M-2a	47.0(75.6)	7.8	0.090	VII
SAN ANDREAS - Whole M-1a	47.0(75.6)	8.0	0.102	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.3(77.8)	7.7	0.081	VII
SAN ANDREAS - San Bernardino M-1	48.3(77.8)	7.5	0.071	VI
SAN ANDREAS - SB-Coach. M-2b	48.3(77.8)	7.7	0.081	VII
CLEGHORN	50.8(81.7)	6.5	0.031	V
HOLSER	50.8(81.7)	6.5	0.039	V
SAN JACINTO-SAN JACINTO VALLEY	50.8(81.7)	7.5	0.067	VI
SIMI-SANTA ROSA	51.1(82.3)	7.0	0.058	VI
OAK RIDGE (Onshore)	55.3(89.0)	7.0	0.052	VI
ROSE CANYON	58.3(93.8)	7.0	0.038	V
NORTH FRONTAL FAULT ZONE (West)	59.3(95.4)	7.2	0.056	VI

-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.1 MILES (3.4 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4650 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: West End of Proj

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.580**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: West End of Proj

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.488**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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*    E Q F A U L T   *
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*    Version 3.00    *
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     DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: Closest to Los Alamitos Fault St "A" 366+00

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7743
   SITE LONGITUDE:  118.0587

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.5(4.1)	7.0	0.555	X
SAN JOAQUIN HILLS	9.1(14.7)	7.0	0.341	IX
PALOS VERDES	11.1(17.9)	7.0	0.241	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.319	IX
WHITTIER	14.4(23.2)	6.8	0.168	VIII
NEWPORT-INGLEWOOD (Offshore)	15.1(24.3)	7.0	0.179	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.7)	7.0	0.153	VIII
SAN JOSE	21.0(33.8)	6.4	0.097	VII
CHINO-CENTRAL AVE. (Elsinore)	22.7(36.5)	6.7	0.109	VII
RAYMOND	24.1(38.8)	7.5	0.171	VIII
ELSINORE (GLEN IVY)	24.9(40.0)	6.8	0.086	VII
VERDUGO	25.3(40.7)	6.9	0.108	VII
HOLLYWOOD	25.8(41.5)	7.5	0.158	VIII
SIERRA MADRE	26.8(43.2)	7.2	0.123	VII
CLAMSHELL-SAWPIT	28.1(45.2)	6.5	0.069	VI
SANTA MONICA	28.6(46.1)	6.6	0.073	VII
CUCAMONGA	30.8(49.5)	6.9	0.083	VII
MALIBU COAST	32.5(52.3)	6.7	0.065	VI
CORONADO BANK	35.7(57.5)	7.6	0.093	VII
SIERRA MADRE (San Fernando)	37.3(60.1)	6.7	0.053	VI
NORTHRIDGE (E. Oak Ridge)	37.8(60.8)	7.0	0.066	VI
ANACAPA-DUME	39.3(63.3)	7.5	0.091	VII
SAN GABRIEL	39.6(63.8)	7.2	0.060	VI
ELSINORE (TEMECULA)	41.8(67.3)	6.8	0.040	V
SAN JACINTO-SAN BERNARDINO	45.4(73.0)	7.5	0.062	VI
SANTA SUSANA	45.5(73.3)	6.7	0.038	V
SAN ANDREAS - Cho-Moj M-1b-1	46.7(75.2)	7.8	0.074	VII
SAN ANDREAS - Mojave M-1c-3	46.7(75.2)	7.4	0.055	VI
SAN ANDREAS - 1857 Rupture M-2a	46.7(75.2)	7.8	0.074	VII
SAN ANDREAS - Whole M-1a	46.7(75.2)	8.0	0.086	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.0(77.2)	7.7	0.066	VI
SAN ANDREAS - San Bernardino M-1	48.0(77.2)	7.5	0.057	VI
SAN ANDREAS - SB-Coach. M-2b	48.0(77.2)	7.7	0.066	VI
SAN JACINTO-SAN JACINTO VALLEY	50.3(80.9)	7.5	0.053	VI
CLEGHORN	50.4(81.1)	6.5	0.023	IV
HOLSER	51.1(82.2)	6.5	0.027	V
SIMI-SANTA ROSA	51.5(82.9)	7.0	0.041	V
OAK RIDGE (Onshore)	55.7(89.6)	7.0	0.036	V
ROSE CANYON	58.0(93.3)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	58.8(94.7)	7.2	0.039	V

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.5 MILES (4.1 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5549 g

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*    E Q F A U L T   *
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*    Version 3.00    *
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     DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: Closest to Los Alamitos Fault St "A" 366+00

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7743
   SITE LONGITUDE:  118.0587

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  20) Sadigh et al. (1997) Horiz. - Soil
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.5(4.1)	7.0	0.445	X
SAN JOAQUIN HILLS	9.1(14.7)	7.0	0.329	IX
PALOS VERDES	11.1(17.9)	7.0	0.223	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.315	IX
WHITTIER	14.4(23.2)	6.8	0.164	VIII
NEWPORT-INGLEWOOD (Offshore)	15.1(24.3)	7.0	0.175	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.7)	7.0	0.171	VIII
SAN JOSE	21.0(33.8)	6.4	0.111	VII
CHINO-CENTRAL AVE. (Elsinore)	22.7(36.5)	6.7	0.126	VIII
RAYMOND	24.1(38.8)	7.5	0.192	VIII
ELSINORE (GLEN IVY)	24.9(40.0)	6.8	0.095	VII
VERDUGO	25.3(40.7)	6.9	0.128	VIII
HOLLYWOOD	25.8(41.5)	7.5	0.180	VIII
SIERRA MADRE	26.8(43.2)	7.2	0.145	VIII
CLAMSHELL-SAWPIT	28.1(45.2)	6.5	0.086	VII
SANTA MONICA	28.6(46.1)	6.6	0.090	VII
CUCAMONGA	30.8(49.5)	6.9	0.102	VII
MALIBU COAST	32.5(52.3)	6.7	0.083	VII
CORONADO BANK	35.7(57.5)	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.3(60.1)	6.7	0.070	VI
NORTHRIDGE (E. Oak Ridge)	37.8(60.8)	7.0	0.086	VII
ANACAPA-DUME	39.3(63.3)	7.5	0.116	VII
SAN GABRIEL	39.6(63.8)	7.2	0.073	VII
ELSINORE (TEMECULA)	41.8(67.3)	6.8	0.051	VI
SAN JACINTO-SAN BERNARDINO	45.4(73.0)	7.5	0.076	VII
SANTA SUSANA	45.5(73.3)	6.7	0.054	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.7(75.2)	7.8	0.090	VII
SAN ANDREAS - Mojave M-1c-3	46.7(75.2)	7.4	0.069	VI
SAN ANDREAS - 1857 Rupture M-2a	46.7(75.2)	7.8	0.090	VII
SAN ANDREAS - Whole M-1a	46.7(75.2)	8.0	0.103	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.0(77.2)	7.7	0.082	VII
SAN ANDREAS - San Bernardino M-1	48.0(77.2)	7.5	0.071	VI
SAN ANDREAS - SB-Coach. M-2b	48.0(77.2)	7.7	0.082	VII
SAN JACINTO-SAN JACINTO VALLEY	50.3(80.9)	7.5	0.067	VI
CLEGHORN	50.4(81.1)	6.5	0.031	V
HOLSER	51.1(82.2)	6.5	0.039	V
SIMI-SANTA ROSA	51.5(82.9)	7.0	0.058	VI
OAK RIDGE (Onshore)	55.7(89.6)	7.0	0.052	VI
ROSE CANYON	58.0(93.3)	7.0	0.038	V
NORTH FRONTAL FAULT ZONE (West)	58.8(94.7)	7.2	0.056	VI

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.5 MILES (4.1 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4451 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: Closest to the Fault

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	0.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.653**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos

Location: Closest to the Fault

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	0.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.542**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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*    E Q F A U L T   *
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*    Version 3.00    *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: W. End RW 1325 & 1326  St "H" 1331+57

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7745
   SITE LONGITUDE:  118.0475

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.0(4.8)	7.0	0.527	X
SAN JOAQUIN HILLS	8.6(13.9)	7.0	0.356	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.319	IX
PALOS VERDES	11.7(18.8)	7.0	0.230	IX
WHITTIER	14.2(22.8)	6.8	0.171	VIII
NEWPORT-INGLEWOOD (Offshore)	14.8(23.8)	7.0	0.183	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.4(32.9)	7.0	0.152	VIII
SAN JOSE	20.7(33.3)	6.4	0.099	VII
CHINO-CENTRAL AVE. (Elsinore)	22.2(35.8)	6.7	0.112	VII
RAYMOND	24.2(39.0)	7.5	0.170	VIII
ELSINORE (GLEN IVY)	24.2(39.0)	6.8	0.089	VII
VERDUGO	25.4(40.9)	6.9	0.108	VII
HOLLYWOOD	26.0(41.9)	7.5	0.156	VIII
SIERRA MADRE	26.7(42.9)	7.2	0.124	VII
CLAMSHELL-SAWPIT	28.0(45.1)	6.5	0.070	VI
SANTA MONICA	29.1(46.9)	6.6	0.071	VI
CUCAMONGA	30.4(48.9)	6.9	0.084	VII
MALIBU COAST	33.0(53.1)	6.7	0.064	VI
CORONADO BANK	35.7(57.4)	7.6	0.093	VII
SIERRA MADRE (San Fernando)	37.6(60.5)	6.7	0.052	VI
NORTHRIDGE (E. Oak Ridge)	38.2(61.5)	7.0	0.065	VI
SAN GABRIEL	39.8(64.1)	7.2	0.059	VI
ANACAPA-DUME	39.9(64.2)	7.5	0.089	VII
ELSINORE (TEMECULA)	41.2(66.3)	6.8	0.041	V
SAN JACINTO-SAN BERNARDINO	44.9(72.2)	7.5	0.063	VI
SANTA SUSANA	45.9(73.8)	6.7	0.038	V
SAN ANDREAS - Cho-Moj M-1b-1	46.4(74.7)	7.8	0.075	VII
SAN ANDREAS - Mojave M-1c-3	46.4(74.7)	7.4	0.055	VI
SAN ANDREAS - 1857 Rupture M-2a	46.4(74.7)	7.8	0.075	VII
SAN ANDREAS - Whole M-1a	46.4(74.7)	8.0	0.087	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.5(76.5)	7.7	0.067	VI
SAN ANDREAS - San Bernardino M-1	47.5(76.5)	7.5	0.058	VI
SAN ANDREAS - SB-Coach. M-2b	47.5(76.5)	7.7	0.067	VI
SAN JACINTO-SAN JACINTO VALLEY	49.6(79.9)	7.5	0.054	VI
CLEGHORN	50.0(80.4)	6.5	0.023	IV
HOLSER	51.4(82.8)	6.5	0.026	V
SIMI-SANTA ROSA	51.9(83.6)	7.0	0.040	V
OAK RIDGE (Onshore)	56.1(90.3)	7.0	0.035	V
ROSE CANYON	57.5(92.6)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	58.3(93.9)	7.2	0.039	V

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.0 MILES (4.8 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5271 g

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*    E Q F A U L T   *
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*    Version 3.00    *
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     DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: W. End RW 1325 & 1326  St "H" 1331+57

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7745
   SITE LONGITUDE:  118.0475

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  20) Sadigh et al. (1997) Horiz. - Soil
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.0(4.8)	7.0	0.427	X
SAN JOAQUIN HILLS	8.6(13.9)	7.0	0.341	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.315	IX
PALOS VERDES	11.7(18.8)	7.0	0.215	VIII
WHITTIER	14.2(22.8)	6.8	0.167	VIII
NEWPORT-INGLEWOOD (Offshore)	14.8(23.8)	7.0	0.178	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.4(32.9)	7.0	0.170	VIII
SAN JOSE	20.7(33.3)	6.4	0.113	VII
CHINO-CENTRAL AVE. (Elsinore)	22.2(35.8)	6.7	0.129	VIII
RAYMOND	24.2(39.0)	7.5	0.191	VIII
ELSINORE (GLEN IVY)	24.2(39.0)	6.8	0.098	VII
VERDUGO	25.4(40.9)	6.9	0.127	VIII
HOLLYWOOD	26.0(41.9)	7.5	0.178	VIII
SIERRA MADRE	26.7(42.9)	7.2	0.146	VIII
CLAMSHELL-SAWPIT	28.0(45.1)	6.5	0.086	VII
SANTA MONICA	29.1(46.9)	6.6	0.088	VII
CUCAMONGA	30.4(48.9)	6.9	0.104	VII
MALIBU COAST	33.0(53.1)	6.7	0.081	VII
CORONADO BANK	35.7(57.4)	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.6(60.5)	6.7	0.069	VI
NORTHRIDGE (E. Oak Ridge)	38.2(61.5)	7.0	0.084	VII
SAN GABRIEL	39.8(64.1)	7.2	0.072	VI
ANACAPA-DUME	39.9(64.2)	7.5	0.114	VII
ELSINORE (TEMECULA)	41.2(66.3)	6.8	0.052	VI
SAN JACINTO-SAN BERNARDINO	44.9(72.2)	7.5	0.077	VII
SANTA SUSANA	45.9(73.8)	6.7	0.053	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.4(74.7)	7.8	0.091	VII
SAN ANDREAS - Mojave M-1c-3	46.4(74.7)	7.4	0.069	VI
SAN ANDREAS - 1857 Rupture M-2a	46.4(74.7)	7.8	0.091	VII
SAN ANDREAS - Whole M-1a	46.4(74.7)	8.0	0.104	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.5(76.5)	7.7	0.083	VII
SAN ANDREAS - San Bernardino M-1	47.5(76.5)	7.5	0.072	VI
SAN ANDREAS - SB-Coach. M-2b	47.5(76.5)	7.7	0.083	VII
SAN JACINTO-SAN JACINTO VALLEY	49.6(79.9)	7.5	0.068	VI
CLEGHORN	50.0(80.4)	6.5	0.031	V
HOLSER	51.4(82.8)	6.5	0.039	V
SIMI-SANTA ROSA	51.9(83.6)	7.0	0.057	VI
OAK RIDGE (Onshore)	56.1(90.3)	7.0	0.051	VI
ROSE CANYON	57.5(92.6)	7.0	0.039	V
NORTH FRONTAL FAULT ZONE (West)	58.3(93.9)	7.2	0.057	VI

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.0 MILES (4.8 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4266 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos

Location: West End RW1325+6

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.630**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: West End RW1325+6

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.524**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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*  Version 3.00  *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 08-22-2008

JOB NAME: HOV Conn

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7749
SITE LONGITUDE: 118.0427

SEARCH RADIUS: 62 mi

ATTENUATION RELATION: 21) Sadigh et al. (1997) Horiz. - Rock
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.2(5.2)	7.0	0.512	X
SAN JOAQUIN HILLS	8.5(13.6)	7.0	0.362	IX
PUENTE HILLS BLIND THRUST	11.2(18.1)	7.3	0.320	IX
PALOS VERDES	11.9(19.2)	7.0	0.226	IX
WHITTIER	14.0(22.5)	6.8	0.173	VIII
NEWPORT-INGLEWOOD (Offshore)	14.7(23.6)	7.0	0.184	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.5(33.0)	7.0	0.152	VIII
SAN JOSE	20.6(33.1)	6.4	0.100	VII
CHINO-CENTRAL AVE. (Elsinore)	22.0(35.4)	6.7	0.114	VII
ELSINORE (GLEN IVY)	23.9(38.5)	6.8	0.091	VII
RAYMOND	24.2(39.0)	7.5	0.170	VIII
VERDUGO	25.4(40.9)	6.9	0.108	VII
HOLLYWOOD	26.1(42.0)	7.5	0.155	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.125	VII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.070	VI
SANTA MONICA	29.3(47.2)	6.6	0.070	VI
CUCAMONGA	30.2(48.6)	6.9	0.085	VII
MALIBU COAST	33.2(53.5)	6.7	0.063	VI
CORONADO BANK	35.6(57.3)	7.6	0.093	VII
SIERRA MADRE (San Fernando)	37.7(60.6)	6.7	0.052	VI
NORTHRIDGE (E. Oak Ridge)	38.3(61.7)	7.0	0.064	VI
SAN GABRIEL	39.9(64.2)	7.2	0.059	VI
ANACAPA-DUME	40.1(64.6)	7.5	0.088	VII
ELSINORE (TEMECULA)	40.9(65.9)	6.8	0.041	V
SAN JACINTO-SAN BERNARDINO	44.7(71.9)	7.5	0.063	VI
SANTA SUSANA	46.0(74.0)	6.7	0.038	V
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.4)	7.8	0.075	VII
SAN ANDREAS - Mojave M-1c-3	46.2(74.4)	7.4	0.056	VI
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.4)	7.8	0.075	VII
SAN ANDREAS - Whole M-1a	46.2(74.4)	8.0	0.087	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.3(76.2)	7.7	0.068	VI
SAN ANDREAS - San Bernardino M-1	47.3(76.2)	7.5	0.058	VI
SAN ANDREAS - SB-Coach. M-2b	47.3(76.2)	7.7	0.068	VI
SAN JACINTO-SAN JACINTO VALLEY	49.4(79.5)	7.5	0.054	VI
CLEGHORN	49.8(80.1)	6.5	0.023	IV
HOLSER	51.6(83.1)	6.5	0.026	V
SIMI-SANTA ROSA	52.1(83.9)	7.0	0.040	V
OAK RIDGE (Onshore)	56.3(90.6)	7.0	0.035	V
ROSE CANYON	57.4(92.4)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	58.1(93.5)	7.2	0.040	V
SAN CAYETANO	61.6(99.1)	7.0	0.030	V

-END OF SEARCH- 41 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.2 MILES (5.2 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5122 g

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*  Version 3.00  *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 08-22-2008

JOB NAME: HOV Conn

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7749
   SITE LONGITUDE:  118.0427

SEARCH RADIUS:   62  mi

ATTENUATION RELATION:  20) Sadigh et al. (1997) Horiz. - Soil
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.2(5.2)	7.0	0.416	X
SAN JOAQUIN HILLS	8.5(13.6)	7.0	0.346	IX
PUENTE HILLS BLIND THRUST	11.2(18.1)	7.3	0.316	IX
PALOS VERDES	11.9(19.2)	7.0	0.212	VIII
WHITTIER	14.0(22.5)	6.8	0.169	VIII
NEWPORT-INGLEWOOD (Offshore)	14.7(23.6)	7.0	0.179	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.5(33.0)	7.0	0.169	VIII
SAN JOSE	20.6(33.1)	6.4	0.114	VII
CHINO-CENTRAL AVE. (Elsinore)	22.0(35.4)	6.7	0.131	VIII
ELSINORE (GLEN IVY)	23.9(38.5)	6.8	0.099	VII
RAYMOND	24.2(39.0)	7.5	0.191	VIII
VERDUGO	25.4(40.9)	6.9	0.127	VIII
HOLLYWOOD	26.1(42.0)	7.5	0.178	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.146	VIII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.086	VII
SANTA MONICA	29.3(47.2)	6.6	0.087	VII
CUCAMONGA	30.2(48.6)	6.9	0.104	VII
MALIBU COAST	33.2(53.5)	6.7	0.081	VII
CORONADO BANK	35.6(57.3)	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.7(60.6)	6.7	0.069	VI
NORTHRIDGE (E. Oak Ridge)	38.3(61.7)	7.0	0.084	VII
SAN GABRIEL	39.9(64.2)	7.2	0.072	VI
ANACAPA-DUME	40.1(64.6)	7.5	0.113	VII
ELSINORE (TEMECULA)	40.9(65.9)	6.8	0.052	VI
SAN JACINTO-SAN BERNARDINO	44.7(71.9)	7.5	0.078	VII
SANTA SUSANA	46.0(74.0)	6.7	0.053	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.4)	7.8	0.092	VII
SAN ANDREAS - Mojave M-1c-3	46.2(74.4)	7.4	0.069	VI
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.4)	7.8	0.092	VII
SAN ANDREAS - Whole M-1a	46.2(74.4)	8.0	0.104	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.3(76.2)	7.7	0.083	VII
SAN ANDREAS - San Bernardino M-1	47.3(76.2)	7.5	0.072	VII
SAN ANDREAS - SB-Coach. M-2b	47.3(76.2)	7.7	0.083	VII
SAN JACINTO-SAN JACINTO VALLEY	49.4(79.5)	7.5	0.069	VI
CLEGHORN	49.8(80.1)	6.5	0.032	V
HOLSER	51.6(83.1)	6.5	0.038	V
SIMI-SANTA ROSA	52.1(83.9)	7.0	0.057	VI
OAK RIDGE (Onshore)	56.3(90.6)	7.0	0.051	VI
ROSE CANYON	57.4(92.4)	7.0	0.039	V
NORTH FRONTAL FAULT ZONE (West)	58.1(93.5)	7.2	0.057	VI
SAN CAYETANO	61.6(99.1)	7.0	0.045	VI

-END OF SEARCH- 41 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.2 MILES (5.2 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4165 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: HOV Connector

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.7
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.594**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: HOV Connector

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.7
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.498**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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*  Version 3.00  *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 07-23-2008

JOB NAME: SR-22 Bolsa Chica Rd OC

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7743
   SITE LONGITUDE:  118.0380

SEARCH RADIUS:   100  mi

ATTENUATION RELATION:  21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.4(5.5)	7.0	0.501	X
SAN JOAQUIN HILLS	8.3(13.3)	7.0	0.368	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.319	IX
PALOS VERDES	12.1(19.5)	7.0	0.222	IX
WHITTIER	13.9(22.4)	6.8	0.174	VIII
NEWPORT-INGLEWOOD (Offshore)	14.5(23.4)	7.0	0.186	VIII
SAN JOSE	20.4(32.9)	6.4	0.100	VII
UPPER ELYSIAN PARK BLIND THRUST	20.6(33.2)	7.0	0.150	VIII
CHINO-CENTRAL AVE. (Elsinore)	21.8(35.1)	6.7	0.115	VII
ELSINORE (GLEN IVY)	23.7(38.1)	6.8	0.092	VII
RAYMOND	24.4(39.2)	7.5	0.169	VIII
VERDUGO	25.5(41.1)	6.9	0.107	VII
HOLLYWOOD	26.3(42.3)	7.5	0.154	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.125	VII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.070	VI
SANTA MONICA	29.5(47.5)	6.6	0.070	VI
CUCAMONGA	30.1(48.4)	6.9	0.085	VII
MALIBU COAST	33.5(53.9)	6.7	0.062	VI
CORONADO BANK	35.5(57.2)	7.6	0.094	VII
SIERRA MADRE (San Fernando)	37.8(60.8)	6.7	0.052	VI
NORTHRIDGE (E. Oak Ridge)	38.6(62.1)	7.0	0.064	VI
SAN GABRIEL	40.1(64.5)	7.2	0.059	VI
ANACAPA-DUME	40.4(65.0)	7.5	0.088	VII
ELSINORE (TEMECULA)	40.6(65.4)	6.8	0.042	VI
SAN JACINTO-SAN BERNARDINO	44.5(71.6)	7.5	0.064	VI
SAN ANDREAS - Mojave M-1c-3	46.2(74.3)	7.4	0.056	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.3)	7.8	0.075	VII
SANTA SUSANA	46.2(74.3)	6.7	0.038	V
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.3)	7.8	0.075	VII
SAN ANDREAS - Whole M-1a	46.2(74.3)	8.0	0.087	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.2(76.0)	7.7	0.068	VI
SAN ANDREAS - San Bernardino M-1	47.2(76.0)	7.5	0.058	VI
SAN ANDREAS - SB-Coach. M-2b	47.2(76.0)	7.7	0.068	VI
SAN JACINTO-SAN JACINTO VALLEY	49.2(79.1)	7.5	0.055	VI
CLEGHORN	49.6(79.9)	6.5	0.023	IV
HOLSER	51.8(83.4)	6.5	0.026	V
SIMI-SANTA ROSA	52.3(84.2)	7.0	0.040	V
OAK RIDGE (Onshore)	56.5(90.9)	7.0	0.035	V
ROSE CANYON	57.2(92.1)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	57.9(93.2)	7.2	0.040	V
SAN CAYETANO	61.8(99.5)	7.0	0.030	V
SAN JACINTO-ANZA	64.4(103.7)	7.2	0.028	V

-END OF SEARCH- 67 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.4 MILES (5.5 km) AWAY.
LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5013 g

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*        *
*  E Q F A U L T  *
*        *
*  Version 3.00  *
*        *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 07-23-2008

JOB NAME: SR-22 Bolsa Chica Rd OC

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7743
SITE LONGITUDE: 118.0380

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.4(5.5)	7.0	0.409	X
SAN JOAQUIN HILLS	8.3(13.3)	7.0	0.350	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.315	IX
PALOS VERDES	12.1(19.5)	7.0	0.209	VIII
WHITTIER	13.9(22.4)	6.8	0.169	VIII
NEWPORT-INGLEWOOD (Offshore)	14.5(23.4)	7.0	0.181	VIII
SAN JOSE	20.4(32.9)	6.4	0.115	VII
UPPER ELYSIAN PARK BLIND THRUST	20.6(33.2)	7.0	0.168	VIII
CHINO-CENTRAL AVE. (Elsinore)	21.8(35.1)	6.7	0.132	VIII
ELSINORE (GLEN IVY)	23.7(38.1)	6.8	0.100	VII
RAYMOND	24.4(39.2)	7.5	0.190	VIII
VERDUGO	25.5(41.1)	6.9	0.126	VIII
HOLLYWOOD	26.3(42.3)	7.5	0.177	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.146	VIII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.086	VII
SANTA MONICA	29.5(47.5)	6.6	0.087	VII
CUCAMONGA	30.1(48.4)	6.9	0.105	VII
MALIBU COAST	33.5(53.9)	6.7	0.080	VII
CORONADO BANK	35.5(57.2)	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.8(60.8)	6.7	0.069	VI
NORTHRIDGE (E. Oak Ridge)	38.6(62.1)	7.0	0.083	VII
SAN GABRIEL	40.1(64.5)	7.2	0.072	VI
ANACAPA-DUME	40.4(65.0)	7.5	0.112	VII
ELSINORE (TEMECULA)	40.6(65.4)	6.8	0.052	VI
SAN JACINTO-SAN BERNARDINO	44.5(71.6)	7.5	0.078	VII
SAN ANDREAS - Mojave M-1c-3	46.2(74.3)	7.4	0.070	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.3)	7.8	0.092	VII
SANTA SUSANA	46.2(74.3)	6.7	0.053	VI
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.3)	7.8	0.092	VII
SAN ANDREAS - Whole M-1a	46.2(74.3)	8.0	0.104	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.2(76.0)	7.7	0.083	VII
SAN ANDREAS - San Bernardino M-1	47.2(76.0)	7.5	0.073	VII
SAN ANDREAS - SB-Coach. M-2b	47.2(76.0)	7.7	0.083	VII
SAN JACINTO-SAN JACINTO VALLEY	49.2(79.1)	7.5	0.069	VI
CLEGHORN	49.6(79.9)	6.5	0.032	V
HOLSER	51.8(83.4)	6.5	0.038	V
SIMI-SANTA ROSA	52.3(84.2)	7.0	0.056	VI
OAK RIDGE (Onshore)	56.5(90.9)	7.0	0.051	VI
ROSE CANYON	57.2(92.1)	7.0	0.039	V
NORTH FRONTAL FAULT ZONE (West)	57.9(93.2)	7.2	0.058	VI
SAN CAYETANO	61.8(99.5)	7.0	0.045	VI
SAN JACINTO-ANZA	64.4(103.7)	7.2	0.039	V

-END OF SEARCH- 67 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.4 MILES (5.5 km) AWAY.
LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4092 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: Bolsa Chica Road OC

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.573**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos

Location: Bolsa Chica Road OC

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.483**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Appendix F.2
Liquefaction Calculations

TABLE 4
LIQUEFACTION SUMMARY

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Design Ground Water Elevation (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-001	18	0.17	0.00	0.17
CPT-08-002	18	0.92	0.00	0.92
CPT-08-003	18	0.26	0.00	0.26
CPT-08-006	16	0.00	0.00	0.00
CPT-08-007	16	0.24	0.00	0.24
CPT-08-008	16	0.02	0.02	0.04
CPT-08-009	16	0.24	0.02	0.26
CPT-08-013	16	0.78	0.02	0.80
CPT-08-014	16	0.30	0.02	0.32
CPT-08-014B	16	0.07	0.01	0.08
CPT-08-015	16	0.68	0.02	0.70
CPT-08-016	16	0.50	0.03	0.53
CPT-08-018	16	0.24	0.08	0.32
CPT-08-020	16	0.15	0.00	0.15
CPT-08-021	16	0.33	0.01	0.34
CPT-08-022	16	0.12	0.00	0.12
CPT-08-102	12	0.12	0.00	0.12
CPT-08-104	13	0.85	0.00	0.85
CPT-08-107	14	0.25	0.00	0.25
CPT-08-110	14	0.69	0.00	0.69
CPT-08-117	16	0.28	0.00	0.28
CPT-08-119	16	0.37	0.00	0.37

Min	**0.00**
Max	**0.92**
Average	**0.36**

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-001

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	24.50	ft
GWT Elev. During Test	18.00	ft
GWT Elev. For Design	18.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	6.50 ft below ground surface
GWT Depth For Design, Zwd =	6.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	13.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.17 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.17 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	21.61	0.22	1.00	sandy silt to clayey silt	23.5	1.00	9	60	60	60	1.84	1.14	141.63	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	22.6	N/A	N/A	N/A	0.17
1.50	69.54	1.31	1.88	silty sand to sandy silt	22.5	1.00	23	180	180	180	1.86	1.15	267.14	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	52.3	0.026	0.000	0.00	0.17
2.50	57.08	2.03	3.55	clayey silt to silty clay	21.5	1.00	29	300	300	300	2.20	1.66	245.08	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
3.50	37.27	1.35	3.61	clayey silt to silty clay	20.5	1.00	31	420	420	420	2.06	1.38	186.13	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
4.50	16.14	0.62	3.84	silty clay to clay	19.5	1.00	11	540	540	540	2.58	3.20	137.83	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
5.50	19.29	0.91	4.74	clay	18.5	1.00	32	660	660	660	2.41	2.35	130.47	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
6.50	7.38	0.31	4.26	clay	17.5	1.00	7	780	780	780	2.96	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
7.50	29.59	0.46	1.56	sandy silt to clayey silt	16.5	1.00	12	900	838	838	2.30	1.95	89.10	0.983	1.000	0.309	0.146	0.563	YES	2.8	21.1	> 800	26.9	N/A	0.096	0.01	0.16
8.50	58.23	0.76	1.31	silty sand to sandy silt	15.5	1.00	19	1,020	895	895	2.04	1.35	117.40	0.980	1.000	0.327	0.230	0.841	YES	2.8	31.8	> 800	39.8	N/A	0.001	0.00	0.16
9.50	34.17	0.71	2.08	sandy silt to clayey silt	14.5	1.66	23	1,140	953	953	2.04	1.36	111.67	0.978	1.000	0.342	0.210	0.730	YES	2.8	35.6	> 800	44.3	N/A	0.000	0.00	0.16
10.50	7.66	0.25	3.24	clay	13.5	1.00	8	1,260	1,010	1,010	2.95	N/A	N/A	0.976	N/A	0.356	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
11.50	9.69	0.27	2.82	silty clay to clay	12.5	1.00	6	1,380	1,068	1,068	2.84	N/A	N/A	0.973	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
12.50	9.19	0.29	3.25	clay	11.5	1.00	9	1,500	1,126	1,126	2.91	N/A	N/A	0.971	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
13.50	8.03	0.29	3.77	clay	10.5	1.00	8	1,620	1,183	1,183	3.01	N/A	N/A	0.969	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
14.50	12.76	0.60	4.73	clay	9.5	1.00	13	1,740	1,241	1,241	2.93	N/A	N/A	0.966	N/A	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
15.50	15.72	0.79	4.98	clay	8.5	1.00	16	1,860	1,298	1,298	2.89	N/A	N/A	0.964	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
16.50	12.60	0.55	4.40	clay	7.5	1.00	13	1,980	1,356	1,356	2.94	N/A	N/A	0.962	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
17.50	13.75	0.69	5.12	clay	6.5	1.00	14	2,100	1,414	1,414	2.96	N/A	N/A	0.959	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
18.50	24.18	0.86	3.58	clayey silt to silty clay	5.5	1.00	12	2,220	1,471	1,471	2.68	N/A	N/A	0.957	N/A	0.422	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
19.50	15.03	0.52	3.45	silty clay to clay	4.5	1.00	10	2,340	1,529	1,529	2.84	N/A	N/A	0.955	N/A	0.427	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
20.50	10.62	0.29	2.81	silty clay to clay	3.5	1.00	7	2,460	1,586	1,586	2.92	N/A	N/A	0.952	N/A	0.432	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
21.50	27.73	1.02	3.71	clayey silt to silty clay	2.5	1.00	14	2,580	1,644	1,644	2.67	N/A	N/A	0.950	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
22.50	59.04	1.00	1.69	silty sand to sandy silt	1.5	1.00	20	2,700	1,702	1,702	2.21	1.70	108.68	0.948	1.000	0.440	0.199	0.541	YES	2.8	24.1	> 800	30.6	N/A	0.184	0.02	0.14
23.50	68.21	1.46	2.14	silty sand to sandy silt	0.5	1.66	38	2,820	1,759	1,759	1.93	1.22	146.52	0.945	1.000	0.443	0.373	1.003	YES	2.8	42.9	> 800	53.2	N/A	0.000	0.00	0.14
24.50	24.86	1.22	4.95	clay	-0.5	1.00	25	2,940	1,817	1,817	2.82	N/A	N/A	0.943	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
25.50	39.82	1.24	3.11	clayey silt to silty clay	-1.5	1.66	33	3,060	1,874	1,874	2.22	1.73	117.61	0.941	1.000	0.449	0.231	0.614	YES	2.8	36.9	> 800	N/A	N/A	0.000	0.00	0.14
26.50	13.56	0.66	5.07	clay	-2.5	1.00	14	3,180	1,932	1,932	3.04	N/A	N/A	0.938	N/A	0.452	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
27.50	25.09	1.14	4.61	clay	-3.5	1.00	25	3,300	1,990	1,990	2.81	N/A	N/A	0.936	N/A	0.454	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
28.50	45.16	1.18	2.61	sandy silt to clayey silt	-4.5	1.00	18	3,420	2,047	2,047	2.46	2.57	114.79	0.934	0.993	0.456	0.221	0.573	YES	2.8	20.7	> 800	26.4	N/A	1.035	0.12	0.01
29.50	44.27	1.51	3.42	clayey silt to silty clay	-5.5	1.00	22	3,540	2,105	2,105	2.55	3.03	130.92	0.931	0.982	0.458	0.289	0.738	YES	2.8	24.4	> 800	N/A	N/A	0.000	0.00	0.01
30.50	58.95	2.06	3.50	clayey silt to silty clay	-6.5	1.66	49	3,660	2,162	2,162	2.16	1.57	147.15	0.926	0.969	0.458	0.376	0.949	YES	2.8	49.7	> 800	N/A	N/A	0.000	0.00	0.01
31.50	20.54	1.08	5.36	clay	-7.5	1.00	21	3,780	2,220	2,220	2.95	N/A	N/A	0.918	N/A	0.457	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
32.50	24.78	1.13	4.59	clay	-8.5	1.00	25	3,900	2,278	2,278	2.85	N/A	N/A	0.909	N/A	0.455	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
33.50	25.58	1.15	4.60	clay	-9.5	1.00	26	4,020	2,335	2,335	2.85	N/A	N/A	0.901	N/A	0.454	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
34.50	89.56	3.22	3.59	sandy silt to clayey silt	-10.5	1.00	36	4,140	2,393	2,393	2.37	2.19	179.40	0.893	0.931	0.452	N/A	N/A	NO	N/A	N/A	N/A	44.3	N/A	0.000	0.00	0.01
35.50	72.52	1.77	2.44	sandy silt to clayey silt	-11.5	1.66	48	4,260	2,450	2,450	2.00	1.30	141.26	0.885	0.922	0.450	0.342	0.836	YES	2.8	46.2	> 800	57.1	N/A	0.000	0.00	0.01
36.50	15.86	0.52	3.35	silty clay to clay	-12.5	1.00	11	4,380	2,508	2,508	2.95	N/A	N/A	0.877	N/A	0.448	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
37.50	34.22	1.75	5.24	clay	-13.5	1.00	34	4,500	2,566	2,566	2.81	N/A	N/A	0.869	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
38.50	126.94	3.81	3.01	sandy silt to clayey silt	-14.5	1.00	51	4,620	2,623	2,623	2.22	1.72	191.13	0.861	0.897	0.443	N/A	N/A	NO	N/A	N/A	N/A	58.2	N/A	0.000	0.00	0.01
39.50	139.06	3.18	2.29	silty sand to sandy silt	-15.5	1.00	46	4,740	2,681	2,681	2.11	1.47	176.85	0.852	0.889	0.441	N/A	N/A	NO	N/A	N/A	N/A	53.0	N/A	0.000	0.00	0.01
40.50	153.13	3.70	2.42	silty sand to sandy silt	-16.5	1.00	51	4,860	2,738	2,738	2.10	1.46	191.10	0.844	0.882	0.438	N/A	N/A	NO	N/A	N/A	N/A	57.3	N/A	0.000	0.00	0.01
41.50	227.08	5.28	2.33	silty sand to sandy silt	-17.5	1.00	76	4,980	2,796	2,796	1.98	1.28	245.98	0.836	0.875	0.436	N/A	N/A	NO	N/A	N/A	N/A	81.8	N/A	0.000	0.00	0.01
42.50	135.69	3.22	2.37	silty sand to sandy silt	-18.5	1.66	75	5,100	2,854	2,854	1.83	1.13	211.86	0.828	0.867	0.433	N/A	N/A	NO	N/A	N/A	N/A	80.2	N/A	0.000	0.00	0.01
43.50	24.18	1.00	4.23	silty clay to clay	-19.5	1.00	16	5,220	2,911	2,911	2.90	N/A	N/A	0.820	N/A	0.430	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
44.50	71.77	2.35	3.30	sandy silt to clayey silt	-20.5	1.00	29	5,340	2,969	2,969	2.44	2.49	146.49	0.812	0.866	0.427	0.372	0.901	YES	2.8	26.4	> 800	33.3	N/A	0.080	0.01	0.00
45.50	84.50	2.50	2.96	sandy silt to clayey silt	-21.5	1.00	34	5,460	3,026	3,026	2.36	2.16	148.37	0.804	0.850	0.424	0.384	0.917	YES	2.8	30.3	> 800	38.0	N/A	0.024	0.00	0.00
46.50	159.35	3.94	2.47	silty sand to sandy silt	-22.5	1.00	53	5,580	3,084	3,084	2.12	1.49	190.72	0.795	0.841	0.421	N/A	N/A	NO	N/A	N/A	N/A	56.3	N/A	0.000	0.00	0.00
47.50	162.90	3.83	2.35	silty sand to sandy silt	-23.5	1.00	54	5,700	3,142	3,142	2.10	1.45	188.35	0.787	0.835	0.418	N/A	N/A	NO	N/A	N/A	N/A	57.0	N/A	0.000	0.00	0.00
48.50	140.45	3.33	2.37	silty sand to sandy silt	-24.5	1.00	47	5,820	3,199	3,199	2.14	1.54	171.24	0.779	0.829	0.415	N/A	N/A	NO	N/A	N/A	N/A	49.4	N/A	0.000	0.00	0.00
49.50	78.50	3.27	4.17	clayey silt to silty clay	-25.5	1.66	65	5,940	3,257	3,257	2.19	1.64	167.30	0.771	0.823	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.00
50.50	20.24	0.98	5.12	clay	-26.5	1.00	20	6,060	3,314	3,314	3.05	N/A	N/A	0.763	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
51.50	22.43	0.92	4.32	clay	-27.5	1.00	22	6,180	3,372	3,372	2.97	N/A	N/A	0.755	N/A	0.405	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	30.26	1.02	3.48	clayey silt to silty clay	-28.5	1.00	15	6,300	3,430	3,430	2.81	N/A	N/A	0.747	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
53.50	57.51	1.83	3.19	sandy silt to clayey silt	-29.5	1.66	38	6,420	3,487	3,487	2.21	1.70	122.78	0.739	0.801	0.398	0.252	0.605	YES	2.8	31.6	> 800	39.6	N/A	0.004	0.00	0.00
54.50	21.14	0.89	4.40	clay	-30.5	1.00	21	6,540	3,545	3,545	3.02	N/A	N/A	0.730	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	22.56	0.82	3.89	silty clay to clay	-31.5	1.00	15	6,660	3,602	3,602	2.96	N/A	N/A	0.722	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
56.50	21.03	1.08	5.32	clay	-32.5	1.00	21	6,780	3,660	3,660	3.08	N/A	N/A	0.714	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	25.88	1.16	4.67	clay	-33.5	1.00	26	6,900	3,718	3,718	2.97	N/A	N/A	0.706	N/A	0.383	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	57.31	3.07	5.48	clay	-34.5	1.00	57	7,020	3,775	3,775	2.75	N/A	N/A	0.698	N/A	0.380	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	55.78	3.17	5.80	clay	-35.5	1.00	56	7,140	3,833	3,833	2.79	N/A	N/A	0.690	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
60.50	49.20	2.31	4.84	silty clay to clay	-36.5	1.00	33	7,260	3,890	3,890	2.77	N/A	N/A	0.682	N/A	0.372	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	Garden Grove Freway (SR-22)
Project No.	I-436
Location	Seal Beach, CA
Exploration No.	CPT-08-002

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	25.00	ft
GWT Elev. During Test	18.00	ft
GWT Elev. For Design	18.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	7.00 ft below ground surface
GWT Depth For Design, Zwd =	7.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	17.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.92 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.92 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio CRR$_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	235.29	0.91	0.39	sand	24.0	1.66	78	60	60	60	0.60	1.00	2,249.24	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	132.5	0.011	0.000	0.00	0.92
1.50	72.05	2.05	2.85	sandy silt to clayey silt	23.0	1.00	29	180	180	180	2.00	1.30	311.72	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	63.8	N/A	N/A	N/A	0.92
2.50	59.60	1.81	3.05	sandy silt to clayey silt	22.0	1.00	24	300	300	300	2.13	1.52	233.52	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	53.6	N/A	N/A	N/A	0.92
3.50	57.15	1.43	2.51	sandy silt to clayey silt	21.0	1.66	38	420	420	420	1.82	1.12	230.98	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	82.2	N/A	N/A	N/A	0.92
4.50	19.14	0.57	2.97	clayey silt to silty clay	20.0	1.00	10	540	540	540	2.55	3.04	111.94	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.92
5.50	12.01	0.29	2.44	clayey silt to silty clay	19.0	1.00	6	660	660	660	2.59	3.29	90.67	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.92
6.50	8.88	0.21	2.40	silty clay to clay	18.0	1.00	6	780	780	780	2.74	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.92
7.50	9.50	0.22	2.30	silty clay to clay	17.0	1.00	6	900	869	869	2.74	N/A	N/A	0.983	N/A	0.298	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.92
8.50	40.44	0.41	1.01	silty sand to sandy silt	16.0	1.00	13	1,020	926	926	2.09	1.45	85.88	0.980	1.000	0.316	0.139	0.525	YES	2.8	22.6	> 800	28.8	N/A	0.085	0.01	0.91
9.50	32.22	0.46	1.41	silty sand to sandy silt	15.0	1.66	18	1,140	984	984	1.96	1.26	95.56	0.978	1.000	0.331	0.161	0.580	YES	2.8	28.2	> 800	35.4	N/A	0.037	0.00	0.91
10.50	10.83	0.31	2.89	silty clay to clay	14.0	1.00	7	1,260	1,042	1,042	2.80	N/A	N/A	0.976	N/A	0.345	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
11.50	11.41	0.22	2.05	clayey silt to silty clay	13.0	1.00	6	1,380	1,099	1,099	2.70	N/A	N/A	0.973	N/A	0.357	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
12.50	10.65	0.18	1.72	clayey silt to silty clay	12.0	1.00	5	1,500	1,157	1,157	2.70	N/A	N/A	0.971	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
13.50	10.66	0.19	1.89	clayey silt to silty clay	11.0	1.00	5	1,620	1,214	1,214	2.73	N/A	N/A	0.969	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
14.50	12.51	0.28	2.31	clayey silt to silty clay	10.0	1.00	6	1,740	1,272	1,272	2.74	N/A	N/A	0.966	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
15.50	12.43	0.36	3.01	silty clay to clay	9.0	1.00	8	1,860	1,330	1,330	2.82	N/A	N/A	0.964	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
16.50	14.03	0.31	2.34	clayey silt to silty clay	8.0	1.00	7	1,980	1,387	1,387	2.72	N/A	N/A	0.962	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
17.50	19.58	0.45	2.33	clayey silt to silty clay	7.0	1.00	10	2,100	1,445	1,445	2.62	N/A	N/A	0.959	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.91
18.50	28.21	0.50	1.79	sandy silt to clayey silt	6.0	1.00	11	2,220	1,502	1,502	2.46	2.56	83.43	0.957	1.000	0.414	0.134	0.386	YES	2.8	15.8	782	20.6	N/A	1.452	0.17	0.74
19.50	28.81	0.80	2.80	clayey silt to silty clay	5.0	1.66	24	2,340	1,560	1,560	2.26	1.84	99.41	0.955	1.000	0.419	0.171	0.488	YES	2.8	29.8	> 800	N/A	N/A	0.000	0.00	0.74
20.50	13.87	0.39	2.94	silty clay to clay	4.0	1.00	9	2,460	1,618	1,618	2.83	N/A	N/A	0.952	N/A	0.424	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.74
21.50	26.80	0.78	2.91	clayey silt to silty clay	3.0	1.00	13	2,580	1,675	1,675	2.61	N/A	N/A	0.950	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.74
22.50	42.14	0.82	1.94	sandy silt to clayey silt	2.0	1.00	17	2,700	1,733	1,733	2.37	2.19	99.13	0.948	1.000	0.432	0.171	0.471	YES	2.8	20.9	> 800	26.7	N/A	0.960	0.12	0.62
23.50	38.76	0.72	1.86	sandy silt to clayey silt	1.0	1.00	16	2,820	1,790	1,790	2.39	2.28	93.20	0.945	1.000	0.435	0.155	0.425	YES	2.8	19.2	> 800	24.7	N/A	1.153	0.14	0.48
24.50	22.21	0.97	4.42	clay	0.0	1.00	22	2,940	1,848	1,848	2.82	N/A	N/A	0.943	N/A	0.439	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.48
25.50	41.22	1.19	2.88	sandy silt to clayey silt	-1.0	1.66	27	3,060	1,906	1,906	2.19	1.65	115.13	0.941	1.000	0.442	0.222	0.599	YES	2.8	30.8	> 800	38.6	N/A	0.018	0.00	0.48
26.50	14.72	0.66	4.55	clay	-2.0	1.00	15	3,180	1,963	1,963	2.99	N/A	N/A	0.938	N/A	0.445	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.48
27.50	20.01	0.83	4.19	silty clay to clay	-3.0	1.00	13	3,300	2,021	2,021	2.87	N/A	N/A	0.936	N/A	0.447	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.48
28.50	27.28	0.81	2.97	clayey silt to silty clay	-4.0	1.00	14	3,420	2,078	2,078	2.67	N/A	N/A	0.934	N/A	0.449	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.48
29.50	31.50	0.92	2.93	clayey silt to silty clay	-5.0	1.00	16	3,540	2,136	2,136	2.63	N/A	N/A	0.931	N/A	0.451	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.48
30.50	48.48	1.11	2.30	sandy silt to clayey silt	-6.0	1.00	19	3,660	2,194	2,194	2.41	2.35	108.98	0.926	0.971	0.452	0.200	0.513	YES	2.8	21.3	> 800	27.2	N/A	0.928	0.11	0.37
31.50	39.54	1.17	2.98	sandy silt to clayey silt	-7.0	1.00	16	3,780	2,251	2,251	2.56	3.08	114.72	0.918	0.966	0.451	0.220	0.564	YES	2.8	17.7	> 800	22.9	N/A	1.304	0.16	0.21
32.50	58.83	1.21	2.06	silty sand to sandy silt	-8.0	1.00	20	3,900	2,309	2,309	2.32	2.03	110.95	0.909	0.955	0.449	0.207	0.525	YES	2.8	21.1	> 800	26.9	N/A	0.984	0.12	0.09
33.50	30.32	0.86	2.83	clayey silt to silty clay	-9.0	1.00	15	4,020	2,366	2,366	2.66	N/A	N/A	0.901	N/A	0.448	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
34.50	46.23	1.91	4.17	clayey silt to silty clay	-10.0	1.00	23	4,140	2,424	2,424	2.63	N/A	N/A	0.893	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
35.50	78.41	1.88	2.40	sandy silt to clayey silt	-11.0	1.66	52	4,260	2,482	2,482	1.97	1.27	147.69	0.885	0.917	0.444	0.380	0.935	YES	2.8	49.4	> 800	60.9	N/A	0.000	0.00	0.09
36.50	18.74	0.45	2.42	clayey silt to silty clay	-12.0	1.00	9	4,380	2,539	2,539	2.81	N/A	N/A	0.877	N/A	0.442	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
37.50	21.02	0.54	2.65	clayey silt to silty clay	-13.0	1.00	11	4,500	2,597	2,597	2.79	N/A	N/A	0.869	N/A	0.440	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
38.50	97.22	2.51	2.60	sandy silt to clayey silt	-14.0	1.00	39	4,620	2,654	2,654	2.25	1.81	152.70	0.861	0.893	0.438	0.411	0.999	YES	2.8	36.6	> 800	45.5	N/A	0.000	0.00	0.09
39.50	153.56	2.83	1.84	silty sand to sandy silt	-15.0	1.00	51	4,740	2,712	2,712	2.01	1.32	173.58	0.852	0.885	0.436	N/A	N/A	NO	N/A	N/A	N/A	57.7	N/A	0.000	0.00	0.09
40.50	169.85	3.42	2.02	silty sand to sandy silt	-16.0	1.00	57	4,860	2,770	2,770	2.01	1.32	190.51	0.844	0.878	0.433	N/A	N/A	NO	N/A	N/A	N/A	62.7	N/A	0.000	0.00	0.09
41.50	227.48	4.20	1.85	sand to silty sand	-17.0	1.00	57	4,980	2,827	2,827	1.91	1.20	228.68	0.836	0.871	0.431	N/A	N/A	NO	N/A	N/A	N/A	52.6	N/A	0.000	0.00	0.09
42.50	154.47	2.29	1.48	sand to silty sand	-18.0	1.66	64	5,100	2,885	2,885	1.64	1.00	212.95	0.828	0.864	0.428	N/A	N/A	NO	N/A	N/A	N/A	58.3	N/A	0.000	0.00	0.09
43.50	29.28	0.94	3.25	clayey silt to silty clay	-19.0	1.00	15	5,220	2,942	2,942	2.77	N/A	N/A	0.820	N/A	0.425	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
44.50	64.88	1.74	2.70	sandy silt to clayey silt	-20.0	1.00	26	5,340	3,000	3,000	2.41	2.37	125.32	0.812	0.869	0.423	0.263	0.645	YES	2.8	24.0	> 800	30.4	N/A	0.164	0.02	0.07
45.50	72.28	1.44	2.00	silty sand to sandy silt	-21.0	1.00	24	5,460	3,058	3,058	2.29	1.93	112.83	0.804	0.869	0.420	0.214	0.527	YES	2.8	22.3	> 800	28.4	N/A	0.493	0.06	0.01
46.50	89.56	2.09	2.34	silty sand to sandy silt	-22.0	1.00	30	5,580	3,115	3,115	2.27	1.87	134.11	0.795	0.850	0.417	0.304	0.740	YES	2.8	26.7	> 800	33.7	N/A	0.072	0.01	0.01
47.50	157.86	2.48	1.57	sand to silty sand	-23.0	1.00	39	5,700	3,173	3,173	1.98	1.27	159.40	0.787	0.831	0.414	0.457	1.095	YES	1.3	32.7	> 800	35.3	N/A	0.053	0.01	0.00
48.50	161.94	2.75	1.70	sand to silty sand	-24.0	1.66	67	5,820	3,230	3,230	1.68	1.03	216.81	0.779	0.825	0.411	N/A	N/A	NO	N/A	N/A	N/A	57.8	N/A	0.000	0.00	0.00
49.50	79.42	2.08	2.62	sandy silt to clayey silt	-25.0	1.66	53	5,940	3,288	3,288	2.04	1.36	139.39	0.771	0.820	0.407	0.332	0.796	YES	2.8	43.8	> 800	54.2	N/A	0.000	0.00	0.00
50.50	21.81	0.90	4.31	clay	-26.0	1.00	22	6,060	3,346	3,346	2.98	N/A	N/A	0.763	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
51.50	16.63	0.55	3.59	silty clay to clay	-27.0	1.00	11	6,180	3,403	3,403	3.04	N/A	N/A	0.755	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	24.13	0.61	2.64	clayey silt to silty clay	-28.0	1.00	12	6,300	3,461	3,461	2.82	N/A	N/A	0.747	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
53.50	23.28	0.71	3.20	clayey silt to silty clay	-29.0	1.00	12	6,420	3,518	3,518	2.89	N/A	N/A	0.739	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
54.50	28.81	0.98	3.46	clayey silt to silty clay	-30.0	1.00	14	6,540	3,576	3,576	2.84	N/A	N/A	0.730	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	22.95	0.75	3.45	clayey silt to silty clay	-31.0	1.00	11	6,660	3,634	3,634	2.93	N/A	N/A	0.722	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
56.50	26.94	1.02	3.97	silty clay to clay	-32.0	1.00	18	6,780	3,691	3,691	2.91	N/A	N/A	0.714	N/A	0.384	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	27.24	1.22	4.66	clay	-33.0	1.00	27	6,900	3,749	3,749	2.96	N/A	N/A	0.706	N/A	0.380	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	27.79	1.06	4.04	silty clay to clay	-34.0	1.00	19	7,020	3,806	3,806	2.91	N/A	N/A	0.698	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	47.71	1.83	3.98	clayey silt to silty clay	-35.0	1.00	24	7,140	3,864	3,864	2.72	N/A	N/A	0.690	N/A	0.373	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
60.50	58.67	2.47	4.32	clayey silt to silty clay	-36.0	1.00	29	7,260	3,922	3,922	2.68	N/A	N/A	0.682	N/A	0.369	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-003

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	27.90	ft
GWT Elev. During Test	18.00	ft
GWT Elev. For Design	18.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

\+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	9.90 ft below ground surface
GWT Depth For Design, Zwd =	9.90 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	10.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.26 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.26 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	176.98	0.99	0.56	sand	26.9	1.00	35	60	60	60	1.07	1.00	1,021.81	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	60.2	0.014	0.000	0.00	0.26
1.50	116.77	1.25	1.07	sand to silty sand	25.9	1.66	48	180	180	180	1.23	1.00	644.46	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	88.6	0.022	0.000	0.00	0.26
2.50	52.19	1.44	2.77	sandy silt to clayey silt	24.9	1.00	21	300	300	300	2.14	1.52	205.25	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	47.6	N/A	N/A	N/A	0.26
3.50	66.22	2.23	3.36	sandy silt to clayey silt	23.9	1.00	26	420	420	420	2.18	1.63	235.40	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	59.0	N/A	N/A	N/A	0.26
4.50	45.03	1.29	2.88	sandy silt to clayey silt	22.9	1.00	18	540	540	540	2.27	1.87	161.96	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	41.7	N/A	N/A	N/A	0.26
5.50	45.47	1.43	3.15	clayey silt to silty clay	21.9	1.00	23	660	660	660	2.33	2.05	162.27	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
6.50	116.20	3.18	2.75	sandy silt to clayey silt	20.9	1.66	77	780	780	780	1.74	1.07	328.46	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	152.9	N/A	N/A	N/A	0.26
7.50	54.88	1.23	2.25	sandy silt to clayey silt	19.9	1.66	36	900	900	900	1.90	1.19	161.42	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	70.0	N/A	N/A	N/A	0.26
8.50	17.67	0.42	2.38	clayey silt to silty clay	18.9	1.00	9	1,020	1,020	1,020	2.57	3.15	92.17	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
9.50	10.26	0.38	3.68	clay	17.9	1.00	10	1,140	1,140	1,140	2.91	N/A	N/A	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
10.50	9.89	0.41	4.20	clay	16.9	1.00	10	1,260	1,223	1,223	2.98	N/A	N/A	0.976	N/A	0.294	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
11.50	19.90	0.58	2.91	clayey silt to silty clay	15.9	1.00	10	1,380	1,280	1,280	2.64	N/A	N/A	0.973	N/A	0.307	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
12.50	45.32	0.77	1.70	silty sand to sandy silt	14.9	1.66	25	1,500	1,338	1,338	1.95	1.24	113.74	0.971	1.000	0.318	0.217	0.812	YES	2.8	33.4	> 800	41.7	N/A	0.000	0.00	0.26
13.50	17.82	0.41	2.29	clayey silt to silty clay	13.9	1.00	9	1,620	1,395	1,395	2.64	N/A	N/A	0.969	N/A	0.329	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
14.50	11.81	0.30	2.56	clayey silt to silty clay	12.9	1.00	6	1,740	1,453	1,453	2.83	N/A	N/A	0.966	N/A	0.338	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
15.50	9.19	0.29	3.24	clay	11.9	1.00	9	1,860	1,511	1,511	2.99	N/A	N/A	0.964	N/A	0.347	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
16.50	10.74	0.34	3.21	silty clay to clay	10.9	1.00	7	1,980	1,568	1,568	2.94	N/A	N/A	0.962	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
17.50	13.62	0.33	2.46	clayey silt to silty clay	9.9	1.00	7	2,100	1,626	1,626	2.80	N/A	N/A	0.959	N/A	0.362	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
18.50	10.73	0.39	3.67	clay	8.9	1.00	11	2,220	1,683	1,683	3.00	N/A	N/A	0.957	N/A	0.369	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
19.50	15.32	0.48	3.21	silty clay to clay	7.9	1.00	10	2,340	1,741	1,741	2.84	N/A	N/A	0.955	N/A	0.375	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
20.50	19.78	0.55	2.82	clayey silt to silty clay	6.9	1.00	10	2,460	1,799	1,799	2.73	N/A	N/A	0.952	N/A	0.381	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
21.50	23.08	0.56	2.45	sandy silt to clayey silt	5.9	1.00	9	2,580	1,856	1,856	2.64	N/A	N/A	0.950	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
22.50	18.47	0.64	3.51	silty clay to clay	4.9	1.00	12	2,700	1,914	1,914	2.83	N/A	N/A	0.948	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
23.50	16.98	0.46	2.79	clayey silt to silty clay	3.9	1.00	8	2,820	1,971	1,971	2.80	N/A	N/A	0.945	N/A	0.395	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
24.50	29.77	0.96	3.26	clayey silt to silty clay	2.9	1.00	15	2,940	2,029	2,029	2.66	N/A	N/A	0.943	N/A	0.400	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
25.50	41.16	0.99	2.41	sandy silt to clayey silt	1.9	1.00	16	3,060	2,087	2,087	2.47	2.61	105.20	0.941	0.987	0.403	0.188	0.550	YES	2.8	18.9	> 800	24.3	N/A	1.136	0.14	0.13
26.50	60.10	1.02	1.70	silty sand to sandy silt	0.9	1.66	33	3,180	2,144	2,144	1.93	1.22	117.59	0.938	0.973	0.407	0.231	0.659	YES	2.8	34.8	> 800	43.4	N/A	0.000	0.00	0.13
27.50	21.28	0.89	4.26	silty clay to clay	-0.1	1.00	14	3,300	2,202	2,202	2.87	N/A	N/A	0.936	N/A	0.410	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.13
28.50	22.71	1.00	4.43	clay	-1.1	1.00	23	3,420	2,259	2,259	2.87	N/A	N/A	0.934	N/A	0.413	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.13
29.50	13.70	0.54	4.20	clay	-2.1	1.00	14	3,540	2,317	2,317	3.03	N/A	N/A	0.931	N/A	0.416	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.13
30.50	22.76	1.20	5.38	clay	-3.1	1.00	23	3,660	2,375	2,375	2.94	N/A	N/A	0.926	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.13
31.50	33.87	1.39	4.12	silty clay to clay	-4.1	1.00	23	3,780	2,432	2,432	2.73	N/A	N/A	0.918	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.13
32.50	51.53	1.20	2.33	sandy silt to clayey silt	-5.1	1.00	21	3,900	2,490	2,490	2.41	2.37	109.53	0.909	0.932	0.417	0.202	0.539	YES	2.8	21.3	> 800	27.2	N/A	0.771	0.09	0.03
33.50	28.62	1.32	4.66	clay	-6.1	1.00	29	4,020	2,547	2,547	2.84	N/A	N/A	0.901	N/A	0.416	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
34.50	89.71	2.34	2.61	sandy silt to clayey silt	-7.1	1.00	36	4,140	2,605	2,605	2.28	1.88	147.93	0.893	0.900	0.415	0.381	0.985	YES	2.8	34.2	> 800	42.7	N/A	0.000	0.00	0.03
35.50	80.61	2.36	2.93	sandy silt to clayey silt	-8.1	1.66	53	4,260	2,663	2,663	2.04	1.35	156.44	0.885	0.892	0.414	0.436	1.120	NO	N/A	N/A	N/A	60.5	N/A	0.000	0.00	0.03
36.50	31.60	1.17	3.74	clayey silt to silty clay	-9.1	1.00	16	4,380	2,720	2,720	2.76	N/A	N/A	0.877	N/A	0.413	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
37.50	82.04	2.97	3.63	clayey silt to silty clay	-10.1	1.66	68	4,500	2,778	2,778	2.11	1.47	169.19	0.869	0.877	0.412	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.03
38.50	37.97	1.59	4.20	silty clay to clay	-11.1	1.66	42	4,620	2,835	2,835	2.40	2.30	121.34	0.861	0.870	0.410	0.246	0.622	YES	5.0	40.2	> 800	N/A	N/A	0.000	0.00	0.03
39.50	15.48	0.68	4.49	clay	-12.1	1.00	15	4,740	2,893	2,893	3.08	N/A	N/A	0.852	N/A	0.409	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
40.50	21.51	1.00	4.80	clay	-13.1	1.00	22	4,860	2,951	2,951	2.98	N/A	N/A	0.844	N/A	0.407	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
41.50	143.29	3.52	2.46	silty sand to sandy silt	-14.1	1.00	48	4,980	3,008	3,008	2.14	1.54	179.36	0.836	0.849	0.405	N/A	N/A	NO	N/A	N/A	N/A	51.7	N/A	0.000	0.00	0.03
42.50	140.18	2.89	2.06	silty sand to sandy silt	-15.1	1.00	47	5,100	3,066	3,066	2.09	1.44	163.50	0.828	0.843	0.403	N/A	N/A	NO	N/A	N/A	N/A	50.3	N/A	0.000	0.00	0.03
43.50	156.87	3.37	2.15	silty sand to sandy silt	-16.1	1.00	52	5,220	3,123	3,123	2.08	1.41	177.45	0.820	0.837	0.401	N/A	N/A	NO	N/A	N/A	N/A	55.2	N/A	0.000	0.00	0.03
44.50	218.25	2.92	1.34	sand to silty sand	-17.1	1.66	90	5,340	3,181	3,181	1.52	1.00	286.53	0.812	0.831	0.399	N/A	N/A	NO	N/A	N/A	N/A	77.6	N/A	0.000	0.00	0.03
45.50	44.41	1.43	3.23	clayey silt to silty clay	-18.1	1.00	22	5,460	3,239	3,239	2.65	N/A	N/A	0.804	N/A	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
46.50	87.95	1.78	2.04	silty sand to sandy silt	-19.1	1.00	29	5,580	3,296	3,296	2.24	1.78	122.24	0.795	0.836	0.394	0.250	0.633	YES	2.8	25.6	> 800	32.4	N/A	0.078	0.01	0.03
47.50	177.30	3.04	1.72	sand to silty sand	-20.1	1.00	44	5,700	3,354	3,354	1.98	1.27	174.19	0.787	0.813	0.391	N/A	N/A	NO	N/A	N/A	N/A	38.4	N/A	0.017	0.00	0.02
48.50	161.59	3.08	1.91	silty sand to sandy silt	-21.1	1.00	54	5,820	3,411	3,411	2.04	1.36	168.24	0.779	0.808	0.389	N/A	N/A	NO	N/A	N/A	N/A	54.5	N/A	0.000	0.00	0.02
49.50	96.30	1.97	2.05	silty sand to sandy silt	-22.1	1.66	53	5,940	3,469	3,469	1.92	1.20	145.70	0.771	0.802	0.386	0.368	0.911	YES	2.8	43.2	> 800	53.4	N/A	0.000	0.00	0.02
50.50	36.40	1.65	4.61	silty clay to clay	-23.1	1.00	24	6,060	3,527	3,527	2.84	N/A	N/A	0.763	N/A	0.383	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
51.50	27.17	1.16	4.37	silty clay to clay	-24.1	1.00	18	6,180	3,584	3,584	2.93	N/A	N/A	0.755	N/A	0.381	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
52.50	28.55	0.99	3.58	clayey silt to silty clay	-25.1	1.00	14	6,300	3,642	3,642	2.86	N/A	N/A	0.747	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
53.50	28.16	0.69	2.52	sandy silt to clayey silt	-26.1	1.00	11	6,420	3,699	3,699	2.77	N/A	N/A	0.739	N/A	0.375	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
54.50	64.49	1.61	2.53	sandy silt to clayey silt	-27.1	1.00	26	6,540	3,757	3,757	2.43	2.45	115.48	0.730	0.815	0.372	0.223	0.583	YES	2.8	21.6	> 800	27.6	N/A	0.188	0.02	0.00
55.50	59.78	1.53	2.56	sandy silt to clayey silt	-28.1	1.66	40	6,660	3,815	3,815	2.15	1.56	111.58	0.722	0.772	0.369	0.209	0.523	YES	2.8	31.5	> 800	39.4	N/A	0.006	0.00	0.00
56.50	22.61	0.84	3.91	silty clay to clay	-29.1	1.00	15	6,780	3,872	3,872	2.98	N/A	N/A	0.714	N/A	0.366	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	27.07	0.87	3.44	clayey silt to silty clay	-30.1	1.00	14	6,900	3,930	3,930	2.88	N/A	N/A	0.706	N/A	0.363	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	31.57	1.33	4.41	silty clay to clay	-31.1	1.00	21	7,020	3,987	3,987	2.90	N/A	N/A	0.698	N/A	0.359	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	33.99	1.49	4.55	silty clay to clay	-32.1	1.00	23	7,140	4,045	4,045	2.89	N/A	N/A	0.690	N/A	0.356	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
60.50	34.52	1.32	3.89	clayey silt to silty clay	-33.1	1.00	17	7,260	4,103	4,103	2.85	N/A	N/A	0.682	N/A	0.353	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-006

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	42.00	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \to \infty}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	26.00 ft below ground surface
GWT Depth For Design, Zwd =	26.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	2.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.00 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.00 inches	

INPUT SOIL PROFILE (CPT DATA)

SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +

RESIDUAL STRENGTH *

GROUND SETTLEMENT **

Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio CRR$_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	182.71	0.79	0.43	sand	41.0	1.66	61	60	60	60	0.68	1.00	1,746.64	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	102.9	0.012	0.000	0.00	0.00
1.50	81.74	0.63	0.77	sand to silty sand	40.0	1.00	20	180	180	180	1.52	1.00	272.47	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	38.9	0.029	0.023	0.00	0.00
2.50	47.90	1.30	2.72	sandy silt to clayey silt	39.0	1.00	19	300	300	300	2.15	1.56	193.07	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	44.1	N/A	N/A	N/A	0.00
3.50	114.81	2.76	2.41	silty sand to sandy silt	38.0	1.00	38	420	420	420	1.93	1.22	304.56	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	83.1	0.034	0.000	0.00	0.00
4.50	118.63	2.48	2.09	silty sand to sandy silt	37.0	1.00	40	540	540	540	1.90	1.19	271.56	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	85.7	0.037	0.000	0.00	0.00
5.50	86.59	2.76	3.18	sandy silt to clayey silt	36.0	1.00	35	660	660	660	2.15	1.56	235.51	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	75.7	N/A	N/A	N/A	0.00
6.50	68.09	2.13	3.13	sandy silt to clayey silt	35.0	1.00	27	780	780	780	2.24	1.76	192.10	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	57.3	N/A	N/A	N/A	0.00
7.50	53.13	2.01	3.78	clayey silt to silty clay	34.0	1.00	27	900	900	900	2.39	2.27	180.05	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
8.50	68.01	2.38	3.50	clayey silt to silty clay	33.0	1.00	34	1,020	1,020	1,020	2.31	1.99	189.29	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
9.50	77.40	2.74	3.54	clayey silt to silty clay	32.0	1.00	39	1,140	1,140	1,140	2.30	1.93	198.32	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
10.50	53.16	2.00	3.77	clayey silt to silty clay	31.0	1.00	27	1,260	1,260	1,260	2.44	2.48	165.85	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
11.50	57.02	1.46	2.57	sandy silt to clayey silt	30.0	1.00	23	1,380	1,380	1,380	2.31	1.98	136.22	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	37.9	N/A	N/A	N/A	0.00
12.50	53.48	2.14	4.00	clayey silt to silty clay	29.0	1.00	27	1,500	1,500	1,500	2.48	2.68	165.47	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
13.50	63.51	2.72	4.29	clayey silt to silty clay	28.0	1.00	32	1,620	1,620	1,620	2.47	2.60	183.54	0.969	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
14.50	72.89	2.12	2.91	sandy silt to clayey silt	27.0	1.00	29	1,740	1,740	1,740	2.31	1.98	154.98	0.966	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	42.5	N/A	N/A	N/A	0.00
15.50	63.25	2.23	3.52	clayey silt to silty clay	26.0	1.00	32	1,860	1,860	1,860	2.42	2.41	158.33	0.964	N/A	0.282	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
16.50	65.40	2.19	3.35	sandy silt to clayey silt	25.0	1.00	26	1,980	1,980	1,980	2.41	2.34	154.03	0.962	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	36.6	N/A	N/A	N/A	0.00
17.50	41.63	1.84	4.42	silty clay to clay	24.0	1.00	28	2,100	2,100	2,100	2.65	N/A	N/A	0.959	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
18.50	31.92	1.29	4.04	silty clay to clay	23.0	1.00	21	2,220	2,220	2,220	2.72	N/A	N/A	0.957	N/A	0.280	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
19.50	48.72	1.98	4.05	clayey silt to silty clay	22.0	1.00	24	2,340	2,340	2,340	2.60	3.30	143.12	0.955	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
20.50	102.08	2.30	2.26	silty sand to sandy silt	21.0	1.00	34	2,460	2,460	2,460	2.18	1.62	149.38	0.952	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	41.8	0.094	0.000	0.00	0.00
21.50	90.59	3.11	3.44	sandy silt to clayey silt	20.0	1.66	60	2,580	2,580	2,580	2.05	1.37	180.65	0.950	N/A	0.278	N/A	N/A	NO	N/A	N/A	N/A	68.4	N/A	N/A	N/A	0.00
22.50	43.42	2.04	4.70	silty clay to clay	19.0	1.00	29	2,700	2,700	2,700	2.71	N/A	N/A	0.948	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
23.50	24.17	0.98	4.07	silty clay to clay	18.0	1.00	16	2,820	2,820	2,820	2.88	N/A	N/A	0.945	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
24.50	15.51	0.68	4.40	clay	17.0	1.00	16	2,940	2,940	2,940	3.07	N/A	N/A	0.943	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
25.50	14.15	0.76	5.40	clay	16.0	1.00	14	3,060	3,060	3,060	3.17	N/A	N/A	0.941	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
26.50	26.21	0.65	2.48	sandy silt to clayey silt	15.0	1.00	10	3,180	3,149	3,149	2.74	N/A	N/A	0.938	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
27.50	16.00	0.47	2.97	clayey silt to silty clay	14.0	1.00	8	3,300	3,206	3,206	2.98	N/A	N/A	0.936	N/A	0.282	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
28.50	12.95	0.54	4.20	clay	13.0	1.00	13	3,420	3,264	3,264	3.16	N/A	N/A	0.934	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
29.50	11.29	0.49	4.37	clay	12.0	1.00	11	3,540	3,322	3,322	3.23	N/A	N/A	0.931	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
30.50	10.44	0.39	3.73	clay	11.0	1.00	10	3,660	3,379	3,379	3.22	N/A	N/A	0.926	N/A	0.293	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
31.50	13.01	0.41	3.12	silty clay to clay	10.0	1.00	9	3,780	3,437	3,437	3.10	N/A	N/A	0.918	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
32.50	12.30	0.41	3.36	silty clay to clay	9.0	1.00	8	3,900	3,494	3,494	3.14	N/A	N/A	0.909	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
33.50	14.43	0.41	2.81	clayey silt to silty clay	8.0	1.00	7	4,020	3,552	3,552	3.04	N/A	N/A	0.901	N/A	0.298	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
34.50	13.69	0.40	2.95	clayey silt to silty clay	7.0	1.00	7	4,140	3,610	3,610	3.08	N/A	N/A	0.893	N/A	0.300	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
35.50	14.76	0.46	3.10	clayey silt to silty clay	6.0	1.00	7	4,260	3,667	3,667	3.07	N/A	N/A	0.885	N/A	0.301	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
36.50	15.95	0.52	3.29	silty clay to clay	5.0	1.00	11	4,380	3,725	3,725	3.06	N/A	N/A	0.877	N/A	0.302	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
37.50	11.78	0.26	2.18	clayey silt to silty clay	4.0	1.00	6	4,500	3,782	3,782	3.09	N/A	N/A	0.869	N/A	0.302	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
38.50	17.84	0.46	2.58	clayey silt to silty clay	3.0	1.00	9	4,620	3,840	3,840	2.96	N/A	N/A	0.861	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
39.50	22.82	0.78	3.45	clayey silt to silty clay	2.0	1.00	11	4,740	3,898	3,898	2.95	N/A	N/A	0.852	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
40.50	27.33	1.45	5.33	clay	1.0	1.00	27	4,860	3,955	3,955	3.01	N/A	N/A	0.844	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
41.50	30.81	0.98	3.18	clayey silt to silty clay	0.0	1.00	15	4,980	4,013	4,013	2.82	N/A	N/A	0.836	N/A	0.304	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
42.50	17.04	0.77	4.53	clay	-1.0	1.00	17	5,100	4,070	4,070	3.14	N/A	N/A	0.828	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
43.50	23.90	1.31	5.47	clay	-2.0	1.00	24	5,220	4,128	4,128	3.07	N/A	N/A	0.820	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
44.50	43.14	1.63	3.77	clayey silt to silty clay	-3.0	1.00	22	5,340	4,186	4,186	2.76	N/A	N/A	0.812	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
45.50	79.67	1.56	1.96	silty sand to sandy silt	-4.0	1.66	44	5,460	4,243	4,243	2.00	1.29	117.21	0.804	0.740	0.302	0.230	0.671	YES	2.8	33.0	> 800	41.2	N/A	0.000	0.00	0.00
46.50	28.88	1.35	4.68	clay	-5.0	1.00	29	5,580	4,301	4,301	2.97	N/A	N/A	0.795	N/A	0.302	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
47.50	30.93	1.35	4.38	silty clay to clay	-6.0	1.00	21	5,700	4,358	4,358	2.93	N/A	N/A	0.787	N/A	0.301	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	51.59	1.67	3.24	clayey silt to silty clay	-7.0	1.00	26	5,820	4,416	4,416	2.67	N/A	N/A	0.779	N/A	0.300	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	36.22	1.08	3.00	clayey silt to silty clay	-8.0	1.00	18	5,940	4,474	4,474	2.78	N/A	N/A	0.771	N/A	0.299	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
50.50	21.03	0.85	4.05	silty clay to clay	-9.0	1.00	14	6,060	4,531	4,531	3.07	N/A	N/A	0.763	N/A	0.298	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
51.50	46.11	2.13	4.63	silty clay to clay	-10.0	1.00	31	6,180	4,589	4,589	2.82	N/A	N/A	0.755	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	49.99	2.44	4.89	silty clay to clay	-11.0	1.66	55	6,300	4,646	4,646	2.43	2.45	133.19	0.747	0.714	0.296	0.300	0.862	YES	5.0	41.2	> 800	N/A	N/A	0.000	0.00	0.00
53.50	19.11	0.87	4.55	clay	-12.0	1.00	19	6,420	4,704	4,704	3.15	N/A	N/A	0.739	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
54.50	19.86	1.04	5.29	clay	-13.0	1.00	20	6,540	4,762	4,762	3.18	N/A	N/A	0.730	N/A	0.293	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	116.02	3.57	3.08	sandy silt to clayey silt	-14.0	1.00	46	6,660	4,819	4,819	2.35	2.11	157.67	0.722	0.703	0.292	0.444	1.277	NO	N/A	N/A	N/A	40.9	N/A	0.000	0.00	0.00
56.50	194.87	4.18	2.14	silty sand to sandy silt	-15.0	1.00	65	6,780	4,877	4,877	2.08	1.42	176.65	0.714	0.700	0.290	N/A	N/A	NO	N/A	N/A	N/A	54.9	N/A	0.000	0.00	0.00
57.50	229.04	4.48	1.96	sand to silty sand	-16.0	1.00	57	6,900	4,934	4,934	2.00	1.30	190.11	0.706	0.697	0.289	N/A	N/A	NO	N/A	N/A	N/A	40.7	N/A	0.000	0.00	0.00
58.50	239.13	3.63	1.52	sand to silty sand	-17.0	1.00	60	7,020	4,992	4,992	1.91	1.20	181.34	0.698	0.694	0.287	N/A	N/A	NO	N/A	N/A	N/A	42.2	N/A	0.000	0.00	0.00
59.50	137.97	2.47	1.79	silty sand to sandy silt	-18.0	1.66	76	7,140	5,050	5,050	1.82	1.12	161.19	0.690	0.690	0.285	N/A	N/A	NO	N/A	N/A	N/A	62.5	N/A	0.000	0.00	0.00
60.50	32.88	1.36	4.16	silty clay to clay	-19.0	1.00	22	7,260	5,107	5,107	2.94	N/A	N/A	0.682	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-007

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	27.00	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	11.00 ft below ground surface
GWT Depth For Design, Zwd =	11.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	17.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.24 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.24 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	209.91	0.91	0.43	sand	26.0	1.00	42	60	60	60	0.94	1.00	1,211.93	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	71.4	0.014	0.000	0.00	0.24
1.50	163.71	1.90	1.16	sand to silty sand	25.0	1.00	68	180	180	180	1.18	1.00	903.54	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	123.2	0.019	0.000	0.00	0.24
2.50	39.14	1.73	4.44	silty clay to clay	24.0	1.00	26	300	300	300	2.37	2.21	223.31	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
3.50	35.95	1.31	3.64	clayey silt to silty clay	23.0	1.00	18	420	420	420	2.38	2.23	174.80	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
4.50	58.77	1.68	2.87	sandy silt to clayey silt	22.0	1.00	24	540	540	540	2.20	1.66	187.54	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	53.0	N/A	N/A	N/A	0.24
5.50	37.09	0.80	2.15	sandy silt to clayey silt	21.0	1.00	15	660	660	660	2.28	1.87	120.93	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	35.3	N/A	N/A	N/A	0.24
6.50	20.93	0.67	3.19	clayey silt to silty clay	20.0	1.66	17	780	780	780	2.29	1.93	106.84	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
7.50	9.81	0.33	3.40	clay	19.0	1.00	10	900	900	900	2.84	N/A	N/A	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
8.50	26.96	0.66	2.44	sandy silt to clayey silt	18.0	1.00	11	1,020	1,020	1,020	2.49	2.71	102.25	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	23.1	N/A	N/A	N/A	0.24
9.50	67.96	1.01	1.49	silty sand to sandy silt	17.0	1.00	23	1,140	1,140	1,140	2.06	1.39	125.05	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	41.0	0.068	0.000	0.00	0.24
10.50	70.28	0.91	1.29	silty sand to sandy silt	16.0	1.66	39	1,260	1,260	1,260	1.72	1.05	153.64	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	63.6	0.061	0.000	0.00	0.24
11.50	13.50	0.46	3.38	silty clay to clay	15.0	1.00	9	1,380	1,349	1,349	2.83	N/A	N/A	0.973	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
12.50	8.72	0.32	3.70	clay	14.0	1.00	9	1,500	1,406	1,406	3.03	N/A	N/A	0.971	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
13.50	9.75	0.31	3.22	silty clay to clay	13.0	1.00	7	1,620	1,464	1,464	2.96	N/A	N/A	0.969	N/A	0.313	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
14.50	14.72	0.47	3.25	silty clay to clay	12.0	1.00	10	1,740	1,522	1,522	2.82	N/A	N/A	0.966	N/A	0.323	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
15.50	11.00	0.43	3.95	clay	11.0	1.00	11	1,860	1,579	1,579	2.99	N/A	N/A	0.964	N/A	0.332	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
16.50	13.13	0.46	3.54	silty clay to clay	10.0	1.00	9	1,980	1,637	1,637	2.91	N/A	N/A	0.962	N/A	0.340	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
17.50	13.09	0.43	3.34	silty clay to clay	9.0	1.00	9	2,100	1,694	1,694	2.90	N/A	N/A	0.959	N/A	0.348	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
18.50	14.71	0.67	4.59	clay	8.0	1.00	15	2,220	1,752	1,752	2.96	N/A	N/A	0.957	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
19.50	42.97	1.01	2.37	sandy silt to clayey silt	7.0	1.00	17	2,340	1,810	1,810	2.42	2.41	108.73	0.955	1.000	0.361	0.200	0.659	YES	2.8	20.9	> 800	26.7	N/A	0.183	0.02	0.22
20.50	53.14	1.30	2.45	sandy silt to clayey silt	6.0	1.66	35	2,460	1,867	1,867	2.06	1.38	125.77	0.952	1.000	0.367	0.265	0.861	YES	2.8	39.2	> 800	48.7	N/A	0.000	0.00	0.22
21.50	17.06	0.53	3.15	clayey silt to silty clay	5.0	1.00	9	2,580	1,925	1,925	2.83	N/A	N/A	0.950	N/A	0.372	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
22.50	15.32	0.37	2.44	clayey silt to silty clay	4.0	1.00	8	2,700	1,982	1,982	2.81	N/A	N/A	0.948	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
23.50	27.17	1.06	3.96	silty clay to clay	3.0	1.00	18	2,820	2,040	2,040	2.75	N/A	N/A	0.945	N/A	0.382	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
24.50	51.70	1.13	2.18	sandy silt to clayey silt	2.0	1.66	34	2,940	2,098	2,098	2.05	1.37	114.84	0.943	0.981	0.387	0.221	0.669	YES	2.8	36.2	> 800	45.1	N/A	0.000	0.00	0.22
25.50	18.95	0.83	4.42	clay	1.0	1.00	19	3,060	2,155	2,155	2.92	N/A	N/A	0.941	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
26.50	16.53	0.94	5.75	clay	0.0	1.00	17	3,180	2,213	2,213	3.05	N/A	N/A	0.938	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
27.50	20.06	1.21	6.10	clay	-1.0	1.00	20	3,300	2,270	2,270	3.01	N/A	N/A	0.936	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
28.50	42.53	1.47	3.46	clayey silt to silty clay	-2.0	1.00	21	3,420	2,328	2,328	2.59	3.29	124.77	0.934	0.951	0.401	0.261	0.737	YES	2.8	22.5	> 800	N/A	N/A	0.000	0.00	0.22
29.50	87.70	1.40	1.59	silty sand to sandy silt	-3.0	1.66	48	3,540	2,386	2,386	1.81	1.11	147.99	0.931	0.932	0.404	0.381	1.049	YES	2.8	47.1	> 800	58.2	N/A	0.000	0.00	0.22
30.50	24.43	0.73	3.01	clayey silt to silty clay	-4.0	1.00	12	3,660	2,443	2,443	2.76	N/A	N/A	0.926	N/A	0.406	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
31.50	22.57	0.62	2.79	clayey silt to silty clay	-5.0	1.00	11	3,780	2,501	2,501	2.77	N/A	N/A	0.918	N/A	0.406	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
32.50	117.13	1.80	1.54	sand to silty sand	-6.0	1.00	29	3,900	2,558	2,558	2.03	1.34	138.80	0.909	0.910	0.406	0.329	0.880	YES	1.3	27.2	> 800	29.6	N/A	0.182	0.02	0.20
33.50	162.52	2.23	1.37	sand to silty sand	-7.0	1.00	41	4,020	2,616	2,616	1.90	1.18	168.30	0.901	0.898	0.405	N/A	N/A	NO	N/A	N/A	N/A	39.7	N/A	0.003	0.00	0.19
34.50	87.10	1.54	1.77	silty sand to sandy silt	-8.0	1.66	48	4,140	2,674	2,674	1.86	1.15	143.84	0.893	0.890	0.405	0.357	0.937	YES	2.8	44.4	> 800	54.9	N/A	0.000	0.00	0.19
35.50	18.24	0.52	2.90	clayey silt to silty clay	-9.0	1.00	9	4,260	2,731	2,731	2.89	N/A	N/A	0.885	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
36.50	14.19	0.44	3.22	silty clay to clay	-10.0	1.00	9	4,380	2,789	2,789	3.01	N/A	N/A	0.877	N/A	0.403	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
37.50	21.09	0.73	3.59	silty clay to clay	-11.0	1.00	14	4,500	2,846	2,846	2.89	N/A	N/A	0.869	N/A	0.402	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
38.50	55.28	2.00	3.61	clayey silt to silty clay	-12.0	1.66	46	4,620	2,904	2,904	2.23	1.75	133.19	0.861	0.861	0.400	0.300	0.769	YES	2.8	40.8	> 800	N/A	N/A	0.000	0.00	0.19
39.50	18.81	0.61	3.25	clayey silt to silty clay	-13.0	1.00	9	4,740	2,962	2,962	2.93	N/A	N/A	0.852	N/A	0.399	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
40.50	91.13	1.63	1.80	silty sand to sandy silt	-14.0	1.00	30	4,860	3,019	3,019	2.18	1.63	120.55	0.844	0.858	0.398	0.243	0.625	YES	2.8	27.5	> 800	34.7	N/A	0.056	0.01	0.19
41.50	57.22	1.23	2.16	sandy silt to clayey silt	-15.0	1.66	38	4,980	3,077	3,077	2.08	1.42	108.56	0.836	0.842	0.396	0.199	0.505	YES	2.8	33.4	> 800	41.7	N/A	0.000	0.00	0.19
42.50	18.62	0.71	3.86	silty clay to clay	-16.0	1.00	12	5,100	3,134	3,134	3.00	N/A	N/A	0.828	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
43.50	26.21	1.05	4.07	silty clay to clay	-17.0	1.00	17	5,220	3,192	3,192	2.89	N/A	N/A	0.820	N/A	0.392	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
44.50	20.96	0.95	4.59	clay	-18.0	1.00	21	5,340	3,250	3,250	3.01	N/A	N/A	0.812	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
45.50	51.91	1.39	2.68	sandy silt to clayey silt	-19.0	1.00	21	5,460	3,307	3,307	2.54	3.00	106.70	0.804	0.859	0.388	0.193	0.510	YES	2.8	18.9	> 800	24.4	N/A	1.107	0.13	0.06
46.50	74.45	1.60	2.15	silty sand to sandy silt	-20.0	1.00	25	5,580	3,365	3,365	2.32	2.02	115.92	0.795	0.843	0.386	0.225	0.586	YES	2.8	21.9	> 800	28.0	N/A	0.340	0.04	0.01
47.50	72.59	1.78	2.46	sandy silt to clayey silt	-21.0	1.00	29	5,700	3,422	3,422	2.37	2.20	122.16	0.787	0.827	0.384	0.250	0.642	YES	2.8	25.0	> 800	31.6	N/A	0.082	0.01	0.00
48.50	70.63	1.52	2.16	silty sand to sandy silt	-22.0	1.66	39	5,820	3,480	3,480	2.03	1.34	119.09	0.779	0.801	0.381	0.237	0.594	YES	2.8	32.4	> 800	40.5	N/A	0.000	0.00	0.00
49.50	25.56	1.13	4.48	clay	-23.0	1.00	26	5,940	3,538	3,538	2.96	N/A	N/A	0.771	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
50.50	33.99	1.40	4.18	silty clay to clay	-24.0	1.00	23	6,060	3,595	3,595	2.84	N/A	N/A	0.763	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
51.50	50.69	2.38	4.72	silty clay to clay	-25.0	1.00	34	6,180	3,653	3,653	2.74	N/A	N/A	0.755	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	105.45	2.66	2.53	silty sand to sandy silt	-26.0	1.00	35	6,300	3,710	3,710	2.27	1.87	144.76	0.747	0.790	0.371	0.362	0.920	YES	2.8	28.6	> 800	36.0	N/A	0.038	0.00	0.00
53.50	198.74	3.75	1.89	sand to silty sand	-27.0	1.00	50	6,420	3,768	3,768	1.99	1.29	186.90	0.739	0.776	0.368	N/A	N/A	NO	N/A	N/A	N/A	40.4	N/A	0.000	0.00	0.00
54.50	135.37	2.68	1.98	silty sand to sandy silt	-28.0	1.00	45	6,540	3,826	3,826	2.13	1.50	147.24	0.730	0.771	0.365	0.377	0.950	YES	2.8	35.4	> 800	44.2	N/A	0.000	0.00	0.00
55.50	105.92	2.50	2.36	silty sand to sandy silt	-29.0	1.66	58	6,660	3,883	3,883	1.95	1.24	155.50	0.722	0.767	0.362	0.430	1.085	YES	2.8	44.8	> 800	55.3	N/A	0.000	0.00	0.00
56.50	25.72	1.26	4.92	clay	-30.0	1.00	26	6,780	3,941	3,941	3.01	N/A	N/A	0.714	N/A	0.359	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	34.21	1.82	5.40	clay	-31.0	1.00	34	6,900	3,998	3,998	2.94	N/A	N/A	0.706	N/A	0.356	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	39.18	1.74	4.54	silty clay to clay	-32.0	1.00	26	7,020	4,056	4,056	2.84	N/A	N/A	0.698	N/A	0.353	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	38.51	1.55	4.15	silty clay to clay	-33.0	1.00	26	7,140	4,114	4,114	2.82	N/A	N/A	0.690	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
60.50	34.04	1.49	4.53	silty clay to clay	-34.0	1.00	23	7,260	4,171	4,171	2.90	N/A	N/A	0.682	N/A	0.347	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-008

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	49.00	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	33.00 ft below ground surface
GWT Depth For Design, Zwd =	33.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	5.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.02 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.02 inches	<--- Dry or Unsaturated Sands
Total:	0.04 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	319.29	3.25	1.02	sand	48.0	1.00	64	60	60	60	1.24	1.00	1,843.42	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	108.6	0.012	0.000	0.00	0.04
1.50	293.71	3.54	1.21	sand	47.0	1.00	59	180	180	180	1.39	1.00	979.03	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	99.9	0.021	0.000	0.00	0.04
2.50	185.26	3.37	1.82	sand to silty sand	46.0	1.00	46	300	300	300	1.68	1.02	489.27	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	85.0	0.028	0.000	0.00	0.04
3.50	115.79	2.56	2.22	silty sand to sandy silt	45.0	1.00	39	420	420	420	1.89	1.18	299.17	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	83.7	0.033	0.000	0.00	0.04
4.50	60.79	1.70	2.79	sandy silt to clayey silt	44.0	1.00	24	540	540	540	2.18	1.62	188.97	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	54.6	N/A	N/A	N/A	0.04
5.50	92.96	3.43	3.71	clayey silt to silty clay	43.0	1.00	46	660	660	660	2.19	1.64	265.18	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
6.50	104.50	3.61	3.48	sandy silt to clayey silt	42.0	1.00	42	780	780	780	2.16	1.57	262.15	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	85.3	N/A	N/A	N/A	0.04
7.50	94.91	3.05	3.23	sandy silt to clayey silt	41.0	1.00	38	900	900	900	2.17	1.61	227.39	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	72.9	N/A	N/A	N/A	0.04
8.50	135.25	3.39	2.52	silty sand to sandy silt	40.0	1.00	45	1,020	1,020	1,020	2.01	1.32	249.16	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	80.8	0.052	0.000	0.00	0.04
9.50	108.19	3.10	2.88	sandy silt to clayey silt	39.0	1.00	43	1,140	1,140	1,140	2.13	1.52	217.29	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	73.8	N/A	N/A	N/A	0.04
10.50	62.28	2.38	3.83	clayey silt to silty clay	38.0	1.00	31	1,260	1,260	1,260	2.40	2.30	180.53	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
11.50	48.36	2.14	4.44	silty clay to clay	37.0	1.00	32	1,380	1,380	1,380	2.53	2.94	171.14	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
12.50	94.34	2.54	2.69	sandy silt to clayey silt	36.0	1.66	62	1,500	1,500	1,500	1.88	1.17	210.78	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	91.6	N/A	N/A	N/A	0.04
13.50	46.13	2.19	4.74	silty clay to clay	35.0	1.00	31	1,620	1,620	1,620	2.59	3.28	168.23	0.969	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
14.50	29.42	1.42	4.85	clay	34.0	1.00	29	1,740	1,740	1,740	2.74	N/A	N/A	0.966	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
15.50	99.61	2.53	2.54	silty sand to sandy silt	33.0	1.00	33	1,860	1,860	1,860	2.18	1.63	168.38	0.964	N/A	0.282	N/A	N/A	NO	N/A	N/A	N/A	46.3	0.081	0.000	0.00	0.04
16.50	105.17	2.37	2.25	silty sand to sandy silt	32.0	1.66	58	1,980	1,980	1,980	1.83	1.13	197.38	0.962	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	75.0	0.071	0.000	0.00	0.04
17.50	50.77	1.82	3.60	clayey silt to silty clay	31.0	1.00	25	2,100	2,100	2,100	2.52	2.86	141.48	0.959	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
18.50	78.55	1.89	2.41	sandy silt to clayey silt	30.0	1.00	31	2,220	2,220	2,220	2.27	1.84	137.53	0.957	N/A	0.280	N/A	N/A	NO	N/A	N/A	N/A	40.8	N/A	N/A	N/A	0.04
19.50	44.25	1.79	4.04	clayey silt to silty clay	29.0	1.00	22	2,340	2,340	2,340	2.63	N/A	N/A	0.955	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
20.50	23.42	0.98	4.19	silty clay to clay	28.0	1.00	16	2,460	2,460	2,460	2.86	N/A	N/A	0.952	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
21.50	19.42	0.89	4.60	clay	27.0	1.00	19	2,580	2,580	2,580	2.96	N/A	N/A	0.950	N/A	0.278	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
22.50	18.11	0.95	5.27	clay	26.0	1.00	18	2,700	2,700	2,700	3.04	N/A	N/A	0.948	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
23.50	21.77	1.14	5.23	clay	25.0	1.00	22	2,820	2,820	2,820	2.98	N/A	N/A	0.945	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
24.50	26.59	1.37	5.16	clay	24.0	1.00	27	2,940	2,940	2,940	2.92	N/A	N/A	0.943	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
25.50	24.26	1.35	5.59	clay	23.0	1.00	24	3,060	3,060	3,060	2.99	N/A	N/A	0.941	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
26.50	43.47	2.01	4.63	silty clay to clay	22.0	1.00	29	3,180	3,180	3,180	2.75	N/A	N/A	0.938	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
27.50	207.16	2.63	1.27	sand to silty sand	21.0	1.66	86	3,300	3,300	3,300	1.52	1.00	267.02	0.936	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	72.5	0.088	0.000	0.00	0.04
28.50	48.00	1.80	3.76	clayey silt to silty clay	20.0	1.00	24	3,420	3,420	3,420	2.67	N/A	N/A	0.934	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
29.50	36.64	1.20	3.27	clayey silt to silty clay	19.0	1.00	18	3,540	3,540	3,540	2.73	N/A	N/A	0.931	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
30.50	24.89	0.91	3.65	clayey silt to silty clay	18.0	1.00	12	3,660	3,660	3,660	2.91	N/A	N/A	0.926	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
31.50	38.55	1.21	3.15	clayey silt to silty clay	17.0	1.00	19	3,780	3,780	3,780	2.72	N/A	N/A	0.918	N/A	0.268	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
32.50	89.63	1.62	1.81	silty sand to sandy silt	16.0	1.00	30	3,900	3,900	3,900	2.23	1.74	111.95	0.909	N/A	0.266	N/A	N/A	NO	N/A	N/A	N/A	30.7	0.121	0.130	0.02	0.02
33.50	46.98	1.32	2.82	sandy silt to clayey silt	15.0	1.66	31	4,020	3,989	3,989	2.26	1.84	101.24	0.901	0.784	0.266	0.176	0.621	YES	2.8	24.8	> 800	31.4	N/A	0.053	0.01	0.01
34.50	12.12	0.61	5.11	clay	14.0	1.00	12	4,140	4,046	4,046	3.30	N/A	N/A	0.893	N/A	0.267	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
35.50	14.78	0.66	4.54	clay	13.0	1.00	15	4,260	4,104	4,104	3.19	N/A	N/A	0.885	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
36.50	10.74	0.50	4.84	clay	12.0	1.00	11	4,380	4,162	4,162	3.34	N/A	N/A	0.877	N/A	0.270	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
37.50	9.84	0.44	4.64	clay	11.0	1.00	10	4,500	4,219	4,219	3.36	N/A	N/A	0.869	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
38.50	12.42	0.55	4.71	clay	10.0	1.00	12	4,620	4,277	4,277	3.27	N/A	N/A	0.861	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
39.50	22.56	1.01	4.56	clay	9.0	1.00	23	4,740	4,334	4,334	3.05	N/A	N/A	0.852	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
40.50	14.73	0.63	4.49	clay	8.0	1.00	15	4,860	4,392	4,392	3.20	N/A	N/A	0.844	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
41.50	12.76	0.55	4.63	clay	7.0	1.00	13	4,980	4,450	4,450	3.27	N/A	N/A	0.836	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
42.50	13.97	0.57	4.39	clay	6.0	1.00	14	5,100	4,507	4,507	3.22	N/A	N/A	0.828	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
43.50	13.63	0.50	3.94	clay	5.0	1.00	14	5,220	4,565	4,565	3.21	N/A	N/A	0.820	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
44.50	17.40	0.69	4.20	clay	4.0	1.00	17	5,340	4,622	4,622	3.14	N/A	N/A	0.812	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
45.50	19.07	0.78	4.29	clay	3.0	1.00	19	5,460	4,680	4,680	3.11	N/A	N/A	0.804	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
46.50	21.14	0.96	4.77	clay	2.0	1.00	21	5,580	4,738	4,738	3.11	N/A	N/A	0.795	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
47.50	41.95	1.09	2.65	sandy silt to clayey silt	1.0	1.00	17	5,700	4,795	4,795	2.71	N/A	N/A	0.787	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
48.50	60.62	1.65	2.72	sandy silt to clayey silt	0.0	1.66	40	5,820	4,853	4,853	2.20	1.67	107.91	0.779	0.714	0.273	0.197	0.613	YES	2.8	28.6	> 800	35.9	N/A	0.026	0.00	0.01
49.50	22.91	1.33	5.98	clay	-1.0	1.00	23	5,940	4,910	4,910	3.15	N/A	N/A	0.771	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
50.50	27.23	1.58	5.98	clay	-2.0	1.00	27	6,060	4,968	4,968	3.09	N/A	N/A	0.763	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
51.50	44.27	1.53	3.50	clayey silt to silty clay	-3.0	1.00	22	6,180	5,026	5,026	2.78	N/A	N/A	0.755	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
52.50	45.71	1.83	4.01	clayey silt to silty clay	-4.0	1.00	23	6,300	5,083	5,083	2.81	N/A	N/A	0.747	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
53.50	36.26	1.47	4.09	silty clay to clay	-5.0	1.00	24	6,420	5,141	5,141	2.90	N/A	N/A	0.739	N/A	0.270	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
54.50	49.56	1.43	2.91	sandy silt to clayey silt	-6.0	1.00	20	6,540	5,198	5,198	2.70	N/A	N/A	0.730	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
55.50	78.15	1.67	2.14	silty sand to sandy silt	-7.0	1.00	26	6,660	5,256	5,256	2.38	2.22	107.08	0.722	0.748	0.268	0.194	0.647	YES	2.8	18.9	> 800	24.3	N/A	0.097	0.01	0.00
56.50	75.28	1.93	2.57	sandy silt to clayey silt	-8.0	1.66	50	6,780	5,314	5,314	2.13	1.51	115.58	0.714	0.676	0.267	0.224	0.677	YES	2.8	33.4	> 800	41.7	N/A	0.000	0.00	0.00
57.50	30.70	1.42	4.68	clay	-9.0	1.00	31	6,900	5,371	5,371	3.01	N/A	N/A	0.706	N/A	0.265	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	34.21	1.83	5.47	clay	-10.0	1.00	34	7,020	5,429	5,429	3.01	N/A	N/A	0.698	N/A	0.264	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	58.60	2.47	4.21	clayey silt to silty clay	-11.0	1.66	49	7,140	5,486	5,486	2.36	2.17	127.33	0.690	0.668	0.263	0.272	0.825	YES	2.8	32.1	> 800	N/A	N/A	0.000	0.00	0.00
60.50	18.34	1.00	5.62	clay	-12.0	1.00	18	7,260	5,544	5,544	3.27	N/A	N/A	0.682	N/A	0.261	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-009

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	29.00	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	13.00 ft below ground surface
GWT Depth For Design, Zwd =	13.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	14.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.24 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.02 inches	<--- Dry or Unsaturated Sands
Total:	0.26 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	172.18	1.28	0.74	sand	28.0	1.00	34	60	60	60	1.19	1.00	994.09	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	58.5	0.014	0.000	0.00	0.26
1.50	123.63	1.62	1.31	sand to silty sand	27.0	1.00	51	180	180	180	1.29	1.00	682.33	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	93.7	0.021	0.000	0.00	0.26
2.50	23.45	0.97	4.14	silty clay to clay	26.0	1.00	16	300	300	300	2.50	2.75	166.35	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
3.50	36.89	1.38	3.75	clayey silt to silty clay	25.0	1.00	18	420	420	420	2.38	2.24	179.97	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
4.50	25.53	0.85	3.35	clayey silt to silty clay	24.0	1.00	13	540	540	540	2.49	2.73	134.31	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
5.50	22.28	0.83	3.75	silty clay to clay	23.0	1.00	15	660	660	660	2.52	2.86	146.10	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
6.50	15.06	0.61	4.07	clay	22.0	1.00	15	780	780	780	2.71	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
7.50	47.04	0.78	1.66	silty sand to sandy silt	21.0	1.66	26	900	900	900	1.86	1.16	134.17	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	51.4	0.057	0.000	0.00	0.26
8.50	19.55	0.39	2.02	sandy silt to clayey silt	20.0	1.00	8	1,020	1,020	1,020	2.55	3.02	82.70	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	18.1	N/A	N/A	N/A	0.26
9.50	17.67	0.74	4.21	clay	19.0	1.00	18	1,140	1,140	1,140	2.76	N/A	N/A	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
10.50	22.09	0.89	4.05	silty clay to clay	18.0	1.00	15	1,260	1,260	1,260	2.70	N/A	N/A	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
11.50	55.57	0.71	1.28	silty sand to sandy silt	17.0	1.00	19	1,380	1,380	1,380	2.12	1.48	99.29	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	31.8	0.081	0.083	0.01	0.25
12.50	76.93	0.96	1.25	sand to silty sand	16.0	1.00	19	1,500	1,500	1,500	2.02	1.32	117.35	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	25.8	0.090	0.119	0.01	0.24
13.50	50.69	0.72	1.42	silty sand to sandy silt	15.0	1.66	28	1,620	1,589	1,589	1.89	1.18	111.18	0.969	1.000	0.289	0.208	0.858	YES	2.8	34.2	> 800	42.7	N/A	0.000	0.00	0.24
14.50	10.76	0.27	2.57	silty clay to clay	14.0	1.00	7	1,740	1,646	1,646	2.90	N/A	N/A	0.966	N/A	0.299	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
15.50	9.98	0.35	3.53	clay	13.0	1.00	10	1,860	1,704	1,704	3.02	N/A	N/A	0.964	N/A	0.308	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
16.50	9.44	0.39	4.20	clay	12.0	1.00	9	1,980	1,762	1,762	3.09	N/A	N/A	0.962	N/A	0.316	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
17.50	7.40	0.31	4.34	clay	11.0	1.00	7	2,100	1,819	1,819	3.20	N/A	N/A	0.959	N/A	0.324	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
18.50	8.54	0.36	4.39	clay	10.0	1.00	9	2,220	1,877	1,877	3.16	N/A	N/A	0.957	N/A	0.331	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
19.50	12.20	0.61	5.19	clay	9.0	1.00	12	2,340	1,934	1,934	3.08	N/A	N/A	0.955	N/A	0.338	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
20.50	10.20	0.37	3.83	clay	8.0	1.00	10	2,460	1,992	1,992	3.07	N/A	N/A	0.952	N/A	0.344	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
21.50	12.49	0.50	4.25	clay	7.0	1.00	12	2,580	2,050	2,050	3.03	N/A	N/A	0.950	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
22.50	14.23	0.67	4.95	clay	6.0	1.00	14	2,700	2,107	2,107	3.03	N/A	N/A	0.948	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
23.50	15.36	0.52	3.52	silty clay to clay	5.0	1.00	10	2,820	2,165	2,165	2.92	N/A	N/A	0.945	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
24.50	12.33	0.32	2.73	silty clay to clay	4.0	1.00	8	2,940	2,222	2,222	2.94	N/A	N/A	0.943	N/A	0.365	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
25.50	12.87	0.45	3.73	clay	3.0	1.00	13	3,060	2,280	2,280	3.01	N/A	N/A	0.941	N/A	0.369	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
26.50	33.74	1.39	4.21	silty clay to clay	2.0	1.00	22	3,180	2,338	2,338	2.72	N/A	N/A	0.938	N/A	0.373	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
27.50	52.98	2.16	4.11	clayey silt to silty clay	1.0	1.00	26	3,300	2,395	2,395	2.58	3.21	148.59	0.936	0.936	0.377	0.385	1.140	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.24
28.50	35.34	1.21	3.45	clayey silt to silty clay	0.0	1.66	29	3,420	2,453	2,453	2.34	2.07	109.21	0.934	0.924	0.381	0.201	0.582	YES	2.8	29.2	> 800	N/A	N/A	0.000	0.00	0.24
29.50	16.34	1.02	6.37	clay	-1.0	1.00	16	3,540	2,510	2,510	3.11	N/A	N/A	0.931	N/A	0.384	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
30.50	29.10	1.54	5.38	clay	-2.0	1.00	29	3,660	2,568	2,568	2.87	N/A	N/A	0.926	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
31.50	30.91	1.29	4.22	silty clay to clay	-3.0	1.00	21	3,780	2,626	2,626	2.79	N/A	N/A	0.918	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
32.50	66.92	1.21	1.82	silty sand to sandy silt	-4.0	1.66	37	3,900	2,683	2,683	1.96	1.25	119.15	0.909	0.889	0.387	0.237	0.651	YES	2.8	34.7	> 800	43.3	N/A	0.000	0.00	0.24
33.50	27.91	0.85	3.06	clayey silt to silty clay	-5.0	1.00	14	4,020	2,741	2,741	2.74	N/A	N/A	0.901	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
34.50	40.83	0.96	2.37	sandy silt to clayey silt	-6.0	1.00	16	4,140	2,798	2,798	2.52	2.85	98.54	0.893	0.911	0.386	0.169	0.475	YES	2.8	16.6	> 800	21.6	N/A	1.343	0.16	0.08
35.50	116.19	1.53	1.32	sand to silty sand	-7.0	1.00	29	4,260	2,856	2,856	2.00	1.30	126.76	0.885	0.877	0.386	0.269	0.730	YES	1.3	25.6	> 800	28.0	N/A	0.339	0.04	0.04
36.50	88.51	1.37	1.55	silty sand to sandy silt	-8.0	1.66	49	4,380	2,914	2,914	1.83	1.13	137.23	0.877	0.860	0.386	0.320	0.852	YES	2.8	43.3	> 800	53.6	N/A	0.000	0.00	0.04
37.50	19.41	0.81	4.25	clay	-9.0	1.00	19	4,500	2,971	2,971	2.99	N/A	N/A	0.869	N/A	0.385	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
38.50	61.81	1.71	2.79	sandy silt to clayey silt	-10.0	1.00	25	4,620	3,029	3,029	2.44	2.48	124.41	0.861	0.870	0.384	0.259	0.700	YES	2.8	22.9	> 800	29.1	N/A	0.159	0.02	0.02
39.50	95.22	2.41	2.54	sandy silt to clayey silt	-11.0	1.66	63	4,740	3,086	3,086	1.96	1.26	159.47	0.852	0.841	0.383	0.457	1.197	NO	N/A	N/A	N/A	65.9	N/A	0.000	0.00	0.02
40.50	44.63	1.59	3.59	clayey silt to silty clay	-12.0	1.66	37	4,860	3,144	3,144	2.31	1.99	117.25	0.844	0.834	0.382	0.230	0.599	YES	2.8	32.3	> 800	N/A	N/A	0.000	0.00	0.02
41.50	15.56	0.70	4.61	clay	-13.0	1.00	16	4,980	3,202	3,202	3.12	N/A	N/A	0.836	N/A	0.380	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
42.50	16.97	0.76	4.68	clay	-14.0	1.00	17	5,100	3,259	3,259	3.09	N/A	N/A	0.828	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
43.50	19.73	0.82	4.34	clay	-15.0	1.00	20	5,220	3,317	3,317	3.01	N/A	N/A	0.820	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
44.50	72.36	2.31	3.22	sandy silt to clayey silt	-16.0	1.00	29	5,340	3,374	3,374	2.45	2.53	140.69	0.812	0.831	0.376	0.339	0.894	YES	2.8	25.1	> 800	31.7	N/A	0.079	0.01	0.01
45.50	199.80	2.54	1.28	sand to silty sand	-17.0	1.00	50	5,460	3,432	3,432	1.85	1.15	174.80	0.804	0.806	0.374	N/A	N/A	NO	N/A	N/A	N/A	42.5	N/A	0.000	0.00	0.01
46.50	182.96	2.00	1.10	sand	-18.0	1.66	61	5,580	3,490	3,490	1.52	1.00	229.34	0.795	0.800	0.372	N/A	N/A	NO	N/A	N/A	N/A	45.9	N/A	0.000	0.00	0.01
47.50	53.71	1.12	2.10	sandy silt to clayey silt	-19.0	1.66	36	5,700	3,547	3,547	2.12	1.49	99.44	0.787	0.801	0.370	0.171	0.443	YES	2.8	29.5	> 800	37.1	N/A	0.028	0.00	0.01
48.50	22.81	0.62	2.78	clayey silt to silty clay	-20.0	1.00	11	5,820	3,605	3,605	2.87	N/A	N/A	0.779	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
49.50	65.18	2.71	4.20	clayey silt to silty clay	-21.0	1.00	33	5,940	3,662	3,662	2.63	N/A	N/A	0.771	N/A	0.366	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
50.50	82.69	3.07	3.73	clayey silt to silty clay	-22.0	1.00	41	6,060	3,720	3,720	2.47	2.63	159.33	0.763	0.780	0.364	0.456	1.168	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.01
51.50	96.26	2.64	2.75	sandy silt to clayey silt	-23.0	1.00	39	6,180	3,778	3,778	2.33	2.05	143.82	0.755	0.777	0.361	0.357	0.915	YES	2.8	30.8	> 800	38.6	N/A	0.013	0.00	0.00
52.50	107.69	2.00	1.87	silty sand to sandy silt	-24.0	1.00	36	6,300	3,835	3,835	2.18	1.62	125.81	0.747	0.780	0.359	0.265	0.688	YES	2.8	28.7	> 800	36.1	N/A	0.035	0.00	0.00
53.50	60.84	2.59	4.28	clayey silt to silty clay	-25.0	1.66	50	6,420	3,893	3,893	2.30	1.95	141.10	0.739	0.766	0.356	0.341	0.875	YES	2.8	38.9	> 800	N/A	N/A	0.000	0.00	0.00
54.50	19.01	1.20	6.55	clay	-26.0	1.00	19	6,540	3,950	3,950	3.20	N/A	N/A	0.730	N/A	0.354	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	138.19	2.41	1.75	silty sand to sandy silt	-27.0	1.00	46	6,660	4,008	4,008	2.09	1.43	139.83	0.722	0.757	0.351	0.334	0.860	YES	2.8	35.3	> 800	44.0	N/A	0.000	0.00	0.00
56.50	301.51	2.93	0.98	sand	-28.0	1.00	60	6,780	4,066	4,066	1.67	1.02	214.78	0.714	0.753	0.348	N/A	N/A	NO	N/A	N/A	N/A	42.3	N/A	0.000	0.00	0.00
57.50	360.39	2.21	0.62	gravelly sand to sand	-29.0	1.00	60	6,900	4,123	4,123	1.47	1.00	251.00	0.706	0.749	0.346	N/A	N/A	NO	N/A	N/A	N/A	41.8	N/A	0.000	0.00	0.00
58.50	357.63	1.09	0.31	gravelly sand to sand	-30.0	1.00	60	7,020	4,181	4,181	1.29	1.00	247.36	0.698	0.745	0.343	N/A	N/A	NO	N/A	N/A	N/A	41.2	N/A	0.000	0.00	0.00
59.50	344.80	0.96	0.28	gravelly sand to sand	-31.0	1.00	57	7,140	4,238	4,238	1.28	1.00	236.86	0.690	0.741	0.340	N/A	N/A	NO	N/A	N/A	N/A	39.5	N/A	0.004	0.00	0.00
60.50	350.66	1.09	0.31	gravelly sand to sand	-32.0	1.00	58	7,260	4,296	4,296	1.30	1.00	239.26	0.682	0.737	0.337	N/A	N/A	NO	N/A	N/A	N/A	39.9	N/A	0.001	0.00	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-013

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	28.50	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	12.50 ft below ground surface
GWT Depth For Design, Zwd =	12.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	17.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.78 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.02 inches	<--- Dry or Unsaturated Sands
Total:	0.80 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	225.68	1.19	0.53	sand	27.5	1.00	45	60	60	60	1.01	1.00	1,302.95	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	76.7	0.013	0.000	0.00	0.80
1.50	159.89	1.29	0.81	sand	26.5	1.66	53	180	180	180	1.05	1.00	882.48	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	90.0	0.022	0.000	0.00	0.80
2.50	33.26	1.35	4.06	silty clay to clay	25.5	1.00	22	300	300	300	2.39	2.27	194.79	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
3.50	119.96	2.86	2.39	silty sand to sandy silt	24.5	1.00	40	420	420	420	1.91	1.20	314.62	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	86.6	0.033	0.000	0.00	0.80
4.50	67.97	3.15	4.64	silty clay to clay	23.5	1.00	45	540	540	540	2.32	2.02	264.68	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
5.50	65.35	3.16	4.85	silty clay to clay	22.5	1.00	44	660	660	660	2.37	2.21	251.23	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
6.50	37.08	1.79	4.83	clay	21.5	1.00	37	780	780	780	2.55	3.05	180.95	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
7.50	39.10	1.74	4.46	silty clay to clay	20.5	1.00	26	900	900	900	2.53	2.94	171.33	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
8.50	34.43	1.57	4.56	silty clay to clay	19.5	1.00	23	1,020	1,020	1,020	2.60	3.31	159.52	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
9.50	32.80	1.30	3.96	silty clay to clay	18.5	1.00	22	1,140	1,140	1,140	2.59	3.24	140.65	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
10.50	29.22	1.01	3.45	clayey silt to silty clay	17.5	1.00	15	1,260	1,260	1,260	2.60	3.31	121.83	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80
11.50	39.78	1.10	2.77	sandy silt to clayey silt	16.5	1.00	16	1,380	1,380	1,380	2.45	2.51	120.40	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	28.0	N/A	N/A	N/A	0.80
12.50	71.93	0.80	1.12	sand to silty sand	15.5	1.00	18	1,500	1,500	1,500	2.01	1.31	108.65	0.971	1.000	0.284	0.199	0.837	YES	1.3	22.1	> 800	24.3	N/A	0.131	0.02	0.78
13.50	51.31	0.72	1.41	silty sand to sandy silt	14.5	1.66	28	1,620	1,558	1,558	1.88	1.17	112.89	0.969	1.000	0.295	0.214	0.866	YES	2.8	34.9	> 800	43.5	N/A	0.000	0.00	0.78
14.50	10.53	0.32	3.03	silty clay to clay	13.5	1.00	7	1,740	1,615	1,615	2.94	N/A	N/A	0.966	N/A	0.304	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
15.50	11.65	0.41	3.50	silty clay to clay	12.5	1.00	8	1,860	1,673	1,673	2.95	N/A	N/A	0.964	N/A	0.313	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
16.50	9.29	0.36	3.84	clay	11.5	1.00	9	1,980	1,730	1,730	3.07	N/A	N/A	0.962	N/A	0.322	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
17.50	7.49	0.28	3.75	clay	10.5	1.00	7	2,100	1,788	1,788	3.16	N/A	N/A	0.959	N/A	0.330	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
18.50	9.54	0.40	4.25	clay	9.5	1.00	10	2,220	1,846	1,846	3.11	N/A	N/A	0.957	N/A	0.337	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
19.50	10.29	0.44	4.30	clay	8.5	1.00	10	2,340	1,903	1,903	3.10	N/A	N/A	0.955	N/A	0.343	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
20.50	11.30	0.40	3.54	silty clay to clay	7.5	1.00	8	2,460	1,961	1,961	3.02	N/A	N/A	0.952	N/A	0.349	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
21.50	12.77	0.66	5.23	clay	6.5	1.00	13	2,580	2,018	2,018	3.09	N/A	N/A	0.950	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
22.50	11.88	0.51	4.33	clay	5.5	1.00	12	2,700	2,076	2,076	3.07	N/A	N/A	0.948	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
23.50	11.62	0.55	4.83	clay	4.5	1.00	12	2,820	2,134	2,134	3.11	N/A	N/A	0.945	N/A	0.365	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
24.50	13.24	0.42	3.23	silty clay to clay	3.5	1.00	9	2,940	2,191	2,191	2.97	N/A	N/A	0.943	N/A	0.370	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
25.50	10.98	0.31	2.93	silty clay to clay	2.5	1.00	7	3,060	2,249	2,249	3.02	N/A	N/A	0.941	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
26.50	18.49	0.80	4.39	clay	1.5	1.00	18	3,180	2,306	2,306	2.94	N/A	N/A	0.938	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
27.50	60.59	1.19	1.98	silty sand to sandy silt	0.5	1.66	33	3,300	2,364	2,364	1.99	1.29	118.77	0.936	0.935	0.382	0.236	0.688	YES	2.8	33.6	> 800	41.9	N/A	0.000	0.00	0.78
28.50	21.79	0.76	3.54	clayey silt to silty clay	-0.5	1.00	11	3,420	2,422	2,422	2.84	N/A	N/A	0.934	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
29.50	22.41	1.22	5.51	clay	-1.5	1.00	22	3,540	2,479	2,479	2.96	N/A	N/A	0.931	N/A	0.389	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
30.50	38.73	1.30	3.40	clayey silt to silty clay	-2.5	1.00	19	3,660	2,537	2,537	2.64	N/A	N/A	0.926	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.78
31.50	47.76	1.32	2.77	sandy silt to clayey silt	-3.5	1.00	19	3,780	2,594	2,594	2.50	2.75	115.24	0.918	0.923	0.391	0.222	0.626	YES	2.8	19.6	> 800	25.1	N/A	1.048	0.13	0.66
32.50	48.74	1.21	2.49	sandy silt to clayey silt	-4.5	1.00	19	3,900	2,652	2,652	2.46	2.58	109.39	0.909	0.917	0.391	0.202	0.564	YES	2.8	19.7	> 800	25.3	N/A	1.033	0.12	0.53
33.50	74.54	1.59	2.15	silty sand to sandy silt	-5.5	1.00	25	4,020	2,710	2,710	2.28	1.89	121.17	0.901	0.900	0.391	0.245	0.674	YES	2.8	24.1	> 800	30.6	N/A	0.096	0.01	0.52
34.50	57.33	1.26	2.21	sandy silt to clayey silt	-6.5	1.00	23	4,140	2,767	2,767	2.38	2.23	108.83	0.893	0.898	0.391	0.200	0.548	YES	2.8	22.3	> 800	28.4	N/A	0.290	0.03	0.49
35.50	30.09	1.36	4.56	silty clay to clay	-7.5	1.00	20	4,260	2,825	2,825	2.84	N/A	N/A	0.885	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.49
36.50	65.60	2.40	3.68	clayey silt to silty clay	-8.5	1.66	54	4,380	2,882	2,882	2.18	1.63	147.12	0.877	0.864	0.390	0.376	0.995	YES	2.8	48.0	> 800	N/A	N/A	0.000	0.00	0.49
37.50	32.24	1.26	3.95	silty clay to clay	-9.5	1.00	21	4,500	2,940	2,940	2.79	N/A	N/A	0.869	N/A	0.389	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.49
38.50	24.62	0.86	3.54	clayey silt to silty clay	-10.5	1.00	12	4,620	2,998	2,998	2.85	N/A	N/A	0.861	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.49
39.50	22.01	0.71	3.27	clayey silt to silty clay	-11.5	1.00	11	4,740	3,055	3,055	2.88	N/A	N/A	0.852	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.49
40.50	45.01	1.62	3.62	clayey silt to silty clay	-12.5	1.66	37	4,860	3,113	3,113	2.31	1.98	118.47	0.844	0.838	0.386	0.235	0.608	YES	2.8	32.7	> 800	N/A	N/A	0.000	0.00	0.49
41.50	14.58	0.66	4.67	clay	-13.5	1.00	15	4,980	3,170	3,170	3.14	N/A	N/A	0.836	N/A	0.384	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.49
42.50	17.03	0.70	4.27	clay	-14.5	1.00	17	5,100	3,228	3,228	3.06	N/A	N/A	0.828	N/A	0.383	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.49
43.50	17.91	0.69	4.00	silty clay to clay	-15.5	1.00	12	5,220	3,286	3,286	3.03	N/A	N/A	0.820	N/A	0.381	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.49
44.50	50.79	1.38	2.75	sandy silt to clayey silt	-16.5	1.00	20	5,340	3,343	3,343	2.56	3.08	106.41	0.812	0.858	0.379	0.192	0.518	YES	2.8	18.5	> 800	23.9	N/A	1.131	0.14	0.35
45.50	113.46	2.10	1.86	silty sand to sandy silt	-17.5	1.00	38	5,460	3,401	3,401	2.14	1.54	133.62	0.804	0.809	0.377	0.302	0.772	YES	2.8	31.8	> 800	39.8	N/A	0.002	0.00	0.35
46.50	146.59	1.89	1.29	sand to silty sand	-18.5	1.66	61	5,580	3,458	3,458	1.64	1.00	184.08	0.795	0.803	0.375	N/A	N/A	NO	N/A	N/A	N/A	50.9	N/A	0.000	0.00	0.35
47.50	50.36	1.51	3.02	sandy silt to clayey silt	-19.5	1.00	20	5,700	3,516	3,516	2.60	N/A	N/A	0.787	N/A	0.373	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
48.50	27.19	0.94	3.59	clayey silt to silty clay	-20.5	1.00	14	5,820	3,574	3,574	2.87	N/A	N/A	0.779	N/A	0.371	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
49.50	124.28	2.77	2.23	silty sand to sandy silt	-21.5	1.00	41	5,940	3,631	3,631	2.18	1.62	149.53	0.771	0.788	0.369	0.391	0.996	YES	2.8	33.5	> 800	41.9	N/A	0.000	0.00	0.35
50.50	82.53	1.48	1.80	silty sand to sandy silt	-22.5	1.00	28	6,060	3,689	3,689	2.25	1.80	109.31	0.763	0.813	0.367	0.201	0.533	YES	2.8	23.1	> 800	29.3	N/A	0.099	0.01	0.34
51.50	67.66	1.34	1.99	silty sand to sandy silt	-23.5	1.00	23	6,180	3,746	3,746	2.35	2.12	104.60	0.755	0.826	0.364	0.186	0.504	YES	2.8	19.3	> 800	24.8	N/A	1.006	0.12	0.22
52.50	73.26	1.18	1.62	silty sand to sandy silt	-24.5	1.00	24	6,300	3,804	3,804	2.27	1.85	98.10	0.747	0.816	0.362	0.168	0.452	YES	2.8	20.5	> 800	26.2	N/A	0.208	0.02	0.19
53.50	68.04	1.31	1.94	silty sand to sandy silt	-25.5	1.00	23	6,420	3,862	3,862	2.35	2.10	102.94	0.739	0.819	0.359	0.181	0.494	YES	2.8	19.1	> 800	24.6	N/A	1.006	0.12	0.07
54.50	43.75	2.18	5.01	clay	-26.5	1.00	44	6,540	3,919	3,919	2.83	N/A	N/A	0.730	N/A	0.356	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
55.50	33.34	1.20	3.65	clayey silt to silty clay	-27.5	1.00	17	6,660	3,977	3,977	2.83	N/A	N/A	0.722	N/A	0.354	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
56.50	264.04	2.02	0.77	sand	-28.5	1.00	53	6,780	4,034	4,034	1.63	1.00	185.91	0.714	0.755	0.351	N/A	N/A	NO	N/A	N/A	N/A	37.2	N/A	0.025	0.00	0.07
57.50	322.08	2.17	0.68	gravelly sand to sand	-29.5	1.00	54	6,900	4,092	4,092	1.54	1.00	225.17	0.706	0.751	0.348	N/A	N/A	NO	N/A	N/A	N/A	37.5	N/A	0.021	0.00	0.07
58.50	267.81	0.97	0.36	gravelly sand to sand	-30.5	1.00	45	7,020	4,150	4,150	1.44	1.00	185.93	0.698	0.747	0.345	N/A	N/A	NO	N/A	N/A	N/A	31.0	N/A	0.077	0.01	0.06
59.50	181.10	1.15	0.63	sand	-31.5	1.00	36	7,140	4,207	4,207	1.72	1.05	131.02	0.690	0.757	0.342	0.289	0.762	YES	0.0	25.0	> 800	25.0	N/A	0.445	0.05	0.01
60.50	249.38	1.25	0.50	sand	-32.5	1.00	50	7,260	4,265	4,265	1.55	1.00	170.78	0.682	0.739	0.339	N/A	N/A	NO	N/A	N/A	N/A	34.2	N/A	0.049	0.01	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-014

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	28.50	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	12.50 ft below ground surface
GWT Depth For Design, Zwd =	12.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	12.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.30 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.02 inches	<--- Dry or Unsaturated Sands
Total:	0.32 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	171.52	0.88	0.51	sand	27.5	1.66	57	60	60	60	0.75	1.00	1,639.63	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	96.6	0.012	0.000	0.00	0.32
1.50	50.24	1.22	2.43	sandy silt to clayey silt	26.5	1.00	20	180	180	180	2.03	1.34	225.22	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	46.0	N/A	N/A	N/A	0.32
2.50	41.05	1.52	3.70	clayey silt to silty clay	25.5	1.00	21	300	300	300	2.30	1.95	206.30	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
3.50	44.08	2.03	4.64	silty clay to clay	24.5	1.00	29	420	420	420	2.40	2.32	222.86	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
4.50	50.32	2.14	4.26	clayey silt to silty clay	23.5	1.00	25	540	540	540	2.37	2.20	213.13	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
5.50	35.14	0.80	2.26	sandy silt to clayey silt	22.5	1.00	14	660	660	660	2.31	1.97	120.76	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	33.7	N/A	N/A	N/A	0.32
6.50	25.26	0.57	2.27	sandy silt to clayey silt	21.5	1.00	10	780	780	780	2.45	2.51	101.34	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	24.4	N/A	N/A	N/A	0.32
7.50	51.46	0.66	1.28	silty sand to sandy silt	20.5	1.00	17	900	900	900	2.07	1.40	107.67	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	35.7	0.064	0.057	0.01	0.31
8.50	49.13	0.97	1.97	sandy silt to clayey silt	19.5	1.00	20	1,020	1,020	1,020	2.23	1.74	119.92	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	38.0	N/A	N/A	N/A	0.31
9.50	77.00	1.01	1.31	sand to silty sand	18.5	1.00	19	1,140	1,140	1,140	1.98	1.28	130.45	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	29.2	0.076	0.087	0.01	0.30
10.50	62.04	0.89	1.43	silty sand to sandy silt	17.5	1.66	34	1,260	1,260	1,260	1.79	1.10	141.89	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	56.8	0.064	0.000	0.00	0.30
11.50	10.53	0.27	2.59	silty clay to clay	16.5	1.00	7	1,380	1,380	1,380	2.86	N/A	N/A	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
12.50	9.86	0.21	2.13	clayey silt to silty clay	15.5	1.00	5	1,500	1,500	1,500	2.86	N/A	N/A	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
13.50	8.86	0.27	3.10	silty clay to clay	14.5	1.00	6	1,620	1,558	1,558	3.00	N/A	N/A	0.969	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
14.50	9.07	0.28	3.17	silty clay to clay	13.5	1.00	6	1,740	1,615	1,615	3.01	N/A	N/A	0.966	N/A	0.304	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
15.50	9.31	0.32	3.52	clay	12.5	1.00	9	1,860	1,673	1,673	3.03	N/A	N/A	0.964	N/A	0.313	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
16.50	8.08	0.32	4.06	clay	11.5	1.00	8	1,980	1,730	1,730	3.13	N/A	N/A	0.962	N/A	0.322	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
17.50	11.07	0.35	3.31	silty clay to clay	10.5	1.00	7	2,100	1,788	1,788	2.97	N/A	N/A	0.959	N/A	0.330	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
18.50	12.53	0.47	3.88	clay	9.5	1.00	13	2,220	1,846	1,846	2.97	N/A	N/A	0.957	N/A	0.337	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
19.50	13.45	0.52	3.99	clay	8.5	1.00	13	2,340	1,903	1,903	2.97	N/A	N/A	0.955	N/A	0.343	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
20.50	14.49	0.63	4.49	clay	7.5	1.00	14	2,460	1,961	1,961	2.98	N/A	N/A	0.952	N/A	0.349	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
21.50	12.98	0.39	3.15	silty clay to clay	6.5	1.00	9	2,580	2,018	2,018	2.94	N/A	N/A	0.950	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
22.50	12.28	0.28	2.42	clayey silt to silty clay	5.5	1.00	6	2,700	2,076	2,076	2.90	N/A	N/A	0.948	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
23.50	20.25	0.60	3.06	clayey silt to silty clay	4.5	1.00	10	2,820	2,134	2,134	2.78	N/A	N/A	0.945	N/A	0.365	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
24.50	20.63	1.00	4.89	clay	3.5	1.00	21	2,940	2,191	2,191	2.92	N/A	N/A	0.943	N/A	0.370	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
25.50	14.85	0.81	5.53	clay	2.5	1.00	15	3,060	2,249	2,249	3.08	N/A	N/A	0.941	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
26.50	35.79	1.34	3.77	clayey silt to silty clay	1.5	1.00	18	3,180	2,306	2,306	2.67	N/A	N/A	0.938	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30
27.50	41.03	1.11	2.70	sandy silt to clayey silt	0.5	1.00	16	3,300	2,364	2,364	2.52	2.89	109.18	0.936	0.952	0.382	0.201	0.598	YES	2.8	17.9	> 800	23.1	N/A	1.203	0.14	0.16
28.50	79.02	1.25	1.58	silty sand to sandy silt	-0.5	1.00	26	3,420	2,422	2,422	2.15	1.56	112.18	0.934	0.932	0.386	0.211	0.609	YES	2.8	26.7	> 800	33.7	N/A	0.062	0.01	0.15
29.50	51.68	1.55	2.99	sandy silt to clayey silt	-1.5	1.00	21	3,540	2,479	2,479	2.49	2.70	125.28	0.931	0.933	0.389	0.263	0.752	YES	2.8	21.4	> 800	27.3	N/A	0.494	0.06	0.09
30.50	37.24	1.14	3.06	clayey silt to silty clay	-2.5	1.00	19	3,660	2,537	2,537	2.62	N/A	N/A	0.926	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
31.50	20.85	0.83	4.02	silty clay to clay	-3.5	1.00	14	3,780	2,594	2,594	2.91	N/A	N/A	0.918	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
32.50	35.78	1.55	4.36	silty clay to clay	-4.5	1.00	24	3,900	2,652	2,652	2.75	N/A	N/A	0.909	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
33.50	27.83	1.10	3.94	silty clay to clay	-5.5	1.00	19	4,020	2,710	2,710	2.82	N/A	N/A	0.901	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
34.50	22.33	0.72	3.24	clayey silt to silty clay	-6.5	1.00	11	4,140	2,767	2,767	2.84	N/A	N/A	0.893	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
35.50	19.94	0.61	3.11	clayey silt to silty clay	-7.5	1.00	10	4,260	2,825	2,825	2.88	N/A	N/A	0.885	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09
36.50	56.48	1.60	2.83	sandy silt to clayey silt	-8.5	1.00	23	4,380	2,882	2,882	2.47	2.60	122.48	0.877	0.888	0.390	0.251	0.682	YES	2.8	21.6	> 800	27.6	N/A	0.440	0.05	0.04
37.50	43.17	1.56	3.62	clayey silt to silty clay	-9.5	1.66	36	4,500	2,940	2,940	2.32	2.00	118.01	0.869	0.857	0.389	0.233	0.612	YES	2.8	32.3	> 800	N/A	N/A	0.000	0.00	0.04
38.50	15.53	0.64	4.11	clay	-10.5	1.00	16	4,620	2,998	2,998	3.07	N/A	N/A	0.861	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
39.50	16.25	0.63	3.91	silty clay to clay	-11.5	1.00	11	4,740	3,055	3,055	3.04	N/A	N/A	0.852	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
40.50	35.31	1.35	3.85	clayey silt to silty clay	-12.5	1.00	18	4,860	3,113	3,113	2.76	N/A	N/A	0.844	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
41.50	103.48	2.20	2.12	silty sand to sandy silt	-13.5	1.00	34	4,980	3,170	3,170	2.20	1.67	137.17	0.836	0.835	0.384	0.320	0.829	YES	2.8	30.2	> 800	37.9	N/A	0.021	0.00	0.04
42.50	155.94	2.95	1.89	silty sand to sandy silt	-14.5	1.00	52	5,100	3,228	3,228	2.04	1.36	166.75	0.828	0.826	0.383	N/A	N/A	NO	N/A	N/A	N/A	54.1	N/A	0.000	0.00	0.04
43.50	136.56	2.86	2.09	silty sand to sandy silt	-15.5	1.66	75	5,220	3,286	3,286	1.80	1.11	195.84	0.820	0.820	0.381	N/A	N/A	NO	N/A	N/A	N/A	75.6	N/A	0.000	0.00	0.04
44.50	34.25	1.32	3.87	clayey silt to silty clay	-16.5	1.00	17	5,340	3,343	3,343	2.79	N/A	N/A	0.812	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
45.50	117.95	2.69	2.29	silty sand to sandy silt	-17.5	1.00	39	5,460	3,401	3,401	2.19	1.65	149.51	0.804	0.809	0.377	0.391	0.999	YES	2.8	33.0	> 800	41.2	N/A	0.000	0.00	0.04
46.50	177.02	3.75	2.12	silty sand to sandy silt	-18.5	1.00	59	5,580	3,458	3,458	2.05	1.37	184.94	0.795	0.803	0.375	N/A	N/A	NO	N/A	N/A	N/A	58.8	N/A	0.000	0.00	0.04
47.50	100.52	2.01	1.99	silty sand to sandy silt	-19.5	1.00	34	5,700	3,516	3,516	2.21	1.69	127.94	0.787	0.808	0.373	0.275	0.710	YES	2.8	28.1	> 800	35.3	N/A	0.044	0.01	0.03
48.50	98.05	1.99	2.03	silty sand to sandy silt	-20.5	1.00	33	5,820	3,574	3,574	2.22	1.73	126.76	0.779	0.806	0.371	0.269	0.698	YES	2.8	27.2	> 800	34.3	N/A	0.053	0.01	0.02
49.50	93.92	1.71	1.82	silty sand to sandy silt	-21.5	1.00	31	5,940	3,631	3,631	2.21	1.69	117.56	0.771	0.806	0.369	0.231	0.602	YES	2.8	26.0	> 800	32.9	N/A	0.067	0.01	0.02
50.50	83.39	1.93	2.31	silty sand to sandy silt	-22.5	1.66	46	6,060	3,689	3,689	2.01	1.31	133.11	0.763	0.783	0.367	0.299	0.762	YES	2.8	36.7	> 800	45.7	N/A	0.000	0.00	0.02
51.50	40.01	2.31	5.78	clay	-23.5	1.00	40	6,180	3,746	3,746	2.89	N/A	N/A	0.755	N/A	0.364	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
52.50	192.73	1.65	0.86	sand	-24.5	1.00	39	6,300	3,804	3,804	1.76	1.08	150.75	0.747	0.775	0.362	0.399	1.019	YES	0.0	27.9	> 800	27.9	N/A	0.140	0.02	0.00
53.50	340.10	3.31	0.97	sand	-25.5	1.00	68	6,420	3,862	3,862	1.62	1.00	244.76	0.739	0.769	0.359	N/A	N/A	NO	N/A	N/A	N/A	49.0	N/A	0.000	0.00	0.00
54.50	279.14	2.82	1.01	sand	-26.5	1.00	56	6,540	3,919	3,919	1.70	1.04	206.53	0.730	0.764	0.356	N/A	N/A	NO	N/A	N/A	N/A	39.9	N/A	0.001	0.00	0.00
55.50	185.80	3.14	1.69	sand to silty sand	-27.5	1.66	77	6,660	3,977	3,977	1.67	1.02	222.53	0.722	0.760	0.354	N/A	N/A	NO	N/A	N/A	N/A	59.7	N/A	0.000	0.00	0.00
56.50	40.19	1.87	4.70	silty clay to clay	-28.5	1.00	27	6,780	4,034	4,034	2.84	N/A	N/A	0.714	N/A	0.351	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	25.47	1.07	4.35	silty clay to clay	-29.5	1.00	17	6,900	4,092	4,092	2.98	N/A	N/A	0.706	N/A	0.348	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	24.94	0.81	3.37	clayey silt to silty clay	-30.5	1.00	12	7,020	4,150	4,150	2.93	N/A	N/A	0.698	N/A	0.345	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	20.19	0.72	3.82	silty clay to clay	-31.5	1.00	13	7,140	4,207	4,207	3.04	N/A	N/A	0.690	N/A	0.342	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
60.50	30.06	0.91	3.14	clayey silt to silty clay	-32.5	1.00	15	7,260	4,265	4,265	2.85	N/A	N/A	0.682	N/A	0.339	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-014B

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	28.50	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \to 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	12.50 ft below ground surface
GWT Depth For Design, Zwd =	12.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	12.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.07 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.01 inches	<--- Dry or Unsaturated Sands
Total:	0.08 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	148.43	1.55	1.05	sand	27.5	1.66	49	60	60	60	1.07	1.00	1,418.92	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	83.6	0.013	0.000	0.00	0.08
1.50	43.84	1.35	3.07	sandy silt to clayey silt	26.5	1.00	18	180	180	180	2.15	1.55	226.90	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	40.8	N/A	N/A	N/A	0.08
2.50	40.55	1.44	3.55	clayey silt to silty clay	25.5	1.00	20	300	300	300	2.29	1.91	200.38	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
3.50	48.02	1.77	3.69	clayey silt to silty clay	24.5	1.00	24	420	420	420	2.30	1.96	205.08	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
4.50	52.21	2.22	4.26	clayey silt to silty clay	23.5	1.00	26	540	540	540	2.36	2.17	217.59	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
5.50	35.54	1.03	2.91	sandy silt to clayey silt	22.5	1.00	14	660	660	660	2.38	2.23	138.22	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	34.0	N/A	N/A	N/A	0.08
6.50	28.01	0.81	2.87	clayey silt to silty clay	21.5	1.00	14	780	780	780	2.48	2.66	119.43	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
7.50	35.60	0.82	2.32	sandy silt to clayey silt	20.5	1.00	14	900	900	900	2.36	2.16	114.61	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	30.5	N/A	N/A	N/A	0.08
8.50	33.69	0.69	2.06	sandy silt to clayey silt	19.5	1.00	13	1,020	1,020	1,020	2.37	2.18	102.71	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	27.6	N/A	N/A	N/A	0.08
9.50	75.77	0.92	1.21	sand to silty sand	18.5	1.00	19	1,140	1,140	1,140	1.97	1.26	126.17	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	28.8	0.076	0.089	0.01	0.07
10.50	46.95	0.68	1.44	silty sand to sandy silt	17.5	1.66	26	1,260	1,260	1,260	1.88	1.17	114.77	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	44.2	0.069	0.000	0.00	0.07
11.50	9.40	0.28	3.02	silty clay to clay	16.5	1.00	6	1,380	1,380	1,380	2.94	N/A	N/A	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
12.50	11.50	0.28	2.41	clayey silt to silty clay	15.5	1.00	6	1,500	1,500	1,500	2.83	N/A	N/A	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
13.50	7.64	0.20	2.57	silty clay to clay	14.5	1.00	5	1,620	1,558	1,558	3.01	N/A	N/A	0.969	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
14.50	7.76	0.20	2.53	silty clay to clay	13.5	1.00	5	1,740	1,615	1,615	3.02	N/A	N/A	0.966	N/A	0.304	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
15.50	9.54	0.25	2.68	silty clay to clay	12.5	1.00	6	1,860	1,673	1,673	2.96	N/A	N/A	0.964	N/A	0.313	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
16.50	12.38	0.38	3.07	silty clay to clay	11.5	1.00	8	1,980	1,730	1,730	2.91	N/A	N/A	0.962	N/A	0.322	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
17.50	13.13	0.40	3.04	silty clay to clay	10.5	1.00	9	2,100	1,788	1,788	2.89	N/A	N/A	0.959	N/A	0.330	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
18.50	12.79	0.42	3.29	silty clay to clay	9.5	1.00	9	2,220	1,846	1,846	2.93	N/A	N/A	0.957	N/A	0.337	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
19.50	10.96	0.40	3.69	clay	8.5	1.00	11	2,340	1,903	1,903	3.03	N/A	N/A	0.955	N/A	0.343	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
20.50	10.44	0.34	3.27	silty clay to clay	7.5	1.00	7	2,460	1,961	1,961	3.03	N/A	N/A	0.952	N/A	0.349	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
21.50	7.73	0.25	3.30	clay	6.5	1.00	8	2,580	2,018	2,018	3.15	N/A	N/A	0.950	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
22.50	9.52	0.21	2.27	silty clay to clay	5.5	1.00	6	2,700	2,076	2,076	2.99	N/A	N/A	0.948	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
23.50	18.76	0.49	2.62	clayey silt to silty clay	4.5	1.00	9	2,820	2,134	2,134	2.77	N/A	N/A	0.945	N/A	0.365	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
24.50	28.66	1.12	3.92	silty clay to clay	3.5	1.00	19	2,940	2,191	2,191	2.74	N/A	N/A	0.943	N/A	0.370	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
25.50	16.56	0.90	5.52	clay	2.5	1.00	17	3,060	2,249	2,249	3.04	N/A	N/A	0.941	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
26.50	33.54	1.36	4.07	silty clay to clay	1.5	1.00	22	3,180	2,306	2,306	2.72	N/A	N/A	0.938	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
27.50	66.55	1.42	2.14	silty sand to sandy silt	0.5	1.00	22	3,300	2,364	2,364	2.29	1.93	118.18	0.936	0.945	0.382	0.233	0.689	YES	2.8	23.2	> 800	29.5	N/A	0.122	0.01	0.05
28.50	103.06	1.66	1.62	silty sand to sandy silt	-0.5	1.00	34	3,420	2,422	2,422	2.07	1.41	132.14	0.934	0.926	0.386	0.295	0.844	YES	2.8	34.0	> 800	42.5	N/A	0.000	0.00	0.05
29.50	81.28	1.82	2.24	silty sand to sandy silt	-1.5	1.00	27	3,540	2,479	2,479	2.25	1.81	131.79	0.931	0.924	0.389	0.293	0.830	YES	2.8	27.1	> 800	34.2	N/A	0.058	0.01	0.05
30.50	45.19	1.60	3.55	clayey silt to silty clay	-2.5	1.66	37	3,660	2,537	2,537	2.27	1.85	123.22	0.926	0.909	0.391	0.254	0.705	YES	2.8	36.0	> 800	N/A	N/A	0.000	0.00	0.05
31.50	22.12	1.21	5.53	clay	-3.5	1.00	22	3,780	2,594	2,594	2.98	N/A	N/A	0.918	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
32.50	42.54	1.71	4.04	clayey silt to silty clay	-4.5	1.00	21	3,900	2,652	2,652	2.67	N/A	N/A	0.909	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
33.50	32.76	1.37	4.19	silty clay to clay	-5.5	1.00	22	4,020	2,710	2,710	2.78	N/A	N/A	0.901	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
34.50	29.38	1.18	4.04	silty clay to clay	-6.5	1.00	20	4,140	2,767	2,767	2.81	N/A	N/A	0.893	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
35.50	35.53	1.37	3.86	clayey silt to silty clay	-7.5	1.00	18	4,260	2,825	2,825	2.74	N/A	N/A	0.885	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
36.50	31.23	1.12	3.59	clayey silt to silty clay	-8.5	1.00	16	4,380	2,882	2,882	2.77	N/A	N/A	0.877	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
37.50	45.32	1.30	2.87	sandy silt to clayey silt	-9.5	1.66	30	4,500	2,940	2,940	2.23	1.75	108.29	0.869	0.866	0.389	0.198	0.526	YES	2.8	27.6	> 800	34.7	N/A	0.053	0.01	0.04
38.50	17.43	0.53	3.02	clayey silt to silty clay	-10.5	1.00	9	4,620	2,998	2,998	2.94	N/A	N/A	0.861	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
39.50	17.20	0.66	3.82	silty clay to clay	-11.5	1.00	11	4,740	3,055	3,055	3.02	N/A	N/A	0.852	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
40.50	29.65	1.07	3.63	clayey silt to silty clay	-12.5	1.00	15	4,860	3,113	3,113	2.81	N/A	N/A	0.844	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
41.50	84.55	2.06	2.44	sandy silt to clayey silt	-13.5	1.00	34	4,980	3,170	3,170	2.31	1.97	132.35	0.836	0.836	0.384	0.296	0.767	YES	2.8	29.7	> 800	37.2	N/A	0.027	0.00	0.04
42.50	151.99	2.58	1.70	sand to silty sand	-14.5	1.00	38	5,100	3,228	3,228	2.01	1.32	157.90	0.828	0.826	0.383	0.446	1.148	NO	N/A	N/A	N/A	33.8	N/A	0.060	0.01	0.03
43.50	128.36	2.02	1.58	sand to silty sand	-15.5	1.66	53	5,220	3,286	3,286	1.74	1.06	176.05	0.820	0.820	0.381	N/A	N/A	NO	N/A	N/A	N/A	45.9	N/A	0.000	0.00	0.03
44.50	39.48	1.53	3.87	clayey silt to silty clay	-16.5	1.00	20	5,340	3,343	3,343	2.75	N/A	N/A	0.812	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
45.50	98.35	2.21	2.25	silty sand to sandy silt	-17.5	1.00	33	5,460	3,401	3,401	2.25	1.79	134.76	0.804	0.819	0.377	0.308	0.796	YES	2.8	27.9	> 800	35.2	N/A	0.047	0.01	0.02
46.50	169.84	3.40	2.00	silty sand to sandy silt	-18.5	1.00	57	5,580	3,458	3,458	2.05	1.36	176.17	0.795	0.803	0.375	N/A	N/A	NO	N/A	N/A	N/A	56.7	N/A	0.000	0.00	0.02
47.50	102.01	2.19	2.15	silty sand to sandy silt	-19.5	1.00	34	5,700	3,516	3,516	2.23	1.73	133.43	0.787	0.807	0.373	0.301	0.776	YES	2.8	28.4	> 800	35.8	N/A	0.040	0.00	0.02
48.50	110.18	2.31	2.10	silty sand to sandy silt	-20.5	1.00	37	5,820	3,574	3,574	2.20	1.66	136.84	0.779	0.796	0.371	0.318	0.814	YES	2.8	30.3	> 800	38.0	N/A	0.019	0.00	0.02
49.50	120.25	2.29	1.91	silty sand to sandy silt	-21.5	1.00	40	5,940	3,631	3,631	2.14	1.54	137.29	0.771	0.788	0.369	0.321	0.817	YES	2.8	32.5	> 800	40.7	N/A	0.000	0.00	0.02
50.50	77.28	2.23	2.89	sandy silt to clayey silt	-22.5	1.66	51	6,060	3,689	3,689	2.10	1.45	136.73	0.763	0.783	0.367	0.318	0.809	YES	2.8	40.5	> 800	50.2	N/A	0.000	0.00	0.02
51.50	30.04	2.00	6.67	clay	-23.5	1.00	30	6,180	3,746	3,746	3.03	N/A	N/A	0.755	N/A	0.364	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
52.50	235.56	2.31	0.98	sand	-24.5	1.00	47	6,300	3,804	3,804	1.74	1.06	181.43	0.747	0.773	0.362	N/A	N/A	NO	N/A	N/A	N/A	34.2	N/A	0.053	0.01	0.01
53.50	331.66	3.92	1.18	sand	-25.5	1.00	66	6,420	3,862	3,862	1.70	1.03	246.95	0.739	0.769	0.359	N/A	N/A	NO	N/A	N/A	N/A	47.7	N/A	0.000	0.00	0.01
54.50	251.07	3.05	1.22	sand	-26.5	1.00	50	6,540	3,919	3,919	1.79	1.10	196.94	0.730	0.764	0.356	N/A	N/A	NO	N/A	N/A	N/A	35.9	N/A	0.037	0.00	0.01
55.50	148.38	1.57	1.06	sand	-27.5	1.66	49	6,660	3,977	3,977	1.60	1.00	174.22	0.722	0.760	0.354	N/A	N/A	NO	N/A	N/A	N/A	34.8	N/A	0.046	0.01	0.00
56.50	36.00	1.68	4.68	silty clay to clay	-28.5	1.00	24	6,780	4,034	4,034	2.88	N/A	N/A	0.714	N/A	0.351	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	31.38	1.69	5.43	clay	-29.5	1.00	31	6,900	4,092	4,092	2.98	N/A	N/A	0.706	N/A	0.348	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	46.45	2.64	5.72	clay	-30.5	1.66	77	7,020	4,150	4,150	2.54	3.00	133.54	0.698	0.747	0.345	0.301	0.778	YES	5.0	58.4	> 800	N/A	N/A	0.000	0.00	0.00
59.50	23.21	0.98	4.29	silty clay to clay	-31.5	1.00	15	7,140	4,207	4,207	3.03	N/A	N/A	0.690	N/A	0.342	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
60.50	29.12	1.55	5.42	clay	-32.5	1.00	29	7,260	4,265	4,265	3.02	N/A	N/A	0.682	N/A	0.339	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-015

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	29.50	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	13.50 ft below ground surface
GWT Depth For Design, Zwd =	13.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	12.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.68 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.02 inches	<--- Dry or Unsaturated Sands
Total:	0.70 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	161.92	0.58	0.36	sand	28.5	1.00	32	60	60	60	0.92	1.00	934.87	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	55.1	0.015	0.000	0.00	0.70
1.50	251.39	1.32	0.53	sand	27.5	1.66	83	180	180	180	0.79	1.00	1,387.45	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	141.5	0.019	0.000	0.00	0.70
2.50	90.48	1.72	1.90	silty sand to sandy silt	26.5	1.66	50	300	300	300	1.56	1.00	386.79	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	106.9	0.026	0.000	0.00	0.70
3.50	31.54	1.41	4.47	silty clay to clay	25.5	1.00	21	420	420	420	2.48	2.69	185.27	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70
4.50	34.83	1.47	4.23	silty clay to clay	24.5	1.00	23	540	540	540	2.47	2.64	177.21	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70
5.50	21.19	0.73	3.45	clayey silt to silty clay	23.5	1.00	11	660	660	660	2.60	3.30	121.66	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70
6.50	25.34	0.78	3.09	clayey silt to silty clay	22.5	1.00	13	780	780	780	2.53	2.94	119.29	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70
7.50	19.01	0.78	4.10	silty clay to clay	21.5	1.00	13	900	900	900	2.67	N/A	N/A	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70
8.50	36.03	0.73	2.03	sandy silt to clayey silt	20.5	1.00	14	1,020	1,020	1,020	2.34	2.08	105.15	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	29.2	N/A	N/A	N/A	0.70
9.50	40.76	0.74	1.81	sandy silt to clayey silt	19.5	1.00	16	1,140	1,140	1,140	2.28	1.90	102.61	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	30.9	N/A	N/A	N/A	0.70
10.50	66.86	0.66	0.98	sand to silty sand	18.5	1.00	17	1,260	1,260	1,260	1.97	1.26	105.98	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	24.6	0.084	0.119	0.01	0.69
11.50	70.63	0.69	0.98	sand to silty sand	17.5	1.66	29	1,380	1,380	1,380	1.65	1.01	141.69	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	39.4	0.075	0.060	0.01	0.68
12.50	23.26	0.39	1.69	sandy silt to clayey silt	16.5	1.66	15	1,500	1,500	1,500	2.20	1.67	74.38	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	26.3	N/A	N/A	N/A	0.68
13.50	7.89	0.14	1.71	clayey silt to silty clay	15.5	1.00	4	1,620	1,620	1,620	2.92	N/A	N/A	0.969	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
14.50	8.58	0.13	1.52	clayey silt to silty clay	14.5	1.00	4	1,740	1,678	1,678	2.87	N/A	N/A	0.966	N/A	0.293	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
15.50	6.79	0.14	2.03	silty clay to clay	13.5	1.00	5	1,860	1,735	1,735	3.04	N/A	N/A	0.964	N/A	0.302	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
16.50	6.60	0.12	1.85	silty clay to clay	12.5	1.00	4	1,980	1,793	1,793	3.04	N/A	N/A	0.962	N/A	0.311	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
17.50	9.70	0.26	2.74	silty clay to clay	11.5	1.00	6	2,100	1,850	1,850	2.99	N/A	N/A	0.959	N/A	0.318	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
18.50	15.96	0.66	4.14	clay	10.5	1.00	16	2,220	1,908	1,908	2.92	N/A	N/A	0.957	N/A	0.326	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
19.50	12.73	0.47	3.71	silty clay to clay	9.5	1.00	8	2,340	1,966	1,966	2.98	N/A	N/A	0.955	N/A	0.332	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
20.50	13.37	0.48	3.62	silty clay to clay	8.5	1.00	9	2,460	2,023	2,023	2.97	N/A	N/A	0.952	N/A	0.339	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
21.50	13.70	0.47	3.48	silty clay to clay	7.5	1.00	9	2,580	2,081	2,081	2.96	N/A	N/A	0.950	N/A	0.344	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
22.50	12.09	0.44	3.72	clay	6.5	1.00	12	2,700	2,138	2,138	3.03	N/A	N/A	0.948	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
23.50	13.69	0.36	2.71	clayey silt to silty clay	5.5	1.00	7	2,820	2,196	2,196	2.91	N/A	N/A	0.945	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
24.50	15.54	0.59	3.85	silty clay to clay	4.5	1.00	10	2,940	2,254	2,254	2.96	N/A	N/A	0.943	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.68
25.50	62.66	0.91	1.46	silty sand to sandy silt	3.5	1.00	21	3,060	2,311	2,311	2.20	1.67	97.40	0.941	0.953	0.364	0.166	0.518	YES	2.8	22.2	> 800	28.3	N/A	0.132	0.02	0.66
26.50	46.84	1.04	2.22	sandy silt to clayey silt	2.5	1.00	19	3,180	2,369	2,369	2.42	2.41	103.72	0.938	0.949	0.368	0.184	0.564	YES	2.8	20.0	> 800	25.7	N/A	0.734	0.09	0.57
27.50	33.26	0.86	2.60	sandy silt to clayey silt	1.5	1.00	13	3,300	2,426	2,426	2.61	N/A	N/A	0.936	N/A	0.372	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
28.50	54.30	0.90	1.66	silty sand to sandy silt	0.5	1.00	18	3,420	2,484	2,484	2.30	1.94	94.76	0.934	0.937	0.376	0.159	0.473	YES	2.8	19.0	> 800	24.5	N/A	1.067	0.13	0.45
29.50	74.54	1.22	1.63	silty sand to sandy silt	-0.5	1.00	25	3,540	2,542	2,542	2.19	1.65	108.85	0.931	0.919	0.379	0.200	0.578	YES	2.8	24.8	> 800	31.4	N/A	0.083	0.01	0.44
30.50	61.92	1.31	2.12	silty sand to sandy silt	-1.5	1.00	21	3,660	2,599	2,599	2.33	2.05	111.62	0.926	0.920	0.381	0.209	0.602	YES	2.8	20.9	> 800	26.7	N/A	0.569	0.07	0.37
31.50	44.55	1.00	2.25	sandy silt to clayey silt	-2.5	1.00	18	3,780	2,657	2,657	2.46	2.60	100.39	0.918	0.920	0.382	0.174	0.500	YES	2.8	18.3	> 800	23.6	N/A	1.165	0.14	0.23
32.50	28.50	1.11	3.92	silty clay to clay	-3.5	1.00	19	3,900	2,714	2,714	2.80	N/A	N/A	0.909	N/A	0.382	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.23
33.50	56.33	1.55	2.75	sandy silt to clayey silt	-4.5	1.00	23	4,020	2,772	2,772	2.45	2.53	121.24	0.901	0.898	0.382	0.246	0.689	YES	2.8	21.9	> 800	28.0	N/A	0.296	0.04	0.19
34.50	101.91	1.86	1.83	silty sand to sandy silt	-5.5	1.66	56	4,140	2,830	2,830	1.83	1.13	160.09	0.893	0.870	0.382	N/A	N/A	NO	N/A	N/A	N/A	61.7	N/A	0.000	0.00	0.19
35.50	50.02	1.11	2.23	sandy silt to clayey silt	-6.5	1.00	20	4,260	2,887	2,887	2.44	2.47	102.94	0.885	0.894	0.382	0.181	0.506	YES	2.8	19.5	> 800	25.0	N/A	1.042	0.12	0.07
36.50	33.74	1.15	3.42	clayey silt to silty clay	-7.5	1.00	17	4,380	2,945	2,945	2.73	N/A	N/A	0.877	N/A	0.381	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
37.50	18.82	0.63	3.37	clayey silt to silty clay	-8.5	1.00	9	4,500	3,002	3,002	2.94	N/A	N/A	0.869	N/A	0.381	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
38.50	58.96	1.51	2.57	sandy silt to clayey silt	-9.5	1.00	24	4,620	3,060	3,060	2.43	2.46	117.03	0.861	0.870	0.380	0.229	0.625	YES	2.8	21.9	> 800	27.9	N/A	0.270	0.03	0.04
39.50	59.80	1.10	1.84	silty sand to sandy silt	-10.5	1.66	33	4,740	3,118	3,118	2.02	1.33	105.58	0.852	0.843	0.379	0.189	0.502	YES	2.8	29.2	> 800	36.7	N/A	0.032	0.00	0.03
40.50	22.92	0.46	2.01	sandy silt to clayey silt	-11.5	1.00	9	4,860	3,175	3,175	2.75	N/A	N/A	0.844	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
41.50	24.80	0.34	1.38	sandy silt to clayey silt	-12.5	1.00	10	4,980	3,233	3,233	2.64	N/A	N/A	0.836	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
42.50	28.44	0.89	3.13	clayey silt to silty clay	-13.5	1.00	14	5,100	3,290	3,290	2.80	N/A	N/A	0.828	N/A	0.375	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
43.50	34.27	1.47	4.31	silty clay to clay	-14.5	1.00	23	5,220	3,348	3,348	2.83	N/A	N/A	0.820	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
44.50	93.32	1.87	2.00	silty sand to sandy silt	-15.5	1.00	31	5,340	3,406	3,406	2.23	1.74	124.22	0.812	0.823	0.372	0.258	0.681	YES	2.8	26.6	> 800	33.6	N/A	0.061	0.01	0.02
45.50	119.44	2.04	1.71	silty sand to sandy silt	-16.5	1.66	66	5,460	3,463	3,463	1.79	1.10	165.33	0.804	0.803	0.371	N/A	N/A	NO	N/A	N/A	N/A	65.1	N/A	0.000	0.00	0.02
46.50	29.47	1.28	4.35	silty clay to clay	-17.5	1.00	20	5,580	3,521	3,521	2.89	N/A	N/A	0.795	N/A	0.369	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
47.50	76.15	1.76	2.32	silty sand to sandy silt	-18.5	1.00	25	5,700	3,578	3,578	2.35	2.10	119.75	0.787	0.827	0.367	0.240	0.644	YES	2.8	21.8	> 800	27.8	N/A	0.160	0.02	0.01
48.50	190.29	3.19	1.68	sand to silty sand	-19.5	1.00	48	5,820	3,636	3,636	1.96	1.25	176.83	0.779	0.787	0.365	N/A	N/A	NO	N/A	N/A	N/A	39.5	N/A	0.005	0.00	0.01
49.50	170.87	3.15	1.85	sand to silty sand	-20.5	1.00	43	5,940	3,694	3,694	2.03	1.34	168.07	0.771	0.782	0.363	N/A	N/A	NO	N/A	N/A	N/A	35.4	N/A	0.042	0.01	0.00
50.50	202.31	3.36	1.66	sand to silty sand	-21.5	1.00	51	6,060	3,751	3,751	1.94	1.23	182.35	0.763	0.778	0.361	N/A	N/A	NO	N/A	N/A	N/A	41.2	N/A	0.000	0.00	0.00
51.50	137.26	3.81	2.78	silty sand to sandy silt	-22.5	1.00	46	6,180	3,809	3,809	2.23	1.74	173.17	0.755	0.773	0.358	N/A	N/A	NO	N/A	N/A	N/A	44.8	N/A	0.000	0.00	0.00
52.50	152.87	3.31	2.17	silty sand to sandy silt	-23.5	1.00	51	6,300	3,866	3,866	2.12	1.49	163.70	0.747	0.768	0.356	N/A	N/A	NO	N/A	N/A	N/A	49.0	N/A	0.000	0.00	0.00
53.50	259.26	3.77	1.46	sand to silty sand	-24.5	1.00	65	6,420	3,924	3,924	1.84	1.13	209.96	0.739	0.764	0.353	N/A	N/A	NO	N/A	N/A	N/A	51.0	N/A	0.000	0.00	0.00
54.50	264.63	4.43	1.67	sand to silty sand	-25.5	1.00	66	6,540	3,982	3,982	1.88	1.17	219.42	0.730	0.759	0.351	N/A	N/A	NO	N/A	N/A	N/A	51.6	N/A	0.000	0.00	0.00
55.50	287.19	4.15	1.45	sand to silty sand	-26.5	1.00	72	6,660	4,039	4,039	1.81	1.11	225.07	0.722	0.755	0.348	N/A	N/A	NO	N/A	N/A	N/A	55.4	N/A	0.000	0.00	0.00
56.50	331.34	2.69	0.81	sand	-27.5	1.00	66	6,780	4,097	4,097	1.58	1.00	231.51	0.714	0.751	0.346	N/A	N/A	NO	N/A	N/A	N/A	46.3	N/A	0.000	0.00	0.00
57.50	401.34	1.88	0.47	gravelly sand to sand	-28.5	1.00	67	6,900	4,154	4,154	1.36	1.00	278.47	0.706	0.746	0.343	N/A	N/A	NO	N/A	N/A	N/A	46.4	N/A	0.000	0.00	0.00
58.50	381.44	1.59	0.42	gravelly sand to sand	-29.5	1.00	64	7,020	4,212	4,212	1.35	1.00	262.84	0.698	0.742	0.340	N/A	N/A	NO	N/A	N/A	N/A	43.8	N/A	0.000	0.00	0.00
59.50	369.06	1.73	0.47	gravelly sand to sand	-30.5	1.00	62	7,140	4,270	4,270	1.39	1.00	252.59	0.690	0.738	0.337	N/A	N/A	NO	N/A	N/A	N/A	42.1	N/A	0.000	0.00	0.00
60.50	353.23	1.57	0.45	gravelly sand to sand	-31.5	1.00	59	7,260	4,327	4,327	1.40	1.00	240.14	0.682	0.734	0.334	N/A	N/A	NO	N/A	N/A	N/A	40.0	N/A	0.000	0.00	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-016

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	30.00 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.45 g
Required Factor of Safety	1.10

REFERENCES

\+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	14.00 ft below ground surface
GWT Depth For Design, Zwd =	14.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	15.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.50 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.03 inches	<--- Dry or Unsaturated Sands
Total:	0.53 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	251.78	1.03	0.41	gravelly sand to sand	29.0	1.00	42	60	60	60	0.89	1.00	1,453.63	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	71.3	0.014	0.000	0.00	0.53
1.50	155.84	1.61	1.03	sand	28.0	1.66	52	180	180	180	1.15	1.00	860.09	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	87.7	0.022	0.000	0.00	0.53
2.50	32.99	1.37	4.18	silty clay to clay	27.0	1.00	22	300	300	300	2.40	2.31	197.03	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.53
3.50	32.68	1.50	4.59	silty clay to clay	26.0	1.00	22	420	420	420	2.48	2.68	191.14	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.53
4.50	22.19	1.37	6.17	clay	25.0	1.00	22	540	540	540	2.63	N/A	N/A	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.53
5.50	20.75	1.36	6.59	clay	24.0	1.00	21	660	660	660	2.72	N/A	N/A	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.53
6.50	30.86	1.69	5.49	clay	23.0	1.00	31	780	780	780	2.58	3.21	200.72	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.53
7.50	24.86	1.54	6.21	clay	22.0	1.00	25	900	900	900	2.71	N/A	N/A	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.53
8.50	53.76	2.03	3.81	clayey silt to silty clay	21.0	1.00	27	1,020	1,020	1,020	2.41	2.33	175.75	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.53
9.50	57.05	1.26	2.21	sandy silt to clayey silt	20.0	1.00	23	1,140	1,140	1,140	2.23	1.76	132.68	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	41.3	N/A	N/A	N/A	0.53
10.50	70.54	0.89	1.27	silty sand to sandy silt	19.0	1.00	24	1,260	1,260	1,260	2.02	1.32	117.68	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	40.5	0.071	0.000	0.00	0.53
11.50	65.30	0.63	0.96	sand to silty sand	18.0	1.00	16	1,380	1,380	1,380	1.98	1.28	100.63	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	23.1	0.090	0.136	0.02	0.51
12.50	40.98	0.68	1.65	silty sand to sandy silt	17.0	1.00	14	1,500	1,500	1,500	2.30	1.96	92.85	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	23.9	0.092	0.134	0.02	0.50
13.50	58.01	0.57	0.98	silty sand to sandy silt	16.0	1.66	32	1,620	1,620	1,620	1.75	1.07	114.61	0.969	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	47.7	0.076	0.000	0.00	0.50
14.50	16.57	0.35	2.12	clayey silt to silty clay	15.0	1.00	8	1,740	1,709	1,709	2.70	N/A	N/A	0.966	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
15.50	8.67	0.29	3.39	clay	14.0	1.00	9	1,860	1,766	1,766	3.07	N/A	N/A	0.964	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
16.50	10.16	0.38	3.86	clay	13.0	1.00	10	1,980	1,824	1,824	3.05	N/A	N/A	0.962	N/A	0.305	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
17.50	8.65	0.36	4.29	clay	12.0	1.00	9	2,100	1,882	1,882	3.15	N/A	N/A	0.959	N/A	0.313	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
18.50	10.96	0.42	3.99	clay	11.0	1.00	11	2,220	1,939	1,939	3.05	N/A	N/A	0.957	N/A	0.320	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
19.50	12.88	0.43	3.47	silty clay to clay	10.0	1.00	9	2,340	1,997	1,997	2.96	N/A	N/A	0.955	N/A	0.327	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
20.50	15.05	0.50	3.40	silty clay to clay	9.0	1.00	10	2,460	2,054	2,054	2.91	N/A	N/A	0.952	N/A	0.334	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
21.50	14.73	0.52	3.71	silty clay to clay	8.0	1.00	10	2,580	2,112	2,112	2.94	N/A	N/A	0.950	N/A	0.339	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
22.50	11.90	0.42	3.76	clay	7.0	1.00	12	2,700	2,170	2,170	3.03	N/A	N/A	0.948	N/A	0.345	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
23.50	17.13	0.71	4.39	clay	6.0	1.00	17	2,820	2,227	2,227	2.95	N/A	N/A	0.945	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
24.50	13.81	0.56	4.23	clay	5.0	1.00	14	2,940	2,285	2,285	3.02	N/A	N/A	0.943	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
25.50	13.42	0.38	2.97	silty clay to clay	4.0	1.00	9	3,060	2,342	2,342	2.95	N/A	N/A	0.941	N/A	0.359	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
26.50	12.53	0.38	3.22	silty clay to clay	3.0	1.00	8	3,180	2,400	2,400	3.00	N/A	N/A	0.938	N/A	0.364	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
27.50	33.50	1.06	3.21	clayey silt to silty clay	2.0	1.00	17	3,300	2,458	2,458	2.66	N/A	N/A	0.936	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
28.50	44.78	1.72	3.85	clayey silt to silty clay	1.0	1.00	22	3,420	2,515	2,515	2.63	N/A	N/A	0.934	N/A	0.371	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
29.50	34.57	1.17	3.40	clayey silt to silty clay	0.0	1.00	17	3,540	2,573	2,573	2.68	N/A	N/A	0.931	N/A	0.375	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50
30.50	66.16	0.96	1.45	silty sand to sandy silt	-1.0	1.00	22	3,660	2,630	2,630	2.20	1.68	96.74	0.926	0.914	0.377	0.164	0.475	YES	2.8	22.0	> 800	28.1	N/A	0.187	0.02	0.48
31.50	49.90	1.13	2.27	sandy silt to clayey silt	-2.0	1.00	20	3,780	2,688	2,688	2.43	2.44	104.94	0.918	0.912	0.377	0.187	0.540	YES	2.8	20.0	> 800	25.7	N/A	0.875	0.11	0.37
32.50	61.38	1.12	1.84	silty sand to sandy silt	-3.0	1.00	20	3,900	2,746	2,746	2.30	1.96	102.66	0.909	0.905	0.378	0.181	0.516	YES	2.8	20.3	> 800	26.0	N/A	0.778	0.09	0.28
33.50	50.64	1.11	2.21	sandy silt to clayey silt	-4.0	1.00	20	4,020	2,803	2,803	2.42	2.41	103.28	0.901	0.901	0.378	0.182	0.518	YES	2.8	19.9	> 800	25.5	N/A	0.929	0.11	0.17
34.50	32.64	1.32	4.08	silty clay to clay	-5.0	1.00	22	4,140	2,861	2,861	2.78	N/A	N/A	0.893	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
35.50	25.92	0.96	3.78	silty clay to clay	-6.0	1.00	17	4,260	2,918	2,918	2.84	N/A	N/A	0.885	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
36.50	67.46	2.38	3.52	clayey silt to silty clay	-7.0	1.66	56	4,380	2,976	2,976	2.17	1.59	145.60	0.877	0.853	0.377	0.367	0.989	YES	2.8	48.6	> 800	N/A	N/A	0.000	0.00	0.17
37.50	25.50	0.81	3.17	clayey silt to silty clay	-8.0	1.00	13	4,500	3,034	3,034	2.82	N/A	N/A	0.869	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
38.50	38.53	1.33	3.49	clayey silt to silty clay	-9.0	1.00	19	4,620	3,091	3,091	2.70	N/A	N/A	0.861	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
39.50	24.51	0.90	3.74	silty clay to clay	-10.0	1.00	16	4,740	3,149	3,149	2.88	N/A	N/A	0.852	N/A	0.375	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
40.50	55.29	1.98	3.59	clayey silt to silty clay	-11.0	1.00	28	4,860	3,206	3,206	2.60	3.32	128.74	0.844	0.848	0.374	0.278	0.752	YES	2.8	24.6	> 800	N/A	N/A	0.000	0.00	0.17
41.50	40.63	1.35	3.33	clayey silt to silty clay	-12.0	1.66	34	4,980	3,264	3,264	2.33	2.05	107.75	0.836	0.828	0.373	0.196	0.520	YES	2.8	29.1	> 800	N/A	N/A	0.000	0.00	0.17
42.50	18.05	0.69	3.96	silty clay to clay	-13.0	1.00	12	5,100	3,322	3,322	3.02	N/A	N/A	0.828	N/A	0.372	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
43.50	18.73	0.62	3.45	silty clay to clay	-14.0	1.00	12	5,220	3,379	3,379	2.98	N/A	N/A	0.820	N/A	0.370	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
44.50	35.11	1.21	3.50	clayey silt to silty clay	-15.0	1.00	18	5,340	3,437	3,437	2.76	N/A	N/A	0.812	N/A	0.369	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
45.50	57.95	1.55	2.69	sandy silt to clayey silt	-16.0	1.00	23	5,460	3,494	3,494	2.48	2.65	116.02	0.804	0.839	0.367	0.225	0.614	YES	2.8	20.3	> 800	26.0	N/A	0.559	0.07	0.10
46.50	87.77	1.33	1.52	silty sand to sandy silt	-17.0	1.00	29	5,580	3,552	3,552	2.17	1.61	105.73	0.795	0.817	0.366	0.190	0.506	YES	2.8	24.8	> 800	31.3	N/A	0.080	0.01	0.09
47.50	78.44	1.86	2.37	sandy silt to clayey silt	-18.0	1.00	31	5,700	3,610	3,610	2.34	2.10	122.49	0.787	0.807	0.364	0.251	0.664	YES	2.8	26.2	> 800	33.0	N/A	0.064	0.01	0.08
48.50	43.72	1.12	2.60	sandy silt to clayey silt	-19.0	1.00	17	5,820	3,667	3,667	2.62	N/A	N/A	0.779	N/A	0.362	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
49.50	205.01	2.06	1.00	sand	-20.0	1.00	41	5,940	3,725	3,725	1.78	1.09	164.41	0.771	0.780	0.360	N/A	N/A	NO	N/A	N/A	N/A	30.0	N/A	0.090	0.01	0.07
50.50	246.69	2.46	1.00	sand	-21.0	1.00	49	6,060	3,782	3,782	1.73	1.05	189.22	0.763	0.775	0.358	N/A	N/A	NO	N/A	N/A	N/A	35.9	N/A	0.037	0.00	0.07
51.50	208.05	2.25	1.08	sand	-22.0	1.00	42	6,180	3,840	3,840	1.81	1.11	166.85	0.755	0.770	0.355	N/A	N/A	NO	N/A	N/A	N/A	30.0	N/A	0.089	0.01	0.06
52.50	170.63	2.15	1.26	sand to silty sand	-23.0	1.00	43	6,300	3,898	3,898	1.92	1.21	147.42	0.747	0.766	0.353	0.378	0.978	YES	1.3	31.9	> 800	34.5	N/A	0.048	0.01	0.05
53.50	125.07	1.84	1.48	sand to silty sand	-24.0	1.00	31	6,420	3,955	3,955	2.07	1.40	124.33	0.739	0.786	0.351	0.259	0.692	YES	1.3	23.6	> 800	25.8	N/A	0.199	0.02	0.03
54.50	74.10	1.91	2.58	sandy silt to clayey silt	-25.0	1.66	49	6,540	4,013	4,013	2.09	1.44	124.63	0.730	0.757	0.348	0.260	0.674	YES	2.8	37.4	> 800	46.6	N/A	0.000	0.00	0.03
55.50	35.50	1.68	4.83	clay	-26.0	1.00	36	6,660	4,070	4,070	2.90	N/A	N/A	0.722	N/A	0.346	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
56.50	187.94	1.71	0.91	sand	-27.0	1.00	38	6,780	4,128	4,128	1.80	1.11	144.75	0.714	0.757	0.343	0.362	0.953	YES	0.0	26.2	> 800	26.2	N/A	0.181	0.02	0.00
57.50	364.06	2.31	0.64	gravelly sand to sand	-28.0	1.00	61	6,900	4,186	4,186	1.48	1.00	251.66	0.706	0.744	0.340	N/A	N/A	NO	N/A	N/A	N/A	41.9	N/A	0.000	0.00	0.00
58.50	263.99	1.74	0.66	sand	-29.0	1.66	87	7,020	4,243	4,243	1.29	1.00	300.09	0.698	0.740	0.338	N/A	N/A	NO	N/A	N/A	N/A	60.0	N/A	0.000	0.00	0.00
59.50	112.01	2.21	1.98	silty sand to sandy silt	-30.0	1.00	37	7,140	4,301	4,301	2.20	1.68	128.02	0.690	0.748	0.335	0.275	0.733	YES	2.8	28.3	> 800	35.6	N/A	0.036	0.00	0.00
60.50	61.21	2.07	3.41	clayey silt to silty clay	-31.0	1.00	31	7,260	4,358	4,358	2.63	N/A	N/A	0.682	N/A	0.332	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-018

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	43.50	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \to \infty}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	27.50 ft below ground surface
GWT Depth For Design, Zwd =	27.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	10.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.24 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.08 inches	<--- Dry or Unsaturated Sands
Total:	0.32 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	20.27	0.17	0.84	sandy silt to clayey silt	42.5	1.00	8	60	60	60	1.81	1.11	130.33	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	21.5	N/A	N/A	N/A	0.32
1.50	159.00	0.81	0.51	sand	41.5	1.66	53	180	180	180	0.88	1.00	877.52	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	89.5	0.022	0.000	0.00	0.32
2.50	23.38	1.00	4.29	silty clay to clay	40.5	1.00	16	300	300	300	2.51	2.82	170.01	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
3.50	31.66	1.08	3.42	clayey silt to silty clay	39.5	1.00	16	420	420	420	2.40	2.30	158.93	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
4.50	18.74	0.76	4.06	silty clay to clay	38.5	1.00	12	540	540	540	2.55	3.03	151.81	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
5.50	87.92	1.89	2.15	silty sand to sandy silt	37.5	1.00	29	660	660	660	2.02	1.32	202.52	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	64.8	0.045	0.000	0.00	0.32
6.50	51.90	1.72	3.31	clayey silt to silty clay	36.5	1.00	26	780	780	780	2.33	2.06	170.92	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
7.50	28.26	1.43	5.07	clay	35.5	1.00	28	900	900	900	2.61	N/A	N/A	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
8.50	24.56	1.20	4.92	clay	34.5	1.00	25	1,020	1,020	1,020	2.67	N/A	N/A	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
9.50	47.39	1.85	3.91	clayey silt to silty clay	33.5	1.00	24	1,140	1,140	1,140	2.47	2.61	164.04	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
10.50	50.12	2.21	4.42	silty clay to clay	32.5	1.00	33	1,260	1,260	1,260	2.51	2.80	177.06	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
11.50	102.52	2.85	2.78	sandy silt to clayey silt	31.5	1.00	41	1,380	1,380	1,380	2.16	1.58	195.06	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	64.2	N/A	N/A	N/A	0.32
12.50	63.49	2.52	3.99	clayey silt to silty clay	30.5	1.00	32	1,500	1,500	1,500	2.43	2.44	178.74	0.971	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
13.50	53.18	2.04	3.85	clayey silt to silty clay	29.5	1.00	27	1,620	1,620	1,620	2.48	2.68	158.41	0.969	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
14.50	42.49	1.78	4.22	silty clay to clay	28.5	1.00	28	1,740	1,740	1,740	2.59	3.27	148.97	0.966	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
15.50	40.34	1.53	3.82	clayey silt to silty clay	27.5	1.00	20	1,860	1,860	1,860	2.59	3.25	135.93	0.964	N/A	0.282	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
16.50	33.03	1.67	5.08	clay	26.5	1.00	33	1,980	1,980	1,980	2.75	N/A	N/A	0.962	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.32
17.50	148.71	1.24	0.84	sand	25.5	1.00	30	2,100	2,100	2,100	1.74	1.06	154.38	0.959	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	29.0	0.100	0.115	0.01	0.31
18.50	80.18	1.33	1.66	silty sand to sandy silt	24.5	1.00	27	2,220	2,220	2,220	2.15	1.55	117.86	0.957	N/A	0.280	N/A	N/A	NO	N/A	N/A	N/A	35.4	0.095	0.086	0.01	0.30
19.50	54.51	1.11	2.04	silty sand to sandy silt	23.5	1.00	18	2,340	2,340	2,340	2.34	2.10	105.59	0.955	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	25.2	0.109	0.149	0.02	0.28
20.50	46.65	1.62	3.48	clayey silt to silty clay	22.5	1.66	39	2,460	2,460	2,460	2.25	1.79	124.33	0.952	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
21.50	18.50	0.86	4.68	clay	21.5	1.00	19	2,580	2,580	2,580	2.98	N/A	N/A	0.950	N/A	0.278	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
22.50	16.39	0.58	3.58	silty clay to clay	20.5	1.00	11	2,700	2,700	2,700	2.97	N/A	N/A	0.948	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
23.50	14.89	0.49	3.35	silty clay to clay	19.5	1.00	10	2,820	2,820	2,820	3.00	N/A	N/A	0.945	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
24.50	30.99	0.70	2.26	sandy silt to clayey silt	18.5	1.00	12	2,940	2,940	2,940	2.64	N/A	N/A	0.943	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
25.50	55.67	0.66	1.19	silty sand to sandy silt	17.5	1.00	19	3,060	3,060	3,060	2.24	1.77	79.46	0.941	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	23.0	0.125	0.191	0.02	0.26
26.50	43.42	0.50	1.16	silty sand to sandy silt	16.5	1.66	24	3,180	3,180	3,180	2.02	1.33	75.86	0.938	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	27.8	0.119	0.145	0.02	0.24
27.50	9.28	0.34	3.71	clay	15.5	1.00	9	3,300	3,300	3,300	3.25	N/A	N/A	0.936	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
28.50	11.01	0.34	3.20	silty clay to clay	14.5	1.00	7	3,420	3,358	3,358	3.15	N/A	N/A	0.934	N/A	0.278	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
29.50	8.99	0.31	3.53	clay	13.5	1.00	9	3,540	3,415	3,415	3.26	N/A	N/A	0.931	N/A	0.282	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
30.50	13.16	0.31	2.48	clayey silt to silty clay	12.5	1.00	7	3,660	3,473	3,473	3.03	N/A	N/A	0.926	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
31.50	56.70	0.97	1.72	silty sand to sandy silt	11.5	1.00	19	3,780	3,530	3,530	2.35	2.13	90.90	0.918	0.852	0.287	0.150	0.530	YES	2.8	17.0	> 800	22.1	N/A	0.393	0.05	0.19
32.50	124.39	0.94	0.76	sand	10.5	1.66	41	3,900	3,588	3,588	1.56	1.00	153.77	0.909	0.792	0.289	0.418	1.365	NO	N/A	N/A	N/A	30.8	N/A	0.063	0.01	0.19
33.50	32.85	0.77	2.36	sandy silt to clayey silt	9.5	1.66	22	4,020	3,646	3,646	2.32	2.03	81.79	0.901	0.835	0.291	0.131	0.448	YES	2.8	18.9	> 800	24.3	N/A	0.148	0.02	0.17
34.50	12.35	0.17	1.43	clayey silt to silty clay	8.5	1.00	6	4,140	3,703	3,703	2.95	N/A	N/A	0.893	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
35.50	10.95	0.19	1.87	clayey silt to silty clay	7.5	1.00	5	4,260	3,761	3,761	3.06	N/A	N/A	0.885	N/A	0.293	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
36.50	13.59	0.34	2.64	clayey silt to silty clay	6.5	1.00	7	4,380	3,818	3,818	3.06	N/A	N/A	0.877	N/A	0.294	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
37.50	11.03	0.34	3.34	silty clay to clay	5.5	1.00	7	4,500	3,876	3,876	3.20	N/A	N/A	0.869	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
38.50	11.42	0.30	2.76	silty clay to clay	4.5	1.00	8	4,620	3,934	3,934	3.15	N/A	N/A	0.861	N/A	0.296	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
39.50	14.41	0.34	2.46	clayey silt to silty clay	3.5	1.00	7	4,740	3,991	3,991	3.03	N/A	N/A	0.852	N/A	0.296	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
40.50	20.51	0.61	3.11	clayey silt to silty clay	2.5	1.00	10	4,860	4,049	4,049	2.96	N/A	N/A	0.844	N/A	0.296	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
41.50	29.18	1.05	3.73	clayey silt to silty clay	1.5	1.00	15	4,980	4,106	4,106	2.88	N/A	N/A	0.836	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
42.50	38.18	1.81	4.81	clay	0.5	1.00	38	5,100	4,164	4,164	2.87	N/A	N/A	0.828	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
43.50	165.31	1.79	1.08	sand	-0.5	1.00	33	5,220	4,222	4,222	1.90	1.18	134.74	0.820	0.765	0.297	0.307	0.947	YES	0.0	22.8	> 800	22.8	N/A	0.379	0.05	0.12
44.50	249.88	1.66	0.66	sand	-1.5	1.00	50	5,340	4,279	4,279	1.62	1.00	170.83	0.812	0.738	0.296	N/A	N/A	NO	N/A	N/A	N/A	34.2	N/A	0.041	0.00	0.12
45.50	243.48	1.33	0.55	sand	-2.5	1.00	49	5,460	4,337	4,337	1.58	1.00	165.35	0.804	0.734	0.296	N/A	N/A	NO	N/A	N/A	N/A	33.1	N/A	0.048	0.01	0.11
46.50	219.11	1.54	0.70	sand	-3.5	1.66	73	5,580	4,394	4,394	1.38	1.00	244.75	0.795	0.730	0.295	N/A	N/A	NO	N/A	N/A	N/A	49.0	N/A	0.000	0.00	0.11
47.50	51.31	1.87	3.66	clayey silt to silty clay	-4.5	1.00	26	5,700	4,452	4,452	2.71	N/A	N/A	0.787	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
48.50	77.38	2.08	2.70	sandy silt to clayey silt	-5.5	1.00	31	5,820	4,510	4,510	2.42	2.40	123.88	0.779	0.758	0.294	0.257	0.789	YES	2.8	23.4	> 800	29.7	N/A	0.071	0.01	0.10
49.50	167.70	2.15	1.28	sand to silty sand	-6.5	1.00	42	5,940	4,567	4,567	1.95	1.24	137.89	0.771	0.722	0.293	0.324	0.950	YES	1.3	29.1	> 800	31.6	N/A	0.058	0.01	0.10
50.50	133.01	1.76	1.32	sand to silty sand	-7.5	1.66	55	6,060	4,625	4,625	1.73	1.06	153.07	0.763	0.715	0.292	0.414	1.206	NO	N/A	N/A	N/A	40.4	N/A	0.000	0.00	0.10
51.50	27.72	0.90	3.27	clayey silt to silty clay	-8.5	1.00	14	6,180	4,682	4,682	2.91	N/A	N/A	0.755	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
52.50	21.29	0.76	3.66	silty clay to clay	-9.5	1.00	14	6,300	4,740	4,740	3.04	N/A	N/A	0.747	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
53.50	92.42	1.97	2.14	silty sand to sandy silt	-10.5	1.00	31	6,420	4,798	4,798	2.31	1.97	117.49	0.739	0.746	0.289	0.231	0.711	YES	2.8	22.7	> 800	28.9	N/A	0.076	0.01	0.09
54.50	65.70	1.38	2.09	silty sand to sandy silt	-11.5	1.66	36	6,540	4,855	4,855	2.10	1.46	102.06	0.730	0.726	0.288	0.179	0.538	YES	2.8	26.1	> 800	32.9	N/A	0.048	0.01	0.08
55.50	16.62	0.77	4.72	clay	-12.5	1.00	17	6,660	4,913	4,913	3.22	N/A	N/A	0.722	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
56.50	17.82	0.86	4.98	clay	-13.5	1.00	18	6,780	4,970	4,970	3.21	N/A	N/A	0.714	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
57.50	20.74	0.91	4.60	clay	-14.5	1.00	21	6,900	5,028	5,028	3.13	N/A	N/A	0.706	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
58.50	70.06	1.38	1.98	silty sand to sandy silt	-15.5	1.00	23	7,020	5,086	5,086	2.39	2.26	99.31	0.698	0.765	0.282	0.171	0.554	YES	2.8	17.4	> 800	22.6	N/A	0.212	0.03	0.06
59.50	173.95	1.99	1.14	sand	-16.5	1.00	35	7,140	5,143	5,143	1.93	1.22	131.86	0.690	0.719	0.280	0.293	0.898	YES	0.0	21.7	> 800	21.7	N/A	0.369	0.04	0.01
60.50	135.47	1.82	1.34	sand to silty sand	-17.5	1.00	34	7,260	5,201	5,201	2.06	1.38	116.26	0.682	0.720	0.278	0.226	0.698	YES	1.3	22.3	> 800	24.5	N/A	0.102	0.01	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-020

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	28.00 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.45 g
Required Factor of Safety	1.10

REFERENCES

\+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	12.00 ft below ground surface
GWT Depth For Design, Zwd =	12.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	13.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.15 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.15 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	196.33	0.97	0.49	sand	27.0	1.00	39	60	60	60	1.00	1.00	1,133.51	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	66.8	0.014	0.000	0.00	0.15
1.50	169.44	1.37	0.81	sand	26.0	1.00	56	180	180	180	1.04	1.00	935.14	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	95.4	0.021	0.000	0.00	0.15
2.50	49.80	1.66	3.33	clayey silt to silty clay	25.0	1.00	41	300	300	300	1.90	1.19	253.90	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
3.50	18.51	0.84	4.53	clay	24.0	1.00	19	420	420	420	2.53	2.94	175.09	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
4.50	17.15	0.64	3.71	silty clay to clay	23.0	1.00	11	540	540	540	2.55	3.03	138.65	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
5.50	20.57	0.70	3.42	clayey silt to silty clay	22.0	1.00	10	660	660	660	2.52	2.85	134.50	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
6.50	22.89	0.92	4.04	silty clay to clay	21.0	1.00	15	780	780	780	2.57	3.16	146.53	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
7.50	25.38	0.83	3.26	clayey silt to silty clay	20.0	1.00	13	900	900	900	2.57	3.16	119.41	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
8.50	25.48	0.79	3.10	clayey silt to silty clay	19.0	1.00	13	1,020	1,020	1,020	2.58	3.18	113.58	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
9.50	15.30	0.47	3.05	clayey silt to silty clay	18.0	1.00	8	1,140	1,140	1,140	2.72	N/A	N/A	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
10.50	8.07	0.26	3.20	clay	17.0	1.00	8	1,260	1,260	1,260	2.99	N/A	N/A	0.976	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
11.50	10.30	0.46	4.49	clay	16.0	1.00	10	1,380	1,380	1,380	3.01	N/A	N/A	0.973	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
12.50	18.33	0.73	3.96	silty clay to clay	15.0	1.00	12	1,500	1,469	1,469	2.79	N/A	N/A	0.971	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
13.50	66.38	0.76	1.14	sand to silty sand	14.0	1.00	17	1,620	1,526	1,526	2.04	1.36	103.23	0.969	1.000	0.301	0.182	0.723	YES	1.3	20.3	> 800	22.4	N/A	0.543	0.07	0.08
14.50	47.63	0.79	1.65	silty sand to sandy silt	13.0	1.00	26	1,740	1,584	1,584	1.95	1.24	110.15	0.966	1.000	0.310	0.204	0.785	YES	2.8	32.3	> 800	40.4	N/A	0.000	0.00	0.08
15.50	9.47	0.28	2.92	silty clay to clay	12.0	1.00	6	1,860	1,642	1,642	2.98	N/A	N/A	0.964	N/A	0.319	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
16.50	9.80	0.21	2.14	clayey silt to silty clay	11.0	1.00	5	1,980	1,699	1,699	2.90	N/A	N/A	0.962	N/A	0.328	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
17.50	10.68	0.22	2.02	clayey silt to silty clay	10.0	1.00	5	2,100	1,757	1,757	2.87	N/A	N/A	0.959	N/A	0.335	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
18.50	9.99	0.30	3.02	silty clay to clay	9.0	1.00	7	2,220	1,814	1,814	3.00	N/A	N/A	0.957	N/A	0.342	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
19.50	8.66	0.27	3.09	silty clay to clay	8.0	1.00	6	2,340	1,872	1,872	3.07	N/A	N/A	0.955	N/A	0.349	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
20.50	7.77	0.24	3.04	clay	7.0	1.00	8	2,460	1,930	1,930	3.12	N/A	N/A	0.952	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
21.50	14.86	0.51	3.46	silty clay to clay	6.0	1.00	10	2,580	1,987	1,987	2.92	N/A	N/A	0.950	N/A	0.361	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
22.50	22.08	1.00	4.54	clay	5.0	1.00	22	2,700	2,045	2,045	2.86	N/A	N/A	0.948	N/A	0.366	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
23.50	50.40	1.61	3.21	sandy silt to clayey silt	4.0	1.00	20	2,820	2,102	2,102	2.49	2.70	132.78	0.945	0.984	0.371	0.298	0.942	YES	2.8	22.5	> 800	28.6	N/A	0.136	0.02	0.07
24.50	56.06	1.62	2.89	sandy silt to clayey silt	3.0	1.00	22	2,940	2,160	2,160	2.43	2.42	130.53	0.943	0.974	0.375	0.287	0.887	YES	2.8	24.4	> 800	30.9	N/A	0.087	0.01	0.06
25.50	102.59	1.90	1.86	silty sand to sandy silt	2.0	1.00	34	3,060	2,218	2,218	2.10	1.46	142.50	0.941	0.960	0.380	0.349	1.053	YES	2.8	35.3	> 800	44.0	N/A	0.000	0.00	0.06
26.50	177.92	2.17	1.22	sand to silty sand	1.0	1.00	44	3,180	2,275	2,275	1.81	1.11	185.66	0.938	0.950	0.384	N/A	N/A	NO	N/A	N/A	N/A	46.2	N/A	0.000	0.00	0.06
27.50	327.51	4.14	1.26	sand	0.0	1.00	66	3,300	2,333	2,333	1.65	1.00	304.69	0.936	0.940	0.387	N/A	N/A	NO	N/A	N/A	N/A	60.6	N/A	0.000	0.00	0.06
28.50	310.95	4.16	1.34	sand	-1.0	1.00	62	3,420	2,390	2,390	1.69	1.03	293.03	0.934	0.931	0.391	N/A	N/A	NO	N/A	N/A	N/A	56.9	N/A	0.000	0.00	0.06
29.50	274.42	3.37	1.23	sand	-2.0	1.00	91	3,540	2,448	2,448	1.39	1.00	410.69	0.931	0.922	0.394	N/A	N/A	NO	N/A	N/A	N/A	82.1	N/A	0.000	0.00	0.06
30.50	129.92	3.08	2.37	silty sand to sandy silt	-3.0	1.00	72	3,660	2,506	2,506	1.82	1.12	215.50	0.926	0.914	0.396	N/A	N/A	NO	N/A	N/A	N/A	81.9	N/A	0.000	0.00	0.06
31.50	46.34	2.82	6.10	clay	-4.0	1.00	46	3,780	2,563	2,563	2.76	N/A	N/A	0.918	N/A	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
32.50	68.58	2.79	4.07	clayey silt to silty clay	-5.0	1.00	34	3,900	2,621	2,621	2.50	2.77	166.23	0.909	0.898	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.06
33.50	62.65	2.37	3.79	clayey silt to silty clay	-6.0	1.00	52	4,020	2,678	2,678	2.20	1.66	148.59	0.901	0.890	0.396	0.385	1.033	YES	2.8	47.6	> 800	N/A	N/A	0.000	0.00	0.06
34.50	18.73	0.91	4.89	clay	-7.0	1.00	19	4,140	2,736	2,736	3.02	N/A	N/A	0.893	N/A	0.395	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
35.50	25.38	1.47	5.79	clay	-8.0	1.00	25	4,260	2,794	2,794	2.97	N/A	N/A	0.885	N/A	0.395	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
36.50	16.92	0.96	5.70	clay	-9.0	1.00	17	4,380	2,851	2,851	3.11	N/A	N/A	0.877	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
37.50	94.48	2.42	2.57	sandy silt to clayey silt	-10.0	1.00	63	4,500	2,909	2,909	1.96	1.25	162.53	0.869	0.861	0.393	N/A	N/A	NO	N/A	N/A	N/A	67.3	N/A	0.000	0.00	0.06
38.50	30.86	1.05	3.41	clayey silt to silty clay	-11.0	1.00	26	4,620	2,966	2,966	2.41	2.37	99.31	0.861	0.873	0.392	0.171	0.455	YES	2.8	23.8	> 800	N/A	N/A	0.000	0.00	0.06
39.50	14.03	0.71	5.10	clay	-12.0	1.00	14	4,740	3,024	3,024	3.17	N/A	N/A	0.852	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
40.50	16.91	0.85	5.05	clay	-13.0	1.00	17	4,860	3,082	3,082	3.10	N/A	N/A	0.844	N/A	0.389	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
41.50	36.45	1.45	4.00	silty clay to clay	-14.0	1.00	24	4,980	3,139	3,139	2.77	N/A	N/A	0.836	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
42.50	86.02	2.17	2.52	sandy silt to clayey silt	-15.0	1.00	34	5,100	3,197	3,197	2.31	1.99	135.49	0.828	0.832	0.386	0.311	0.800	YES	2.8	30.0	> 800	37.7	N/A	0.023	0.00	0.06
43.50	165.31	3.05	1.84	sand to silty sand	-16.0	1.00	41	5,220	3,254	3,254	2.02	1.32	171.51	0.820	0.823	0.385	N/A	N/A	NO	N/A	N/A	N/A	36.5	N/A	0.035	0.00	0.05
44.50	134.98	2.41	1.79	silty sand to sandy silt	-17.0	1.00	45	5,340	3,312	3,312	2.07	1.41	147.52	0.812	0.817	0.383	0.379	0.964	YES	2.8	37.8	> 800	47.0	N/A	0.000	0.00	0.05
45.50	76.19	1.94	2.54	sandy silt to clayey silt	-18.0	1.00	50	5,460	3,370	3,370	2.05	1.37	133.18	0.804	0.812	0.381	0.300	0.762	YES	2.8	41.7	> 800	51.6	N/A	0.000	0.00	0.05
46.50	29.80	1.16	3.90	silty clay to clay	-19.0	1.00	20	5,580	3,427	3,427	2.85	N/A	N/A	0.795	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
47.50	188.38	3.49	1.85	sand to silty sand	-20.0	1.00	47	5,700	3,485	3,485	1.99	1.29	183.86	0.787	0.801	0.377	N/A	N/A	NO	N/A	N/A	N/A	39.9	N/A	0.001	0.00	0.05
48.50	200.68	3.75	1.87	sand to silty sand	-21.0	1.00	50	5,820	3,542	3,542	1.98	1.27	191.84	0.779	0.796	0.374	N/A	N/A	NO	N/A	N/A	N/A	42.0	N/A	0.000	0.00	0.05
49.50	187.65	3.91	2.08	silty sand to sandy silt	-22.0	1.00	63	5,940	3,600	3,600	2.04	1.35	188.65	0.771	0.790	0.372	N/A	N/A	NO	N/A	N/A	N/A	60.9	N/A	0.000	0.00	0.05
50.50	173.57	3.87	2.23	silty sand to sandy silt	-23.0	1.00	58	6,060	3,658	3,658	2.08	1.42	182.86	0.763	0.785	0.370	N/A	N/A	NO	N/A	N/A	N/A	56.3	N/A	0.000	0.00	0.05
51.50	133.23	3.02	2.27	silty sand to sandy silt	-24.0	1.00	44	6,180	3,715	3,715	2.17	1.59	155.79	0.755	0.781	0.367	0.432	1.094	YES	2.8	35.4	> 800	44.1	N/A	0.000	0.00	0.05
52.50	103.15	3.67	3.56	sandy silt to clayey silt	-25.0	1.00	41	6,300	3,773	3,773	2.39	2.28	171.60	0.747	0.776	0.365	N/A	N/A	NO	N/A	N/A	N/A	41.0	N/A	0.000	0.00	0.05
53.50	268.85	5.62	2.09	sand to silty sand	-26.0	1.00	67	6,420	3,830	3,830	1.95	1.23	239.87	0.739	0.771	0.362	N/A	N/A	NO	N/A	N/A	N/A	53.4	N/A	0.000	0.00	0.05
54.50	297.02	6.58	2.22	sand to silty sand	-27.0	1.00	74	6,540	3,888	3,888	1.94	1.23	262.08	0.730	0.767	0.359	N/A	N/A	NO	N/A	N/A	N/A	58.3	N/A	0.000	0.00	0.05
55.50	296.32	6.38	2.15	sand to silty sand	-28.0	1.00	74	6,660	3,946	3,946	1.93	1.22	257.87	0.722	0.762	0.357	N/A	N/A	NO	N/A	N/A	N/A	57.8	N/A	0.000	0.00	0.05
56.50	314.29	5.75	1.83	sand to silty sand	-29.0	1.00	79	6,780	4,003	4,003	1.86	1.16	256.88	0.714	0.758	0.354	N/A	N/A	NO	N/A	N/A	N/A	60.7	N/A	0.000	0.00	0.05
57.50	310.61	5.36	1.73	sand to silty sand	-30.0	1.00	78	6,900	4,061	4,061	1.85	1.14	249.30	0.706	0.753	0.351	N/A	N/A	NO	N/A	N/A	N/A	59.6	N/A	0.000	0.00	0.05
58.50	293.18	5.49	1.88	sand to silty sand	-31.0	1.00	73	7,020	4,118	4,118	1.89	1.18	241.82	0.698	0.749	0.348	N/A	N/A	NO	N/A	N/A	N/A	56.0	N/A	0.000	0.00	0.05
59.50	182.74	1.95	1.07	sand	-32.0	1.00	37	7,140	4,176	4,176	1.86	1.15	145.58	0.690	0.758	0.345	0.367	0.961	YES	0.0	25.3	> 800	25.3	N/A	0.367	0.04	0.01
60.50	102.21	1.56	1.53	silty sand to sandy silt	-33.0	1.00	34	7,260	4,234	4,234	2.16	1.57	110.09	0.682	0.762	0.342	0.204	0.542	YES	2.8	26.2	> 800	33.1	N/A	0.058	0.01	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-021

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	26.00	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

\+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \to \infty}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	10.00 ft below ground surface
GWT Depth For Design, Zwd =	10.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	14.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.33 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.01 inches	<--- Dry or Unsaturated Sands
Total:	0.34 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	339.57	1.56	0.46	gravelly sand to sand	25.0	1.00	57	60	60	60	0.90	1.00	1,960.53	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	96.2	0.012	0.000	0.00	0.34
1.50	207.08	1.30	0.63	sand	24.0	1.66	69	180	180	180	0.90	1.00	1,142.92	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	116.6	0.020	0.000	0.00	0.34
2.50	32.19	0.91	2.83	sandy silt to clayey silt	23.0	1.00	13	300	300	300	2.28	1.89	156.97	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	31.3	N/A	N/A	N/A	0.34
3.50	35.03	0.51	1.45	silty sand to sandy silt	22.0	1.00	12	420	420	420	2.11	1.46	111.89	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	28.8	0.048	0.055	0.01	0.33
4.50	19.32	0.79	4.07	silty clay to clay	21.0	1.00	13	540	540	540	2.54	2.99	154.01	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
5.50	16.74	0.55	3.30	clayey silt to silty clay	20.0	1.00	8	660	660	660	2.57	3.15	121.04	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
6.50	10.26	0.38	3.77	clay	19.0	1.00	10	780	780	780	2.81	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
7.50	32.48	0.62	1.90	sandy silt to clayey silt	18.0	1.66	22	900	900	900	2.03	1.33	106.96	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	43.5	N/A	N/A	N/A	0.33
8.50	10.56	0.25	2.32	clayey silt to silty clay	17.0	1.00	5	1,020	1,020	1,020	2.75	N/A	N/A	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
9.50	9.18	0.39	4.23	clay	16.0	1.00	9	1,140	1,140	1,140	2.98	N/A	N/A	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
10.50	10.43	0.49	4.68	clay	15.0	1.00	10	1,260	1,229	1,229	2.99	N/A	N/A	0.976	N/A	0.293	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
11.50	41.01	0.63	1.54	silty sand to sandy silt	14.0	1.00	14	1,380	1,286	1,286	2.26	1.82	93.26	0.973	1.000	0.305	0.155	0.607	YES	2.8	19.8	> 800	25.5	N/A	0.137	0.02	0.32
12.50	37.46	0.54	1.44	silty sand to sandy silt	13.0	1.66	21	1,500	1,344	1,344	1.97	1.26	95.69	0.971	1.000	0.317	0.161	0.608	YES	2.8	28.0	> 800	35.3	N/A	0.036	0.00	0.31
13.50	12.37	0.40	3.26	silty clay to clay	12.0	1.00	8	1,620	1,402	1,402	2.87	N/A	N/A	0.969	N/A	0.327	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
14.50	10.29	0.40	3.97	clay	11.0	1.00	10	1,740	1,459	1,459	3.00	N/A	N/A	0.966	N/A	0.337	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
15.50	12.70	0.39	3.16	silty clay to clay	10.0	1.00	8	1,860	1,517	1,517	2.87	N/A	N/A	0.964	N/A	0.346	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
16.50	13.78	0.30	2.20	clayey silt to silty clay	9.0	1.00	7	1,980	1,574	1,574	2.75	N/A	N/A	0.962	N/A	0.354	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
17.50	14.07	0.34	2.49	clayey silt to silty clay	8.0	1.00	7	2,100	1,632	1,632	2.78	N/A	N/A	0.959	N/A	0.361	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
18.50	11.52	0.44	3.96	clay	7.0	1.00	12	2,220	1,690	1,690	2.99	N/A	N/A	0.957	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
19.50	13.00	0.36	2.93	silty clay to clay	6.0	1.00	9	2,340	1,747	1,747	2.87	N/A	N/A	0.955	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
20.50	26.56	1.22	4.64	clay	5.0	1.00	27	2,460	1,805	1,805	2.77	N/A	N/A	0.952	N/A	0.380	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
21.50	45.53	2.31	5.06	clay	4.0	1.00	46	2,580	1,862	1,862	2.64	N/A	N/A	0.950	N/A	0.385	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
22.50	31.86	1.93	6.09	clay	3.0	1.00	32	2,700	1,920	1,920	2.81	N/A	N/A	0.948	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
23.50	72.05	1.96	2.72	sandy silt to clayey silt	2.0	1.00	29	2,820	1,978	1,978	2.31	2.00	144.58	0.945	1.000	0.394	0.361	1.092	YES	2.8	31.8	> 800	39.8	N/A	0.002	0.00	0.31
24.50	121.75	2.78	2.28	silty sand to sandy silt	1.0	1.00	41	2,940	2,035	2,035	2.11	1.46	176.81	0.943	0.993	0.398	N/A	N/A	NO	N/A	N/A	N/A	53.3	N/A	0.000	0.00	0.31
25.50	292.56	2.17	0.74	sand	0.0	1.00	59	3,060	2,093	2,093	1.49	1.00	286.00	0.941	0.982	0.402	N/A	N/A	NO	N/A	N/A	N/A	57.2	N/A	0.000	0.00	0.31
26.50	251.94	1.23	0.49	sand	-1.0	1.00	50	3,180	2,150	2,150	1.42	1.00	242.97	0.938	0.971	0.406	N/A	N/A	NO	N/A	N/A	N/A	48.6	N/A	0.000	0.00	0.31
27.50	173.73	1.30	0.75	sand	-2.0	1.00	35	3,300	2,208	2,208	1.66	1.01	167.53	0.936	0.961	0.409	N/A	N/A	NO	N/A	N/A	N/A	33.1	N/A	0.077	0.01	0.30
28.50	121.63	1.66	1.36	sand to silty sand	-3.0	1.00	30	3,420	2,266	2,266	1.96	1.25	143.10	0.934	0.951	0.412	0.352	0.970	YES	1.3	29.9	> 800	32.4	N/A	0.085	0.01	0.29
29.50	86.31	2.18	2.53	sandy silt to clayey silt	-4.0	1.00	35	3,540	2,323	2,323	2.26	1.83	146.58	0.931	0.942	0.415	0.373	1.009	YES	2.8	34.8	> 800	43.4	N/A	0.000	0.00	0.29
30.50	56.79	2.94	5.18	clay	-5.0	1.00	57	3,660	2,381	2,381	2.63	N/A	N/A	0.926	N/A	0.416	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.29
31.50	50.45	1.80	3.57	clayey silt to silty clay	-6.0	1.00	25	3,780	2,438	2,438	2.55	3.01	137.42	0.918	0.931	0.416	0.321	0.858	YES	2.8	25.6	> 800	N/A	N/A	0.000	0.00	0.29
32.50	42.57	1.16	2.74	sandy silt to clayey silt	-7.0	1.00	17	3,900	2,496	2,496	2.53	2.90	110.67	0.909	0.937	0.416	0.206	0.554	YES	2.8	18.0	> 800	23.3	N/A	1.239	0.15	0.14
33.50	22.65	0.93	4.20	silty clay to clay	-8.0	1.00	15	4,020	2,554	2,554	2.89	N/A	N/A	0.901	N/A	0.415	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
34.50	26.18	1.16	4.50	clay	-9.0	1.00	26	4,140	2,611	2,611	2.86	N/A	N/A	0.893	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
35.50	43.96	1.54	3.54	clayey silt to silty clay	-10.0	1.00	22	4,260	2,669	2,669	2.62	N/A	N/A	0.885	N/A	0.413	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
36.50	30.65	0.98	3.20	clayey silt to silty clay	-11.0	1.00	15	4,380	2,726	2,726	2.73	N/A	N/A	0.877	N/A	0.412	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
37.50	16.84	0.78	4.79	clay	-12.0	1.00	17	4,500	2,784	2,784	3.05	N/A	N/A	0.869	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
38.50	17.80	0.80	4.67	clay	-13.0	1.00	18	4,620	2,842	2,842	3.03	N/A	N/A	0.861	N/A	0.409	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
39.50	19.59	0.76	4.07	silty clay to clay	-14.0	1.00	13	4,740	2,899	2,899	2.96	N/A	N/A	0.852	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
40.50	124.73	2.58	2.08	silty sand to sandy silt	-15.0	1.00	42	4,860	2,957	2,957	2.12	1.50	154.04	0.844	0.855	0.406	0.420	1.055	YES	2.8	37.0	> 800	46.0	N/A	0.000	0.00	0.14
41.50	232.09	3.45	1.49	sand to silty sand	-16.0	1.00	58	4,980	3,014	3,014	1.84	1.13	214.53	0.836	0.849	0.404	N/A	N/A	NO	N/A	N/A	N/A	52.0	N/A	0.000	0.00	0.14
42.50	199.00	2.24	1.12	sand	-17.0	1.66	66	5,100	3,072	3,072	1.49	1.00	265.86	0.828	0.842	0.402	N/A	N/A	NO	N/A	N/A	N/A	53.2	N/A	0.000	0.00	0.14
43.50	58.03	1.72	2.98	sandy silt to clayey silt	-18.0	1.00	23	5,220	3,130	3,130	2.49	2.71	125.49	0.820	0.865	0.400	0.264	0.681	YES	2.8	21.4	> 800	27.3	N/A	0.607	0.07	0.07
44.50	41.32	1.19	2.92	sandy silt to clayey silt	-19.0	1.00	17	5,340	3,187	3,187	2.63	N/A	N/A	0.812	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07
45.50	133.86	2.00	1.49	sand to silty sand	-20.0	1.00	33	5,460	3,245	3,245	2.02	1.32	138.92	0.804	0.830	0.396	0.329	0.825	YES	1.3	27.6	> 800	30.0	N/A	0.126	0.02	0.06
46.50	126.69	2.66	2.10	silty sand to sandy silt	-21.0	1.00	42	5,580	3,302	3,302	2.14	1.54	151.35	0.795	0.818	0.393	0.402	0.999	YES	2.8	35.7	> 800	44.4	N/A	0.000	0.00	0.06
47.50	143.33	2.05	1.43	sand to silty sand	-22.0	1.00	36	5,700	3,360	3,360	1.99	1.28	142.05	0.787	0.815	0.391	0.347	0.862	YES	1.3	29.0	> 800	31.5	N/A	0.087	0.01	0.05
48.50	130.49	1.81	1.39	sand to silty sand	-23.0	1.00	33	5,820	3,418	3,418	2.01	1.31	131.25	0.779	0.818	0.388	0.290	0.730	YES	1.3	26.3	> 800	28.7	N/A	0.219	0.03	0.02
49.50	69.83	2.01	2.88	sandy silt to clayey silt	-24.0	1.00	28	5,940	3,475	3,475	2.43	2.46	130.34	0.771	0.826	0.385	0.286	0.731	YES	2.8	24.0	> 800	30.4	N/A	0.095	0.01	0.01
50.50	216.92	2.45	1.13	sand	-25.0	1.00	43	6,060	3,533	3,533	1.79	1.10	179.88	0.763	0.796	0.383	N/A	N/A	NO	N/A	N/A	N/A	32.6	N/A	0.072	0.01	0.00
51.50	264.07	3.79	1.44	sand to silty sand	-26.0	1.00	66	6,180	3,590	3,590	1.81	1.12	220.21	0.755	0.791	0.380	N/A	N/A	NO	N/A	N/A	N/A	54.1	N/A	0.000	0.00	0.00
52.50	319.74	2.58	0.81	sand	-27.0	1.00	64	6,300	3,648	3,648	1.58	1.00	236.75	0.747	0.786	0.377	N/A	N/A	NO	N/A	N/A	N/A	47.3	N/A	0.000	0.00	0.00
53.50	283.11	3.43	1.21	sand	-28.0	1.00	57	6,420	3,706	3,706	1.74	1.07	221.89	0.739	0.781	0.374	N/A	N/A	NO	N/A	N/A	N/A	41.6	N/A	0.000	0.00	0.00
54.50	338.81	3.55	1.05	sand	-29.0	1.00	68	6,540	3,763	3,763	1.65	1.00	247.15	0.730	0.777	0.371	N/A	N/A	NO	N/A	N/A	N/A	49.4	N/A	0.000	0.00	0.00
55.50	388.95	2.56	0.66	gravelly sand to sand	-30.0	1.00	65	6,660	3,821	3,821	1.46	1.00	281.41	0.722	0.772	0.368	N/A	N/A	NO	N/A	N/A	N/A	46.9	N/A	0.000	0.00	0.00
56.50	349.05	3.65	1.05	sand	-31.0	1.00	70	6,780	3,878	3,878	1.64	1.00	249.83	0.714	0.767	0.365	N/A	N/A	NO	N/A	N/A	N/A	50.1	N/A	0.000	0.00	0.00
57.50	301.77	3.83	1.27	sand	-32.0	1.00	60	6,900	3,936	3,936	1.75	1.07	230.32	0.706	0.763	0.362	N/A	N/A	NO	N/A	N/A	N/A	43.0	N/A	0.000	0.00	0.00
58.50	318.61	4.63	1.46	sand	-33.0	1.00	64	7,020	3,994	3,994	1.78	1.09	246.46	0.698	0.758	0.359	N/A	N/A	NO	N/A	N/A	N/A	45.1	N/A	0.000	0.00	0.00
59.50	353.81	4.95	1.40	sand	-34.0	1.00	71	7,140	4,051	4,051	1.74	1.07	264.93	0.690	0.754	0.356	N/A	N/A	NO	N/A	N/A	N/A	49.7	N/A	0.000	0.00	0.00
60.50	351.86	4.89	1.39	sand	-35.0	1.00	70	7,260	4,109	4,109	1.74	1.07	261.82	0.682	0.750	0.352	N/A	N/A	NO	N/A	N/A	N/A	49.1	N/A	0.000	0.00	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-022

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	26.00	ft
GWT Elev. During Test	16.00	ft
GWT Elev. For Design	16.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \to \infty}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	10.00 ft below ground surface
GWT Depth For Design, Zwd =	10.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	10.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.12 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.12 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	92.69	0.94	1.02	sand to silty sand	25.0	1.00	23	60	60	60	1.43	1.00	535.12	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	43.8	0.016	0.000	0.00	0.12
1.50	242.67	1.70	0.70	sand	24.0	1.66	80	180	180	180	0.91	1.00	1,339.35	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	136.6	0.019	0.000	0.00	0.12
2.50	51.35	1.29	2.51	sandy silt to clayey silt	23.0	1.66	34	300	300	300	1.80	1.11	242.79	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	74.4	N/A	N/A	N/A	0.12
3.50	21.29	0.70	3.28	clayey silt to silty clay	22.0	1.00	11	420	420	420	2.51	2.80	130.15	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
4.50	13.22	0.54	4.09	clay	21.0	1.00	13	540	540	540	2.66	N/A	N/A	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
5.50	22.23	0.67	3.01	clayey silt to silty clay	20.0	1.66	18	660	660	660	2.23	1.74	111.56	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
6.50	10.35	0.38	3.67	clay	19.0	1.00	10	780	780	780	2.80	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
7.50	11.17	0.33	2.96	silty clay to clay	18.0	1.00	7	900	900	900	2.76	N/A	N/A	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
8.50	8.23	0.50	6.05	clay	17.0	1.00	8	1,020	1,020	1,020	3.09	N/A	N/A	0.980	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
9.50	9.18	0.48	5.30	clay	16.0	1.00	9	1,140	1,140	1,140	3.05	N/A	N/A	0.978	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
10.50	21.54	0.58	2.71	clayey silt to silty clay	15.0	1.00	11	1,260	1,229	1,229	2.59	3.24	100.59	0.976	1.000	0.293	0.175	0.712	YES	2.8	16.5	> 800	N/A	N/A	0.000	0.00	0.12
11.50	35.48	0.61	1.72	sandy silt to clayey silt	14.0	1.66	23	1,380	1,286	1,286	2.03	1.34	98.26	0.973	1.000	0.305	0.168	0.657	YES	2.8	32.1	> 800	40.2	N/A	0.000	0.00	0.12
12.50	11.42	0.43	3.80	clay	13.0	1.00	11	1,500	1,344	1,344	2.92	N/A	N/A	0.971	N/A	0.317	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
13.50	12.05	0.56	4.76	clay	12.0	1.00	12	1,620	1,402	1,402	2.97	N/A	N/A	0.969	N/A	0.327	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
14.50	11.53	0.48	4.35	clay	11.0	1.00	12	1,740	1,459	1,459	2.97	N/A	N/A	0.966	N/A	0.337	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
15.50	13.09	0.48	3.80	clay	10.0	1.00	13	1,860	1,517	1,517	2.90	N/A	N/A	0.964	N/A	0.346	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
16.50	9.38	0.29	3.31	clay	9.0	1.00	9	1,980	1,574	1,574	2.99	N/A	N/A	0.962	N/A	0.354	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
17.50	9.87	0.37	4.05	clay	8.0	1.00	10	2,100	1,632	1,632	3.04	N/A	N/A	0.959	N/A	0.361	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
18.50	7.71	0.31	4.22	clay	7.0	1.00	8	2,220	1,690	1,690	3.15	N/A	N/A	0.957	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
19.50	13.11	0.50	3.93	clay	6.0	1.00	13	2,340	1,747	1,747	2.95	N/A	N/A	0.955	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
20.50	27.23	1.04	3.84	silty clay to clay	5.0	1.00	18	2,460	1,805	1,805	2.71	N/A	N/A	0.952	N/A	0.380	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
21.50	25.29	1.39	5.53	clay	4.0	1.00	25	2,580	1,862	1,862	2.85	N/A	N/A	0.950	N/A	0.385	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
22.50	53.31	1.21	2.28	sandy silt to clayey silt	3.0	1.00	21	2,700	1,920	1,920	2.35	2.13	115.65	0.948	1.000	0.390	0.224	0.685	YES	2.8	24.6	> 800	31.1	N/A	0.090	0.01	0.11
23.50	136.15	1.68	1.23	sand to silty sand	2.0	1.00	34	2,820	1,978	1,978	1.87	1.16	159.46	0.945	1.000	0.394	0.457	1.383	NO	N/A	N/A	N/A	38.4	N/A	0.017	0.00	0.10
24.50	255.77	1.86	0.73	sand	1.0	1.00	51	2,940	2,035	2,035	1.52	1.00	253.55	0.943	0.993	0.398	N/A	N/A	NO	N/A	N/A	N/A	50.7	N/A	0.000	0.00	0.10
25.50	264.43	1.86	0.70	sand	0.0	1.00	53	3,060	2,093	2,093	1.50	1.00	258.50	0.941	0.982	0.402	N/A	N/A	NO	N/A	N/A	N/A	51.7	N/A	0.000	0.00	0.10
26.50	265.47	1.69	0.64	sand	-1.0	1.00	53	3,180	2,150	2,150	1.48	1.00	256.02	0.938	0.971	0.406	N/A	N/A	NO	N/A	N/A	N/A	51.2	N/A	0.000	0.00	0.10
27.50	204.61	1.52	0.74	sand	-2.0	1.66	68	3,300	2,208	2,208	1.30	1.00	322.42	0.936	0.961	0.409	N/A	N/A	NO	N/A	N/A	N/A	64.5	N/A	0.000	0.00	0.10
28.50	73.26	2.30	3.14	sandy silt to clayey silt	-3.0	1.66	49	3,420	2,266	2,266	2.06	1.39	158.61	0.934	0.951	0.412	0.451	1.242	NO	N/A	N/A	N/A	59.7	N/A	0.000	0.00	0.10
29.50	30.27	1.44	4.78	clay	-4.0	1.00	30	3,540	2,323	2,323	2.80	N/A	N/A	0.931	N/A	0.415	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
30.50	54.94	2.27	4.16	clayey silt to silty clay	-5.0	1.00	27	3,660	2,381	2,381	2.56	3.09	155.54	0.926	0.937	0.416	0.430	1.154	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.10
31.50	30.59	1.23	4.04	silty clay to clay	-6.0	1.00	20	3,780	2,438	2,438	2.76	N/A	N/A	0.918	N/A	0.416	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
32.50	18.93	0.92	5.03	clay	-7.0	1.00	19	3,900	2,496	2,496	2.99	N/A	N/A	0.909	N/A	0.416	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
33.50	27.11	1.22	4.55	clay	-8.0	1.00	27	4,020	2,554	2,554	2.85	N/A	N/A	0.901	N/A	0.415	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
34.50	29.32	1.29	4.51	silty clay to clay	-9.0	1.00	20	4,140	2,611	2,611	2.82	N/A	N/A	0.893	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
35.50	80.17	1.15	1.44	silty sand to sandy silt	-10.0	1.66	44	4,260	2,669	2,669	1.83	1.13	129.69	0.885	0.891	0.413	0.283	0.727	YES	2.8	41.1	> 800	51.0	N/A	0.000	0.00	0.10
36.50	21.88	1.01	4.66	clay	-11.0	1.00	22	4,380	2,726	2,726	2.95	N/A	N/A	0.877	N/A	0.412	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
37.50	14.47	0.71	5.18	clay	-12.0	1.00	14	4,500	2,784	2,784	3.13	N/A	N/A	0.869	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
38.50	14.33	0.72	5.42	clay	-13.0	1.00	14	4,620	2,842	2,842	3.14	N/A	N/A	0.861	N/A	0.409	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
39.50	18.19	0.86	5.02	clay	-14.0	1.00	18	4,740	2,899	2,899	3.04	N/A	N/A	0.852	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
40.50	74.45	1.95	2.63	sandy silt to clayey silt	-15.0	1.00	30	4,860	2,957	2,957	2.36	2.15	131.79	0.844	0.865	0.406	0.293	0.744	YES	2.8	27.3	> 800	34.4	N/A	0.061	0.01	0.10
41.50	185.36	2.84	1.53	sand to silty sand	-16.0	1.00	46	4,980	3,014	3,014	1.91	1.20	181.25	0.836	0.849	0.404	N/A	N/A	NO	N/A	N/A	N/A	42.1	N/A	0.000	0.00	0.10
42.50	269.54	2.79	1.04	sand	-17.0	1.66	89	5,100	3,072	3,072	1.37	1.00	360.11	0.828	0.842	0.402	N/A	N/A	NO	N/A	N/A	N/A	72.0	N/A	0.000	0.00	0.10
43.50	128.45	1.87	1.46	sand to silty sand	-18.0	1.66	53	5,220	3,130	3,130	1.70	1.04	176.89	0.820	0.836	0.400	N/A	N/A	NO	N/A	N/A	N/A	47.0	N/A	0.000	0.00	0.10
44.50	30.52	1.26	4.14	silty clay to clay	-19.0	1.00	20	5,340	3,187	3,187	2.84	N/A	N/A	0.812	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10
45.50	86.24	1.47	1.72	silty sand to sandy silt	-20.0	1.00	29	5,460	3,245	3,245	2.20	1.66	112.71	0.804	0.842	0.396	0.213	0.541	YES	2.8	25.4	> 800	32.1	N/A	0.082	0.01	0.09
46.50	154.69	2.29	1.48	sand to silty sand	-21.0	1.00	39	5,580	3,302	3,302	1.97	1.26	152.11	0.795	0.818	0.393	0.407	1.011	YES	1.3	31.4	> 800	34.0	N/A	0.061	0.01	0.08
47.50	154.00	2.19	1.42	sand to silty sand	-22.0	1.00	39	5,700	3,360	3,360	1.96	1.25	149.09	0.787	0.813	0.391	0.388	0.963	YES	1.3	31.0	> 800	33.6	N/A	0.065	0.01	0.07
48.50	178.65	1.64	0.92	sand	-23.0	1.00	36	5,820	3,418	3,418	1.79	1.10	150.12	0.779	0.811	0.388	0.395	0.983	YES	0.0	27.3	> 800	27.3	N/A	0.478	0.06	0.01
49.50	105.06	1.96	1.87	silty sand to sandy silt	-24.0	1.00	35	5,940	3,475	3,475	2.17	1.60	127.75	0.771	0.808	0.385	0.274	0.685	YES	2.8	29.4	> 800	36.9	N/A	0.031	0.00	0.01
50.50	212.12	2.65	1.25	sand	-25.0	1.00	42	6,060	3,533	3,533	1.83	1.13	180.45	0.763	0.796	0.383	N/A	N/A	NO	N/A	N/A	N/A	31.9	N/A	0.079	0.01	0.00
51.50	314.02	3.26	1.04	sand	-26.0	1.00	63	6,180	3,590	3,590	1.66	1.01	236.44	0.755	0.791	0.380	N/A	N/A	NO	N/A	N/A	N/A	46.9	N/A	0.000	0.00	0.00
52.50	357.96	3.08	0.86	sand	-27.0	1.00	72	6,300	3,648	3,648	1.56	1.00	265.05	0.747	0.786	0.377	N/A	N/A	NO	N/A	N/A	N/A	53.0	N/A	0.000	0.00	0.00
53.50	334.58	2.45	0.73	gravelly sand to sand	-28.0	1.00	56	6,420	3,706	3,706	1.53	1.00	245.80	0.739	0.781	0.374	N/A	N/A	NO	N/A	N/A	N/A	41.0	N/A	0.000	0.00	0.00
54.50	366.18	2.16	0.59	gravelly sand to sand	-29.0	1.00	61	6,540	3,763	3,763	1.44	1.00	266.95	0.730	0.777	0.371	N/A	N/A	NO	N/A	N/A	N/A	44.5	N/A	0.000	0.00	0.00
55.50	292.79	2.55	0.87	sand	-30.0	1.00	59	6,660	3,821	3,821	1.63	1.00	211.83	0.722	0.772	0.368	N/A	N/A	NO	N/A	N/A	N/A	42.4	N/A	0.000	0.00	0.00
56.50	311.60	3.45	1.11	sand	-31.0	1.00	62	6,780	3,878	3,878	1.69	1.03	231.15	0.714	0.767	0.365	N/A	N/A	NO	N/A	N/A	N/A	44.8	N/A	0.000	0.00	0.00
57.50	312.26	3.31	1.06	sand	-32.0	1.00	62	6,900	3,936	3,936	1.68	1.02	227.98	0.706	0.763	0.362	N/A	N/A	NO	N/A	N/A	N/A	44.5	N/A	0.000	0.00	0.00
58.50	381.97	2.60	0.68	gravelly sand to sand	-33.0	1.00	64	7,020	3,994	3,994	1.48	1.00	270.31	0.698	0.758	0.359	N/A	N/A	NO	N/A	N/A	N/A	45.1	N/A	0.000	0.00	0.00
59.50	383.49	2.04	0.53	gravelly sand to sand	-34.0	1.00	64	7,140	4,051	4,051	1.41	1.00	269.45	0.690	0.754	0.356	N/A	N/A	NO	N/A	N/A	N/A	44.9	N/A	0.000	0.00	0.00
60.50	355.58	1.71	0.48	gravelly sand to sand	-35.0	1.00	59	7,260	4,109	4,109	1.41	1.00	248.09	0.682	0.750	0.352	N/A	N/A	NO	N/A	N/A	N/A	41.3	N/A	0.000	0.00	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-102

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	20.00 ft
GWT Elev. During Test	12.00 ft
GWT Elev. For Design	12.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.45 g
Required Factor of Safety	1.10

REFERENCES

\+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\ A_{max}\ (\sigma_v/\sigma_v')\ r_d$

+++ $FS = (CRR_{7.5}/CSR)\ MSF\ K_\sigma\ K_\alpha$ ---> where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	8.00 ft below ground surface
GWT Depth For Design, Zwd =	8.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	9.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.12 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.12 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) $\sigma_{v'}$ (psf)	Effective Vert. Stress (Test) $\sigma_{v'}$ (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_i (in.)	Cumulative Settlement Profile (in.)
0.50	237.13	2.20	0.93	sand	19.0	1.00	47	60	60	60	1.23	1.00	1,369.08	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	80.6	0.013	0.000	0.00	0.12
1.50	277.40	2.80	1.01	sand	18.0	1.66	92	180	180	180	1.04	1.00	1,531.01	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	156.2	0.018	0.000	0.00	0.12
2.50	69.53	1.49	2.14	silty sand to sandy silt	17.0	1.66	38	300	300	300	1.66	1.01	301.06	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	83.3	0.028	0.000	0.00	0.12
3.50	27.53	1.05	3.87	silty clay to clay	16.0	1.00	18	420	420	420	2.47	2.63	158.26	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
4.50	72.91	2.71	3.74	clayey silt to silty clay	15.0	1.00	36	540	540	540	2.23	1.74	243.56	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
5.50	83.03	2.33	2.81	sandy silt to clayey silt	14.0	1.66	55	660	660	660	1.82	1.12	267.55	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	117.2	N/A	N/A	N/A	0.12
6.50	13.04	0.58	4.41	clay	13.0	1.00	13	780	780	780	2.78	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
7.50	10.31	0.43	4.14	clay	12.0	1.00	10	900	900	900	2.88	N/A	N/A	0.983	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
8.50	18.95	0.67	3.51	silty clay to clay	11.0	1.00	13	1,020	989	989	2.65	N/A	N/A	0.980	N/A	0.296	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
9.50	27.41	0.98	3.59	clayey silt to silty clay	10.0	1.66	23	1,140	1,046	1,046	2.29	1.91	119.92	0.978	1.000	0.312	0.240	0.920	YES	2.8	34.2	> 800	N/A	N/A	0.000	0.00	0.12
10.50	9.96	0.47	4.71	clay	9.0	1.00	10	1,260	1,104	1,104	2.98	N/A	N/A	0.976	N/A	0.326	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
11.50	13.19	0.50	3.80	silty clay to clay	8.0	1.00	9	1,380	1,162	1,162	2.84	N/A	N/A	0.973	N/A	0.338	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
12.50	47.69	1.03	2.15	sandy silt to clayey silt	7.0	1.66	32	1,500	1,219	1,219	1.98	1.28	129.45	0.971	1.000	0.349	0.282	0.962	YES	2.8	43.2	> 800	53.5	N/A	0.000	0.00	0.12
13.50	12.86	0.45	3.51	silty clay to clay	6.0	1.00	9	1,620	1,277	1,277	2.85	N/A	N/A	0.969	N/A	0.359	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
14.50	8.39	0.40	4.72	clay	5.0	1.00	8	1,740	1,334	1,334	3.10	N/A	N/A	0.966	N/A	0.369	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
15.50	7.08	0.36	5.10	clay	4.0	1.00	7	1,860	1,392	1,392	3.19	N/A	N/A	0.964	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
16.50	9.99	0.46	4.69	clay	3.0	1.00	10	1,980	1,450	1,450	3.05	N/A	N/A	0.962	N/A	0.384	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
17.50	10.40	0.54	5.29	clay	2.0	1.00	10	2,100	1,507	1,507	3.08	N/A	N/A	0.959	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
18.50	7.56	0.32	4.38	clay	1.0	1.00	8	2,220	1,565	1,565	3.16	N/A	N/A	0.957	N/A	0.397	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
19.50	8.53	0.35	4.28	clay	0.0	1.00	9	2,340	1,622	1,622	3.12	N/A	N/A	0.955	N/A	0.403	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
20.50	11.35	0.48	4.37	clay	-1.0	1.00	11	2,460	1,680	1,680	3.03	N/A	N/A	0.952	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
21.50	12.43	0.51	4.22	clay	-2.0	1.00	12	2,580	1,738	1,738	2.99	N/A	N/A	0.950	N/A	0.413	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
22.50	13.03	0.49	3.97	clay	-3.0	1.00	13	2,700	1,795	1,795	2.96	N/A	N/A	0.948	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
23.50	12.96	0.67	5.44	clay	-4.0	1.00	13	2,820	1,853	1,853	3.06	N/A	N/A	0.945	N/A	0.421	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
24.50	13.35	0.72	5.57	clay	-5.0	1.00	13	2,940	1,910	1,910	3.07	N/A	N/A	0.943	N/A	0.424	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
25.50	14.03	0.64	4.69	clay	-6.0	1.00	14	3,060	1,968	1,968	3.01	N/A	N/A	0.941	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
26.50	22.05	1.46	6.77	clay	-7.0	1.00	22	3,180	2,026	2,026	2.97	N/A	N/A	0.938	N/A	0.431	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
27.50	26.59	1.61	6.15	clay	-8.0	1.00	27	3,300	2,083	2,083	2.89	N/A	N/A	0.936	N/A	0.434	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
28.50	19.80	1.15	5.94	clay	-9.0	1.00	20	3,420	2,141	2,141	2.98	N/A	N/A	0.934	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
29.50	95.83	1.52	1.59	silty sand to sandy silt	-10.0	1.00	32	3,540	2,198	2,198	2.08	1.42	129.44	0.931	0.963	0.439	0.282	0.738	YES	2.8	33.3	> 800	41.6	N/A	0.000	0.00	0.12
30.50	65.83	2.43	3.70	clayey silt to silty clay	-11.0	1.66	54	3,660	2,256	2,256	2.15	1.55	158.80	0.926	0.953	0.439	0.452	1.171	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.12
31.50	21.13	1.13	5.38	clay	-12.0	1.00	21	3,780	2,314	2,314	2.96	N/A	N/A	0.918	N/A	0.439	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
32.50	12.62	0.63	5.24	clay	-13.0	1.00	13	3,900	2,371	2,371	3.14	N/A	N/A	0.909	N/A	0.438	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
33.50	38.48	1.19	3.11	clayey silt to silty clay	-14.0	1.66	32	4,020	2,429	2,429	2.28	1.87	108.33	0.901	0.925	0.436	0.198	0.501	YES	2.8	31.7	> 800	N/A	N/A	0.000	0.00	0.12
34.50	14.65	0.70	4.86	clay	-15.0	1.00	15	4,140	2,486	2,486	3.08	N/A	N/A	0.893	N/A	0.435	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
35.50	46.06	1.07	2.33	sandy silt to clayey silt	-16.0	1.66	31	4,260	2,544	2,544	2.14	1.54	103.89	0.885	0.910	0.433	0.184	0.462	YES	2.8	29.8	> 800	37.5	N/A	0.031	0.00	0.11
36.50	22.96	1.02	4.53	clay	-17.0	1.00	23	4,380	2,602	2,602	2.91	N/A	N/A	0.877	N/A	0.432	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
37.50	52.30	1.46	2.81	sandy silt to clayey silt	-18.0	1.00	21	4,500	2,659	2,659	2.48	2.65	120.14	0.869	0.913	0.430	0.241	0.611	YES	2.8	20.9	> 800	26.8	N/A	0.942	0.11	0.00
38.50	118.30	2.45	2.07	silty sand to sandy silt	-19.0	1.00	39	4,620	2,717	2,717	2.13	1.51	152.98	0.861	0.885	0.428	0.413	1.018	YES	2.8	36.6	> 800	45.6	N/A	0.000	0.00	0.00
39.50	88.59	2.24	2.53	sandy silt to clayey silt	-20.0	1.00	35	4,740	2,774	2,774	2.28	1.89	142.39	0.852	0.877	0.426	0.348	0.856	YES	2.8	32.9	> 800	41.1	N/A	0.000	0.00	0.00
40.50	86.15	2.16	2.51	sandy silt to clayey silt	-21.0	1.00	34	4,860	2,832	2,832	2.29	1.92	139.24	0.844	0.870	0.424	0.331	0.811	YES	2.8	31.8	> 800	39.8	N/A	0.003	0.00	0.00
41.50	66.00	3.93	5.99	very stiff fine grained (*)	-22.0	1.00	66	4,980	2,890	2,890	2.68	N/A	N/A	0.836	N/A	0.422	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
42.50	39.80	1.98	5.05	clay	-23.0	1.00	40	5,100	2,947	2,947	2.79	N/A	N/A	0.828	N/A	0.419	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
43.50	24.85	1.05	4.26	silty clay to clay	-24.0	1.00	17	5,220	3,005	3,005	2.91	N/A	N/A	0.820	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
44.50	20.97	0.98	4.75	clay	-25.0	1.00	21	5,340	3,062	3,062	3.00	N/A	N/A	0.812	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
45.50	24.31	1.17	5.00	clay	-26.0	1.00	24	5,460	3,120	3,120	2.96	N/A	N/A	0.804	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
46.50	25.15	1.10	4.59	clay	-27.0	1.00	25	5,580	3,178	3,178	2.93	N/A	N/A	0.795	N/A	0.409	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
47.50	24.41	1.02	4.39	clay	-28.0	1.00	24	5,700	3,235	3,235	2.93	N/A	N/A	0.787	N/A	0.406	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	41.42	2.45	6.05	clay	-29.0	1.00	41	5,820	3,293	3,293	2.86	N/A	N/A	0.779	N/A	0.403	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	28.91	1.13	4.05	silty clay to clay	-30.0	1.00	19	5,940	3,350	3,350	2.86	N/A	N/A	0.771	N/A	0.400	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-104

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	19.50	ft
GWT Elev. During Test	13.00	ft
GWT Elev. For Design	13.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw = 6.50 ft below ground surface

GWT Depth For Design, Zwd = 6.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils = 11.00 feet

Earthquake-Induced Settlements:

- Liquefaction-Induced Settlement = 0.85 inches <--- Saturated Sands
- Seismic Compaction Settlement = 0.00 inches <--- Dry or Unsaturated Sands

Total: 0.85 inches

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +																RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	187.32	1.95	1.04	sand	18.5	1.00	37	60	60	60	1.31	1.00	1,081.48	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	63.7	0.014	0.000	0.00	0.85
1.50	414.75	3.90	0.94	sand	17.5	1.66	137	180	180	180	0.98	1.00	2,289.06	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	233.5	0.016	0.000	0.00	0.85
2.50	155.42	1.72	1.11	sand	16.5	1.66	51	300	300	300	1.23	1.00	664.44	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	87.5	0.028	0.000	0.00	0.85
3.50	42.77	0.88	2.06	sandy silt to clayey silt	15.5	1.66	28	420	420	420	1.84	1.13	175.21	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	62.8	N/A	N/A	N/A	0.85
4.50	19.22	0.84	4.37	clay	14.5	1.00	19	540	540	540	2.57	3.12	160.06	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
5.50	14.69	0.73	5.00	clay	13.5	1.00	15	660	660	660	2.74	N/A	N/A	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
6.50	9.92	0.44	4.46	clay	12.5	1.00	10	780	780	780	2.87	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
7.50	13.39	0.44	3.30	silty clay to clay	11.5	1.00	9	900	838	838	2.70	N/A	N/A	0.983	N/A	0.309	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
8.50	8.38	0.37	4.37	clay	10.5	1.00	8	1,020	895	895	2.96	N/A	N/A	0.980	N/A	0.327	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
9.50	9.38	0.41	4.40	clay	9.5	1.00	9	1,140	953	953	2.94	N/A	N/A	0.978	N/A	0.342	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
10.50	10.89	0.42	3.91	clay	8.5	1.00	11	1,260	1,010	1,010	2.87	N/A	N/A	0.976	N/A	0.356	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
11.50	13.18	0.50	3.79	silty clay to clay	7.5	1.00	9	1,380	1,068	1,068	2.81	N/A	N/A	0.973	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
12.50	10.42	0.42	4.12	clay	6.5	1.00	10	1,500	1,126	1,126	2.93	N/A	N/A	0.971	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
13.50	11.89	0.62	5.30	clay	5.5	1.00	12	1,620	1,183	1,183	2.97	N/A	N/A	0.969	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
14.50	12.84	0.70	5.54	clay	4.5	1.00	13	1,740	1,241	1,241	2.97	N/A	N/A	0.966	N/A	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
15.50	12.23	0.70	5.84	clay	3.5	1.00	12	1,860	1,298	1,298	3.01	N/A	N/A	0.964	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
16.50	9.20	0.40	4.49	clay	2.5	1.00	9	1,980	1,356	1,356	3.05	N/A	N/A	0.962	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
17.50	12.82	0.57	4.55	clay	1.5	1.00	13	2,100	1,414	1,414	2.95	N/A	N/A	0.959	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
18.50	13.20	0.54	4.25	clay	0.5	1.00	13	2,220	1,471	1,471	2.93	N/A	N/A	0.957	N/A	0.422	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
19.50	10.93	0.31	3.01	silty clay to clay	-0.5	1.00	7	2,340	1,529	1,529	2.91	N/A	N/A	0.955	N/A	0.427	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
20.50	25.12	1.03	4.15	silty clay to clay	-1.5	1.00	17	2,460	1,586	1,586	2.72	N/A	N/A	0.952	N/A	0.432	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
21.50	15.38	0.60	4.00	clay	-2.5	1.00	15	2,580	1,644	1,644	2.89	N/A	N/A	0.950	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
22.50	14.42	0.76	5.38	clay	-3.5	1.00	14	2,700	1,702	1,702	3.00	N/A	N/A	0.948	N/A	0.440	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
23.50	11.07	0.58	5.41	clay	-4.5	1.00	11	2,820	1,759	1,759	3.11	N/A	N/A	0.945	N/A	0.443	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
24.50	14.13	0.62	4.59	clay	-5.5	1.00	14	2,940	1,817	1,817	2.98	N/A	N/A	0.943	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
25.50	14.12	0.52	3.86	silty clay to clay	-6.5	1.00	9	3,060	1,874	1,874	2.94	N/A	N/A	0.941	N/A	0.449	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
26.50	11.41	0.54	5.01	clay	-7.5	1.00	11	3,180	1,932	1,932	3.10	N/A	N/A	0.938	N/A	0.452	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.85
27.50	59.58	0.95	1.61	silty sand to sandy silt	-8.5	1.00	20	3,300	1,990	1,990	2.22	1.72	102.64	0.936	1.000	0.454	0.181	0.474	YES	2.8	22.7	> 800	28.9	N/A	0.617	0.07	0.78
28.50	79.49	1.65	2.07	silty sand to sandy silt	-9.5	1.00	26	3,420	2,047	2,047	2.21	1.68	132.22	0.934	0.991	0.456	0.295	0.764	YES	2.8	29.0	> 800	36.4	N/A	0.046	0.01	0.77
29.50	44.98	1.34	2.98	sandy silt to clayey silt	-10.5	1.00	18	3,540	2,105	2,105	2.50	2.79	122.23	0.931	0.984	0.458	0.250	0.640	YES	2.8	20.3	> 800	26.0	N/A	1.066	0.13	0.64
30.50	24.21	0.97	4.05	silty clay to clay	-11.5	1.00	16	3,660	2,162	2,162	2.81	N/A	N/A	0.926	N/A	0.458	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
31.50	19.80	0.67	3.43	clayey silt to silty clay	-12.5	1.00	10	3,780	2,220	2,220	2.84	N/A	N/A	0.918	N/A	0.457	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
32.50	17.30	0.60	3.53	silty clay to clay	-13.5	1.00	12	3,900	2,278	2,278	2.91	N/A	N/A	0.909	N/A	0.455	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
33.50	14.98	0.51	3.53	silty clay to clay	-14.5	1.00	10	4,020	2,335	2,335	2.96	N/A	N/A	0.901	N/A	0.454	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
34.50	18.47	0.81	4.54	clay	-15.5	1.00	18	4,140	2,393	2,393	2.96	N/A	N/A	0.893	N/A	0.452	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
35.50	179.20	1.50	0.84	sand	-16.5	1.00	36	4,260	2,450	2,450	1.71	1.04	168.66	0.885	0.922	0.450	N/A	N/A	NO	N/A	N/A	N/A	32.4	N/A	0.097	0.01	0.63
36.50	137.27	1.22	0.89	sand	-17.5	1.66	45	4,380	2,508	2,508	1.50	1.00	202.97	0.877	0.913	0.448	N/A	N/A	NO	N/A	N/A	N/A	40.6	N/A	0.000	0.00	0.63
37.50	33.61	0.92	2.73	sandy silt to clayey silt	-18.5	1.00	13	4,500	2,566	2,566	2.63	N/A	N/A	0.869	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.63
38.50	54.49	1.73	3.19	sandy silt to clayey silt	-19.5	1.00	22	4,620	2,623	2,623	2.50	2.76	131.46	0.861	0.915	0.443	0.291	0.717	YES	2.8	21.8	> 800	27.8	N/A	0.781	0.09	0.54
39.50	39.78	1.89	4.77	silty clay to clay	-20.5	1.00	27	4,740	2,681	2,681	2.75	N/A	N/A	0.852	N/A	0.441	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.54
40.50	93.72	1.36	1.46	sand to silty sand	-21.5	1.00	23	4,860	2,738	2,738	2.10	1.45	116.07	0.844	0.900	0.438	0.225	0.552	YES	1.3	21.4	> 800	23.5	N/A	1.248	0.15	0.39
41.50	124.26	1.36	1.10	sand to silty sand	-22.5	1.00	31	4,980	2,796	2,796	1.93	1.21	127.56	0.836	0.879	0.436	0.273	0.657	YES	1.3	27.6	> 800	30.0	N/A	0.247	0.03	0.36
42.50	99.81	1.19	1.20	sand to silty sand	-23.5	1.00	25	5,100	2,854	2,854	2.03	1.34	111.66	0.828	0.885	0.433	0.209	0.511	YES	1.3	22.2	> 800	24.4	N/A	1.171	0.14	0.22
43.50	68.74	1.36	1.98	silty sand to sandy silt	-24.5	1.00	23	5,220	2,911	2,911	2.30	1.95	111.04	0.820	0.885	0.430	0.207	0.509	YES	2.8	21.8	> 800	27.8	N/A	0.711	0.09	0.13
44.50	98.75	1.55	1.57	silty sand to sandy silt	-25.5	1.00	33	5,340	2,969	2,969	2.12	1.48	120.20	0.812	0.857	0.427	0.242	0.578	YES	2.8	29.8	> 800	37.4	N/A	0.030	0.00	0.13
45.50	100.33	1.00	1.00	sand to silty sand	-26.5	1.66	42	5,460	3,026	3,026	1.67	1.02	137.84	0.804	0.847	0.424	0.324	0.771	YES	1.3	35.1	> 800	37.9	N/A	0.025	0.00	0.13
46.50	35.30	0.99	2.81	sandy silt to clayey silt	-27.5	1.00	14	5,580	3,084	3,084	2.67	N/A	N/A	0.795	N/A	0.421	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.13
47.50	204.89	1.87	0.92	sand	-28.5	1.00	41	5,700	3,142	3,142	1.73	1.06	172.78	0.787	0.835	0.418	N/A	N/A	NO	N/A	N/A	N/A	32.7	N/A	0.084	0.01	0.12
48.50	329.32	2.11	0.64	gravelly sand to sand	-29.5	1.00	55	5,820	3,199	3,199	1.47	1.00	260.39	0.779	0.829	0.415	N/A	N/A	NO	N/A	N/A	N/A	43.4	N/A	0.000	0.00	0.12
49.50	167.71	1.60	0.96	sand	-30.5	1.00	34	5,940	3,257	3,257	1.81	1.12	146.61	0.771	0.829	0.411	0.373	0.897	YES	0.0	26.3	> 800	26.3	N/A	0.969	0.12	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-107

GENERAL INPUT DATA		
Ground Surf. Elev. During Test	20.50	ft
GWT Elev. During Test	14.00	ft
GWT Elev. For Design	14.00	ft
Total Soil Unit Weight, γ_t	120.00	pcf
Earthquake Magnitude, M_{eq}	7.00	
Peak Ground Acceleration, A_{max}	0.45	g
Required Factor of Safety	1.10	

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	6.50 ft below ground surface
GWT Depth For Design, Zwd =	6.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	9.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.25 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.25 inches	

INPUT SOIL PROFILE (CPT DATA)

Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)
0.50	158.39	1.49	0.94	sand
1.50	239.24	2.01	0.84	sand
2.50	103.94	2.84	2.74	sandy silt to clayey silt
3.50	96.22	3.57	3.72	clayey silt to silty clay
4.50	28.59	1.27	4.45	silty clay to clay
5.50	6.56	0.31	4.82	clay
6.50	10.61	0.62	5.82	clay
7.50	15.48	0.79	5.16	clay
8.50	28.24	0.87	3.09	clayey silt to silty clay
9.50	14.33	0.59	4.12	clay
10.50	9.55	0.53	5.54	clay
11.50	10.12	0.54	5.39	clay
12.50	8.89	0.43	4.89	clay
13.50	8.94	0.46	5.17	clay
14.50	7.13	0.36	5.11	clay
15.50	13.48	0.70	5.19	clay
16.50	13.33	0.70	5.31	clay
17.50	10.31	0.45	4.36	clay
18.50	13.21	0.54	4.12	clay
19.50	20.12	0.80	4.02	silty clay to clay
20.50	50.15	1.61	3.21	clayey silt to silty clay
21.50	25.62	0.96	3.78	silty clay to clay
22.50	29.93	1.24	4.16	silty clay to clay
23.50	37.22	1.64	4.43	silty clay to clay
24.50	17.53	0.81	4.66	clay
25.50	18.78	0.69	3.74	silty clay to clay
26.50	9.70	0.44	4.64	clay
27.50	11.17	0.58	5.33	clay
28.50	42.51	0.94	2.23	sandy silt to clayey silt
29.50	27.35	0.85	3.15	clayey silt to silty clay
30.50	8.91	0.38	4.40	clay
31.50	10.08	0.40	4.16	clay
32.50	39.67	1.56	3.97	clayey silt to silty clay
33.50	36.20	1.74	4.80	clay
34.50	10.83	0.61	5.73	clay
35.50	60.66	1.24	2.06	silty sand to sandy silt
36.50	90.93	1.80	1.98	silty sand to sandy silt
37.50	38.37	2.19	5.75	clay
38.50	83.83	3.46	4.14	clayey silt to silty clay
39.50	13.05	0.62	4.86	clay
40.50	12.84	0.40	3.18	silty clay to clay
41.50	39.41	1.71	4.48	silty clay to clay
42.50	51.64	3.20	6.34	clay
43.50	26.06	1.43	5.63	clay
44.50	21.70	1.08	5.05	clay
45.50	26.39	1.32	5.04	clay
46.50	53.83	2.71	5.10	silty clay to clay
47.50	42.82	2.32	5.53	clay
48.50	93.02	3.30	3.56	sandy silt to clayey silt
49.50	68.38	2.75	4.07	clayey silt to silty clay

SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) + | **RESIDUAL STRENGTH *** | **GROUND SETTLEMENT ****

Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio ++ $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
19.5	1.00	32	60	60	60	1.30	1.00	914.44	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	53.9	0.015	0.000	0.00	0.25
18.5	1.66	79	180	180	180	0.99	1.00	1,320.42	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	134.7	0.019	0.000	0.00	0.25
17.5	1.00	42	300	300	300	1.96	1.25	335.01	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	89.8	N/A	N/A	N/A	0.25
16.5	1.66	80	420	420	420	1.83	1.13	391.24	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
15.5	1.66	32	540	540	540	2.24	1.76	160.49	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
14.5	1.00	7	660	660	660	2.99	N/A	N/A	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
13.5	1.00	11	780	780	780	2.93	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
12.5	1.00	15	900	838	838	2.79	N/A	N/A	0.983	N/A	0.309	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
11.5	1.00	14	1,020	895	895	2.52	2.87	121.31	0.980	1.000	0.327	0.246	0.898	YES	2.8	23.9	> 800	N/A	N/A	0.000	0.00	0.25
10.5	1.00	14	1,140	953	953	2.78	N/A	N/A	0.978	N/A	0.342	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
9.5	1.00	10	1,260	1,010	1,010	3.02	N/A	N/A	0.976	N/A	0.356	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
8.5	1.00	10	1,380	1,068	1,068	3.01	N/A	N/A	0.973	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
7.5	1.00	9	1,500	1,126	1,126	3.04	N/A	N/A	0.971	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
6.5	1.00	9	1,620	1,183	1,183	3.07	N/A	N/A	0.969	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
5.5	1.00	7	1,740	1,241	1,241	3.16	N/A	N/A	0.966	N/A	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
4.5	1.00	13	1,860	1,298	1,298	2.95	N/A	N/A	0.964	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
3.5	1.00	13	1,980	1,356	1,356	2.97	N/A	N/A	0.962	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
2.5	1.00	10	2,100	1,414	1,414	3.02	N/A	N/A	0.959	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
1.5	1.00	13	2,220	1,471	1,471	2.92	N/A	N/A	0.957	N/A	0.422	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
0.5	1.00	13	2,340	1,529	1,529	2.78	N/A	N/A	0.955	N/A	0.427	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
-0.5	1.00	25	2,460	1,586	1,586	2.44	2.50	140.72	0.952	1.000	0.432	0.339	0.937	YES	2.8	31.0	> 800	N/A	N/A	0.000	0.00	0.25
-1.5	1.00	17	2,580	1,644	1,644	2.70	N/A	N/A	0.950	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
-2.5	1.00	20	2,700	1,702	1,702	2.69	N/A	N/A	0.948	N/A	0.440	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
-3.5	1.66	41	2,820	1,759	1,759	2.34	2.08	136.81	0.945	1.000	0.443	0.318	0.856	YES	5.0	48.8	> 800	N/A	N/A	0.000	0.00	0.25
-4.5	1.00	18	2,940	1,817	1,817	2.92	N/A	N/A	0.943	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
-5.5	1.00	13	3,060	1,874	1,874	2.84	N/A	N/A	0.941	N/A	0.449	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
-6.5	1.00	10	3,180	1,932	1,932	3.15	N/A	N/A	0.938	N/A	0.452	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
-7.5	1.00	11	3,300	1,990	1,990	3.14	N/A	N/A	0.936	N/A	0.454	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25
-8.5	1.00	17	3,420	2,047	2,047	2.43	2.45	102.88	0.934	0.993	0.456	0.181	0.471	YES	2.8	19.6	> 800	25.2	N/A	1.132	0.14	0.12
-9.5	1.66	23	3,540	2,105	2,105	2.37	2.20	96.90	0.931	0.982	0.458	0.165	0.421	YES	2.8	24.9	> 800	N/A	N/A	0.000	0.00	0.12
-10.5	1.00	9	3,660	2,162	2,162	3.20	N/A	N/A	0.926	N/A	0.458	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
-11.5	1.00	10	3,780	2,220	2,220	3.15	N/A	N/A	0.918	N/A	0.457	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
-12.5	1.00	20	3,900	2,278	2,278	2.65	N/A	N/A	0.909	N/A	0.455	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
-13.5	1.66	60	4,020	2,335	2,335	2.42	2.40	132.95	0.901	0.940	0.454	0.299	0.738	YES	5.0	60.5	> 800	N/A	N/A	0.000	0.00	0.12
-14.5	1.00	11	4,140	2,393	2,393	3.24	N/A	N/A	0.893	N/A	0.452	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
-15.5	1.00	20	4,260	2,450	2,450	2.32	2.02	110.73	0.885	0.937	0.450	0.206	0.512	YES	2.8	21.1	> 800	26.9	N/A	0.982	0.12	0.00
-16.5	1.66	50	4,380	2,508	2,508	1.87	1.16	156.19	0.877	0.913	0.448	0.434	1.057	YES	2.8	47.6	> 800	58.8	N/A	0.000	0.00	0.00
-17.5	1.00	38	4,500	2,566	2,566	2.81	N/A	N/A	0.869	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-18.5	1.66	69	4,620	2,623	2,623	2.13	1.52	184.43	0.861	0.897	0.443	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.00
-19.5	1.00	13	4,740	2,681	2,681	3.15	N/A	N/A	0.852	N/A	0.441	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-20.5	1.00	9	4,860	2,738	2,738	3.05	N/A	N/A	0.844	N/A	0.438	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-21.5	1.00	26	4,980	2,796	2,796	2.74	N/A	N/A	0.836	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-22.5	1.00	52	5,100	2,854	2,854	2.76	N/A	N/A	0.828	N/A	0.433	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-23.5	1.00	26	5,220	2,911	2,911	2.96	N/A	N/A	0.820	N/A	0.430	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-24.5	1.00	22	5,340	2,969	2,969	3.00	N/A	N/A	0.812	N/A	0.427	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-25.5	1.00	26	5,460	3,026	3,026	2.94	N/A	N/A	0.804	N/A	0.424	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-26.5	1.00	36	5,580	3,084	3,084	2.70	N/A	N/A	0.795	N/A	0.421	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-27.5	1.00	43	5,700	3,142	3,142	2.81	N/A	N/A	0.787	N/A	0.418	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
-28.5	1.00	37	5,820	3,199	3,199	2.40	2.31	169.62	0.779	0.829	0.415	N/A	N/A	NO	N/A	N/A	N/A	40.3	N/A	0.000	0.00	0.00
-29.5	1.00	34	5,940	3,257	3,257	2.57	3.16	150.12	0.771	0.828	0.411	0.395	0.947	YES	2.8	29.6	> 800	N/A	N/A	0.000	0.00	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-110

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	23.00 ft
GWT Elev. During Test	14.00 ft
GWT Elev. For Design	14.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.45 g
Required Factor of Safety	1.10

REFERENCES

\+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\ A_{max}\ (\sigma_v/\sigma_v')\ r_d$

+++ $FS = (CRR_{7.5}/CSR)\ MSF\ K_\sigma\ K_\alpha$ —>> where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw = 9.00 ft below ground surface
GWT Depth For Design, Zwd = 9.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils = 11.00 feet

Earthquake-Induced Settlements:

- Liquefaction-Induced Settlement = 0.69 inches <--- Saturated Sands
- Seismic Compaction Settlement = 0.00 inches <--- Dry or Unsaturated Sands

Total: 0.69 inches

INPUT SOIL PROFILE (CPT DATA)

Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)
0.50	138.12	1.17	0.85	sand
1.50	40.41	1.36	3.37	clayey silt to silty clay
2.50	26.06	0.96	3.69	clayey silt to silty clay
3.50	65.26	0.70	1.08	sand to silty sand
4.50	28.83	0.64	2.22	sandy silt to clayey silt
5.50	9.91	0.33	3.35	silty clay to clay
6.50	10.60	0.47	4.46	clay
7.50	13.04	0.74	5.69	clay
8.50	23.10	0.79	3.43	clayey silt to silty clay
9.50	24.17	0.76	3.15	clayey silt to silty clay
10.50	9.52	0.68	7.14	clay
11.50	9.89	0.49	4.97	clay
12.50	10.07	0.47	4.72	clay
13.50	8.78	0.44	5.04	clay
14.50	10.84	0.64	5.93	clay
15.50	10.30	0.53	5.20	clay
16.50	9.76	0.55	5.72	clay
17.50	9.52	0.46	4.92	clay
18.50	12.47	0.67	5.49	clay
19.50	12.94	0.61	4.81	clay
20.50	17.93	0.95	5.37	clay
21.50	20.29	0.87	4.34	clay
22.50	16.67	1.01	6.17	clay
23.50	25.87	1.52	5.94	clay
24.50	18.99	1.15	6.14	clay
25.50	13.83	0.59	4.35	clay
26.50	15.99	0.85	5.45	clay
27.50	19.56	1.23	6.37	clay
28.50	21.56	1.34	6.27	clay
29.50	30.71	1.42	4.66	clay
30.50	53.04	1.78	3.36	clayey silt to silty clay
31.50	28.70	0.84	2.95	clayey silt to silty clay
32.50	47.05	1.21	2.57	sandy silt to clayey silt
33.50	106.57	1.85	1.74	silty sand to sandy silt
34.50	27.79	1.15	4.13	silty clay to clay
35.50	19.91	0.79	4.04	silty clay to clay
36.50	119.96	1.08	0.90	sand to silty sand
37.50	88.38	1.03	1.17	sand to silty sand
38.50	80.70	1.14	1.41	silty sand to sandy silt
39.50	93.32	1.15	1.23	sand to silty sand
40.50	58.33	1.02	1.74	silty sand to sandy silt
41.50	19.07	0.62	3.27	clayey silt to silty clay
42.50	70.32	1.34	1.90	silty sand to sandy silt
43.50	23.90	1.05	4.42	clay
44.50	100.16	0.74	0.74	sand to silty sand
45.50	123.16	1.68	1.37	sand to silty sand
46.50	306.62	1.98	0.65	gravelly sand to sand
47.50	307.88	1.86	0.61	gravelly sand to sand
48.50	211.49	1.59	0.75	sand
49.50	247.34	1.25	0.51	sand

SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +

Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) $\sigma_{v'}$ (psf)	Effective Vert. Stress (Test) $\sigma_{v'}$ (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?
22.0	1.66	46	60	60	60	0.99	1.00	1,320.32	0.999	N/A	0.292	N/A	N/A	NO
21.0	1.00	20	180	180	180	2.20	1.67	225.40	0.997	N/A	0.291	N/A	N/A	NO
20.0	1.00	13	300	300	300	2.43	2.43	163.59	0.994	N/A	0.291	N/A	N/A	NO
19.0	1.66	27	420	420	420	1.51	1.00	235.81	0.992	N/A	0.290	N/A	N/A	NO
18.0	1.66	19	540	540	540	2.02	1.33	122.29	0.990	N/A	0.289	N/A	N/A	NO
17.0	1.00	7	660	660	660	2.75	N/A	N/A	0.987	N/A	0.289	N/A	N/A	NO
16.0	1.00	11	780	780	780	2.85	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO
15.0	1.00	13	900	900	900	2.89	N/A	N/A	0.983	N/A	0.287	N/A	N/A	NO
14.0	1.00	12	1,020	1,020	1,020	2.58	3.22	123.32	0.980	N/A	0.287	N/A	N/A	NO
13.0	1.66	20	1,140	1,109	1,109	2.30	1.95	104.70	0.978	1.000	0.294	0.187	0.757	YES
12.0	1.00	10	1,260	1,166	1,166	3.13	N/A	N/A	0.976	N/A	0.308	N/A	N/A	NO
11.0	1.00	10	1,380	1,224	1,224	3.02	N/A	N/A	0.973	N/A	0.321	N/A	N/A	NO
10.0	1.00	10	1,500	1,282	1,282	3.01	N/A	N/A	0.971	N/A	0.332	N/A	N/A	NO
9.0	1.00	9	1,620	1,339	1,339	3.09	N/A	N/A	0.969	N/A	0.343	N/A	N/A	NO
8.0	1.00	11	1,740	1,397	1,397	3.08	N/A	N/A	0.966	N/A	0.352	N/A	N/A	NO
7.0	1.00	10	1,860	1,454	1,454	3.07	N/A	N/A	0.964	N/A	0.361	N/A	N/A	NO
6.0	1.00	10	1,980	1,512	1,512	3.13	N/A	N/A	0.962	N/A	0.368	N/A	N/A	NO
5.0	1.00	10	2,100	1,570	1,570	3.10	N/A	N/A	0.959	N/A	0.375	N/A	N/A	NO
4.0	1.00	12	2,220	1,627	1,627	3.05	N/A	N/A	0.957	N/A	0.382	N/A	N/A	NO
3.0	1.00	13	2,340	1,685	1,685	3.01	N/A	N/A	0.955	N/A	0.388	N/A	N/A	NO
2.0	1.00	18	2,460	1,742	1,742	2.94	N/A	N/A	0.952	N/A	0.393	N/A	N/A	NO
1.0	1.00	20	2,580	1,800	1,800	2.84	N/A	N/A	0.950	N/A	0.398	N/A	N/A	NO
0.0	1.00	17	2,700	1,858	1,858	3.02	N/A	N/A	0.948	N/A	0.403	N/A	N/A	NO
-1.0	1.00	26	2,820	1,915	1,915	2.87	N/A	N/A	0.945	N/A	0.407	N/A	N/A	NO
-2.0	1.00	19	2,940	1,973	1,973	2.99	N/A	N/A	0.943	N/A	0.411	N/A	N/A	NO
-3.0	1.00	14	3,060	2,030	2,030	3.01	N/A	N/A	0.941	N/A	0.415	N/A	N/A	NO
-4.0	1.00	16	3,180	2,088	2,088	3.03	N/A	N/A	0.938	N/A	0.418	N/A	N/A	NO
-5.0	1.00	20	3,300	2,146	2,146	3.01	N/A	N/A	0.936	N/A	0.421	N/A	N/A	NO
-6.0	1.00	22	3,420	2,203	2,203	2.98	N/A	N/A	0.934	N/A	0.424	N/A	N/A	NO
-7.0	1.00	31	3,540	2,261	2,261	2.78	N/A	N/A	0.931	N/A	0.426	N/A	N/A	NO
-8.0	1.00	27	3,660	2,318	2,318	2.50	2.78	136.92	0.926	0.946	0.427	0.319	0.842	YES
-9.0	1.00	14	3,780	2,376	2,376	2.69	N/A	N/A	0.918	N/A	0.427	N/A	N/A	NO
-10.0	1.00	19	3,900	2,434	2,434	2.47	2.62	111.78	0.909	0.941	0.426	0.210	0.553	YES
-11.0	1.66	59	4,020	2,491	2,491	1.78	1.09	172.71	0.901	0.916	0.425	N/A	N/A	NO
-12.0	1.00	19	4,140	2,549	2,549	2.82	N/A	N/A	0.893	N/A	0.424	N/A	N/A	NO
-13.0	1.00	13	4,260	2,606	2,606	2.93	N/A	N/A	0.885	N/A	0.423	N/A	N/A	NO
-14.0	1.00	30	4,380	2,664	2,664	1.87	1.16	120.98	0.877	0.896	0.422	0.245	0.620	YES
-15.0	1.00	22	4,500	2,722	2,722	2.05	1.38	104.26	0.869	0.904	0.420	0.185	0.476	YES
-16.0	1.00	27	4,620	2,779	2,779	2.14	1.53	105.01	0.861	0.889	0.418	0.188	0.475	YES
-17.0	1.00	23	4,740	2,837	2,837	2.06	1.38	108.28	0.852	0.890	0.417	0.198	0.505	YES
-18.0	1.66	32	4,860	2,894	2,894	2.01	1.31	104.95	0.844	0.866	0.415	0.187	0.467	YES
-19.0	1.00	10	4,980	2,952	2,952	2.93	N/A	N/A	0.836	N/A	0.413	N/A	N/A	NO
-20.0	1.66	39	5,100	3,010	3,010	1.97	1.27	120.13	0.828	0.849	0.410	0.241	0.595	YES
-21.0	1.00	24	5,220	3,067	3,067	2.94	N/A	N/A	0.820	N/A	0.408	N/A	N/A	NO
-22.0	1.00	25	5,340	3,125	3,125	1.91	1.20	96.34	0.812	0.861	0.406	0.163	0.413	YES
-23.0	1.00	31	5,460	3,182	3,182	2.01	1.32	128.76	0.804	0.842	0.403	0.279	0.694	YES
-24.0	1.00	51	5,580	3,240	3,240	1.50	1.00	240.90	0.795	0.825	0.401	N/A	N/A	NO
-25.0	1.00	51	5,700	3,298	3,298	1.48	1.00	239.78	0.787	0.819	0.398	N/A	N/A	NO
-26.0	1.00	42	5,820	3,355	3,355	1.67	1.02	166.37	0.779	0.813	0.395	N/A	N/A	NO
-27.0	1.00	49	5,940	3,413	3,413	1.51	1.00	189.34	0.771	0.808	0.393	N/A	N/A	NO

Bottom of Layer Elevation (ft)	RESIDUAL STRENGTH *: SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	GROUND SETTLEMENT **: Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_i (in.)	Cumulative Settlement Profile (in.)
22.0	N/A	N/A	N/A	77.8	0.013	0.000	0.00	0.69
21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
20.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
19.0	N/A	N/A	N/A	50.6	0.040	0.000	0.00	0.69
18.0	N/A	N/A	N/A	43.9	N/A	N/A	N/A	0.69
17.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
16.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
15.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
14.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
13.0	2.8	29.7	> 800	N/A	N/A	0.000	0.00	0.69
12.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
11.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
10.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
9.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
8.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
7.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
6.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
5.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
4.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
3.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
0.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-3.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-4.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-5.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-6.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-7.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-8.0	2.8	27.4	> 800	N/A	N/A	0.000	0.00	0.69
-9.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.69
-10.0	2.8	19.9	> 800	25.5	N/A	1.077	0.13	0.56
-11.0	N/A	N/A	N/A	68.2	N/A	0.000	0.00	0.56
-12.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
-13.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
-14.0	1.3	27.3	> 800	29.7	N/A	0.225	0.03	0.53
-15.0	1.3	20.3	> 800	22.3	N/A	1.319	0.16	0.37
-16.0	2.8	25.6	> 800	32.4	N/A	0.088	0.01	0.36
-17.0	1.3	20.9	> 800	23.0	N/A	1.261	0.15	0.21
-18.0	2.8	29.6	> 800	37.1	N/A	0.033	0.00	0.21
-19.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.21
-20.0	2.8	34.4	> 800	43.0	N/A	0.000	0.00	0.21
-21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.21
-22.0	1.3	21.4	> 800	23.5	N/A	1.209	0.15	0.06
-23.0	1.3	25.7	> 800	28.1	N/A	0.436	0.05	0.01
-24.0	N/A	N/A	N/A	40.2	N/A	0.000	0.00	0.01
-25.0	N/A	N/A	N/A	40.0	N/A	0.000	0.00	0.01
-26.0	N/A	N/A	N/A	32.7	N/A	0.076	0.01	0.00
-27.0	N/A	N/A	N/A	37.9	N/A	0.022	0.00	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-117

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	22.00 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.45 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	6.00 ft below ground surface
GWT Depth For Design, Zwd =	6.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	14.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.28 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.28 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio CRR$_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	203.34	1.53	0.75	sand	21.0	1.00	41	60	60	60	1.17	1.00	1,174.00	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	69.1	0.014	0.000	0.00	0.28
1.50	196.82	2.64	1.34	sand to silty sand	20.0	1.66	81	180	180	180	1.21	1.00	1,086.27	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	147.7	0.018	0.000	0.00	0.28
2.50	62.15	1.24	2.00	silty sand to sandy silt	19.0	1.00	21	300	300	300	1.98	1.27	204.08	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	47.3	0.034	0.000	0.00	0.28
3.50	31.71	0.72	2.27	sandy silt to clayey silt	18.0	1.66	21	420	420	420	1.96	1.25	143.08	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	47.8	N/A	N/A	N/A	0.28
4.50	13.79	0.57	4.13	clay	17.0	1.00	14	540	540	540	2.65	N/A	N/A	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
5.50	9.65	0.37	3.82	clay	16.0	1.00	10	660	660	660	2.80	N/A	N/A	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
6.50	8.44	0.29	3.40	clay	15.0	1.00	8	780	749	749	2.84	N/A	N/A	0.985	N/A	0.300	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.28
7.50	30.22	0.41	1.34	silty sand to sandy silt	14.0	1.66	17	900	806	806	1.94	1.23	96.77	0.983	1.000	0.321	0.164	0.611	YES	2.8	29.1	> 800	36.5	N/A	0.027	0.00	0.27
8.50	12.64	0.31	2.43	clayey silt to silty clay	13.0	1.00	6	1,020	864	864	2.65	N/A	N/A	0.980	N/A	0.338	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
9.50	10.37	0.31	3.00	silty clay to clay	12.0	1.00	7	1,140	922	922	2.79	N/A	N/A	0.978	N/A	0.354	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
10.50	10.30	0.30	2.92	silty clay to clay	11.0	1.00	7	1,260	979	979	2.81	N/A	N/A	0.976	N/A	0.367	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
11.50	12.62	0.55	4.38	clay	10.0	1.00	13	1,380	1,037	1,037	2.86	N/A	N/A	0.973	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
12.50	13.46	0.49	3.69	silty clay to clay	9.0	1.00	9	1,500	1,094	1,094	2.81	N/A	N/A	0.971	N/A	0.389	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
13.50	54.16	0.64	1.19	silty sand to sandy silt	8.0	1.66	30	1,620	1,152	1,152	1.77	1.08	127.83	0.969	1.000	0.398	0.274	0.821	YES	2.8	42.2	> 800	52.3	N/A	0.000	0.00	0.27
14.50	20.17	0.48	2.39	clayey silt to silty clay	7.0	1.00	10	1,740	1,210	1,210	2.57	3.16	92.96	0.966	1.000	0.407	0.155	0.454	YES	2.8	15.8	777	N/A	N/A	0.000	0.00	0.27
15.50	14.85	0.48	3.32	silty clay to clay	6.0	1.00	10	1,860	1,267	1,267	2.78	N/A	N/A	0.964	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
16.50	14.43	0.65	4.58	clay	5.0	1.00	14	1,980	1,325	1,325	2.89	N/A	N/A	0.962	N/A	0.420	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
17.50	11.22	0.48	4.44	clay	4.0	1.00	11	2,100	1,382	1,382	2.98	N/A	N/A	0.959	N/A	0.426	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
18.50	24.04	1.25	5.30	clay	3.0	1.00	24	2,220	1,440	1,440	2.78	N/A	N/A	0.957	N/A	0.431	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
19.50	36.53	1.55	4.27	silty clay to clay	2.0	1.00	24	2,340	1,498	1,498	2.60	3.31	150.42	0.955	1.000	0.436	0.396	1.084	YES	5.0	33.1	> 800	N/A	N/A	0.000	0.00	0.27
20.50	24.76	0.96	3.95	silty clay to clay	1.0	1.00	17	2,460	1,555	1,555	2.71	N/A	N/A	0.952	N/A	0.441	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
21.50	16.10	0.60	3.88	silty clay to clay	0.0	1.00	11	2,580	1,613	1,613	2.85	N/A	N/A	0.950	N/A	0.444	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
22.50	19.83	0.98	5.10	clay	-1.0	1.00	20	2,700	1,670	1,670	2.87	N/A	N/A	0.948	N/A	0.448	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
23.50	16.53	0.76	4.72	clay	-2.0	1.00	17	2,820	1,728	1,728	2.92	N/A	N/A	0.945	N/A	0.451	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
24.50	12.56	0.46	3.90	clay	-3.0	1.00	13	2,940	1,786	1,786	2.97	N/A	N/A	0.943	N/A	0.454	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
25.50	17.58	0.92	5.51	clay	-4.0	1.00	18	3,060	1,843	1,843	2.96	N/A	N/A	0.941	N/A	0.457	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.27
26.50	114.99	1.64	1.43	sand to silty sand	-5.0	1.00	29	3,180	1,901	1,901	1.96	1.26	148.22	0.938	1.000	0.459	0.383	0.995	YES	1.3	30.8	> 800	33.4	N/A	0.085	0.01	0.26
27.50	145.76	1.46	1.00	sand	-6.0	1.00	29	3,300	1,958	1,958	1.79	1.10	161.78	0.936	1.000	0.461	N/A	N/A	NO	N/A	N/A	N/A	29.5	N/A	0.545	0.07	0.20
28.50	111.01	1.24	1.12	sand to silty sand	-7.0	1.66	46	3,420	2,016	2,016	1.60	1.00	183.07	0.934	0.997	0.463	N/A	N/A	NO	N/A	N/A	N/A	50.5	N/A	0.000	0.00	0.20
29.50	41.51	1.44	3.49	clayey silt to silty clay	-8.0	1.00	21	3,540	2,074	2,074	2.57	3.17	129.15	0.931	0.988	0.465	0.280	0.710	YES	2.8	23.2	> 800	N/A	N/A	0.000	0.00	0.20
30.50	63.40	1.76	2.78	sandy silt to clayey silt	-9.0	1.00	25	3,660	2,131	2,131	2.37	2.21	135.66	0.926	0.977	0.465	0.312	0.782	YES	2.8	27.4	> 800	34.5	N/A	0.073	0.01	0.19
31.50	69.33	2.19	3.16	sandy silt to clayey silt	-10.0	1.00	28	3,780	2,189	2,189	2.39	2.27	150.61	0.918	0.966	0.464	0.398	0.988	YES	2.8	29.3	> 800	36.8	N/A	0.042	0.01	0.18
32.50	66.97	2.44	3.65	clayey silt to silty clay	-11.0	1.00	33	3,900	2,246	2,246	2.45	2.53	159.80	0.909	0.955	0.462	0.460	1.133	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.18
33.50	146.67	2.91	1.98	silty sand to sandy silt	-12.0	1.00	49	4,020	2,304	2,304	2.03	1.33	182.31	0.901	0.945	0.460	N/A	N/A	NO	N/A	N/A	N/A	59.7	N/A	0.000	0.00	0.18
34.50	152.48	1.61	1.06	sand	-13.0	1.66	50	4,140	2,362	2,362	1.51	1.00	232.34	0.893	0.936	0.458	N/A	N/A	NO	N/A	N/A	N/A	46.5	N/A	0.000	0.00	0.18
35.50	20.09	0.68	3.44	clayey silt to silty clay	-14.0	1.00	10	4,260	2,419	2,419	2.87	N/A	N/A	0.885	N/A	0.456	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
36.50	13.53	0.57	4.47	clay	-15.0	1.00	14	4,380	2,477	2,477	3.08	N/A	N/A	0.877	N/A	0.454	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
37.50	24.12	1.00	4.31	silty clay to clay	-16.0	1.00	16	4,500	2,534	2,534	2.87	N/A	N/A	0.869	N/A	0.451	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
38.50	116.09	2.38	2.05	silty sand to sandy silt	-17.0	1.00	39	4,620	2,592	2,592	2.12	1.50	152.90	0.861	0.901	0.449	0.412	0.988	YES	2.8	36.8	> 800	45.8	N/A	0.000	0.00	0.18
39.50	172.98	2.12	1.23	sand to silty sand	-18.0	1.00	43	4,740	2,650	2,650	1.84	1.14	171.37	0.852	0.894	0.446	N/A	N/A	NO	N/A	N/A	N/A	41.9	N/A	0.000	0.00	0.18
40.50	122.22	1.60	1.31	sand to silty sand	-19.0	1.66	51	4,860	2,707	2,707	1.67	1.01	176.47	0.844	0.886	0.443	N/A	N/A	NO	N/A	N/A	N/A	48.1	N/A	0.000	0.00	0.18
41.50	57.39	1.09	1.91	silty sand to sandy silt	-20.0	1.66	32	4,980	2,765	2,765	2.03	1.34	108.09	0.836	0.882	0.441	0.197	0.471	YES	2.8	29.7	> 800	37.3	N/A	0.033	0.00	0.18
42.50	24.33	0.69	2.93	clayey silt to silty clay	-21.0	1.00	12	5,100	2,822	2,822	2.79	N/A	N/A	0.828	N/A	0.438	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
43.50	123.37	1.51	1.22	sand to silty sand	-22.0	1.00	31	5,220	2,880	2,880	1.96	1.26	129.07	0.820	0.871	0.435	0.280	0.669	YES	1.3	27.0	> 800	29.4	N/A	0.377	0.05	0.14
44.50	66.73	2.46	3.70	clayey silt to silty clay	-23.0	1.00	33	5,340	2,938	2,938	2.50	2.76	152.08	0.812	0.860	0.432	0.407	0.967	YES	2.8	30.3	> 800	N/A	N/A	0.000	0.00	0.14
45.50	78.03	2.66	3.42	sandy silt to clayey silt	-24.0	1.00	31	5,460	2,995	2,995	2.43	2.44	155.29	0.804	0.858	0.428	0.428	1.023	YES	2.8	28.3	> 800	35.6	N/A	0.052	0.01	0.13
46.50	63.34	1.18	1.87	silty sand to sandy silt	-25.0	1.00	21	5,580	3,053	3,053	2.32	2.01	103.23	0.795	0.877	0.425	0.182	0.448	YES	2.8	19.9	> 800	25.5	N/A	1.073	0.13	0.00
47.50	33.99	1.07	3.15	clayey silt to silty clay	-26.0	1.00	17	5,700	3,110	3,110	2.72	N/A	N/A	0.787	N/A	0.422	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	26.19	0.80	3.09	clayey silt to silty clay	-27.0	1.00	13	5,820	3,168	3,168	2.82	N/A	N/A	0.779	N/A	0.419	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	16.08	0.38	2.41	clayey silt to silty clay	-28.0	1.00	8	5,940	3,226	3,226	2.94	N/A	N/A	0.771	N/A	0.415	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-119

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	23.00 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.45 g
Required Factor of Safety	1.10

REFERENCES

\+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \longrightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis asssumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw = 7.00 ft below ground surface

GWT Depth For Design, Zwd = 7.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils = 10.00 feet

Earthquake-Induced Settlements:

- Liquefaction-Induced Settlement = 0.37 inches <--- Saturated Sands
- Seismic Compaction Settlement = 0.00 inches <--- Dry or Unsaturated Sands

Total: 0.37 inches

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +															RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	201.40	1.15	0.57	sand	22.0	1.00	40	60	60	60	1.06	1.00	1,162.81	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	68.5	0.014	0.000	0.00	0.37
1.50	164.73	1.09	0.66	sand	21.0	1.66	55	180	180	180	0.97	1.00	909.17	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	92.7	0.021	0.000	0.00	0.37
2.50	51.68	1.06	2.05	sandy silt to clayey silt	20.0	1.66	34	300	300	300	1.73	1.06	233.67	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	74.8	N/A	N/A	N/A	0.37
3.50	13.72	0.35	2.54	clayey silt to silty clay	19.0	1.66	11	420	420	420	2.27	1.84	91.46	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.37
4.50	5.90	0.16	2.76	clay	18.0	1.00	6	540	540	540	2.82	N/A	N/A	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.37
5.50	6.87	0.24	3.57	clay	17.0	1.00	7	660	660	660	2.89	N/A	N/A	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.37
6.50	10.51	0.32	3.03	silty clay to clay	16.0	1.00	7	780	780	780	2.74	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.37
7.50	37.49	0.66	1.75	sandy silt to clayey silt	15.0	1.66	25	900	869	869	1.95	1.24	116.57	0.983	1.000	0.298	0.227	0.911	YES	2.8	40.5	> 800	50.2	N/A	0.000	0.00	0.37
8.50	18.15	0.29	1.58	sandy silt to clayey silt	14.0	1.66	12	1,020	926	926	2.19	1.64	72.35	0.980	1.000	0.316	0.115	0.435	YES	2.8	20.5	> 800	26.2	N/A	0.128	0.02	0.35
9.50	8.64	0.20	2.35	silty clay to clay	13.0	1.00	6	1,140	984	984	2.81	N/A	N/A	0.978	N/A	0.331	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
10.50	9.28	0.33	3.56	clay	12.0	1.00	9	1,260	1,042	1,042	2.91	N/A	N/A	0.976	N/A	0.345	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
11.50	6.58	0.24	3.70	clay	11.0	1.00	7	1,380	1,099	1,099	3.07	N/A	N/A	0.973	N/A	0.357	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
12.50	7.70	0.26	3.40	clay	10.0	1.00	8	1,500	1,157	1,157	3.00	N/A	N/A	0.971	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
13.50	11.33	0.36	3.21	silty clay to clay	9.0	1.00	8	1,620	1,214	1,214	2.86	N/A	N/A	0.969	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
14.50	14.68	0.34	2.36	clayey silt to silty clay	8.0	1.00	7	1,740	1,272	1,272	2.69	N/A	N/A	0.966	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
15.50	15.01	0.51	3.45	silty clay to clay	7.0	1.00	10	1,860	1,330	1,330	2.80	N/A	N/A	0.964	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
16.50	18.84	0.54	2.89	clayey silt to silty clay	6.0	1.00	9	1,980	1,387	1,387	2.68	N/A	N/A	0.962	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
17.50	13.87	0.50	3.64	silty clay to clay	5.0	1.00	9	2,100	1,445	1,445	2.87	N/A	N/A	0.959	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
18.50	14.55	0.59	4.08	clay	4.0	1.00	15	2,220	1,502	1,502	2.89	N/A	N/A	0.957	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
19.50	14.26	0.49	3.48	silty clay to clay	3.0	1.00	10	2,340	1,560	1,560	2.87	N/A	N/A	0.955	N/A	0.419	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
20.50	20.69	1.03	5.01	clay	2.0	1.00	21	2,460	1,618	1,618	2.85	N/A	N/A	0.952	N/A	0.424	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
21.50	28.53	1.43	5.03	clay	1.0	1.00	29	2,580	1,675	1,675	2.76	N/A	N/A	0.950	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.35
22.50	27.43	0.72	2.64	sandy silt to clayey silt	0.0	1.00	11	2,700	1,733	1,733	2.59	3.26	99.67	0.948	1.000	0.432	0.172	0.475	YES	2.8	14.6	659	19.1	N/A	1.583	0.19	0.16
23.50	17.86	0.77	4.34	clay	-1.0	1.00	18	2,820	1,790	1,790	2.89	N/A	N/A	0.945	N/A	0.435	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
24.50	17.36	0.91	5.27	clay	-2.0	1.00	17	2,940	1,848	1,848	2.96	N/A	N/A	0.943	N/A	0.439	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
25.50	15.47	0.77	5.02	clay	-3.0	1.00	15	3,060	1,906	1,906	3.00	N/A	N/A	0.941	N/A	0.442	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16
26.50	65.83	1.28	1.95	silty sand to sandy silt	-4.0	1.00	22	3,180	1,963	1,963	2.24	1.77	117.90	0.938	1.000	0.445	0.232	0.624	YES	2.8	24.9	> 800	31.6	N/A	0.129	0.02	0.15
27.50	119.90	0.79	0.66	sand	-5.0	1.66	40	3,300	2,021	2,021	1.43	1.00	197.50	0.936	0.996	0.447	N/A	N/A	NO	N/A	N/A	N/A	39.5	N/A	0.006	0.00	0.15
28.50	58.67	1.06	1.81	silty sand to sandy silt	-6.0	1.00	20	3,420	2,078	2,078	2.27	1.85	106.46	0.934	0.987	0.449	0.192	0.504	YES	2.8	22.0	> 800	28.0	N/A	0.766	0.09	0.05
29.50	88.56	2.01	2.28	silty sand to sandy silt	-7.0	1.00	30	3,540	2,136	2,136	2.21	1.69	144.60	0.931	0.974	0.451	0.361	0.930	YES	2.8	31.4	> 800	39.3	N/A	0.009	0.00	0.05
30.50	207.50	3.54	1.71	sand to silty sand	-8.0	1.00	52	3,660	2,194	2,194	1.87	1.16	230.13	0.926	0.964	0.452	N/A	N/A	NO	N/A	N/A	N/A	54.4	N/A	0.000	0.00	0.05
31.50	114.80	1.96	1.71	silty sand to sandy silt	-9.0	1.66	63	3,780	2,251	2,251	1.74	1.06	190.30	0.918	0.954	0.451	N/A	N/A	NO	N/A	N/A	N/A	76.7	N/A	0.000	0.00	0.05
32.50	20.93	0.93	4.47	clay	-10.0	1.00	21	3,900	2,309	2,309	2.91	N/A	N/A	0.909	N/A	0.449	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
33.50	55.69	2.80	5.05	silty clay to clay	-11.0	1.00	37	4,020	2,366	2,366	2.63	N/A	N/A	0.901	N/A	0.448	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
34.50	48.56	2.42	4.98	silty clay to clay	-12.0	1.66	54	4,140	2,424	2,424	2.35	2.10	153.65	0.893	0.926	0.446	0.417	1.033	YES	5.0	53.7	> 800	N/A	N/A	0.000	0.00	0.05
35.50	12.10	0.58	4.78	clay	-13.0	1.00	12	4,260	2,482	2,482	3.16	N/A	N/A	0.885	N/A	0.444	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
36.50	22.42	1.13	5.06	clay	-14.0	1.00	22	4,380	2,539	2,539	2.95	N/A	N/A	0.877	N/A	0.442	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
37.50	80.79	3.33	4.13	clayey silt to silty clay	-15.0	1.00	40	4,500	2,597	2,597	2.46	2.56	181.51	0.869	0.901	0.440	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.05
38.50	149.99	2.22	1.48	sand to silty sand	-16.0	1.00	37	4,620	2,654	2,654	1.95	1.24	160.94	0.861	0.893	0.438	N/A	N/A	NO	N/A	N/A	N/A	36.6	N/A	0.042	0.00	0.05
39.50	89.07	2.11	2.37	silty sand to sandy silt	-17.0	1.00	30	4,740	2,712	2,712	2.26	1.82	139.14	0.852	0.891	0.436	0.330	0.806	YES	2.8	28.3	> 800	35.6	N/A	0.054	0.01	0.04
40.50	116.26	1.80	1.55	sand to silty sand	-18.0	1.66	48	4,860	2,770	2,770	1.73	1.06	173.57	0.844	0.878	0.433	N/A	N/A	NO	N/A	N/A	N/A	45.4	N/A	0.000	0.00	0.04
41.50	19.92	0.86	4.31	clay	-19.0	1.00	20	4,980	2,827	2,827	2.98	N/A	N/A	0.836	N/A	0.431	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
42.50	61.94	1.97	3.20	sandy silt to clayey silt	-20.0	1.00	25	5,100	2,885	2,885	2.47	2.64	136.26	0.828	0.883	0.428	0.315	0.775	YES	2.8	23.4	> 800	29.8	N/A	0.260	0.03	0.01
43.50	109.84	3.27	2.98	sandy silt to clayey silt	-21.0	1.00	44	5,220	2,942	2,942	2.28	1.88	170.64	0.820	0.857	0.425	N/A	N/A	NO	N/A	N/A	N/A	48.5	N/A	0.000	0.00	0.01
44.50	148.30	2.47	1.66	sand to silty sand	-22.0	1.66	61	5,340	3,000	3,000	1.69	1.03	207.24	0.812	0.850	0.423	N/A	N/A	NO	N/A	N/A	N/A	55.0	N/A	0.000	0.00	0.01
45.50	72.06	2.15	2.98	sandy silt to clayey silt	-23.0	1.00	29	5,460	3,058	3,058	2.42	2.38	138.44	0.804	0.858	0.420	0.327	0.796	YES	2.8	26.1	> 800	33.0	N/A	0.081	0.01	0.00
46.50	40.44	2.02	4.99	clay	-24.0	1.00	40	5,580	3,115	3,115	2.80	N/A	N/A	0.795	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
47.50	25.60	1.24	4.84	clay	-25.0	1.00	26	5,700	3,173	3,173	2.95	N/A	N/A	0.787	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	20.90	0.79	3.79	silty clay to clay	-26.0	1.00	14	5,820	3,230	3,230	2.96	N/A	N/A	0.779	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	26.24	1.13	4.32	silty clay to clay	-27.0	1.00	17	5,940	3,288	3,288	2.92	N/A	N/A	0.771	N/A	0.407	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

Appendix F.3
Slope Stability Calculations

Slope Stabilty Calculation Summary

Location No.	Description	Psuedo-static Coefficient	Factor of Safety	
		Kh = 1/3*PGA	Static	Seismic
1	Bolsa Chica Road OC South Abutment	0.16	1.57	1.12
2	Bolsa Chica Road OC North Abutment		1.67	1.19
3	405-22 HOV Connector Separation Abutment 1 - North Slope (RW1300)	0.17	1.87	1.29
4	405-22 HOV Connector Separation Abutment 1 - South Slope		1.88	1.35
5	405-22 HOV Connector Separation Abutment 1 - West Slope		2.44	1.62
6	S405-E22 Connector Separation Abutment 1 - South Slope (Type I Wall RW33111)	0.17	1.65	1.17
7	S405-E22 Connector Separation Abutment 4 - North Slope (RW3320)		3.37	2.42
8	S405-E22 Connector Separation Abutment 4 - South Slope (RW3319)		3.53	2.45
9	RW1300 highest wall at Station "H" 1309+36	0.17	1.81	1.17
10	RW 1325 & 1326 at Maximum Height	0.17	7.45	2.85
11	RW 1325 & 1326 at Maximum Height - Modified Janbu Method (random irregular surface)		6.88	4.37
12	RW 1325 & 1326 at Maximum Height - Modified Janbu Method (random block surface)		7.82	2.64

I-436 SR-22 Bolsa Chica Road OC S. Abutment - Static

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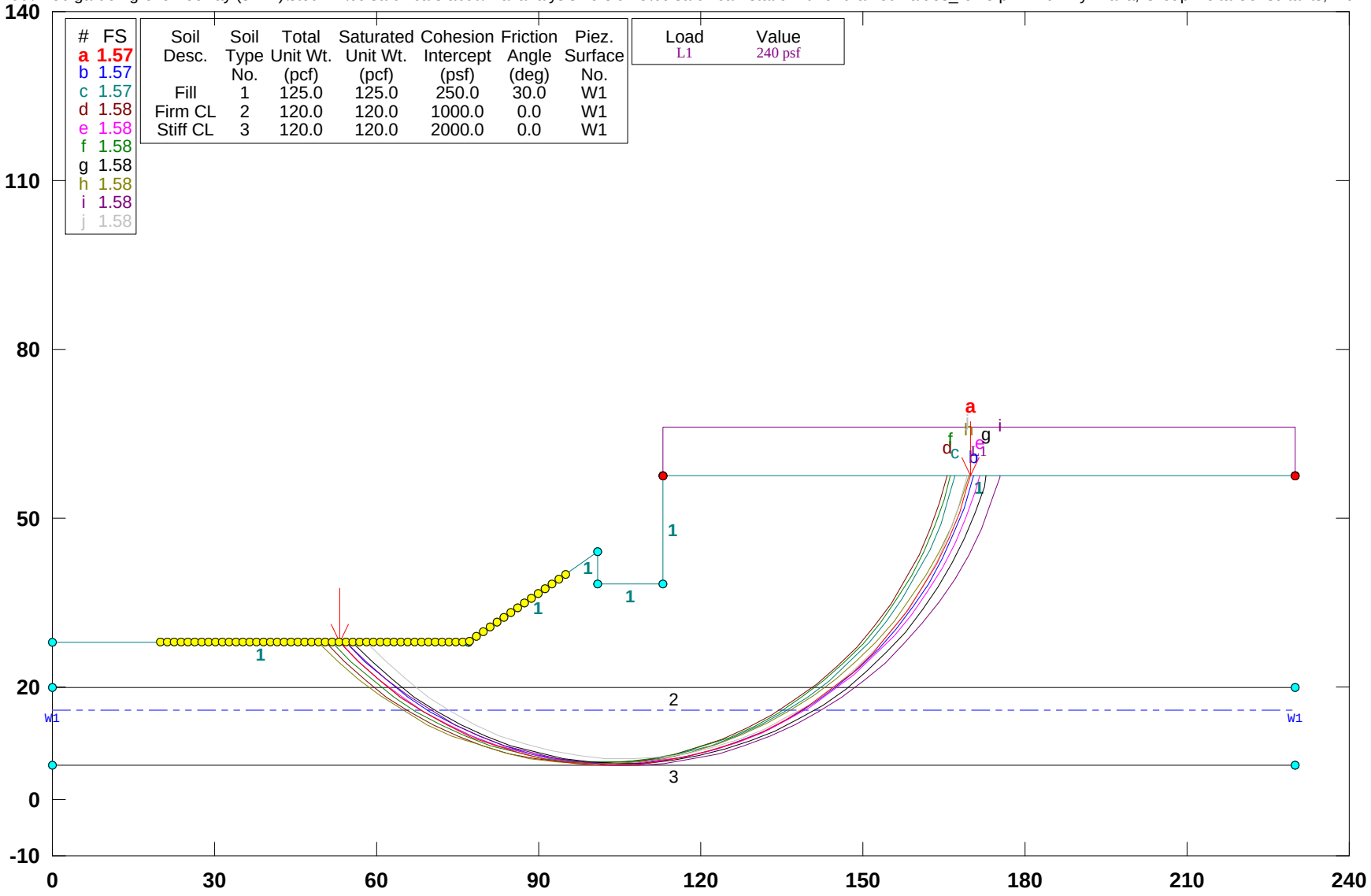
#	FS
a	1.57
b	1.57
c	1.57
d	1.58
e	1.58
f	1.58
g	1.58
h	1.58
i	1.58
j	1.58

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	125.0	125.0	250.0	30.0	W1
Firm CL	2	120.0	120.0	1000.0	0.0	W1
Stiff CL	3	120.0	120.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=1.57

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/5/2008
Time of Run: 10:32AM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:bolsa chica - static with undrained values_rev 3.in
Output Filename: N:bolsa chica - static with undrained values_rev 3.OUT
Unit: ENGLISH
Plotted Output Filename: N:bolsa chica - static with undrained values_rev 3.PLT

PROBLEM DESCRIPTION I-436 SR-22
Bolsa Chica Road OC S. Abutment - Static

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	38.00	77.00	38.00	1
2	77.00	38.00	101.00	54.00	1
3	101.00	54.00	101.01	48.30	1
4	101.01	48.30	113.00	48.30	1
5	113.00	48.30	113.01	67.50	1
6	113.01	67.50	230.00	67.50	1
7	0.00	30.00	230.00	30.00	2
8	0.00	16.00	230.00	16.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	250.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	120.0	120.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	26.00
2	230.00	26.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	113.01	230.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

3600 Trial Surfaces Have Been Generated.

60 Surfaces Initiate From Each Of 60 Points Equally Spaced
Along The Ground Surface Between X = 20.00 ft.
and X = 95.00 ft.

Each Surface Terminates Between X = 113.01 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.05	38.00
2	56.59	34.47
3	60.38	31.20
4	64.39	28.22
5	68.61	25.54
6	73.01	23.17
7	77.58	21.13
8	82.28	19.42
9	87.09	18.06
10	91.99	17.06
11	96.94	16.41
12	101.94	16.12
13	106.93	16.20

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14	111.92	16.65
15	116.85	17.45
16	121.71	18.61
17	126.48	20.12
18	131.12	21.97
19	135.62	24.16
20	139.95	26.66
21	144.08	29.48
22	148.00	32.59
23	151.68	35.97
24	155.10	39.61
25	158.25	43.49
26	161.11	47.60
27	163.67	51.89
28	165.91	56.37
29	167.81	60.99
30	169.37	65.74
31	169.81	67.50

Circle Center At X = 103.3 ; Y = 84.8 and Radius, 68.7

*** 1.568 ***

Individual data on the 39 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.8	2444.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.6	1495.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2.4	2652.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3.5	4701.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.7	1099.3	0.0	12.5	0.0	0.0	0.0	0.0	0.0
7	4.4	7387.6	0.0	514.1	0.0	0.0	0.0	0.0	0.0
8	4.0	7685.3	0.0	1015.5	0.0	0.0	0.0	0.0	0.0
9	0.6	1193.4	0.0	186.7	0.0	0.0	0.0	0.0	0.0
10	4.7	11332.6	0.0	1786.9	0.0	0.0	0.0	0.0	0.0
11	4.8	14393.2	0.0	2264.9	0.0	0.0	0.0	0.0	0.0
12	4.9	17327.0	0.0	2633.7	0.0	0.0	0.0	0.0	0.0
13	5.0	20067.3	0.0	2891.5	0.0	0.0	0.0	0.0	0.0
14	4.1	18156.2	0.0	2461.0	0.0	0.0	0.0	0.0	0.0
15	0.0	43.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0
16	0.9	3654.5	0.0	569.6	0.0	0.0	0.0	0.0	0.0
17	5.0	19736.7	0.0	3068.9	0.0	0.0	0.0	0.0	0.0
18	5.0	19506.1	0.0	2987.6	0.0	0.0	0.0	0.0	0.0
19	1.1	4208.7	0.0	635.5	0.0	0.0	0.0	0.0	0.0
20	0.0	50.7	0.0	5.8	0.0	0.0	0.0	0.0	0.0
21	3.8	23928.8	0.0	2151.9	0.0	0.0	0.0	0.0	921.6
22	4.9	29785.2	0.0	2487.1	0.0	0.0	0.0	0.0	1167.3
23	4.8	28426.4	0.0	2070.5	0.0	0.0	0.0	0.0	1143.9
24	4.6	26759.3	0.0	1545.9	0.0	0.0	0.0	0.0	1114.6
25	4.5	24822.7	0.0	915.9	0.0	0.0	0.0	0.0	1079.3
26	3.2	16787.3	0.0	211.3	0.0	0.0	0.0	0.0	763.3
27	1.1	5874.8	0.0	0.0	0.0	0.0	0.0	0.0	275.0
28	4.1	20328.1	0.0	0.0	0.0	0.0	0.0	0.0	991.8
29	0.7	3102.7	0.0	0.0	0.0	0.0	0.0	0.0	157.8
30	3.3	14752.3	0.0	0.0	0.0	0.0	0.0	0.0	782.3
31	3.7	15285.4	0.0	0.0	0.0	0.0	0.0	0.0	883.4
32	3.4	12719.1	0.0	0.0	0.0	0.0	0.0	0.0	822.0
33	3.2	10220.1	0.0	0.0	0.0	0.0	0.0	0.0	756.3
34	2.9	7850.5	0.0	0.0	0.0	0.0	0.0	0.0	686.5
35	2.6	5670.4	0.0	0.0	0.0	0.0	0.0	0.0	613.2
36	2.2	3736.4	0.0	0.0	0.0	0.0	0.0	0.0	536.6
37	1.9	2100.5	0.0	0.0	0.0	0.0	0.0	0.0	457.1
38	1.6	808.4	0.0	0.0	0.0	0.0	0.0	0.0	375.2
39	0.4	48.6	0.0	0.0	0.0	0.0	0.0	0.0	105.8

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.32	38.00
2	57.87	34.48
3	61.67	31.23
4	65.70	28.26
5	69.93	25.60
6	74.34	23.25
7	78.92	21.24
8	83.63	19.56
9	88.45	18.23
10	93.35	17.25
11	98.32	16.64
12	103.31	16.39
13	108.31	16.51
14	113.28	16.99
15	118.21	17.83
16	123.07	19.03
17	127.82	20.59
18	132.45	22.48
19	136.92	24.71
20	141.22	27.26
21	145.33	30.12
22	149.21	33.27
23	152.85	36.69
24	156.24	40.37
25	159.34	44.29
26	162.15	48.43
27	164.65	52.76
28	166.83	57.26
29	168.67	61.91
30	170.17	66.68
31	170.36	67.50

Circle Center At X = 104.2 ; Y = 84.8 and Radius, 68.4

*** 1.570 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.05	38.00
2	56.59	34.46
3	60.38	31.20
4	64.40	28.23
5	68.63	25.57
6	73.05	23.24
7	77.64	21.24
8	82.36	19.58
9	87.18	18.29
10	92.10	17.36
11	97.07	16.80
12	102.06	16.61
13	107.06	16.79
14	112.03	17.35
15	116.94	18.28
16	121.77	19.57
17	126.49	21.22
18	131.08	23.21
19	135.50	25.55
20	139.73	28.20
21	143.76	31.17
22	147.55	34.43
23	151.09	37.96
24	154.36	41.75
25	157.33	45.77

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26	159.99	50.00
27	162.33	54.42
28	164.34	59.00
29	166.00	63.71
30	167.02	67.50

Circle Center At X = 102.1 ; Y = 83.5 and Radius, 66.9

*** 1.573 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.51	38.00
2	54.05	34.47
3	57.83	31.20
4	61.85	28.23
5	66.08	25.56
6	70.49	23.21
7	75.07	21.19
8	79.78	19.52
9	84.60	18.20
10	89.51	17.23
11	94.47	16.64
12	99.47	16.41
13	104.47	16.55
14	109.44	17.06
15	114.36	17.94
16	119.21	19.18
17	123.95	20.77
18	128.56	22.71
19	133.01	24.99
20	137.28	27.58
21	141.35	30.49
22	145.19	33.69
23	148.79	37.16
24	152.12	40.89
25	155.17	44.85
26	157.91	49.03
27	160.34	53.41
28	162.44	57.94
29	164.19	62.63
30	165.60	67.42
31	165.61	67.50

Circle Center At X = 100.0 ; Y = 84.0 and Radius, 67.6

*** 1.575 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.05	38.00
2	56.64	34.52
3	60.47	31.30
4	64.51	28.36
5	68.76	25.72
6	73.18	23.38
7	77.75	21.37
8	82.46	19.68
9	87.27	18.33

10	92.17	17.32
11	97.13	16.67
12	102.12	16.37
13	107.12	16.42
14	112.10	16.82
15	117.04	17.58
16	121.92	18.69
17	126.71	20.14
18	131.38	21.93
19	135.91	24.04
20	140.28	26.47
21	144.47	29.20
22	148.45	32.22
23	152.21	35.52
24	155.72	39.07
25	158.98	42.87
26	161.96	46.88
27	164.64	51.10
28	167.02	55.50
29	169.09	60.05
30	170.82	64.74
31	171.62	67.50

Circle Center At X = 103.9 ; Y = 86.8 and Radius, 70.5

*** 1.575 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	51.78	38.00
2	55.32	34.47
3	59.12	31.22
4	63.14	28.25
5	67.38	25.59
6	71.80	23.26
7	76.38	21.26
8	81.10	19.60
9	85.93	18.31
10	90.84	17.37
11	95.81	16.80
12	100.81	16.60
13	105.80	16.77
14	110.77	17.32
15	115.69	18.23
16	120.52	19.50
17	125.25	21.13
18	129.84	23.11
19	134.28	25.42
20	138.53	28.05
21	142.57	31.00
22	146.38	34.23
23	149.94	37.74
24	153.23	41.51
25	156.23	45.50
26	158.93	49.71
27	161.31	54.11
28	163.35	58.68
29	165.05	63.38
30	166.20	67.50

Circle Center At X = 101.0 ; Y = 83.8 and Radius, 67.2

*** 1.576 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.59	38.00
2	59.16	34.50
3	62.98	31.26
4	67.01	28.31
5	71.25	25.66
6	75.67	23.32
7	80.24	21.30
8	84.95	19.61
9	89.77	18.27
10	94.67	17.28
11	99.63	16.65
12	104.62	16.37
13	109.62	16.45
14	114.60	16.90
15	119.53	17.70
16	124.40	18.85
17	129.17	20.35
18	133.82	22.19
19	138.32	24.36
20	142.66	26.84
21	146.81	29.64
22	150.74	32.72
23	154.45	36.08
24	157.90	39.70
25	161.08	43.56
26	163.98	47.63
27	166.57	51.91
28	168.85	56.35
29	170.81	60.96
30	172.43	65.69
31	172.91	67.50

Circle Center At X = 106.0 ; Y = 85.8 and Radius, 69.4

*** 1.577 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.24	38.00
2	52.84	34.54
3	56.68	31.33
4	60.73	28.40
5	64.98	25.76
6	69.40	23.42
7	73.97	21.40
8	78.67	19.70
9	83.48	18.33
10	88.37	17.29
11	93.33	16.60
12	98.31	16.26
13	103.31	16.26
14	108.30	16.61
15	113.25	17.31
16	118.14	18.35
17	122.95	19.72
18	127.65	21.43
19	132.22	23.46
20	136.63	25.81
21	140.88	28.45
22	144.93	31.39
23	148.76	34.59
24	152.36	38.06
25	155.72	41.77
26	158.80	45.71
27	161.61	49.84
28	164.12	54.17
29	166.32	58.66
30	168.21	63.29
31	169.59	67.50

Circle Center At X = 100.8 ; Y = 88.1 and Radius, 71.8

*** 1.578 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.32	38.00
2	57.93	34.54
3	61.77	31.34
4	65.82	28.41
5	70.07	25.76
6	74.48	23.42
7	79.05	21.39
8	83.75	19.68
9	88.55	18.29
10	93.44	17.24
11	98.39	16.53
12	103.38	16.17
13	108.38	16.15
14	113.37	16.48
15	118.32	17.15
16	123.22	18.16
17	128.04	19.50
18	132.75	21.18
19	137.33	23.18
20	141.76	25.49
21	146.03	28.10
22	150.10	31.00
23	153.97	34.17
24	157.60	37.60
25	160.99	41.28
26	164.12	45.18
27	166.97	49.29
28	169.53	53.58
29	171.79	58.04
30	173.73	62.65
31	175.35	67.38
32	175.39	67.50

Circle Center At X = 106.2 ; Y = 88.4 and Radius, 72.3

*** 1.580 ***

Failure Surface Specified By 30 Coordinate Points

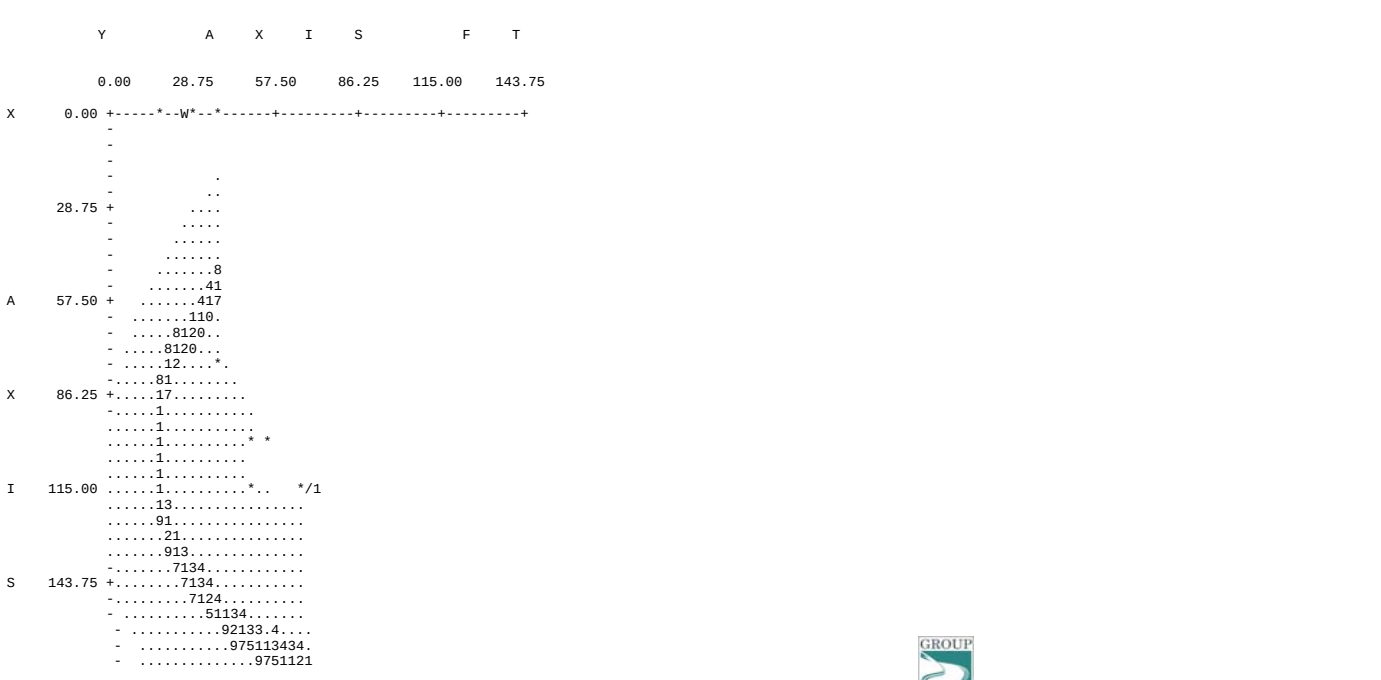
Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.14	38.00
2	61.68	34.47
3	65.48	31.22
4	69.52	28.28
5	73.77	25.65

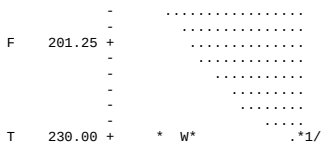
6	78.22	23.36
7	82.82	21.41
8	87.56	19.82
9	92.41	18.60
10	97.34	17.76
11	102.32	17.30
12	107.32	17.22
13	112.31	17.52
14	117.26	18.21
15	122.15	19.27
16	126.94	20.71
17	131.60	22.51
18	136.12	24.66
19	140.45	27.15
20	144.58	29.96
21	148.49	33.09
22	152.14	36.50
23	155.52	40.19
24	158.61	44.12
25	161.38	48.28
26	163.83	52.64
27	165.94	57.17
28	167.70	61.85
29	169.09	66.66
30	169.26	67.50

Circle Center At X = 105.8 ; Y = 82.3 and Radius, 65.1

*** 1.581 ***

1





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I-436 SR-22 Bolsa Chica RD OC S. Abutment - Seismic

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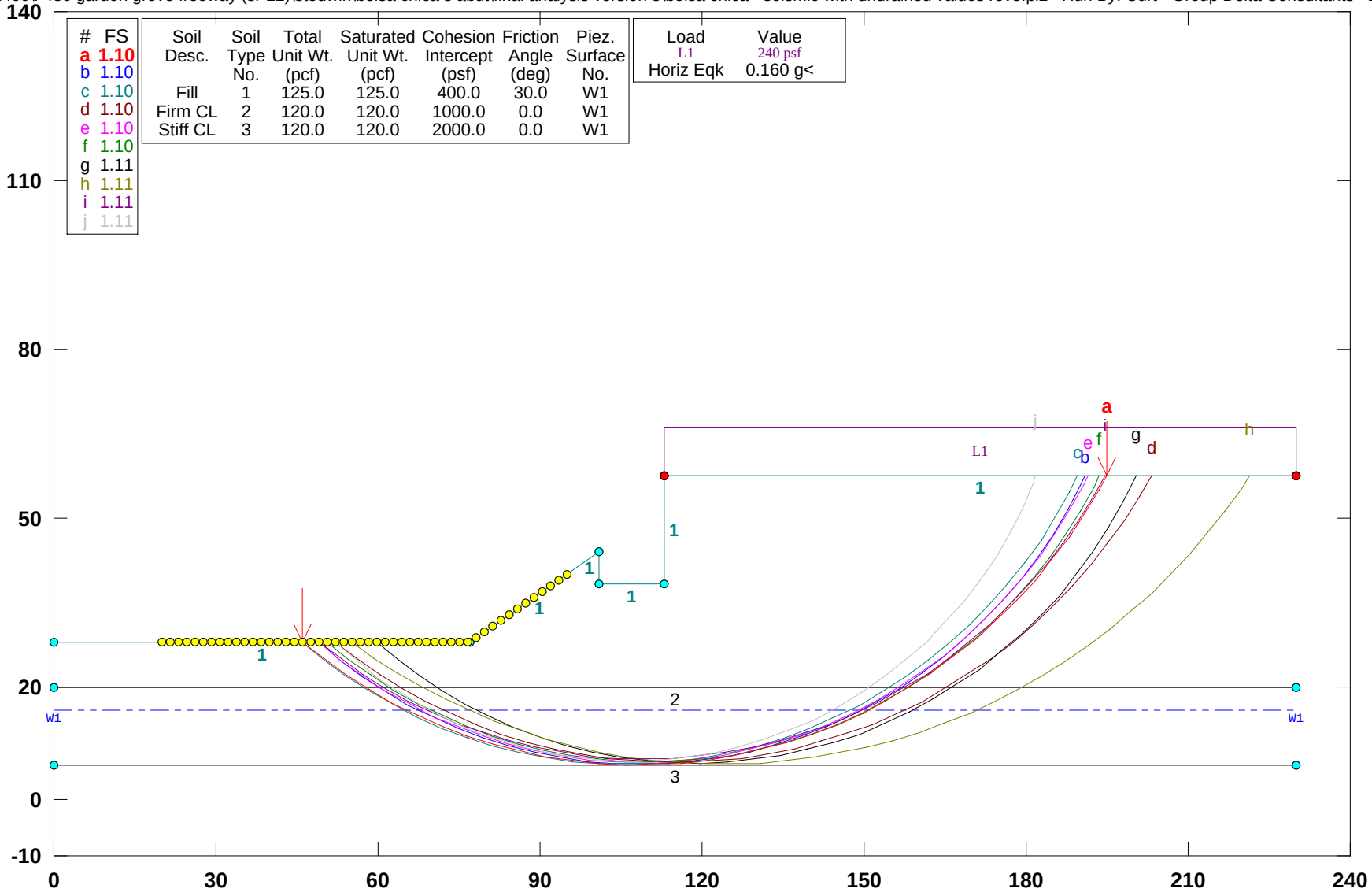

PCSTABL5M/si FSmin=1.10

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 09:03AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:bolsa chica - seismic with undrained values rev3.in
Output Filename: N:bolsa chica - seismic with undrained values rev3.OUT
Unit: ENGLISH
Plotted Output Filename: N:bolsa chica - seismic with undrained values rev3.PLT

PROBLEM DESCRIPTION I-436 SR-22
Bolsa Chica RD OC S. Abutment - Seismic

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	38.00	77.00	38.00	1
2	77.00	38.00	101.00	54.00	1
3	101.00	54.00	101.01	48.30	1
4	101.01	48.30	113.00	48.30	1
5	113.00	48.30	113.01	67.50	1
6	113.01	67.50	230.00	67.50	1
7	0.00	30.00	230.00	30.00	2
8	0.00	16.00	230.00	16.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	400.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	120.0	120.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	26.00
2	230.00	26.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	113.01	230.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.160 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2500 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 20.00 ft.
and X = 95.00 ft.

Each Surface Terminates Between X = 113.01 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	46.02	38.00
2	50.00	34.97
3	54.12	32.15

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4	58.39	29.53
5	62.78	27.14
6	67.28	24.97
7	71.89	23.03
8	76.59	21.32
9	81.37	19.85
10	86.22	18.63
11	91.12	17.65
12	96.07	16.93
13	101.04	16.45
14	106.04	16.22
15	111.04	16.25
16	116.03	16.53
17	121.00	17.06
18	125.94	17.84
19	130.83	18.86
20	135.67	20.14
21	140.43	21.65
22	145.12	23.41
23	149.70	25.40
24	154.19	27.61
25	158.55	30.05
26	162.79	32.71
27	166.88	35.58
28	170.83	38.65
29	174.61	41.92
30	178.23	45.37
31	181.67	49.00
32	184.92	52.80
33	187.97	56.76
34	190.82	60.87
35	193.46	65.11
36	194.78	67.50

Circle Center At X = 108.0 ; Y = 115.2 and Radius, 99.0

*** 1.098 ***

Individual data on the 44 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.0	753.2	0.0	0.0	0.0	0.0	120.5	0.0	0.0
2	4.1	2290.7	0.0	0.0	0.0	0.0	366.5	0.0	0.0
3	3.5	3030.2	0.0	0.0	0.0	0.0	484.8	0.0	0.0
4	0.8	784.7	0.0	0.0	0.0	0.0	125.5	0.0	0.0
5	4.4	5266.3	0.0	0.0	0.0	0.0	842.6	0.0	0.0
6	2.4	3331.7	0.0	0.0	0.0	0.0	533.1	0.0	0.0
7	2.1	3306.7	0.0	76.7	0.0	0.0	529.1	0.0	0.0
8	4.6	7927.9	0.0	625.1	0.0	0.0	1268.5	0.0	0.0
9	4.7	9114.4	0.0	1193.9	0.0	0.0	1458.3	0.0	0.0
10	0.4	843.4	0.0	127.4	0.0	0.0	134.9	0.0	0.0
11	4.4	10131.1	0.0	1561.3	0.0	0.0	1621.0	0.0	0.0
12	4.8	13850.5	0.0	2108.2	0.0	0.0	2216.1	0.0	0.0
13	4.9	16648.9	0.0	2451.4	0.0	0.0	2663.8	0.0	0.0
14	4.9	19331.5	0.0	2717.5	0.0	0.0	3093.0	0.0	0.0
15	4.9	21664.9	0.0	2879.3	0.0	0.0	3466.4	0.0	0.0
16	0.0	42.7	0.0	6.0	0.0	0.0	6.8	0.0	0.0
17	0.0	133.2	0.0	20.4	0.0	0.0	21.3	0.0	0.0
18	5.0	19616.5	0.0	3015.5	0.0	0.0	3138.6	0.0	0.0
19	5.0	19696.4	0.0	3046.8	0.0	0.0	3151.4	0.0	0.0
20	2.0	7709.7	0.0	1188.6	0.0	0.0	1233.5	0.0	0.0
21	0.0	51.3	0.0	6.0	0.0	0.0	8.2	0.0	0.0
22	3.0	19076.7	0.0	1804.7	0.0	0.0	3052.3	0.0	725.1
23	5.0	31186.4	0.0	2873.2	0.0	0.0	4989.8	0.0	1193.2
24	4.9	30591.0	0.0	2668.9	0.0	0.0	4894.6	0.0	1185.3
25	4.9	29777.5	0.0	2386.9	0.0	0.0	4764.4	0.0	1174.4
26	4.8	28756.2	0.0	2027.8	0.0	0.0	4601.0	0.0	1160.4
27	4.8	27540.0	0.0	1592.6	0.0	0.0	4406.4	0.0	1143.5
28	4.7	26144.2	0.0	1082.5	0.0	0.0	4183.1	0.0	1123.7
29	4.6	24586.4	0.0	498.6	0.0	0.0	3933.8	0.0	1101.0
30	1.2	6351.9	0.0	25.7	0.0	0.0	1016.3	0.0	293.0
31	3.3	16534.8	0.0	0.0	0.0	0.0	2645.6	0.0	782.6
32	4.3	20615.5	0.0	0.0	0.0	0.0	3298.5	0.0	1024.2
33	0.1	451.2	0.0	0.0	0.0	0.0	72.2	0.0	23.1
34	4.2	19120.7	0.0	0.0	0.0	0.0	3059.3	0.0	1016.5
35	4.1	17076.6	0.0	0.0	0.0	0.0	2732.3	0.0	983.0
36	3.9	14987.1	0.0	0.0	0.0	0.0	2397.9	0.0	947.0
37	3.8	12880.1	0.0	0.0	0.0	0.0	2060.8	0.0	908.6
38	3.6	10784.6	0.0	0.0	0.0	0.0	1725.5	0.0	867.9
39	3.4	8729.5	0.0	0.0	0.0	0.0	1396.7	0.0	825.0
40	3.2	6743.8	0.0	0.0	0.0	0.0	1079.0	0.0	780.0
41	3.1	4856.5	0.0	0.0	0.0	0.0	777.0	0.0	733.0
42	2.9	3095.6	0.0	0.0	0.0	0.0	495.3	0.0	684.1
43	2.6	1488.3	0.0	0.0	0.0	0.0	238.1	0.0	633.5
44	1.3	197.3	0.0	0.0	0.0	0.0	31.6	0.0	317.3

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.08	38.00
2	52.99	34.88
3	57.06	31.97
4	61.28	29.29
5	65.64	26.85
6	70.13	24.64
7	74.73	22.68
8	79.43	20.98
9	84.21	19.53
10	89.07	18.34
11	93.98	17.42
12	98.94	16.76
13	103.93	16.38
14	108.92	16.27
15	113.92	16.42
16	118.90	16.85
17	123.85	17.55
18	128.76	18.52
19	133.61	19.75
20	138.38	21.25
21	143.06	23.00
22	147.64	25.00
23	152.11	27.24
24	156.45	29.73
25	160.64	32.45
26	164.69	35.39
27	168.56	38.55
28	172.26	41.91
29	175.78	45.47
30	179.09	49.21
31	182.20	53.13
32	185.09	57.21
33	187.75	61.44
34	190.18	65.81
35	191.00	67.50

Circle Center At X = 108.5 ; Y = 108.4 and Radius, 92.1

*** 1.098 ***

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Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	46.02	38.00

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2	49.94	34.90
3	54.03	32.02
4	58.26	29.35
5	62.63	26.92
6	67.12	24.72
7	71.72	22.77
8	76.42	21.06
9	81.20	19.61
10	86.06	18.41
11	90.97	17.47
12	95.93	16.80
13	100.91	16.40
14	105.91	16.25
15	110.91	16.38
16	115.89	16.77
17	120.85	17.43
18	125.76	18.35
19	130.62	19.54
20	135.41	20.98
21	140.11	22.67
22	144.72	24.61
23	149.22	26.80
24	153.59	29.22
25	157.83	31.87
26	161.92	34.75
27	165.85	37.83
28	169.61	41.13
29	173.19	44.62
30	176.58	48.29
31	179.77	52.14
32	182.75	56.16
33	185.51	60.33
34	188.05	64.64
35	189.53	67.50

Circle Center At X = 106.0 ; Y = 109.9 and Radius, 93.7

*** 1.102 ***

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.14	38.00
2	56.17	35.04
3	60.34	32.27
4	64.64	29.72
5	69.05	27.38
6	73.58	25.25
7	78.20	23.35
8	82.92	21.68
9	87.70	20.24
10	92.56	19.03
11	97.46	18.06
12	102.41	17.34
13	107.38	16.85
14	112.38	16.61
15	117.38	16.62
16	122.37	16.86
17	127.35	17.36
18	132.29	18.09
19	137.20	19.06
20	142.05	20.28
21	146.83	21.72
22	151.54	23.40
23	156.17	25.31
24	160.69	27.44
25	165.10	29.79
26	169.40	32.36
27	173.56	35.12
28	177.58	38.09
29	181.46	41.26
30	185.17	44.60
31	188.72	48.13
32	192.09	51.82
33	195.27	55.67
34	198.27	59.68
35	201.06	63.82
36	203.29	67.50

Circle Center At X = 114.8 ; Y = 118.9 and Radius, 102.3

*** 1.103 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.08	38.00
2	53.02	34.92
3	57.11	32.05
4	61.36	29.40
5	65.74	26.99
6	70.24	24.82
7	74.85	22.89
8	79.56	21.21
9	84.35	19.78
10	89.22	18.62
11	94.13	17.72
12	99.09	17.08
13	104.08	16.72
14	109.08	16.62
15	114.08	16.78
16	119.06	17.22
17	124.01	17.92
18	128.91	18.89
19	133.76	20.12
20	138.53	21.61
21	143.22	23.35
22	147.81	25.35
23	152.28	27.58
24	156.62	30.06
25	160.83	32.76
26	164.89	35.68
27	168.78	38.82
28	172.50	42.16
29	176.03	45.70
30	179.37	49.42
31	182.50	53.32
32	185.42	57.38
33	188.12	61.59
34	190.59	65.93
35	191.37	67.50

Circle Center At X = 108.4 ; Y = 109.7 and Radius, 93.1

*** 1.104 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.61	38.00

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2	54.56	34.93
3	58.67	32.08
4	62.92	29.44
5	67.30	27.04
6	71.81	24.88
7	76.43	22.96
8	81.14	21.28
9	85.93	19.86
10	90.79	18.70
11	95.71	17.80
12	100.67	17.16
13	105.66	16.79
14	110.66	16.68
15	115.65	16.84
16	120.64	17.27
17	125.59	17.96
18	130.50	18.91
19	135.35	20.12
20	140.13	21.59
21	144.82	23.32
22	149.42	25.29
23	153.90	27.50
24	158.26	29.94
25	162.48	32.62
26	166.56	35.52
27	170.47	38.63
28	174.22	41.94
29	177.78	45.45
30	181.15	49.15
31	184.32	53.01
32	187.27	57.05
33	190.01	61.23
34	192.52	65.55
35	193.52	67.50

Circle Center At X = 110.2 ; Y = 110.5 and Radius, 93.8

*** 1.104 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.80	38.00
2	63.70	34.88
3	67.77	31.98
4	72.00	29.30
5	76.36	26.86
6	80.85	24.66
7	85.46	22.72
8	90.16	21.02
9	94.95	19.59
10	99.82	18.43
11	104.73	17.53
12	109.70	16.90
13	114.68	16.55
14	119.68	16.47
15	124.68	16.66
16	129.66	17.13
17	134.60	17.87
18	139.50	18.88
19	144.33	20.16
20	149.09	21.70
21	153.75	23.50
22	158.31	25.55
23	162.75	27.85
24	167.06	30.39
25	171.22	33.16
26	175.23	36.15

27	179.06	39.36
28	182.71	42.78
29	186.17	46.39
30	189.43	50.18
31	192.47	54.15
32	195.29	58.28
33	197.88	62.56
34	200.23	66.97
35	200.48	67.50

Circle Center At X = 118.6 ; Y = 107.6 and Radius, 91.2

*** 1.109 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.20	38.00
2	59.35	35.20
3	63.61	32.59
4	67.98	30.15
5	72.44	27.90
6	76.99	25.84
7	81.63	23.97
8	86.34	22.30
9	91.12	20.82
10	95.96	19.55
11	100.84	18.49
12	105.77	17.63
13	110.73	16.98
14	115.71	16.53
15	120.70	16.30
16	125.70	16.28
17	130.70	16.47
18	135.68	16.86
19	140.65	17.47
20	145.58	18.29
21	150.47	19.31
22	155.32	20.53
23	160.11	21.96
24	164.84	23.59
25	169.49	25.42
26	174.07	27.44
27	178.55	29.65
28	182.94	32.05
29	187.22	34.63
30	191.39	37.39
31	195.44	40.32
32	199.37	43.42
33	203.16	46.68
34	206.81	50.09
35	210.31	53.66
36	213.66	57.37
37	216.85	61.22
38	219.88	65.20
39	221.48	67.50

Circle Center At X = 123.7 ; Y = 135.2 and Radius, 118.9

*** 1.111 ***

1

Failure Surface Specified By 35 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.08	38.00
2	53.09	35.01
3	57.25	32.23
4	61.54	29.67
5	65.96	27.33
6	70.50	25.23
7	75.13	23.35
8	79.86	21.72
9	84.66	20.33
10	89.53	19.19
11	94.45	18.30
12	99.41	17.67
13	104.39	17.29
14	109.39	17.17
15	114.39	17.30
16	119.38	17.69
17	124.33	18.33
18	129.25	19.23
19	134.12	20.38
20	138.92	21.78
21	143.64	23.42
22	148.27	25.30
23	152.80	27.42
24	157.22	29.77
25	161.51	32.34
26	165.66	35.12
27	169.66	38.12
28	173.51	41.32
29	177.18	44.71
30	180.68	48.28
31	183.99	52.03
32	187.10	55.94
33	190.00	60.01
34	192.70	64.22
35	194.56	67.50

Circle Center At X = 109.3 ; Y = 114.6 and Radius, 97.4

*** 1.114 ***

Failure Surface Specified By 33 Coordinate Points

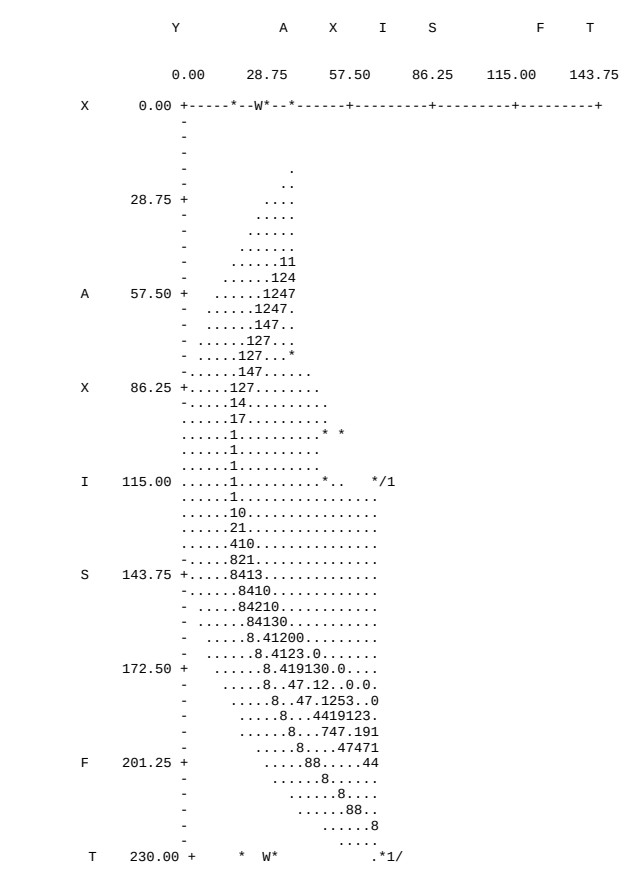
Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.14	38.00
2	55.94	34.74
3	59.92	31.73
4	64.09	28.96
5	68.42	26.46
6	72.89	24.23
7	77.50	22.28
8	82.21	20.61
9	87.02	19.24
10	91.91	18.18
11	96.85	17.41
12	101.83	16.95
13	106.82	16.80
14	111.82	16.96
15	116.80	17.42
16	121.74	18.20
17	126.62	19.27
18	131.43	20.65
19	136.14	22.32
20	140.74	24.28
21	145.21	26.51
22	149.54	29.02
23	153.70	31.79

24	157.68	34.82
25	161.47	38.08
26	165.05	41.57
27	168.41	45.28
28	171.53	49.18
29	174.41	53.27
30	177.02	57.53
31	179.37	61.95
32	181.44	66.50
33	181.83	67.50

Circle Center At X = 106.8 ; Y = 97.8 and Radius, 81.0

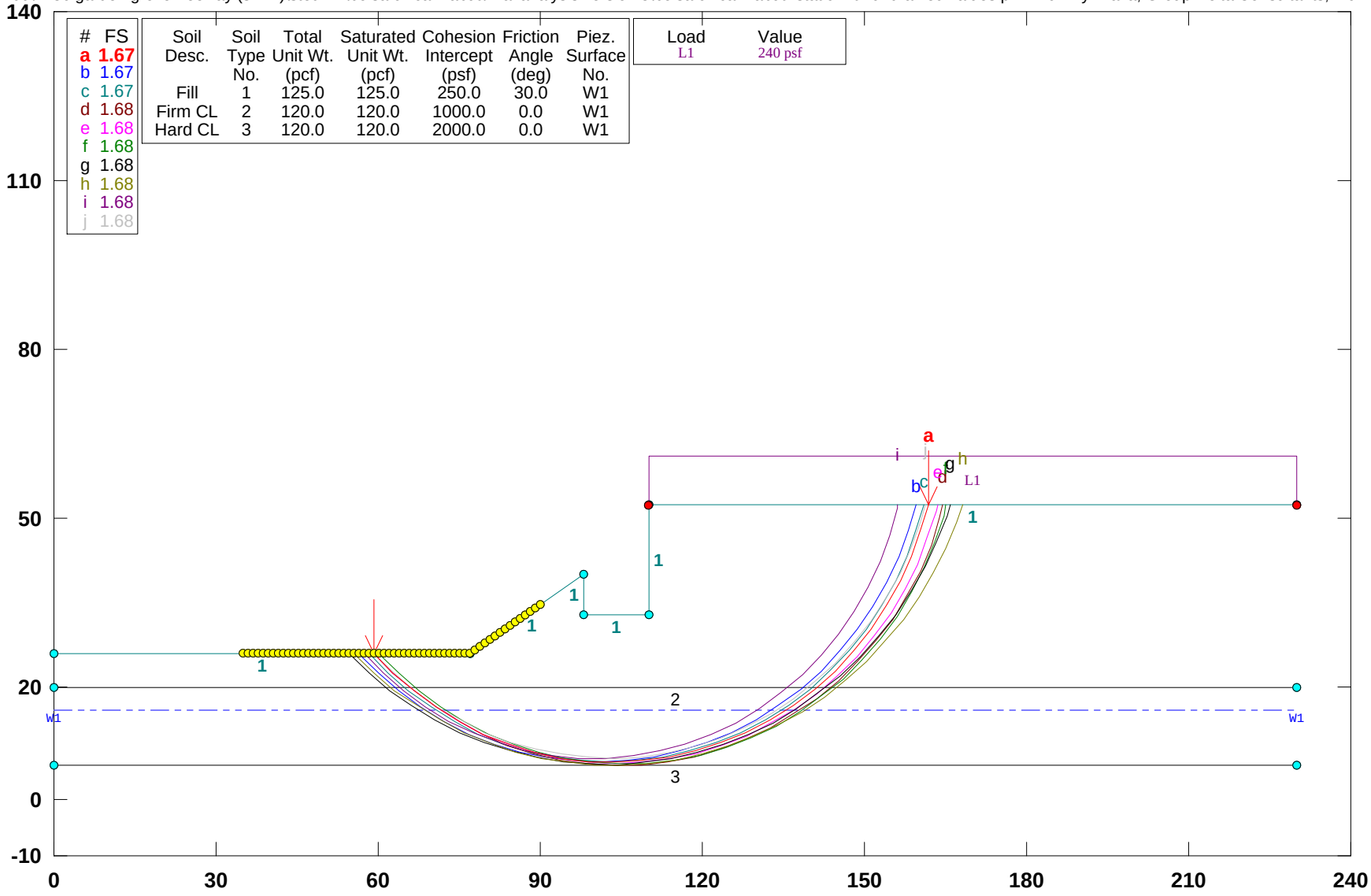
*** 1.114 ***

1



I-436 SR-22 Bolsa Chica Road OC N. Abutment - Static

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\stedwin\bolsa chica n abut\final analysis version 3\bolsa chica n abut- static with undrained values.pl2 Run By: Nava, Group Delta Consultants, Inc. 8/4/2008 05:3



PCSTABL5M/si FSmin=1.67

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/4/2008
Time of Run: 05:34PM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:bolsa chica n abut- static with undrained values.in
Output Filename: N:bolsa chica n abut- static with undrained values.OUT
Unit: ENGLISH
Plotted Output Filename: N:bolsa chica n abut- static with undrained values.PLT

PROBLEM DESCRIPTION I-436 SR-22
Bolsa Chica Road OC N. Abutment - Static

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	36.00	77.00	36.00	1
2	77.00	36.00	98.00	50.00	1
3	98.00	50.00	98.01	42.80	1
4	98.01	42.80	110.00	42.80	1
5	110.00	42.80	110.01	62.30	1
6	110.01	62.30	230.00	62.30	1
7	0.00	30.00	230.00	30.00	2
8	0.00	16.00	230.00	16.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	250.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	120.0	120.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	26.00
2	230.00	26.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	110.01	230.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

3600 Trial Surfaces Have Been Generated.

60 Surfaces Initiate From Each Of 60 Points Equally Spaced
Along The Ground Surface Between X = 35.00 ft.
and X = 90.00 ft.

Each Surface Terminates Between X = 110.01 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.24	36.00
2	62.77	32.46
3	66.59	29.24
4	70.66	26.34
5	74.96	23.78
6	79.46	21.60
7	84.12	19.79
8	88.92	18.38
9	93.82	17.38
10	98.78	16.78
11	103.78	16.60
12	108.77	16.84
13	113.73	17.49

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14	118.62	18.55
15	123.40	20.01
16	128.04	21.86
17	132.52	24.10
18	136.79	26.70
19	140.83	29.64
20	144.61	32.91
21	148.11	36.49
22	151.29	40.34
23	154.15	44.44
24	156.66	48.77
25	158.79	53.29
26	160.55	57.97
27	161.77	62.30

Circle Center At X = 103.5 ; Y = 76.7 and Radius, 60.1

*** 1.674 ***

Individual data on the 35 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.9	1736.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.9	719.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4.1	4136.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.6	683.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.7	5090.5	0.0	300.3	0.0	0.0	0.0	0.0	0.0
7	2.0	3167.0	0.0	383.0	0.0	0.0	0.0	0.0	0.0
8	2.5	4402.6	0.0	649.4	0.0	0.0	0.0	0.0	0.0
9	4.7	10566.1	0.0	1654.8	0.0	0.0	0.0	0.0	0.0
10	4.8	13685.3	0.0	2156.1	0.0	0.0	0.0	0.0	0.0
11	4.9	16660.8	0.0	2533.0	0.0	0.0	0.0	0.0	0.0
12	4.2	16182.6	0.0	2331.4	0.0	0.0	0.0	0.0	0.0
13	0.0	36.3	0.0	5.7	0.0	0.0	0.0	0.0	0.0
14	0.8	2459.8	0.0	445.8	0.0	0.0	0.0	0.0	0.0
15	5.0	15974.1	0.0	2904.0	0.0	0.0	0.0	0.0	0.0
16	5.0	15950.4	0.0	2895.4	0.0	0.0	0.0	0.0	0.0
17	1.2	3884.4	0.0	700.4	0.0	0.0	0.0	0.0	0.0
18	0.0	43.8	0.0	5.7	0.0	0.0	0.0	0.0	0.0
19	3.7	20726.2	0.0	2051.2	0.0	0.0	0.0	0.0	893.3
20	4.9	26755.0	0.0	2490.6	0.0	0.0	0.0	0.0	1172.7
21	4.8	25456.3	0.0	2097.1	0.0	0.0	0.0	0.0	1147.5
22	4.6	23796.6	0.0	1579.6	0.0	0.0	0.0	0.0	1114.4
23	4.5	21826.2	0.0	941.7	0.0	0.0	0.0	0.0	1073.5
24	3.1	14471.5	0.0	216.9	0.0	0.0	0.0	0.0	749.9
25	1.1	5133.8	0.0	0.0	0.0	0.0	0.0	0.0	275.3
26	4.0	17201.7	0.0	0.0	0.0	0.0	0.0	0.0	969.8
27	0.4	1676.8	0.0	0.0	0.0	0.0	0.0	0.0	99.1
28	3.4	12988.1	0.0	0.0	0.0	0.0	0.0	0.0	808.5
29	3.5	12064.0	0.0	0.0	0.0	0.0	0.0	0.0	839.2
30	3.2	9517.7	0.0	0.0	0.0	0.0	0.0	0.0	765.0
31	2.9	7108.1	0.0	0.0	0.0	0.0	0.0	0.0	685.5
32	2.5	4914.2	0.0	0.0	0.0	0.0	0.0	0.0	601.2
33	2.1	3009.9	0.0	0.0	0.0	0.0	0.0	0.0	512.8
34	1.8	1461.5	0.0	0.0	0.0	0.0	0.0	0.0	420.8
35	1.2	330.2	0.0	0.0	0.0	0.0	0.0	0.0	293.1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.44	36.00
2	59.99	32.48
3	63.83	29.27
4	67.91	26.38
5	72.22	23.85
6	76.72	21.67
7	81.39	19.88
8	86.18	18.47
9	91.08	17.47
10	96.05	16.87
11	101.04	16.69
12	106.04	16.91
13	111.00	17.55
14	115.89	18.60
15	120.67	20.04
16	125.32	21.88
17	129.81	24.09
18	134.09	26.67
19	138.15	29.59
20	141.95	32.83
21	145.48	36.38
22	148.70	40.21
23	151.59	44.29
24	154.13	48.59
25	156.31	53.09
26	158.12	57.75
27	159.46	62.30

Circle Center At X = 100.8 ; Y = 77.2 and Radius, 60.6

*** 1.674 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.31	36.00
2	61.85	32.47
3	65.67	29.25
4	69.75	26.36
5	74.05	23.81
6	78.55	21.63
7	83.22	19.83
8	88.02	18.43
9	92.92	17.43
10	97.88	16.83
11	102.88	16.66
12	107.87	16.89
13	112.83	17.55
14	117.72	18.61
15	122.50	20.07
16	127.14	21.92
17	131.61	24.16
18	135.89	26.75
19	139.93	29.69
20	143.71	32.96
21	147.21	36.53
22	150.41	40.38
23	153.27	44.48
24	155.78	48.81
25	157.92	53.32
26	159.68	58.00
27	160.91	62.30

Circle Center At X = 102.5 ; Y = 76.8 and Radius, 60.2

*** 1.674 ***

Failure Surface Specified By 28 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.24	36.00
2	62.78	32.47
3	66.59	29.23
4	70.65	26.31
5	74.93	23.73
6	79.41	21.51
7	84.05	19.65
8	88.83	18.17
9	93.71	17.08
10	98.66	16.39
11	103.65	16.10
12	108.65	16.22
13	113.62	16.74
14	118.54	17.66
15	123.36	18.97
16	128.07	20.66
17	132.62	22.73
18	136.99	25.16
19	141.15	27.94
20	145.07	31.04
21	148.73	34.45
22	152.10	38.14
23	155.16	42.09
24	157.90	46.28
25	160.28	50.67
26	162.31	55.24
27	163.96	59.96
28	164.57	62.30

Circle Center At X = 104.7 ; Y = 78.0 and Radius, 61.9

*** 1.675 ***

1

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.24	36.00
2	62.79	32.48
3	66.61	29.26
4	70.69	26.36
5	74.99	23.81
6	79.48	21.61
7	84.13	19.78
8	88.92	18.35
9	93.81	17.30
10	98.77	16.66
11	103.76	16.42
12	108.76	16.60
13	113.73	17.17
14	118.63	18.15
15	123.44	19.53
16	128.12	21.30
17	132.63	23.44
18	136.96	25.94
19	141.08	28.78
20	144.94	31.95
21	148.54	35.43
22	151.84	39.18
23	154.82	43.19
24	157.47	47.44
25	159.76	51.88
26	161.68	56.50
27	163.22	61.25
28	163.47	62.30

Circle Center At X = 104.1 ; Y = 77.7 and Radius, 61.3

*** 1.676 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.17	36.00
2	63.72	32.48
3	67.54	29.26
4	71.62	26.36
5	75.91	23.79
6	80.40	21.58
7	85.04	19.75
8	89.83	18.29
9	94.71	17.22
10	99.67	16.56
11	104.66	16.29
12	109.66	16.43
13	114.63	16.98
14	119.54	17.92
15	124.36	19.26
16	129.05	20.98
17	133.59	23.08
18	137.95	25.53
19	142.09	28.33
20	145.99	31.46
21	149.63	34.89
22	152.98	38.60
23	156.01	42.58
24	158.72	46.78
25	161.08	51.19
26	163.07	55.78
27	164.68	60.51
28	165.14	62.30

Circle Center At X = 105.4 ; Y = 78.1 and Radius, 61.8

*** 1.678 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.58	36.00
2	58.23	32.59
3	62.13	29.45
4	66.25	26.62
5	70.57	24.10
6	75.06	21.91
7	79.71	20.06
8	84.48	18.56
9	89.35	17.42
10	94.28	16.65
11	99.27	16.25
12	104.27	16.22
13	109.26	16.56
14	114.21	17.27
15	119.09	18.35
16	123.88	19.79

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17	128.54	21.58
18	133.07	23.72
19	137.42	26.18
20	141.57	28.96
21	145.51	32.05
22	149.20	35.42
23	152.63	39.05
24	155.79	42.93
25	158.64	47.03
26	161.19	51.34
27	163.40	55.82
28	165.28	60.46
29	165.87	62.30

Circle Center At X = 102.2 ; Y = 83.3 and Radius, 67.1

*** 1.682 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.51	36.00
2	59.17	32.59
3	63.07	29.47
4	67.19	26.63
5	71.51	24.11
6	76.00	21.91
7	80.64	20.05
8	85.40	18.53
9	90.26	17.36
10	95.20	16.56
11	100.18	16.12
12	105.18	16.05
13	110.17	16.34
14	115.12	17.00
15	120.02	18.03
16	124.82	19.41
17	129.52	21.14
18	134.07	23.21
19	138.46	25.60
20	142.66	28.32
21	146.64	31.33
22	150.40	34.63
23	153.91	38.20
24	157.14	42.01
25	160.08	46.05
26	162.72	50.30
27	165.04	54.73
28	167.03	59.32
29	168.07	62.30

Circle Center At X = 103.7 ; Y = 84.1 and Radius, 68.0

*** 1.683 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	57.37	36.00
2	60.91	32.47
3	64.74	29.25

4	68.83	26.38
5	73.16	23.88
6	77.69	21.76
7	82.38	20.04
8	87.21	18.73
9	92.13	17.85
10	97.11	17.39
11	102.11	17.37
12	107.09	17.78
13	112.02	18.63
14	116.86	19.89
15	121.57	21.57
16	126.11	23.66
17	130.46	26.13
18	134.58	28.96
19	138.44	32.14
20	142.00	35.65
21	145.25	39.45
22	148.16	43.52
23	150.70	47.82
24	152.86	52.33
25	154.63	57.01
26	155.98	61.82
27	156.07	62.30

Circle Center At X = 99.9 ; Y = 75.0 and Radius, 57.6

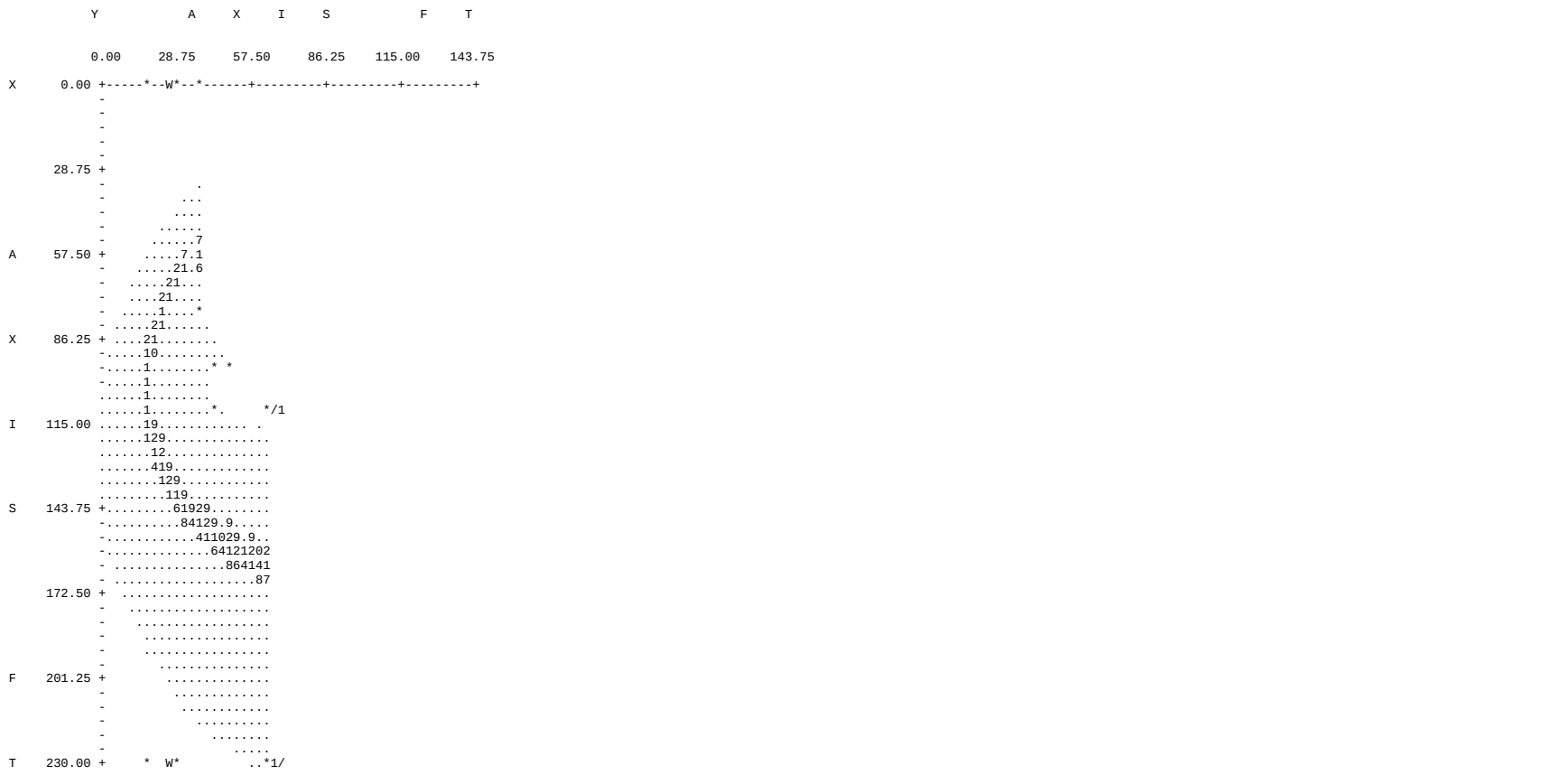
*** 1.683 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.24	36.00
2	62.84	32.53
3	66.71	29.37
4	70.84	26.55
5	75.18	24.07
6	79.72	21.96
7	84.41	20.24
8	89.23	18.91
9	94.14	17.98
10	99.12	17.46
11	104.12	17.36
12	109.11	17.67
13	114.05	18.39
14	118.92	19.52
15	123.68	21.05
16	128.30	22.97
17	132.74	25.27
18	136.98	27.92
19	140.98	30.92
20	144.73	34.23
21	148.18	37.85
22	151.32	41.74
23	154.13	45.88
24	156.59	50.23
25	158.68	54.77
26	160.38	59.47
27	161.15	62.30

Circle Center At X = 102.9 ; Y = 77.7 and Radius, 60.3

*** 1.683 ***


Y A X I S F T
0.00 28.75 57.50 86.25 115.00 143.75
X 0.00
28.75
A 57.50
X 86.25
I 115.00
S 143.75
172.50
F 201.25
T 230.00

I-436 SR-22 Bolsa Chica Road OC N. Abut- Seismic

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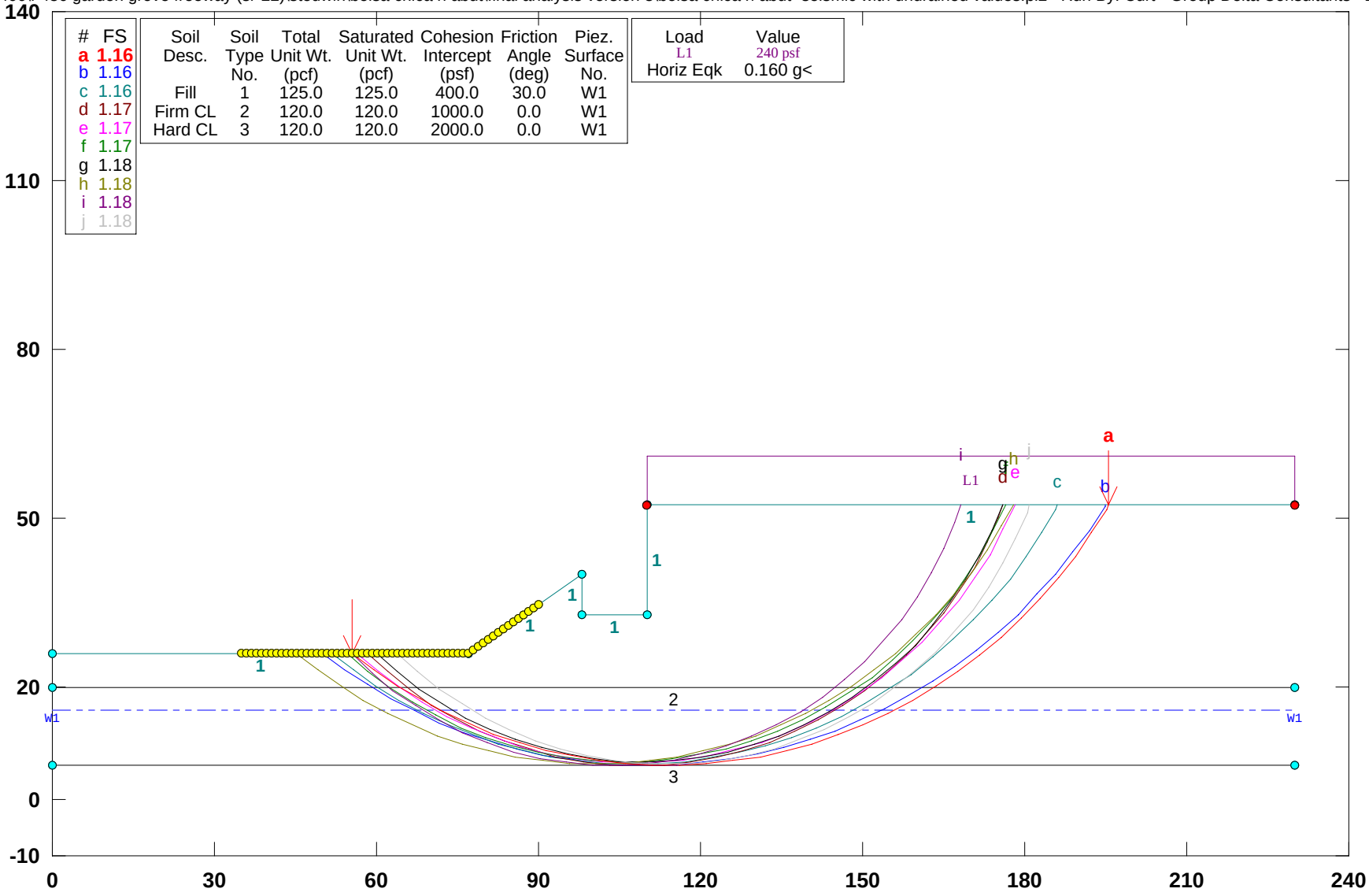
#	FS
a	1.16
b	1.16
c	1.16
d	1.17
e	1.17
f	1.17
g	1.18
h	1.18
i	1.18
j	1.18

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	125.0	125.0	400.0	30.0	W1
Firm CL	2	120.0	120.0	1000.0	0.0	W1
Hard CL	3	120.0	120.0	2000.0	0.0	W1

Load	Value
L1	240 psf
Horiz Eqk	0.160 g<



PCSTABL5M/si FSmin=1.16

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 09:28AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:bolsa chica n abut- seismic with undrained values.in
Output Filename: N:bolsa chica n abut- seismic with undrained values.OUT
Unit: ENGLISH
Plotted Output Filename: N:bolsa chica n abut- seismic with undrained values.PLT

PROBLEM DESCRIPTION I-436 SR-22
Bolsa Chica Road OC N. Abut- Seismic

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	36.00	77.00	36.00	1
2	77.00	36.00	98.00	50.00	1
3	98.00	50.00	98.01	42.80	1
4	98.01	42.80	110.00	42.80	1
5	110.00	42.80	110.01	62.30	1
6	110.01	62.30	230.00	62.30	1
7	0.00	30.00	230.00	30.00	2
8	0.00	16.00	230.00	16.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	400.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	120.0	120.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	26.00
2	230.00	26.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	110.01	230.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.160 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

3600 Trial Surfaces Have Been Generated.

60 Surfaces Initiate From Each Of 60 Points Equally Spaced
Along The Ground Surface Between X = 35.00 ft.
and X = 90.00 ft.

Each Surface Terminates Between X = 110.01 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.51	36.00
2	59.54	33.05
3	63.73	30.31

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4	68.05	27.79
5	72.50	25.51
6	77.06	23.46
7	81.72	21.65
8	86.47	20.09
9	91.29	18.78
10	96.18	17.73
11	101.12	16.93
12	106.09	16.40
13	111.08	16.12
14	116.08	16.11
15	121.08	16.36
16	126.05	16.87
17	130.99	17.64
18	135.88	18.67
19	140.71	19.95
20	145.47	21.49
21	150.14	23.27
22	154.72	25.30
23	159.17	27.56
24	163.51	30.05
25	167.71	32.77
26	171.75	35.70
27	175.64	38.85
28	179.36	42.19
29	182.90	45.72
30	186.25	49.43
31	189.40	53.31
32	192.34	57.36
33	195.07	61.55
34	195.51	62.30

Circle Center At X = 113.8 ; Y = 111.4 and Radius, 95.3

*** 1.159 ***

Individual data on the 42 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.0	744.8	0.0	0.0	0.0	0.0	119.2	0.0	0.0
2	4.2	2260.7	0.0	0.0	0.0	0.0	361.7	0.0	0.0
3	0.5	386.3	0.0	0.0	0.0	0.0	61.8	0.0	0.0
4	3.8	3346.9	0.0	0.0	0.0	0.0	535.5	0.0	0.0
5	3.5	3915.4	0.0	0.0	0.0	0.0	626.5	0.0	0.0
6	1.0	1207.9	0.0	16.6	0.0	0.0	193.3	0.0	0.0
7	4.5	6354.4	0.0	463.7	0.0	0.0	1016.7	0.0	0.0
8	0.1	86.1	0.0	9.7	0.0	0.0	13.8	0.0	0.0
9	4.7	8589.1	0.0	1074.9	0.0	0.0	1374.3	0.0	0.0
10	4.8	11574.6	0.0	1600.1	0.0	0.0	1851.9	0.0	0.0
11	4.8	14514.0	0.0	2047.6	0.0	0.0	2322.2	0.0	0.0
12	4.9	17371.5	0.0	2416.2	0.0	0.0	2779.4	0.0	0.0
13	1.8	7116.8	0.0	967.4	0.0	0.0	1138.7	0.0	0.0
14	0.0	35.6	0.0	5.4	0.0	0.0	5.7	0.0	0.0
15	3.1	9753.2	0.0	1732.1	0.0	0.0	1560.5	0.0	0.0
16	5.0	15909.0	0.0	2912.7	0.0	0.0	2545.4	0.0	0.0
17	3.9	12691.8	0.0	2373.5	0.0	0.0	2030.7	0.0	0.0
18	0.0	44.8	0.0	6.1	0.0	0.0	7.2	0.0	0.0
19	1.1	6107.9	0.0	659.6	0.0	0.0	977.3	0.0	257.2
20	5.0	28518.4	0.0	3084.1	0.0	0.0	4562.9	0.0	1200.0
21	5.0	28412.0	0.0	3047.2	0.0	0.0	4545.9	0.0	1198.5
22	5.0	28071.6	0.0	2928.5	0.0	0.0	4491.4	0.0	1193.7
23	4.9	27501.7	0.0	2728.5	0.0	0.0	4400.3	0.0	1185.6
24	4.9	26710.3	0.0	2447.7	0.0	0.0	4273.7	0.0	1174.3
25	4.8	25708.4	0.0	2086.9	0.0	0.0	4113.3	0.0	1159.7
26	4.8	24509.7	0.0	1646.9	0.0	0.0	3921.6	0.0	1142.0
27	4.7	23131.0	0.0	1129.2	0.0	0.0	3701.0	0.0	1121.1
28	4.6	21591.5	0.0	535.0	0.0	0.0	3454.6	0.0	1097.1
29	1.4	6307.7	0.0	34.0	0.0	0.0	1009.2	0.0	332.0
30	3.1	13605.2	0.0	0.0	0.0	0.0	2176.8	0.0	738.1
31	4.2	17741.7	0.0	0.0	0.0	0.0	2838.7	0.0	1017.7
32	0.1	377.3	0.0	0.0	0.0	0.0	60.4	0.0	22.4
33	4.2	16205.8	0.0	0.0	0.0	0.0	2592.9	0.0	1007.4
34	4.0	14203.5	0.0	0.0	0.0	0.0	2272.6	0.0	971.8
35	3.9	12167.5	0.0	0.0	0.0	0.0	1946.8	0.0	933.5
36	3.7	10128.3	0.0	0.0	0.0	0.0	1620.5	0.0	892.7
37	3.5	8117.0	0.0	0.0	0.0	0.0	1298.7	0.0	849.4
38	3.3	6164.7	0.0	0.0	0.0	0.0	986.3	0.0	803.8
39	3.2	4302.6	0.0	0.0	0.0	0.0	688.4	0.0	756.0
40	2.9	2561.2	0.0	0.0	0.0	0.0	409.8	0.0	706.1
41	2.7	970.2	0.0	0.0	0.0	0.0	155.2	0.0	654.3
42	0.4	20.4	0.0	0.0	0.0	0.0	3.3	0.0	104.2

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.92	36.00
2	54.00	33.12
3	58.23	30.44
4	62.58	27.98
5	67.04	25.73
6	71.62	23.71
7	76.29	21.92
8	81.04	20.36
9	85.86	19.04
10	90.74	17.96
11	95.67	17.12
12	100.63	16.52
13	105.62	16.18
14	110.62	16.07
15	115.62	16.22
16	120.60	16.61
17	125.56	17.25
18	130.48	18.14
19	135.35	19.26
20	140.16	20.63
21	144.90	22.23
22	149.55	24.07
23	154.11	26.13
24	158.55	28.42
25	162.88	30.92
26	167.08	33.63
27	171.14	36.55
28	175.05	39.67
29	178.80	42.97
30	182.39	46.46
31	185.79	50.12
32	189.01	53.94
33	192.04	57.92
34	194.87	62.05
35	195.03	62.30

Circle Center At X = 110.2 ; Y = 117.1 and Radius, 101.0

*** 1.161 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	51.78	36.00
2	55.76	32.98
3	59.91	30.18
4	64.21	27.63
5	68.64	25.31

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6	73.19	23.25
7	77.86	21.44
8	82.61	19.90
9	87.45	18.63
10	92.35	17.62
11	97.29	16.90
12	102.27	16.45
13	107.27	16.28
14	112.27	16.38
15	117.25	16.77
16	122.21	17.44
17	127.12	18.38
18	131.97	19.59
19	136.75	21.07
20	141.43	22.82
21	146.01	24.83
22	150.47	27.08
23	154.80	29.59
24	158.98	32.33
25	163.00	35.30
26	166.85	38.49
27	170.52	41.89
28	173.99	45.49
29	177.25	49.28
30	180.30	53.25
31	183.12	57.37
32	185.70	61.65
33	186.05	62.30

Circle Center At X = 107.8 ; Y = 105.8 and Radius, 89.5

*** 1.163 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.31	36.00
2	62.05	32.69
3	66.02	29.64
4	70.18	26.87
5	74.52	24.40
6	79.03	22.23
7	83.67	20.37
8	88.43	18.84
9	93.28	17.63
10	98.21	16.77
11	103.18	16.24
12	108.18	16.06
13	113.17	16.22
14	118.15	16.72
15	123.08	17.57
16	127.94	18.75
17	132.70	20.26
18	137.35	22.09
19	141.87	24.24
20	146.22	26.70
21	150.40	29.44
22	154.38	32.47
23	158.14	35.77
24	161.66	39.31
25	164.94	43.09
26	167.94	47.09
27	170.67	51.28
28	173.10	55.65
29	175.22	60.18
30	176.05	62.30

Circle Center At X = 108.3 ; Y = 88.8 and Radius, 72.7

*** 1.168 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.44	36.00
2	60.29	32.80
3	64.33	29.86
4	68.56	27.19
5	72.95	24.80
6	77.48	22.69
7	82.14	20.89
8	86.91	19.39
9	91.77	18.20
10	96.69	17.33
11	101.66	16.78
12	106.66	16.55
13	111.66	16.65
14	116.64	17.07
15	121.58	17.81
16	126.47	18.87
17	131.28	20.25
18	135.99	21.93
19	140.58	23.92
20	145.03	26.20
21	149.32	28.76
22	153.44	31.59
23	157.37	34.69
24	161.08	38.03
25	164.58	41.61
26	167.83	45.40
27	170.83	49.40
28	173.57	53.58
29	176.03	57.94
30	178.14	62.30

Circle Center At X = 107.7 ; Y = 93.7 and Radius, 77.2

*** 1.170 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.58	36.00
2	58.44	32.82
3	62.50	29.90
4	66.73	27.25
5	71.13	24.87
6	75.68	22.79
7	80.35	21.00
8	85.12	19.51
9	89.98	18.33
10	94.90	17.47
11	99.88	16.93
12	104.87	16.71
13	109.87	16.82
14	114.85	17.24
15	119.80	17.99
16	124.68	19.05
17	129.49	20.42
18	134.20	22.10

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19	138.79	24.08
20	143.24	26.35
21	147.54	28.91
22	151.67	31.73
23	155.60	34.82
24	159.33	38.15
25	162.84	41.71
26	166.10	45.50
27	169.12	49.48
28	171.88	53.66
29	174.36	58.00
30	176.46	62.30

Circle Center At X = 105.8 ; Y = 94.3 and Radius, 77.6

*** 1.173 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.17	36.00
2	63.94	32.71
3	67.93	29.70
4	72.12	26.97
5	76.49	24.54
6	81.01	22.42
7	85.68	20.61
8	90.46	19.14
9	95.33	18.01
10	100.26	17.21
11	105.24	16.77
12	110.24	16.67
13	115.23	16.92
14	120.20	17.51
15	125.11	18.45
16	129.94	19.73
17	134.68	21.35
18	139.28	23.29
19	143.75	25.54
20	148.04	28.11
21	152.14	30.96
22	156.04	34.09
23	159.71	37.49
24	163.13	41.14
25	166.29	45.01
26	169.18	49.09
27	171.77	53.37
28	174.06	57.82
29	175.98	62.30

Circle Center At X = 109.2 ; Y = 88.4 and Radius, 71.7

*** 1.177 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	45.25	36.00
2	49.22	32.96
3	53.35	30.14
4	57.64	27.57
5	62.07	25.24
6	66.62	23.17
7	71.28	21.36
8	76.04	19.82
9	80.87	18.56
10	85.77	17.57
11	90.72	16.86
12	95.71	16.44
13	100.70	16.30
14	105.70	16.44
15	110.68	16.87
16	115.63	17.58
17	120.53	18.57
18	125.37	19.84
19	130.13	21.39
20	134.79	23.20
21	139.34	25.27
22	143.76	27.60
23	148.04	30.18
24	152.17	33.00
25	156.14	36.05
26	159.92	39.31
27	163.51	42.79
28	166.90	46.47
29	170.07	50.34
30	173.02	54.38
31	175.73	58.58
32	177.85	62.30

Circle Center At X = 100.7 ; Y = 104.0 and Radius, 87.7

*** 1.177 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.51	36.00
2	59.17	32.59
3	63.07	29.47
4	67.19	26.63
5	71.51	24.11
6	76.00	21.91
7	80.64	20.05
8	85.40	18.53
9	90.26	17.36
10	95.20	16.56
11	100.18	16.12
12	105.18	16.05
13	110.17	16.34
14	115.12	17.00
15	120.02	18.03
16	124.82	19.41
17	129.52	21.14
18	134.07	23.21
19	138.46	25.60
20	142.66	28.32
21	146.64	31.33
22	150.40	34.63
23	153.91	38.20
24	157.14	42.01
25	160.08	46.05
26	162.72	50.30
27	165.04	54.73
28	167.03	59.32
29	168.07	62.30

Circle Center At X = 103.7 ; Y = 84.1 and Radius, 68.0

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      ***     1.178   ***


Failure Surface Specified By 30 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1         63.90       36.00
    2         67.65       32.70
    3         71.62       29.66
    4         75.80       26.90
    5         80.15       24.44
    6         84.66       22.29
    7         89.31       20.45
    8         94.07       18.93
    9         98.93       17.75
   10        103.86       16.91
   11        108.84       16.41
   12        113.83       16.26
   13        118.83       16.45
   14        123.80       16.98
   15        128.72       17.86
   16        133.57       19.07
   17        138.33       20.62
   18        142.97       22.49
   19        147.46       24.68
   20        151.80       27.17
   21        155.95       29.95
   22        159.90       33.02
   23        163.63       36.35
   24        167.12       39.93
   25        170.36       43.74
   26        173.32       47.77
   27        176.00       51.99
   28        178.38       56.38
   29        180.45       60.94
   30        180.96       62.30

Circle Center At X =  113.6 ; Y =   88.6  and Radius,   72.3

      ***     1.178   ***


1

            Y           A     X     I     S           F     T


          0.00     28.75     57.50     86.25    115.00    143.75

X      0.00 +-----*--W*--*------+---------+---------+---------+
            -
            -
            -
            -
            -
      28.75 +
            -           .
            -          ...
            -         ...8
            -       ...8.2
            -      ...8.23
A     57.50 +     ....81.1
            -    ....821.7
            -   ....8210..
            -   ...8210...
             -  ....317...*
            - ....8210.....
 X     86.25 + ....310.......
            -.....21.........
            -.....10.......* *
            -.....1.........
            .....1.........
            .....1.........*.     */1
I     115.00 .....1.............. .
            .....1.................
            .....15................
            .....14................
            .....125...............
            .....148...............
S     143.75 +.....1238............
            -.......13499..........
            -........13469.........
            -.........1346899......
            - ........123544.9.9...
            - .........1230.468..99
      172.50 +  .........12.335446..
            -   ..........11.30.544
            -    ...........1..3300
            -     ............1.2.33
            -     ..............11..
            -       ..............11
F     201.25 +         ..............
            -         ..............
            -          .............
            -            ...........
            -              ........
            -                  .....
T     230.00 +     *  W*         ..*1/
```


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I-436 405-22 HOV Connector Separation Abutment 1_North Slope - Static

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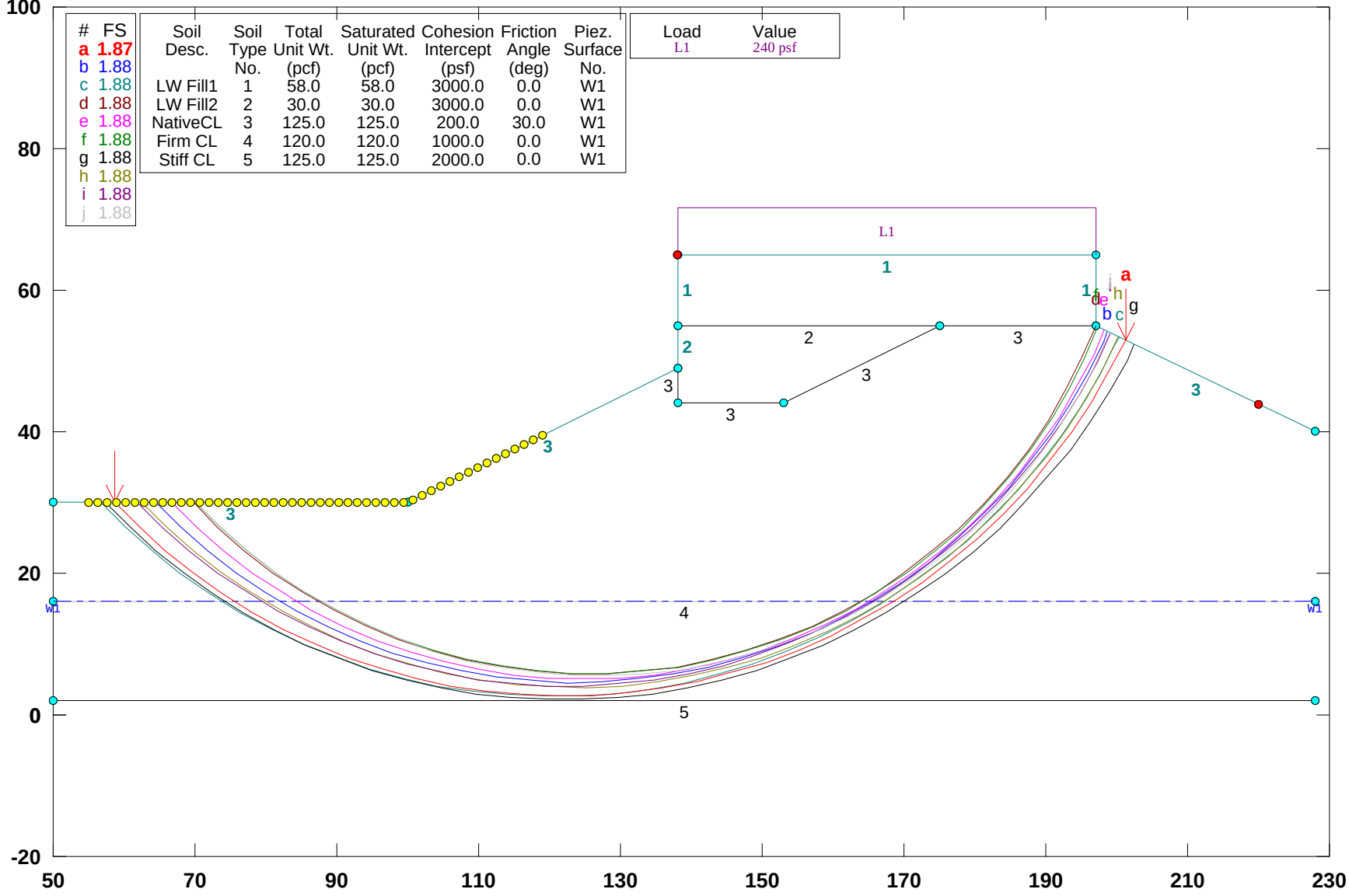
#	FS
a	1.87
b	1.88
c	1.88
d	1.88
e	1.88
f	1.88
g	1.88
h	1.88
i	1.88
j	1.88

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill1	1	58.0	58.0	3000.0	0.0	W1
LW Fill2	2	30.0	30.0	3000.0	0.0	W1
NativeCL	3	125.0	125.0	200.0	30.0	W1
Firm CL	4	120.0	120.0	1000.0	0.0	W1
Stiff CL	5	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=1.87

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/15/2008
Time of Run: 03:21PM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:hov abut 1_north slope_static.in
Output Filename: N:hov abut 1_north slope_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:hov abut 1_north slope_static.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Separation
Abutment 1_North Slope - Static

BOUNDARY COORDINATES

7 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	50.00	50.00	50.00	3
2	50.00	50.00	88.00	69.00	3
3	88.00	69.00	88.01	75.00	2
4	88.01	75.00	88.02	85.00	1
5	88.02	85.00	147.00	85.00	1
6	147.00	85.00	147.01	75.00	1
7	147.01	75.00	178.00	60.00	3
8	88.01	75.00	125.00	75.00	2
9	88.00	69.00	88.01	64.00	3
10	88.01	64.00	103.00	64.00	3
11	103.00	64.00	125.00	75.00	3
12	125.00	75.00	147.01	75.00	3
13	0.00	36.00	178.00	36.00	4
14	0.00	22.00	178.00	22.00	5

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	58.0	58.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	200.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	178.00	36.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	88.02	147.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 5.00 ft.
and X = 70.00 ft.

Each Surface Terminates Between X = 88.02 ft.
and X = 170.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 36 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.59	50.00
2	12.13	46.47
3	15.87	43.14
4	19.79	40.04
5	23.88	37.16
6	28.12	34.52
7	32.52	32.13
8	37.04	30.00
9	41.67	28.13
10	46.41	26.52
11	51.23	25.19
12	56.12	24.14
13	61.06	23.36
14	66.03	22.88
15	71.03	22.67
16	76.03	22.76
17	81.01	23.12
18	85.97	23.78
19	90.88	24.71
20	95.73	25.93
21	100.50	27.42
22	105.18	29.18
23	109.76	31.20
24	114.20	33.49
25	118.51	36.02
26	122.67	38.80
27	126.66	41.81
28	130.48	45.04
29	134.10	48.49
30	137.52	52.14
31	140.73	55.97
32	143.71	59.99
33	146.45	64.17
34	148.96	68.50
35	151.21	72.96
36	151.21	72.97

Circle Center At X = 72.1 ; Y = 110.1 and Radius, 87.4

*** 1.872 ***

Individual data on the 45 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.7	2425.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3.9	4119.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4.1	5828.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.9	3139.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	2.4	4368.5	0.0	128.7	0.0	0.0	0.0	0.0	0.0
7	4.4	9092.8	0.0	833.2	0.0	0.0	0.0	0.0	0.0
8	4.5	10588.5	0.0	1539.1	0.0	0.0	0.0	0.0	0.0
9	4.6	11972.0	0.0	2164.4	0.0	0.0	0.0	0.0	0.0
10	4.7	13217.2	0.0	2706.9	0.0	0.0	0.0	0.0	0.0
11	3.6	10585.1	0.0	2319.4	0.0	0.0	0.0	0.0	0.0
12	1.2	3762.7	0.0	845.6	0.0	0.0	0.0	0.0	0.0
13	4.9	16324.3	0.0	3537.0	0.0	0.0	0.0	0.0	0.0
14	4.9	18557.2	0.0	3821.8	0.0	0.0	0.0	0.0	0.0
15	5.0	20611.1	0.0	4018.5	0.0	0.0	0.0	0.0	0.0
16	5.0	22457.3	0.0	4126.4	0.0	0.0	0.0	0.0	0.0
17	5.0	24070.4	0.0	4145.2	0.0	0.0	0.0	0.0	0.0
18	5.0	25429.1	0.0	4074.8	0.0	0.0	0.0	0.0	0.0
19	5.0	26516.4	0.0	3915.4	0.0	0.0	0.0	0.0	0.0
20	2.0	11174.8	0.0	1551.1	0.0	0.0	0.0	0.0	0.0
21	0.0	54.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0
22	0.0	55.4	0.0	7.5	0.0	0.0	0.0	0.0	0.0
23	2.9	16590.2	0.0	2101.4	0.0	0.0	0.0	0.0	686.8
24	4.9	27604.7	0.0	3332.0	0.0	0.0	0.0	0.0	1164.0
25	4.8	26389.3	0.0	2910.0	0.0	0.0	0.0	0.0	1145.4
26	2.5	13433.8	0.0	1349.6	0.0	0.0	0.0	0.0	598.9
27	2.2	11641.4	0.0	1053.1	0.0	0.0	0.0	0.0	524.2
28	4.6	24315.9	0.0	1812.1	0.0	0.0	0.0	0.0	1097.1
29	4.4	23462.6	0.0	1139.8	0.0	0.0	0.0	0.0	1067.5
30	4.3	22183.5	0.0	388.2	0.0	0.0	0.0	0.0	1025.0
31	0.0	202.3	0.0	0.0	0.0	0.0	0.0	0.0	9.4
32	4.2	21078.2	0.0	0.0	0.0	0.0	0.0	0.0	997.9
33	2.3	11501.8	0.0	0.0	0.0	0.0	0.0	0.0	558.8
34	1.7	8000.0	0.0	0.0	0.0	0.0	0.0	0.0	399.4
35	3.8	17263.9	0.0	0.0	0.0	0.0	0.0	0.0	915.3
36	3.6	14886.2	0.0	0.0	0.0	0.0	0.0	0.0	869.4
37	3.4	12535.8	0.0	0.0	0.0	0.0	0.0	0.0	820.7
38	3.2	10250.9	0.0	0.0	0.0	0.0	0.0	0.0	769.3
39	3.0	8069.6	0.0	0.0	0.0	0.0	0.0	0.0	715.4
40	2.7	6028.7	0.0	0.0	0.0	0.0	0.0	0.0	659.1
41	0.5	1026.2	0.0	0.0	0.0	0.0	0.0	0.0	131.4
42	0.0	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	1.9	1876.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	2.3	783.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.47	50.00
2	18.02	46.48
3	21.78	43.18
4	25.74	40.13
5	29.87	37.32
6	34.17	34.76
7	38.62	32.48
8	43.20	30.47
9	47.90	28.75
10	52.69	27.32
11	57.55	26.18
12	62.48	25.34
13	67.46	24.81
14	72.45	24.59
15	77.45	24.67
16	82.44	25.05
17	87.39	25.74
18	92.29	26.73
19	97.12	28.03
20	101.86	29.61
21	106.50	31.48
22	111.01	33.63
23	115.38	36.06
24	119.60	38.75
25	123.64	41.69
26	127.50	44.87
27	131.15	48.29
28	134.59	51.92
29	137.80	55.75
30	140.76	59.78
31	143.48	63.98
32	145.93	68.33
33	148.11	72.83

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34	148.67	74.19

Circle Center At X = 73.6 ; Y = 106.1 and Radius, 81.5

*** 1.875 ***

1

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.63	50.00
2	10.18	46.48
3	13.92	43.16
4	17.85	40.06
5	21.94	37.19
6	26.19	34.55
7	30.58	32.16
8	35.10	30.03
9	39.74	28.15
10	44.47	26.54
11	49.29	25.20
12	54.17	24.13
13	59.11	23.35
14	64.08	22.84
15	69.08	22.62
16	74.08	22.68
17	79.07	23.02
18	84.03	23.65
19	88.94	24.56
20	93.80	25.74
21	98.58	27.20
22	103.28	28.92
23	107.86	30.91
24	112.33	33.16
25	116.66	35.65
26	120.85	38.39
27	124.87	41.36
28	128.72	44.56
29	132.38	47.96
30	135.84	51.57
31	139.09	55.37
32	142.12	59.35
33	144.92	63.49
34	147.48	67.78
35	149.79	72.22
36	150.32	73.40

Circle Center At X = 70.5 ; Y = 110.7 and Radius, 88.1

*** 1.876 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.70	50.00
2	23.24	46.47
3	26.99	43.17

4	30.96	40.12
5	35.12	37.35
6	39.45	34.84
7	43.93	32.63
8	48.55	30.72
9	53.28	29.11
10	58.11	27.81
11	63.02	26.83
12	67.97	26.17
13	72.96	25.84
14	77.96	25.84
15	82.95	26.16
16	87.91	26.80
17	92.81	27.77
18	97.65	29.06
19	102.38	30.66
20	107.01	32.56
21	111.49	34.77
22	115.83	37.26
23	119.99	40.03
24	123.96	43.06
25	127.73	46.35
26	131.28	49.88
27	134.58	53.63
28	137.63	57.59
29	140.42	61.74
30	142.94	66.06
31	145.16	70.54
32	147.01	74.97

Circle Center At X = 75.5 ; Y = 102.3 and Radius, 76.5

*** 1.876 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	16.76	50.00
2	20.30	46.47
3	24.06	43.18
4	28.02	40.12
5	32.17	37.33
6	36.48	34.79
7	40.94	32.53
8	45.53	30.56
9	50.24	28.88
10	55.05	27.50
11	59.93	26.42
12	64.87	25.65
13	69.85	25.19
14	74.85	25.05
15	79.84	25.22
16	84.82	25.70
17	89.76	26.49
18	94.63	27.59
19	99.43	29.00
20	104.13	30.70
21	108.72	32.70
22	113.17	34.98
23	117.46	37.53
24	121.59	40.35
25	125.54	43.43
26	129.28	46.74

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27	132.81	50.28
28	136.11	54.04
29	139.17	58.00
30	141.97	62.14
31	144.50	66.45
32	146.77	70.91
33	148.27	74.39

Circle Center At X = 74.7 ; Y = 104.7 and Radius, 79.6

*** 1.876 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.03	50.00
2	23.56	46.46
3	27.32	43.17
4	31.29	40.12
5	35.44	37.35
6	39.77	34.85
7	44.26	32.63
8	48.88	30.72
9	53.61	29.11
10	58.44	27.81
11	63.34	26.83
12	68.30	26.18
13	73.29	25.85
14	78.29	25.84
15	83.28	26.16
16	88.24	26.81
17	93.14	27.78
18	97.97	29.07
19	102.71	30.67
20	107.33	32.58
21	111.82	34.78
22	116.15	37.28
23	120.31	40.05
24	124.29	43.08
25	128.05	46.37
26	131.59	49.90
27	134.90	53.66
28	137.95	57.62
29	140.74	61.77
30	143.25	66.09
31	145.47	70.57
32	147.01	74.27

Circle Center At X = 75.8 ; Y = 102.3 and Radius, 76.5

*** 1.876 ***

1

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	7.29	50.00
2	10.83	46.47
3	14.56	43.14
4	18.48	40.03
5	22.56	37.14
6	26.79	34.49
7	31.17	32.07
8	35.68	29.91
9	40.30	27.99
10	45.02	26.34
11	49.82	24.96
12	54.70	23.85
13	59.63	23.01
14	64.59	22.44
15	69.59	22.16
16	74.59	22.16
17	79.58	22.43
18	84.55	22.98
19	89.48	23.81
20	94.35	24.92
21	99.16	26.29
22	103.88	27.93
23	108.51	29.84
24	113.02	31.99
25	117.40	34.40
26	121.64	37.05
27	125.73	39.93
28	129.65	43.03
29	133.39	46.35
30	136.94	49.87
31	140.28	53.59
32	143.42	57.49
33	146.33	61.55
34	149.01	65.77
35	151.45	70.14
36	152.52	72.33

Circle Center At X = 72.2 ; Y = 111.5 and Radius, 89.4

*** 1.876 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	12.51	50.00
2	16.07	46.48
3	19.82	43.18
4	23.77	40.11
5	27.89	37.28
6	32.17	34.70
7	36.60	32.38
8	41.16	30.32
9	45.83	28.54
10	50.60	27.04
11	55.45	25.82
12	60.36	24.89
13	65.32	24.26
14	70.31	23.92
15	75.31	23.88
16	80.30	24.14
17	85.27	24.69
18	90.20	25.54
19	95.07	26.67
20	99.86	28.10
21	104.56	29.80

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22	109.15	31.79
23	113.62	34.04
24	117.94	36.55
25	122.11	39.31
26	126.10	42.32
27	129.91	45.56
28	133.52	49.01
29	136.92	52.68
30	140.10	56.54
31	143.04	60.59
32	145.74	64.80
33	148.18	69.16
34	150.24	73.43

Circle Center At X = 73.5 ; Y = 108.1 and Radius, 84.2

*** 1.878 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	11.86	50.00
2	15.42	46.49
3	19.18	43.19
4	23.13	40.13
5	27.26	37.31
6	31.55	34.74
7	35.98	32.43
8	40.54	30.38
9	45.22	28.62
10	50.00	27.13
11	54.85	25.93
12	59.77	25.03
13	64.73	24.42
14	69.72	24.10
15	74.72	24.09
16	79.71	24.37
17	84.68	24.95
18	89.60	25.83
19	94.46	26.99
20	99.25	28.45
21	103.94	30.18
22	108.51	32.20
23	112.96	34.48
24	117.26	37.03
25	121.41	39.82
26	125.38	42.86
27	129.16	46.13
28	132.74	49.62
29	136.11	53.32
30	139.25	57.21
31	142.15	61.28
32	144.80	65.52
33	147.20	69.91
34	149.12	73.98

Circle Center At X = 72.5 ; Y = 107.8 and Radius, 83.8

*** 1.878 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.03	50.00
2	23.57	46.47
3	27.33	43.18
4	31.30	40.14
5	35.45	37.35
6	39.78	34.84
7	44.25	32.61
8	48.86	30.67
9	53.59	29.03
10	58.40	27.70
11	63.30	26.68
12	68.25	25.97
13	73.23	25.58
14	78.23	25.51
15	83.23	25.77
16	88.19	26.34
17	93.11	27.22
18	97.97	28.43
19	102.73	29.94
20	107.39	31.75
21	111.93	33.85
22	116.32	36.25
23	120.55	38.91
24	124.60	41.85
25	128.45	45.04
26	132.09	48.46
27	135.50	52.12
28	138.67	55.98
29	141.59	60.04
30	144.25	64.28
31	146.62	68.68
32	148.71	73.22
33	149.02	74.03

Circle Center At X = 76.8 ; Y = 103.5 and Radius, 78.0

*** 1.881 ***

1

```
          Y            A     X     I     S            F     T


          0.00     22.25     44.50     66.75     89.00    111.25

X     0.00 +---------*-----*---+-*-------+---------+---------+
           -                    .
           -                   .1
           -                  ..18
           -                 .1.82
           -                 18.24
     22.25 +                182.4.
           -              .3924...
           -             3.124....
           -            31.24.....
           -           .1.256.....
           -          ..1854......
A    44.50 +           .3824.......
           -         .3124.......*
           -         .124..........
           -        ..15...........
```

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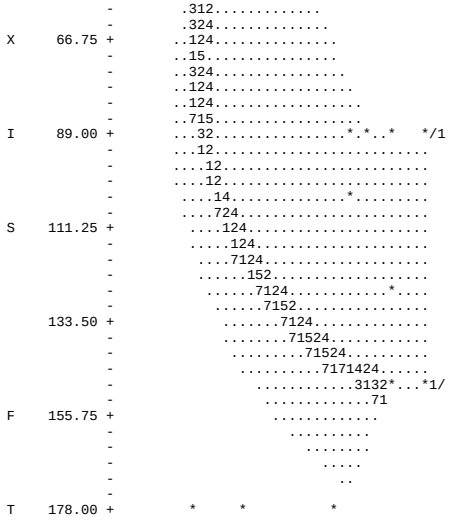

X 66.75
I 89.00
S 111.25
133.50
F 155.75
T 178.00

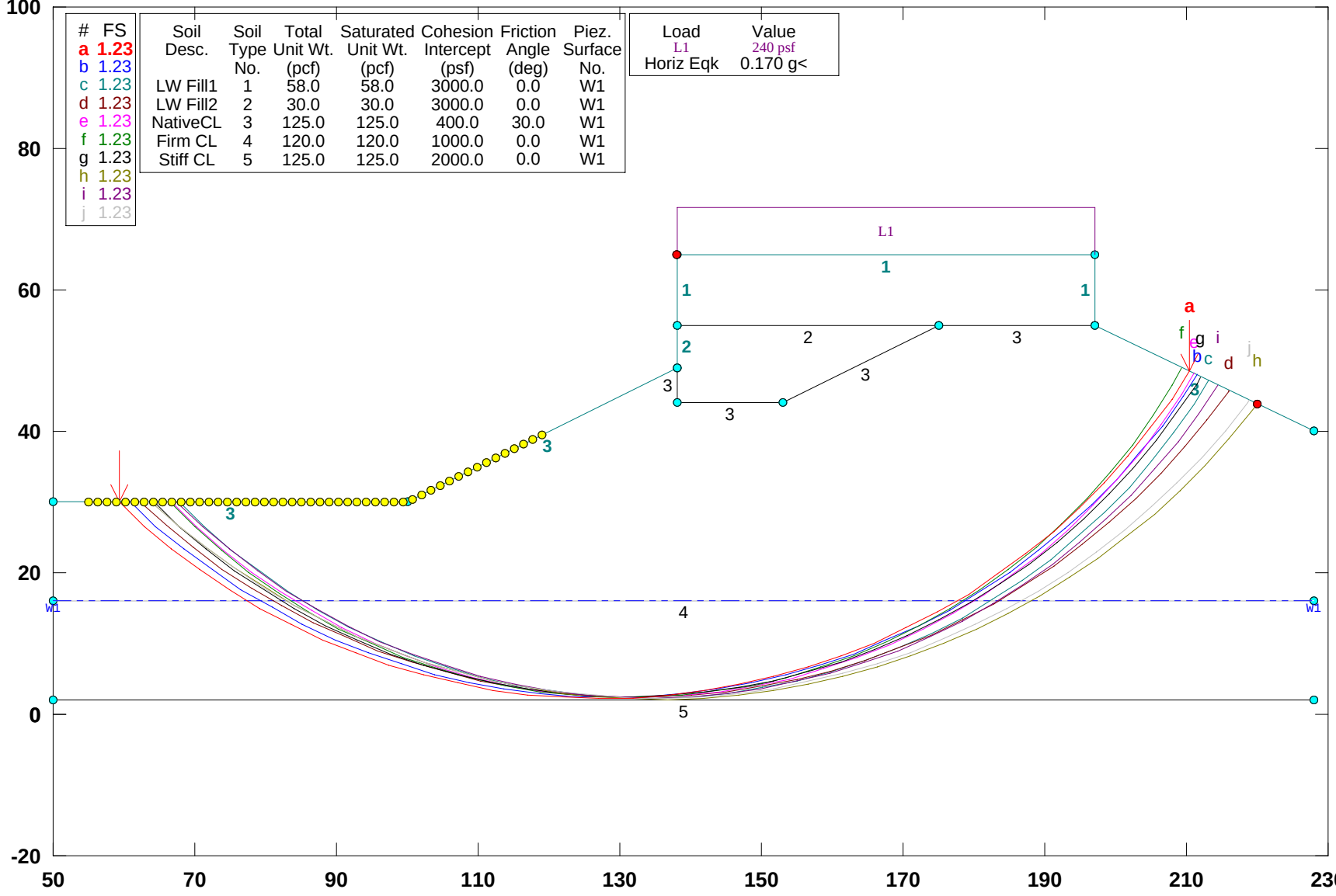
I-436 405-22 HOV Connector Separation Abutment 1_North Slope - Seismic

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\i-436 fr hov connector\slope stability\hov abut 1_north slope_seismic.pl2 Run By: Curt - Group Delta Consultants 1/25/2009 09:50AM

#	FS
a	1.23
b	1.23
c	1.23
d	1.23
e	1.23
f	1.23
g	1.23
h	1.23
i	1.23
j	1.23

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill1	1	58.0	58.0	3000.0	0.0	W1
LW Fill2	2	30.0	30.0	3000.0	0.0	W1
NativeCL	3	125.0	125.0	400.0	30.0	W1
Firm CL	4	120.0	120.0	1000.0	0.0	W1
Stiff CL	5	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf
Horiz Eqk	0.170 g<



PCSTABL5M/si FSmin=1.23

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 09:50AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:hov abut 1_north slope_seismic.in
Output Filename: N:hov abut 1_north slope_seismic.OUT
Unit: ENGLISH
Plotted Output Filename: N:hov abut 1_north slope_seismic.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Separation
Abutment 1_North Slope - Seismic

BOUNDARY COORDINATES

7 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	50.00	50.00	50.00	3
2	50.00	50.00	88.00	69.00	3
3	88.00	69.00	88.01	75.00	2
4	88.01	75.00	88.02	85.00	1
5	88.02	85.00	147.00	85.00	1
6	147.00	85.00	147.01	75.00	1
7	147.01	75.00	178.00	60.00	3
8	88.01	75.00	125.00	75.00	2
9	88.00	69.00	88.01	64.00	3
10	88.01	64.00	103.00	64.00	3
11	103.00	64.00	125.00	75.00	3
12	125.00	75.00	147.01	75.00	3
13	0.00	36.00	178.00	36.00	4
14	0.00	22.00	178.00	22.00	5

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	58.0	58.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	400.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	178.00	36.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	88.02	147.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 5.00 ft.
and X = 70.00 ft.

Each Surface Terminates Between X = 88.02 ft.
and X = 170.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	9.25	50.00
2	12.91	46.60
3	16.75	43.39
4	20.74	40.39
5	24.89	37.59
6	29.17	35.00
7	33.58	32.64
8	38.10	30.51
9	42.72	28.61
10	47.44	26.96
11	52.24	25.54
12	57.10	24.37
13	62.01	23.46
14	66.97	22.79
15	71.95	22.38
16	76.95	22.23
17	81.95	22.33
18	86.94	22.69
19	91.90	23.30
20	96.82	24.16
21	101.70	25.28
22	106.51	26.64
23	111.24	28.25
24	115.89	30.10
25	120.43	32.18
26	124.87	34.49
27	129.18	37.03
28	133.35	39.78
29	137.37	42.75
30	141.24	45.91
31	144.95	49.28
32	148.47	52.82
33	151.81	56.54
34	154.96	60.43
35	157.90	64.47
36	160.51	68.47

Circle Center At X = 77.5 ; Y = 119.9 and Radius, 97.7

*** 1.225 ***

Individual data on the 45 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.7	779.0	0.0	0.0	0.0	0.0	132.4	0.0	0.0
2	3.8	2398.8	0.0	0.0	0.0	0.0	407.8	0.0	0.0
3	4.0	4049.9	0.0	0.0	0.0	0.0	688.5	0.0	0.0
4	4.1	5704.0	0.0	0.0	0.0	0.0	969.7	0.0	0.0
5	2.6	4343.7	0.0	0.0	0.0	0.0	738.4	0.0	0.0
6	1.6	2985.9	0.0	59.8	0.0	0.0	507.6	0.0	0.0
7	4.4	8864.3	0.0	678.8	0.0	0.0	1506.9	0.0	0.0
8	4.5	10314.7	0.0	1379.6	0.0	0.0	1753.5	0.0	0.0
9	4.6	11668.3	0.0	2008.2	0.0	0.0	1983.6	0.0	0.0
10	4.7	12904.4	0.0	2562.9	0.0	0.0	2193.7	0.0	0.0
11	2.6	7369.5	0.0	1568.1	0.0	0.0	1252.8	0.0	0.0
12	2.2	6790.9	0.0	1474.3	0.0	0.0	1154.4	0.0	0.0
13	4.9	16368.8	0.0	3445.3	0.0	0.0	2782.7	0.0	0.0
14	4.9	18665.1	0.0	3770.5	0.0	0.0	3173.1	0.0	0.0
15	5.0	20817.9	0.0	4017.3	0.0	0.0	3539.0	0.0	0.0
16	5.0	22802.6	0.0	4185.0	0.0	0.0	3876.4	0.0	0.0
17	5.0	24596.9	0.0	4273.1	0.0	0.0	4181.5	0.0	0.0
18	5.0	26181.3	0.0	4281.4	0.0	0.0	4450.8	0.0	0.0
19	5.0	27539.1	0.0	4209.9	0.0	0.0	4681.6	0.0	0.0
20	1.1	6041.1	0.0	885.7	0.0	0.0	1027.0	0.0	0.0
21	0.0	55.6	0.0	8.3	0.0	0.0	9.5	0.0	0.0
22	0.0	57.0	0.0	8.3	0.0	0.0	9.7	0.0	0.0
23	3.9	23131.9	0.0	3156.6	0.0	0.0	3932.4	0.0	931.0
24	4.9	28969.3	0.0	3828.5	0.0	0.0	4924.8	0.0	1181.9
25	4.9	28091.9	0.0	3519.6	0.0	0.0	4775.6	0.0	1169.7
26	1.3	7389.6	0.0	890.1	0.0	0.0	1256.2	0.0	312.5
27	3.5	19913.2	0.0	2242.8	0.0	0.0	3385.2	0.0	842.0
28	4.7	27060.5	0.0	2669.3	0.0	0.0	4600.3	0.0	1136.3
29	4.6	26626.4	0.0	2130.1	0.0	0.0	4526.5	0.0	1115.0
30	4.5	25969.6	0.0	1516.8	0.0	0.0	4414.8	0.0	1090.9
31	4.4	25102.3	0.0	830.9	0.0	0.0	4267.4	0.0	1063.9
32	0.1	751.1	0.0	14.2	0.0	0.0	127.7	0.0	32.0
33	2.4	13437.1	0.0	125.4	0.0	0.0	2284.3	0.0	582.0
34	1.7	9432.9	0.0	0.0	0.0	0.0	1603.6	0.0	420.0
35	4.2	21508.2	0.0	0.0	0.0	0.0	3656.4	0.0	1001.5
36	4.0	19314.6	0.0	0.0	0.0	0.0	3283.5	0.0	966.4
37	3.9	17079.1	0.0	0.0	0.0	0.0	2903.4	0.0	928.7
38	3.7	14831.4	0.0	0.0	0.0	0.0	2521.3	0.0	888.6
39	2.1	7527.0	0.0	0.0	0.0	0.0	1279.6	0.0	492.7
40	0.0	32.4	0.0	0.0	0.0	0.0	5.5	0.0	0.0
41	1.5	4125.9	0.0	0.0	0.0	0.0	701.4	0.0	0.0
42	3.3	7849.8	0.0	0.0	0.0	0.0	1334.5	0.0	0.0
43	3.1	5279.5	0.0	0.0	0.0	0.0	897.5	0.0	0.0
44	2.9	2938.9	0.0	0.0	0.0	0.0	499.6	0.0	0.0
45	2.6	856.5	0.0	0.0	0.0	0.0	145.6	0.0	0.0

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	10.88	50.00
2	14.55	46.61
3	18.40	43.41
4	22.40	40.41
5	26.55	37.62
6	30.83	35.05
7	35.25	32.70
8	39.78	30.58
9	44.41	28.69
10	49.13	27.05
11	53.93	25.64
12	58.79	24.49
13	63.71	23.58
14	68.67	22.93
15	73.65	22.53
16	78.65	22.39
17	83.65	22.51
18	88.63	22.88
19	93.59	23.50
20	98.52	24.38
21	103.39	25.51
22	108.19	26.89
23	112.92	28.51

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24	117.56	30.37
25	122.10	32.47
26	126.53	34.80
27	130.83	37.35
28	134.99	40.11
29	139.01	43.09
30	142.87	46.27
31	146.56	49.64
32	150.08	53.20
33	153.40	56.93
34	156.54	60.83
35	159.46	64.88
36	161.48	68.00

Circle Center At X = 78.9 ; Y = 120.0 and Radius, 97.6

*** 1.227 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	17.74	50.00
2	21.34	46.53
3	25.12	43.25
4	29.07	40.19
5	33.18	37.34
6	37.44	34.72
7	41.83	32.34
8	46.35	30.19
9	50.97	28.29
10	55.69	26.64
11	60.49	25.25
12	65.37	24.13
13	70.29	23.26
14	75.25	22.66
15	80.24	22.34
16	85.24	22.28
17	90.24	22.49
18	95.22	22.97
19	100.16	23.72
20	105.06	24.73
21	109.89	26.01
22	114.65	27.55
23	119.32	29.34
24	123.88	31.38
25	128.33	33.66
26	132.65	36.18
27	136.82	38.93
28	140.85	41.90
29	144.70	45.09
30	148.38	48.47
31	151.87	52.05
32	155.16	55.82
33	158.24	59.75
34	161.11	63.85
35	163.18	67.17

Circle Center At X = 83.8 ; Y = 114.9 and Radius, 92.6

*** 1.227 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	12.19	50.00
2	15.92	46.68
3	19.81	43.54
4	23.86	40.59
5	28.04	37.85
6	32.34	35.31
7	36.77	32.99
8	41.31	30.88
9	45.94	29.00
10	50.66	27.34
11	55.45	25.92
12	60.31	24.73
13	65.21	23.78
14	70.16	23.08
15	75.14	22.61
16	80.14	22.38
17	85.14	22.40
18	90.13	22.67
19	95.10	23.17
20	100.05	23.92
21	104.95	24.91
22	109.80	26.13
23	114.58	27.59
24	119.28	29.28
25	123.90	31.20
26	128.42	33.34
27	132.83	35.70
28	137.12	38.27
29	141.28	41.05
30	145.29	44.03
31	149.16	47.19
32	152.87	50.55
33	156.41	54.08
34	159.78	57.77
35	162.96	61.63
36	165.95	65.64
37	166.05	65.79

Circle Center At X = 82.2 ; Y = 125.0 and Radius, 102.6

*** 1.228 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	16.76	50.00
2	20.34	46.51
3	24.10	43.21
4	28.04	40.13
5	32.14	37.28
6	36.39	34.65
7	40.78	32.25
8	45.30	30.11
9	49.93	28.21
10	54.65	26.57

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11	59.46	25.20
12	64.33	24.09
13	69.26	23.25
14	74.23	22.68
15	79.22	22.39
16	84.22	22.37
17	89.21	22.63
18	94.19	23.16
19	99.12	23.96
20	104.01	25.03
21	108.82	26.37
22	113.56	27.97
23	118.20	29.83
24	122.73	31.94
25	127.14	34.30
26	131.41	36.90
27	135.54	39.73
28	139.50	42.78
29	143.29	46.04
30	146.89	49.51
31	150.30	53.17
32	153.50	57.01
33	156.48	61.02
34	159.24	65.19
35	161.02	68.22

Circle Center At X = 82.1 ; Y = 113.3 and Radius, 90.9

*** 1.228 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	16.43	50.00
2	19.98	46.48
3	23.72	43.16
4	27.64	40.06
5	31.73	37.18
6	35.97	34.53
7	40.36	32.13
8	44.87	29.98
9	49.50	28.08
10	54.22	26.45
11	59.03	25.08
12	63.91	23.99
13	68.85	23.17
14	73.82	22.63
15	78.81	22.37
16	83.81	22.38
17	88.80	22.68
18	93.77	23.26
19	98.69	24.12
20	103.56	25.25
21	108.36	26.65
22	113.08	28.32
23	117.69	30.25
24	122.19	32.43
25	126.55	34.87
26	130.78	37.54
27	134.84	40.45
28	138.74	43.58
29	142.46	46.93
30	145.98	50.48
31	149.30	54.22
32	152.40	58.14
33	155.28	62.23
34	157.92	66.47
35	159.33	69.04

Circle Center At X = 81.0 ; Y = 111.5 and Radius, 89.1

*** 1.228 ***

1

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.15	50.00
2	17.79	46.58
3	21.61	43.35
4	25.60	40.33
5	29.73	37.52
6	34.01	34.94
7	38.42	32.58
8	42.95	30.46
9	47.58	28.58
10	52.31	26.94
11	57.11	25.55
12	61.98	24.42
13	66.90	23.55
14	71.87	22.94
15	76.85	22.58
16	81.85	22.49
17	86.85	22.67
18	91.83	23.10
19	96.78	23.80
20	101.69	24.75
21	106.54	25.97
22	111.32	27.43
23	116.02	29.15
24	120.62	31.11
25	125.11	33.30
26	129.48	35.73
27	133.71	38.39
28	137.80	41.27
29	141.74	44.35
30	145.50	47.64
31	149.09	51.13
32	152.49	54.79
33	155.69	58.63
34	158.69	62.63
35	161.47	66.79
36	162.03	67.73

Circle Center At X = 81.0 ; Y = 117.6 and Radius, 95.1

*** 1.228 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

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1	13.82	50.00
2	17.59	46.71
3	21.50	43.60
4	25.56	40.68
5	29.75	37.96
6	34.07	35.43
7	38.50	33.11
8	43.03	31.01
9	47.66	29.11
10	52.37	27.44
11	57.16	25.99
12	62.01	24.77
13	66.91	23.77
14	71.85	23.01
15	76.82	22.48
16	81.81	22.19
17	86.81	22.13
18	91.81	22.31
19	96.79	22.72
20	101.75	23.36
21	106.67	24.24
22	111.55	25.35
23	116.37	26.69
24	121.12	28.25
25	125.79	30.03
26	130.37	32.03
27	134.85	34.25
28	139.23	36.67
29	143.48	39.29
30	147.61	42.12
31	151.60	45.13
32	155.44	48.33
33	159.13	51.71
34	162.65	55.25
35	166.01	58.96
36	169.19	62.82
37	169.98	63.88

Circle Center At X = 85.6 ; Y = 128.4 and Radius, 106.3

*** 1.229 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	17.41	50.00
2	21.04	46.56
3	24.85	43.32
4	28.83	40.29
5	32.96	37.47
6	37.23	34.87
7	41.63	32.50
8	46.15	30.37
9	50.78	28.47
10	55.50	26.83
11	60.30	25.44
12	65.17	24.30
13	70.09	23.42
14	75.06	22.80
15	80.04	22.44
16	85.04	22.35
17	90.04	22.52
18	95.02	22.95
19	99.97	23.65
20	104.88	24.61
21	109.73	25.82
22	114.51	27.29
23	119.20	29.01
24	123.80	30.97
25	128.29	33.18
26	132.65	35.62
27	136.88	38.28
28	140.97	41.17
29	144.89	44.26
30	148.65	47.56
31	152.23	51.05
32	155.62	54.73
33	158.81	58.58
34	161.79	62.60
35	164.43	66.57

Circle Center At X = 84.3 ; Y = 117.1 and Radius, 94.7

*** 1.229 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.82	50.00
2	17.58	46.70
3	21.49	43.59
4	25.54	40.66
5	29.73	37.93
6	34.05	35.41
7	38.48	33.09
8	43.02	30.99
9	47.65	29.10
10	52.36	27.44
11	57.15	26.01
12	62.01	24.80
13	66.91	23.83
14	71.86	23.10
15	76.83	22.60
16	81.82	22.33
17	86.82	22.31
18	91.82	22.53
19	96.80	22.98
20	101.75	23.67
21	106.66	24.60
22	111.53	25.76
23	116.33	27.14
24	121.06	28.76
25	125.71	30.60
26	130.27	32.66
27	134.72	34.94
28	139.06	37.43
29	143.27	40.12
30	147.35	43.00
31	151.29	46.08
32	155.08	49.35
33	158.71	52.79
34	162.17	56.40
35	165.45	60.17
36	168.55	64.09
37	168.81	64.45

Circle Center At X = 84.8 ; Y = 127.1 and Radius, 104.8

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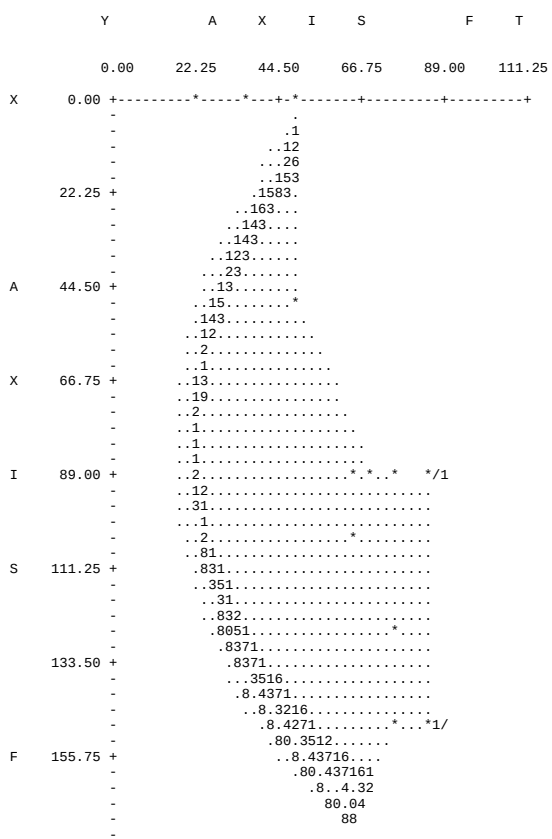
*** 1.231 ***

1


Y A X I S F T
0.00 22.25 44.50 66.75 89.00 111.25
X 0.00
22.25
A 44.50
X 66.75
I 89.00
S 111.25
133.50
F 155.75
T 178.00

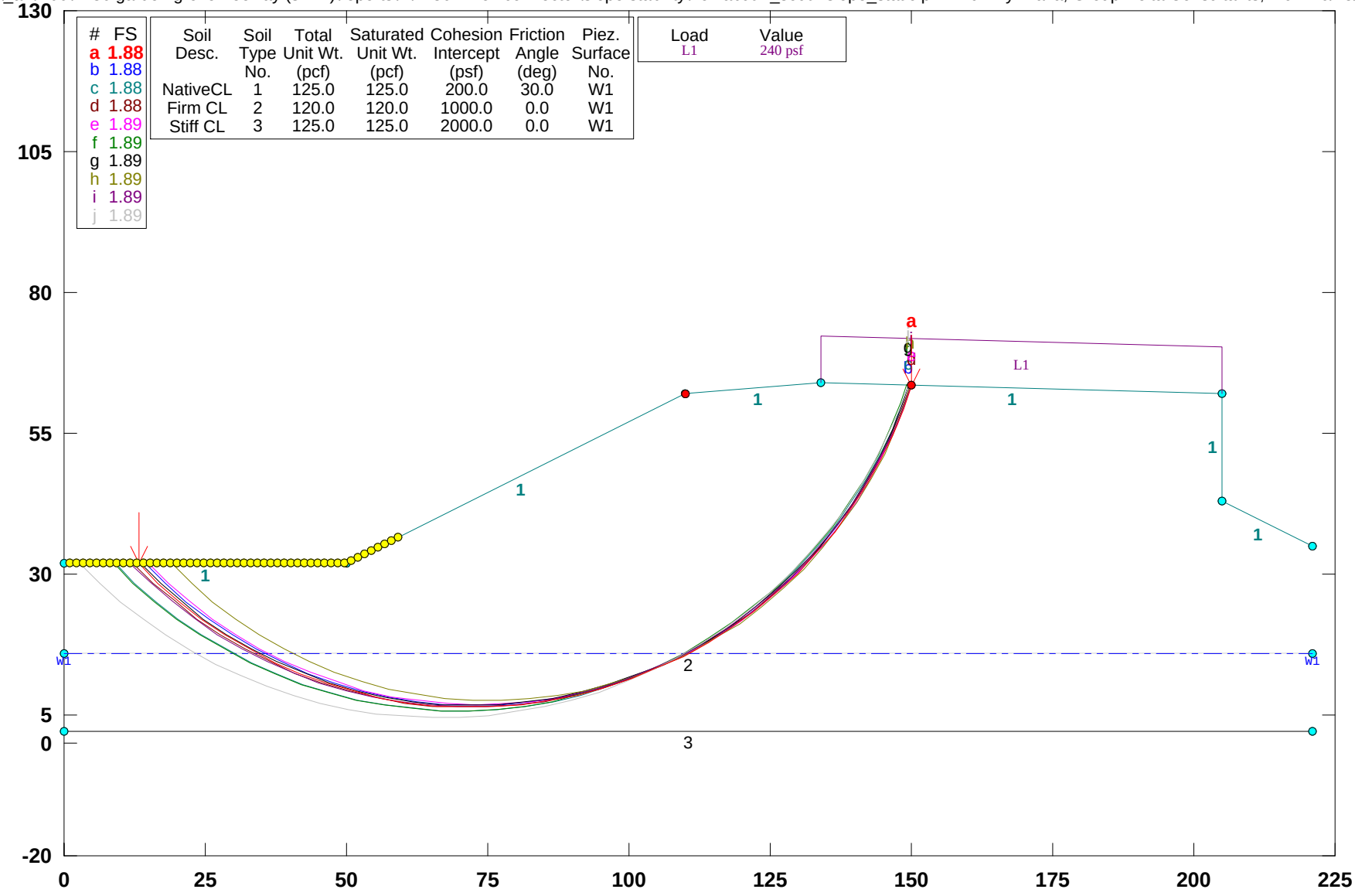
I-436 405-22 HOV Connector Separation Abutment 1_South Slope - Static

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\i-436 fr hov connector\slope stability\hov abut 1_south slope_static.pl2 Run By: Nava, Group Delta Consultants, Inc. 10/15/2008 04:04P

#	FS
a	1.88
b	1.88
c	1.88
d	1.88
e	1.89
f	1.89
g	1.89
h	1.89
i	1.89
j	1.89

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
NativeCL	1	125.0	125.0	200.0	30.0	W1
Firm CL	2	120.0	120.0	1000.0	0.0	W1
Stiff CL	3	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=1.88

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/15/2008
Time of Run: 04:04PM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:hov abut 1_south slope_static.in
Output Filename: N:hov abut 1_south slope_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:hov abut 1_south slope_static.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Separation
Abutment 1_South Slope - Static

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	52.00	50.00	52.00	1
2	50.00	52.00	110.00	82.00	1
3	110.00	82.00	134.00	84.00	1
4	134.00	84.00	205.00	82.00	1
5	205.00	82.00	205.01	63.00	1
6	205.01	63.00	221.00	55.00	1
7	0.00	36.00	221.00	36.00	2
8	0.00	22.00	221.00	22.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	200.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	221.00	36.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	134.00	205.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 1.00 ft.
and X = 60.00 ft.

Each Surface Terminates Between X = 110.00 ft.
and X = 150.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.16	52.00
2	16.69	48.46
3	20.44	45.15

4	24.38	42.08
5	28.51	39.25
6	32.80	36.69
7	37.24	34.39
8	41.81	32.37
9	46.50	30.63
10	51.29	29.18
11	56.15	28.04
12	61.08	27.19
13	66.05	26.65
14	71.05	26.42
15	76.04	26.49
16	81.03	26.87
17	85.98	27.55
18	90.88	28.54
19	95.72	29.83
20	100.46	31.42
21	105.09	33.29
22	109.61	35.44
23	113.98	37.87
24	118.19	40.56
25	122.23	43.51
26	126.08	46.69
27	129.73	50.11
28	133.16	53.75
29	136.36	57.59
30	139.32	61.62
31	142.03	65.83
32	144.47	70.19
33	146.64	74.70
34	148.53	79.33
35	149.95	83.55

Circle Center At X = 72.4 ; Y = 107.7 and Radius, 81.3

*** 1.880 ***

Individual data on the 39 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.7	2430.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3.9	4132.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4.1	5843.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4.3	7525.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1.3	2591.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3.1	6534.4	0.0	176.6	0.0	0.0	0.0	0.0	0.0
8	4.6	10586.5	0.0	818.6	0.0	0.0	0.0	0.0	0.0
9	4.7	11911.2	0.0	1404.8	0.0	0.0	0.0	0.0	0.0
10	3.5	9479.8	0.0	1346.0	0.0	0.0	0.0	0.0	0.0
11	1.3	3645.2	0.0	554.9	0.0	0.0	0.0	0.0	0.0
12	4.9	15179.3	0.0	2305.3	0.0	0.0	0.0	0.0	0.0
13	4.9	17468.4	0.0	2616.3	0.0	0.0	0.0	0.0	0.0
14	5.0	19571.0	0.0	2832.7	0.0	0.0	0.0	0.0	0.0
15	5.0	21452.9	0.0	2953.7	0.0	0.0	0.0	0.0	0.0
16	5.0	23084.2	0.0	2979.0	0.0	0.0	0.0	0.0	0.0
17	5.0	24439.9	0.0	2908.3	0.0	0.0	0.0	0.0	0.0
18	5.0	25500.3	0.0	2741.9	0.0	0.0	0.0	0.0	0.0
19	4.9	26251.4	0.0	2480.6	0.0	0.0	0.0	0.0	0.0
20	4.8	26684.7	0.0	2125.2	0.0	0.0	0.0	0.0	0.0
21	4.7	26798.0	0.0	1677.1	0.0	0.0	0.0	0.0	0.0
22	4.6	26594.6	0.0	1138.0	0.0	0.0	0.0	0.0	0.0
23	4.5	26084.0	0.0	510.0	0.0	0.0	0.0	0.0	0.0
24	0.4	2278.1	0.0	12.6	0.0	0.0	0.0	0.0	0.0
25	0.6	3527.4	0.0	7.4	0.0	0.0	0.0	0.0	0.0
26	3.4	19047.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	4.2	22803.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	4.0	20614.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	3.9	18333.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	3.6	16001.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	3.4	13662.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	0.8	3107.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	2.4	8214.3	0.0	0.0	0.0	0.0	0.0	0.0	567.4
34	3.0	8981.5	0.0	0.0	0.0	0.0	0.0	0.0	710.1
35	2.7	6792.7	0.0	0.0	0.0	0.0	0.0	0.0	649.3
36	2.4	4801.0	0.0	0.0	0.0	0.0	0.0	0.0	586.0
37	2.2	3044.6	0.0	0.0	0.0	0.0	0.0	0.0	520.5
38	1.9	1558.8	0.0	0.0	0.0	0.0	0.0	0.0	453.0
39	1.4	380.2	0.0	0.0	0.0	0.0	0.0	0.0	342.3

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.34	52.00
2	17.88	48.47
3	21.63	45.16
4	25.58	42.09
5	29.71	39.27
6	34.01	36.72
7	38.46	34.44
8	43.04	32.44
9	47.74	30.73
10	52.53	29.31
11	57.41	28.20
12	62.34	27.39
13	67.32	26.89
14	72.31	26.70
15	77.31	26.83
16	82.29	27.26
17	87.24	28.00
18	92.12	29.05
19	96.94	30.40
20	101.66	32.05
21	106.27	33.99
22	110.75	36.21
23	115.08	38.71
24	119.25	41.47
25	123.23	44.49
26	127.03	47.75
27	130.61	51.24
28	133.97	54.94
29	137.09	58.85
30	139.96	62.94
31	142.57	67.20
32	144.91	71.62
33	146.97	76.18
34	148.75	80.85
35	149.59	83.56

Circle Center At X = 72.8 ; Y = 107.0 and Radius, 80.3

*** 1.884 ***

1

Failure Surface Specified By 36 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	9.01	52.00
2	12.55	48.47
3	16.29	45.16
4	20.23	42.07
5	24.34	39.23
6	28.61	36.63
7	33.03	34.30
8	37.59	32.23
9	42.26	30.44
10	47.02	28.94
11	51.87	27.71
12	56.78	26.78
13	61.74	26.15
14	66.73	25.81
15	71.73	25.77
16	76.73	26.03
17	81.69	26.59
18	86.62	27.44
19	91.49	28.58
20	96.28	30.01
21	100.98	31.73
22	105.56	33.72
23	110.02	35.99
24	114.34	38.51
25	118.49	41.29
26	122.48	44.31
27	126.27	47.56
28	129.87	51.04
29	133.25	54.72
30	136.41	58.60
31	139.33	62.66
32	142.00	66.88
33	144.41	71.26
34	146.56	75.77
35	148.44	80.41
36	149.50	83.56

Circle Center At X = 69.9 ; Y = 109.5 and Radius, 83.7

*** 1.884 ***

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	12.27	52.00
2	15.81	48.47
3	19.57	45.17
4	23.51	42.10
5	27.64	39.28
6	31.93	36.72
7	36.37	34.42
8	40.95	32.40
9	45.63	30.66
10	50.42	29.21
11	55.28	28.05
12	60.21	27.19
13	65.18	26.64
14	70.17	26.39
15	75.17	26.44
16	80.16	26.80
17	85.12	27.46
18	90.02	28.43
19	94.86	29.69
20	99.61	31.24
21	104.26	33.08
22	108.79	35.20
23	113.18	37.59
24	117.42	40.25
25	121.48	43.16
26	125.36	46.31
27	129.04	49.70
28	132.51	53.30
29	135.75	57.11
30	138.76	61.10
31	141.51	65.28
32	144.01	69.61
33	146.23	74.09
34	148.18	78.69
35	149.85	83.41
36	149.89	83.55

Circle Center At X = 71.8 ; Y = 108.3 and Radius, 81.9

*** 1.884 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.94	52.00
2	18.48	48.47
3	22.24	45.17
4	26.19	42.11
5	30.33	39.31
6	34.63	36.76
7	39.09	34.49
8	43.68	32.51
9	48.38	30.81
10	53.18	29.40
11	58.06	28.30
12	62.99	27.51
13	67.97	27.02
14	72.96	26.85
15	77.96	26.98
16	82.94	27.43
17	87.89	28.19
18	92.77	29.25
19	97.58	30.61
20	102.30	32.28
21	106.90	34.23
22	111.37	36.47
23	115.70	38.97
24	119.86	41.75
25	123.84	44.78
26	127.62	48.05
27	131.19	51.55
28	134.54	55.26
29	137.64	59.18
30	140.50	63.28
31	143.10	67.55
32	145.43	71.98
33	147.47	76.54
34	149.23	81.22
35	149.95	83.55

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Circle Center At X = 73.3 ; Y = 107.1 and Radius, 80.2

*** 1.885 ***

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.71	52.00
2	12.25	48.47
3	15.99	45.16
4	19.93	42.07
5	24.04	39.23
6	28.32	36.64
7	32.74	34.31
8	37.30	32.24
9	41.97	30.45
10	46.73	28.95
11	51.58	27.73
12	56.49	26.80
13	61.45	26.16
14	66.44	25.83
15	71.44	25.79
16	76.44	26.05
17	81.40	26.61
18	86.33	27.46
19	91.20	28.61
20	95.99	30.04
21	100.68	31.76
22	105.27	33.75
23	109.73	36.02
24	114.04	38.55
25	118.20	41.33
26	122.18	44.35
27	125.97	47.60
28	129.57	51.08
29	132.95	54.76
30	136.10	58.64
31	139.02	62.70
32	141.69	66.93
33	144.10	71.31
34	146.25	75.83
35	148.12	80.46
36	149.17	83.57

Circle Center At X = 69.6 ; Y = 109.5 and Radius, 83.7

*** 1.888 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.45	52.00
2	17.00	48.48
3	20.76	45.18
4	24.72	42.13
5	28.86	39.32
6	33.16	36.77
7	37.61	34.49
8	42.19	32.50
9	46.89	30.79
10	51.69	29.37
11	56.56	28.25
12	61.49	27.43
13	66.47	26.92
14	71.46	26.72
15	76.46	26.82
16	81.44	27.23
17	86.39	27.95
18	91.29	28.98
19	96.11	30.30
20	100.84	31.92
21	105.46	33.83
22	109.96	36.02
23	114.31	38.48
24	118.50	41.20
25	122.52	44.18
26	126.34	47.40
27	129.96	50.85
28	133.36	54.52
29	136.52	58.39
30	139.44	62.45
31	142.11	66.68
32	144.51	71.07
33	146.63	75.59
34	148.47	80.24
35	149.56	83.56

Circle Center At X = 72.3 ; Y = 107.7 and Radius, 81.0

*** 1.888 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.09	52.00
2	22.62	48.46
3	26.38	45.17
4	30.34	42.12
5	34.49	39.33
6	38.81	36.82
7	43.29	34.59
8	47.90	32.65
9	52.63	31.02
10	57.45	29.70
11	62.35	28.69
12	67.30	27.99
13	72.28	27.63
14	77.28	27.58
15	82.28	27.85
16	87.24	28.45
17	92.16	29.37
18	97.00	30.60
19	101.76	32.15
20	106.40	34.00
21	110.92	36.14
22	115.29	38.57
23	119.49	41.28
24	123.51	44.26
25	127.33	47.49
26	130.93	50.95

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27	134.30	54.65
28	137.42	58.55
29	140.29	62.65
30	142.88	66.92
31	145.19	71.36
32	147.22	75.93
33	148.94	80.62
34	149.80	83.55

Circle Center At X = 75.5 ; Y = 104.9 and Radius, 77.3

*** 1.889 ***

1

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	11.67	52.00
2	15.23	48.49
3	19.00	45.20
4	22.95	42.14
5	27.09	39.33
6	31.38	36.77
7	35.83	34.48
8	40.40	32.46
9	45.09	30.73
10	49.88	29.28
11	54.74	28.12
12	59.67	27.26
13	64.64	26.70
14	69.63	26.44
15	74.63	26.48
16	79.62	26.83
17	84.57	27.48
18	89.48	28.42
19	94.33	29.67
20	99.09	31.20
21	103.74	33.02
22	108.28	35.12
23	112.68	37.49
24	116.94	40.12
25	121.02	43.00
26	124.92	46.13
27	128.63	49.49
28	132.12	53.06
29	135.40	56.84
30	138.43	60.81
31	141.23	64.96
32	143.76	69.27
33	146.03	73.73
34	148.03	78.31
35	149.74	83.01
36	149.90	83.55

Circle Center At X = 71.4 ; Y = 108.9 and Radius, 82.5

*** 1.889 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	2.78	52.00
2	6.32	48.46
3	10.05	45.14
4	13.96	42.03
5	18.05	39.14
6	22.29	36.50
7	26.68	34.10
8	31.19	31.96
9	35.83	30.07
10	40.56	28.45
11	45.37	27.11
12	50.26	26.04
13	55.19	25.25
14	60.17	24.74
15	65.16	24.52
16	70.16	24.58
17	75.15	24.93
18	80.11	25.56
19	85.03	26.48
20	89.88	27.67
21	94.66	29.13
22	99.35	30.87
23	103.94	32.87
24	108.40	35.12
25	112.72	37.63
26	116.90	40.38
27	120.91	43.37
28	124.75	46.57
29	128.39	49.99
30	131.84	53.62
31	135.07	57.43
32	138.08	61.42
33	140.86	65.58
34	143.40	69.89
35	145.69	74.33
36	147.72	78.90
37	149.48	83.56

Circle Center At X = 66.6 ; Y = 112.3 and Radius, 87.7

*** 1.890 ***

1

```
          Y           A     X     I     S           F     T


         0.00     27.63     55.25     82.88    110.50    138.13

X   0.00 +-------*-+--*-----*+---------+---------+---------+
         -                 00
         -               0..3
         -              06.31
         -            .031.18
         -           .0312.8.
    27.63 +           03128...
         -           .3158....
         -          015......
         -         0318......
         -         318.......
         -        031.......*
A   55.25 +        015.........
         -        31...........
         -        31...........
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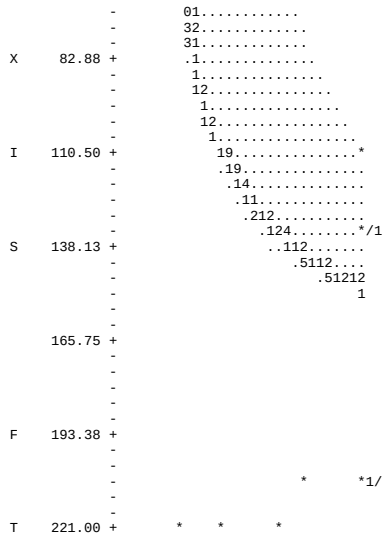
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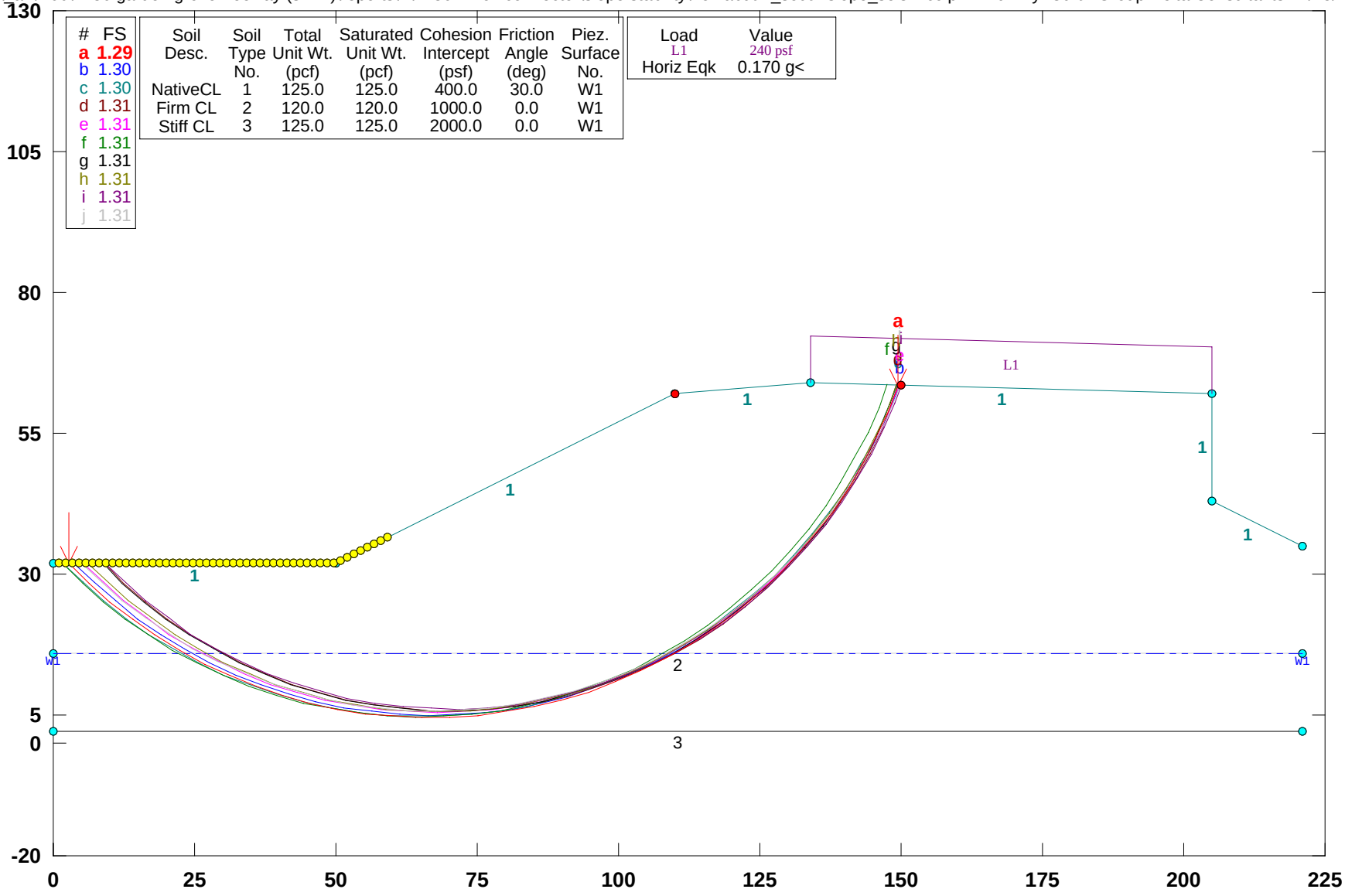
32
31
X 82.88
1
1
12
1
12
1
I 110.50
19
19
14
11
212
124
1/
S 138.13
112
5112
51212
1
165.75
F 193.38
1/
T 221.00

I-436 405-22 HOV Connector Separation Abutment 1_South Slope - Seismic

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\i-436 fr hov connector\slope stability\hov abut 1_south slope_seismicc.pl2 Run By: Curt - Group Delta Consultants 1/25/2009 10:34AM



PCSTABL5M/si FSmin=1.29

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 10:34AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:hov abut 1_south slope_seismicc.in
Output Filename: N:hov abut 1_south slope_seismicc.OUT
Unit: ENGLISH
Plotted Output Filename: N:hov abut 1_south slope_seismicc.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Separation
Abutment 1_South Slope - Seismic

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	52.00	50.00	52.00	1
2	50.00	52.00	110.00	82.00	1
3	110.00	82.00	134.00	84.00	1
4	134.00	84.00	205.00	82.00	1
5	205.00	82.00	205.01	63.00	1
6	205.01	63.00	221.00	55.00	1
7	0.00	36.00	221.00	36.00	2
8	0.00	22.00	221.00	22.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	400.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	221.00	36.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	134.00	205.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 1.00 ft.
and X = 60.00 ft.

Each Surface Terminates Between X = 110.00 ft.
and X = 150.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	2.78	52.00
2	6.32	48.46
3	10.05	45.14
4	13.96	42.03
5	18.05	39.14
6	22.29	36.50
7	26.68	34.10
8	31.19	31.96
9	35.83	30.07
10	40.56	28.45
11	45.37	27.11
12	50.26	26.04
13	55.19	25.25
14	60.17	24.74
15	65.16	24.52
16	70.16	24.58
17	75.15	24.93
18	80.11	25.56
19	85.03	26.48
20	89.88	27.67
21	94.66	29.13
22	99.35	30.87
23	103.94	32.87
24	108.40	35.12
25	112.72	37.63
26	116.90	40.38
27	120.91	43.37
28	124.75	46.57
29	128.39	49.99
30	131.84	53.62
31	135.07	57.43
32	138.08	61.42
33	140.86	65.58
34	143.40	69.89
35	145.69	74.33
36	147.72	78.90
37	149.48	83.56

Circle Center At X = 66.6 ; Y = 112.3 and Radius, 87.7

*** 1.290 ***

Individual data on the 41 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.3	0.0	0.0	0.0	0.0	132.8	0.0	0.0
2	3.7	2425.1	0.0	0.0	0.0	0.0	412.3	0.0	0.0
3	3.9	4119.8	0.0	0.0	0.0	0.0	700.4	0.0	0.0
4	4.1	5829.7	0.0	0.0	0.0	0.0	991.0	0.0	0.0
5	4.2	7520.2	0.0	0.0	0.0	0.0	1278.4	0.0	0.0
6	0.9	1797.7	0.0	0.0	0.0	0.0	305.6	0.0	0.0
7	3.5	7343.7	0.0	234.6	0.0	0.0	1248.4	0.0	0.0
8	4.5	10643.8	0.0	927.3	0.0	0.0	1809.4	0.0	0.0
9	4.6	12034.1	0.0	1555.8	0.0	0.0	2045.8	0.0	0.0
10	4.7	13287.5	0.0	2102.1	0.0	0.0	2258.9	0.0	0.0
11	4.8	14380.7	0.0	2564.3	0.0	0.0	2444.7	0.0	0.0
12	4.6	14475.2	0.0	2778.2	0.0	0.0	2460.8	0.0	0.0
13	0.3	820.6	0.0	162.7	0.0	0.0	139.5	0.0	0.0
14	4.9	16850.8	0.0	3230.7	0.0	0.0	2864.6	0.0	0.0
15	5.0	18904.1	0.0	3432.8	0.0	0.0	3213.7	0.0	0.0
16	5.0	20757.5	0.0	3546.4	0.0	0.0	3528.8	0.0	0.0
17	5.0	22385.9	0.0	3571.3	0.0	0.0	3805.6	0.0	0.0
18	5.0	23767.6	0.0	3507.4	0.0	0.0	4040.5	0.0	0.0
19	5.0	24885.6	0.0	3354.8	0.0	0.0	4230.5	0.0	0.0
20	4.9	25726.9	0.0	3114.0	0.0	0.0	4373.6	0.0	0.0
21	4.9	26283.3	0.0	2785.9	0.0	0.0	4468.2	0.0	0.0
22	4.8	26551.1	0.0	2371.5	0.0	0.0	4513.7	0.0	0.0
23	4.7	26531.3	0.0	1872.1	0.0	0.0	4510.3	0.0	0.0
24	4.6	26229.7	0.0	1289.4	0.0	0.0	4459.0	0.0	0.0
25	4.5	25656.4	0.0	625.3	0.0	0.0	4361.6	0.0	0.0
26	1.5	8679.1	0.0	47.7	0.0	0.0	1475.4	0.0	0.0
27	0.1	540.2	0.0	0.0	0.0	0.0	91.8	0.0	0.0
28	2.7	15402.4	0.0	0.0	0.0	0.0	2618.4	0.0	0.0
29	4.2	22649.0	0.0	0.0	0.0	0.0	3850.3	0.0	0.0
30	4.0	20495.7	0.0	0.0	0.0	0.0	3484.3	0.0	0.0
31	3.8	18266.9	0.0	0.0	0.0	0.0	3105.4	0.0	0.0
32	3.6	15998.6	0.0	0.0	0.0	0.0	2719.8	0.0	0.0
33	3.4	13728.2	0.0	0.0	0.0	0.0	2333.8	0.0	0.0
34	2.2	7841.3	0.0	0.0	0.0	0.0	1333.0	0.0	0.0
35	1.1	3644.0	0.0	0.0	0.0	0.0	619.5	0.0	257.4
36	3.0	9223.5	0.0	0.0	0.0	0.0	1568.0	0.0	722.8
37	2.8	7068.6	0.0	0.0	0.0	0.0	1201.7	0.0	667.1
38	2.5	5088.5	0.0	0.0	0.0	0.0	865.1	0.0	609.2
39	2.3	3316.8	0.0	0.0	0.0	0.0	563.9	0.0	549.3
40	2.0	1784.4	0.0	0.0	0.0	0.0	303.3	0.0	487.6
41	1.8	519.4	0.0	0.0	0.0	0.0	88.3	0.0	423.1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	3.67	52.00
2	7.23	48.49
3	10.98	45.18
4	14.91	42.09
5	19.01	39.24
6	23.27	36.62
7	27.68	34.25
8	32.21	32.13
9	36.85	30.28
10	41.59	28.70
11	46.42	27.38
12	51.31	26.35
13	56.25	25.59
14	61.23	25.12
15	66.23	24.94
16	71.23	25.04
17	76.21	25.42
18	81.17	26.09
19	86.07	27.04
20	90.92	28.27
21	95.69	29.78
22	100.36	31.55
23	104.93	33.59
24	109.37	35.88
25	113.68	38.43
26	117.83	41.21
27	121.82	44.23
28	125.62	47.47
29	129.24	50.93
30	132.65	54.58
31	135.85	58.42
32	138.83	62.44
33	141.57	66.62
34	144.06	70.95

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35	146.31	75.42
36	148.30	80.01
37	149.60	83.56

Circle Center At X = 67.0 ; Y = 112.5 and Radius, 87.6

*** 1.296 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1.59	52.00
2	5.16	48.50
3	8.92	45.20
4	12.86	42.12
5	16.96	39.26
6	21.22	36.64
7	25.62	34.26
8	30.14	32.14
9	34.78	30.27
10	39.52	28.66
11	44.33	27.33
12	49.22	26.26
13	54.16	25.48
14	59.13	24.97
15	64.13	24.74
16	69.13	24.80
17	74.11	25.13
18	79.08	25.74
19	84.00	26.64
20	88.86	27.80
21	93.65	29.24
22	98.35	30.95
23	102.94	32.91
24	107.42	35.14
25	111.77	37.61
26	115.97	40.32
27	120.01	43.26
28	123.89	46.42
29	127.57	49.80
30	131.06	53.38
31	134.35	57.15
32	137.41	61.10
33	140.26	65.21
34	142.86	69.48
35	145.22	73.89
36	147.33	78.42
37	149.18	83.07
38	149.35	83.57

Circle Center At X = 65.7 ; Y = 113.6 and Radius, 88.9

*** 1.298 ***

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	9.01	52.00
2	12.55	48.47
3	16.29	45.16
4	20.23	42.07
5	24.34	39.23
6	28.61	36.63
7	33.03	34.30
8	37.59	32.23
9	42.26	30.44
10	47.02	28.94
11	51.87	27.71
12	56.78	26.78
13	61.74	26.15
14	66.73	25.81
15	71.73	25.77
16	76.73	26.03
17	81.69	26.59
18	86.62	27.44
19	91.49	28.58
20	96.28	30.01
21	100.98	31.73
22	105.56	33.72
23	110.02	35.99
24	114.34	38.51
25	118.49	41.29
26	122.48	44.31
27	126.27	47.56
28	129.87	51.04
29	133.25	54.72
30	136.41	58.60
31	139.33	62.66
32	142.00	66.88
33	144.41	71.26
34	146.56	75.77
35	148.44	80.41
36	149.50	83.56

Circle Center At X = 69.9 ; Y = 109.5 and Radius, 83.7

*** 1.305 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	5.15	52.00
2	8.73	48.50
3	12.50	45.22
4	16.45	42.16
5	20.57	39.33
6	24.85	36.74
7	29.27	34.40
8	33.81	32.32
9	38.47	30.50
10	43.23	28.96
11	48.06	27.69
12	52.96	26.70
13	57.92	26.00
14	62.90	25.58
15	67.90	25.45
16	72.89	25.60
17	77.87	26.05
18	82.82	26.78

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19	87.72	27.79
20	92.55	29.08
21	97.29	30.65
22	101.94	32.49
23	106.48	34.59
24	110.89	36.95
25	115.15	39.56
26	119.26	42.41
27	123.20	45.49
28	126.95	48.80
29	130.51	52.31
30	133.86	56.02
31	136.99	59.92
32	139.89	63.99
33	142.55	68.23
34	144.96	72.60
35	147.12	77.12
36	149.02	81.74
37	149.64	83.56

Circle Center At X = 67.7 ; Y = 112.3 and Radius, 86.9

*** 1.305 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1.59	52.00
2	5.13	48.46
3	8.86	45.14
4	12.78	42.03
5	16.87	39.15
6	21.11	36.51
7	25.50	34.12
8	30.03	31.99
9	34.66	30.11
10	39.40	28.51
11	44.22	27.18
12	49.10	26.12
13	54.04	25.35
14	59.02	24.87
15	64.02	24.67
16	69.02	24.75
17	74.00	25.13
18	78.96	25.78
19	83.87	26.72
20	88.72	27.95
21	93.49	29.44
22	98.17	31.21
23	102.73	33.24
24	107.18	35.53
25	111.48	38.07
26	115.64	40.86
27	119.62	43.88
28	123.43	47.12
29	127.05	50.57
30	130.46	54.23
31	133.65	58.07
32	136.63	62.09
33	139.36	66.28
34	141.85	70.61
35	144.09	75.09
36	146.07	79.68
37	147.51	83.62

Circle Center At X = 65.0 ; Y = 111.9 and Radius, 87.2

*** 1.307 ***

1

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.71	52.00
2	12.25	48.47
3	15.99	45.16
4	19.93	42.07
5	24.04	39.23
6	28.32	36.64
7	32.74	34.31
8	37.30	32.24
9	41.97	30.45
10	46.73	28.95
11	51.58	27.73
12	56.49	26.80
13	61.45	26.16
14	66.44	25.83
15	71.44	25.79
16	76.44	26.05
17	81.40	26.61
18	86.33	27.46
19	91.20	28.61
20	95.99	30.04
21	100.68	31.76
22	105.27	33.75
23	109.73	36.02
24	114.04	38.55
25	118.20	41.33
26	122.18	44.35
27	125.97	47.60
28	129.57	51.08
29	132.95	54.76
30	136.10	58.64
31	139.02	62.70
32	141.69	66.93
33	144.10	71.31
34	146.25	75.83
35	148.12	80.46
36	149.17	83.57

Circle Center At X = 69.6 ; Y = 109.5 and Radius, 83.7

*** 1.308 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.04	52.00
2	9.60	48.49
3	13.37	45.20
4	17.31	42.13

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5	21.43	39.29
6	25.71	36.70
7	30.13	34.37
8	34.68	32.29
9	39.34	30.49
10	44.10	28.96
11	48.94	27.71
12	53.85	26.74
13	58.80	26.06
14	63.79	25.67
15	68.78	25.57
16	73.78	25.76
17	78.76	26.24
18	83.70	27.02
19	88.58	28.07
20	93.40	29.42
21	98.13	31.04
22	102.76	32.93
23	107.27	35.09
24	111.65	37.50
25	115.87	40.17
26	119.94	43.08
27	123.83	46.23
28	127.53	49.59
29	131.02	53.16
30	134.31	56.94
31	137.37	60.89
32	140.19	65.02
33	142.76	69.30
34	145.09	73.73
35	147.15	78.29
36	148.94	82.95
37	149.14	83.57

Circle Center At X = 68.0 ; Y = 111.4 and Radius, 85.8

*** 1.309 ***

1

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	9.01	52.00
2	12.58	48.50
3	16.35	45.22
4	20.31	42.16
5	24.44	39.35
6	28.73	36.78
7	33.17	34.47
8	37.73	32.43
9	42.41	30.67
10	47.18	29.18
11	52.03	27.98
12	56.95	27.06
13	61.91	26.44
14	66.90	26.12
15	71.90	26.09
16	76.89	26.35
17	81.86	26.91
18	86.79	27.76
19	91.66	28.91
20	96.45	30.34
21	101.15	32.04
22	105.74	34.03
23	110.20	36.28
24	114.52	38.79
25	118.69	41.56
26	122.68	44.56
27	126.50	47.80
28	130.11	51.26
29	133.51	54.92
30	136.69	58.78
31	139.64	62.82
32	142.34	67.03
33	144.78	71.39
34	146.97	75.89
35	148.89	80.50
36	149.94	83.55

Circle Center At X = 69.9 ; Y = 110.5 and Radius, 84.5

*** 1.311 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	4.85	52.00
2	8.45	48.53
3	12.24	45.27
4	16.21	42.23
5	20.35	39.42
6	24.64	36.85
7	29.07	34.53
8	33.63	32.47
9	38.29	30.67
10	43.05	29.15
11	47.89	27.89
12	52.80	26.92
13	57.75	26.23
14	62.73	25.82
15	67.73	25.69
16	72.73	25.85
17	77.71	26.30
18	82.65	27.03
19	87.55	28.04
20	92.38	29.33
21	97.13	30.90
22	101.78	32.73
23	106.32	34.83
24	110.73	37.18
25	115.01	39.78
26	119.12	42.62
27	123.07	45.69
28	126.83	48.98
29	130.40	52.48
30	133.77	56.17
31	136.92	60.06
32	139.84	64.12
33	142.52	68.33
34	144.96	72.70
35	147.15	77.20
36	149.07	81.81
37	149.69	83.56

Circle Center At X = 67.4 ; Y = 113.2 and Radius, 87.5

*** 1.312 ***

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```
              Y           A     X     I     S           F     T


              0.00     27.63     55.25     82.88    110.50    138.13

X       0.00 +-------*-+--*-----*+---------+---------+---------+
             -               11
             -             1.24
             -            15.4.
             -           .144...
             -          .14.....
        27.63 +          14......
             -         .1.......
             -         14.......
             -        14........
             -        19........
             -       12........*
A       55.25 +       14.........
             -       19...........
             -       1............
             -       1.............
             -       1..............
             -       18.............
X       82.88 +       21.............
             -        2..............
             -        13.............
             -         1.............
             -         13.............
             -          13.............
I      110.50 +           11.............*
             -           .21.............
             -            .21............
             -             .41...........
             -              ..136........
             -                .121......../1
S      138.13 +                 ..2123.....
             -                    ..1126...
             -                       ..1311
             -                           5
             -
             -
        165.75 +
             -
             -
             -
             -
             -
F      193.38 +
             -
             -
             -                     *      *1/
             -
             -
T      221.00 +       *    *      *
```

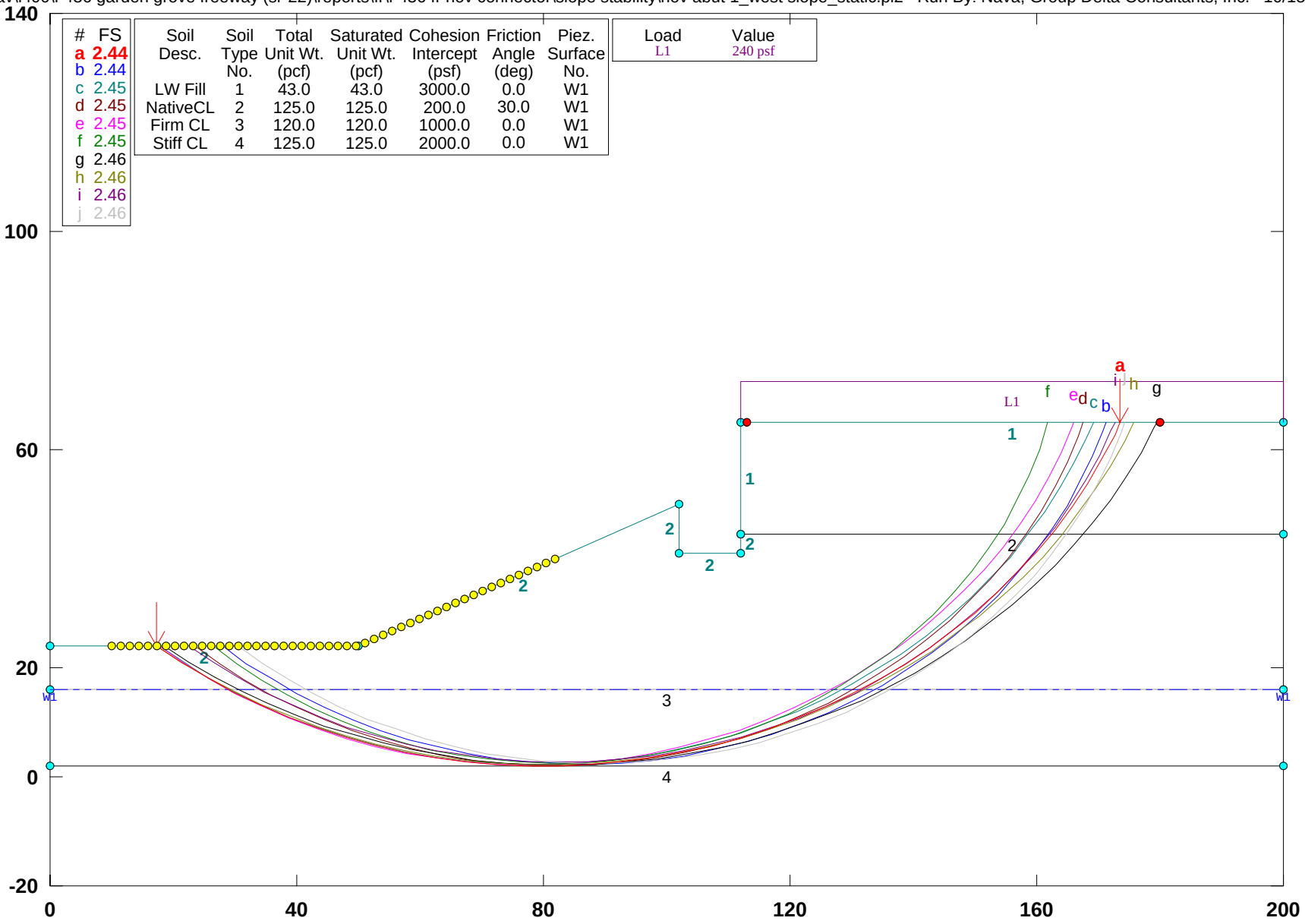
I-436 405-22 HOV Connector Separation Abutment 1_West Slope - Static

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\i-436 fr hov connector\slope stability\hov abut 1_west slope_static.pl2 Run By: Nava, Group Delta Consultants, Inc. 10/15/2008 02:03I

#	FS
a	2.44
b	2.44
c	2.45
d	2.45
e	2.45
f	2.45
g	2.46
h	2.46
i	2.46
j	2.46

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill	1	43.0	43.0	3000.0	0.0	W1
NativeCL	2	125.0	125.0	200.0	30.0	W1
Firm CL	3	120.0	120.0	1000.0	0.0	W1
Stiff CL	4	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=2.44

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/15/2008
Time of Run: 02:03PM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:hov abut 1_west slope_static.in
Output Filename: N:hov abut 1_west slope_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:hov abut 1_west slope_static.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Separation
Abutment 1_West Slope - Static

BOUNDARY COORDINATES

7 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	44.00	50.00	44.00	2
2	50.00	44.00	102.00	70.00	2
3	102.00	70.00	102.01	61.00	2
4	102.01	61.00	112.00	61.00	2
5	112.00	61.00	112.01	64.50	2
6	112.01	64.50	112.03	85.00	1
7	112.03	85.00	200.00	85.00	1
8	112.01	64.50	200.00	64.50	2
9	0.00	36.00	200.00	36.00	3
10	0.00	22.00	200.00	22.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	43.0	43.0	3000.0	0.0	0.00	0.0	1
2	125.0	125.0	200.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	200.00	36.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	112.03	200.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 10.00 ft.
and X = 83.00 ft.

Each Surface Terminates Between X = 113.00 ft.
and X = 180.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

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1	17.34	44.00
2	21.32	40.98
3	25.45	38.16
4	29.71	35.54
5	34.10	33.15
6	38.60	30.97
7	43.20	29.02
8	47.90	27.30
9	52.67	25.81
10	57.52	24.57
11	62.41	23.56
12	67.36	22.80
13	72.33	22.29
14	77.32	22.02
15	82.32	22.00
16	87.32	22.23
17	92.29	22.71
18	97.24	23.44
19	102.15	24.40
20	107.00	25.61
21	111.78	27.06
22	116.49	28.75
23	121.11	30.67
24	125.62	32.81
25	130.03	35.18
26	134.31	37.76
27	138.46	40.55
28	142.46	43.54
29	146.32	46.73
30	150.01	50.11
31	153.52	53.66
32	156.86	57.39
33	160.00	61.27
34	162.95	65.31
35	165.70	69.49
36	168.24	73.80
37	170.55	78.23
38	172.65	82.77
39	173.55	85.00

Circle Center At X = 80.2 ; Y = 122.7 and Radius, 100.7

*** 2.442 ***

Individual data on the 47 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.0	752.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	4.1	2287.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3.5	3044.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.7	764.4	0.0	12.4	0.0	0.0	0.0	0.0	0.0
5	4.4	5258.9	0.0	516.3	0.0	0.0	0.0	0.0	0.0
6	4.5	6630.5	0.0	1230.0	0.0	0.0	0.0	0.0	0.0
7	4.6	7921.8	0.0	1874.0	0.0	0.0	0.0	0.0	0.0
8	4.7	9112.8	0.0	2446.7	0.0	0.0	0.0	0.0	0.0
9	2.1	4377.9	0.0	1239.8	0.0	0.0	0.0	0.0	0.0
10	2.7	6030.8	0.0	1706.9	0.0	0.0	0.0	0.0	0.0
11	4.8	12665.3	0.0	3372.8	0.0	0.0	0.0	0.0	0.0
12	4.9	14963.8	0.0	3723.9	0.0	0.0	0.0	0.0	0.0
13	4.9	17140.5	0.0	3999.1	0.0	0.0	0.0	0.0	0.0
14	5.0	19171.4	0.0	4197.9	0.0	0.0	0.0	0.0	0.0
15	5.0	21034.8	0.0	4319.6	0.0	0.0	0.0	0.0	0.0
16	5.0	22711.4	0.0	4364.0	0.0	0.0	0.0	0.0	0.0
17	5.0	24184.1	0.0	4330.9	0.0	0.0	0.0	0.0	0.0
18	5.0	25438.7	0.0	4220.6	0.0	0.0	0.0	0.0	0.0
19	4.9	26463.9	0.0	4033.1	0.0	0.0	0.0	0.0	0.0
20	4.8	26426.0	0.0	3661.2	0.0	0.0	0.0	0.0	0.0
21	0.0	50.8	0.0	7.4	0.0	0.0	0.0	0.0	0.0
22	0.1	615.0	0.0	100.5	0.0	0.0	0.0	0.0	0.0
23	4.9	21558.0	0.0	3429.1	0.0	0.0	0.0	0.0	0.0
24	4.8	20500.3	0.0	3014.0	0.0	0.0	0.0	0.0	0.0
25	0.2	912.4	0.0	128.3	0.0	0.0	0.0	0.0	0.0
26	0.0	44.1	0.0	5.9	0.0	0.0	0.0	0.0	0.0
27	0.0	101.3	0.0	11.7	0.0	0.0	0.0	0.0	0.0
28	4.5	24125.2	0.0	2378.8	0.0	0.0	0.0	0.0	1070.3
29	4.6	24007.0	0.0	1962.6	0.0	0.0	0.0	0.0	1108.3
30	4.5	22381.9	0.0	1329.0	0.0	0.0	0.0	0.0	1084.1
31	4.4	20635.1	0.0	625.5	0.0	0.0	0.0	0.0	1057.2
32	1.4	6125.1	0.0	40.8	0.0	0.0	0.0	0.0	327.2
33	2.9	12650.6	0.0	0.0	0.0	0.0	0.0	0.0	700.5
34	4.1	16800.5	0.0	0.0	0.0	0.0	0.0	0.0	995.7
35	4.0	14771.0	0.0	0.0	0.0	0.0	0.0	0.0	961.2
36	3.9	12716.9	0.0	0.0	0.0	0.0	0.0	0.0	924.4
37	3.7	10665.5	0.0	0.0	0.0	0.0	0.0	0.0	885.3
38	3.5	8644.9	0.0	0.0	0.0	0.0	0.0	0.0	844.0
39	3.3	6683.0	0.0	0.0	0.0	0.0	0.0	0.0	800.6
40	3.1	4807.7	0.0	0.0	0.0	0.0	0.0	0.0	755.2
41	2.4	2554.9	0.0	0.0	0.0	0.0	0.0	0.0	566.1
42	0.6	511.1	0.0	0.0	0.0	0.0	0.0	0.0	141.9
43	2.7	2078.4	0.0	0.0	0.0	0.0	0.0	0.0	659.1
44	2.5	1456.2	0.0	0.0	0.0	0.0	0.0	0.0	608.5
45	2.3	895.9	0.0	0.0	0.0	0.0	0.0	0.0	556.4
46	2.1	405.7	0.0	0.0	0.0	0.0	0.0	0.0	502.9
47	0.9	43.2	0.0	0.0	0.0	0.0	0.0	0.0	215.8

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.98	44.00
2	31.85	40.84
3	35.89	37.89
4	40.09	35.18
5	44.44	32.71
6	48.92	30.49
7	53.52	28.53
8	58.22	26.82
9	63.01	25.38
10	67.87	24.22
11	72.79	23.32
12	77.75	22.71
13	82.74	22.38
14	87.74	22.32
15	92.73	22.55
16	97.71	23.06
17	102.64	23.84
18	107.53	24.90
19	112.35	26.24
20	117.08	27.84
21	121.72	29.71
22	126.25	31.84
23	130.65	34.21
24	134.91	36.83
25	139.01	39.68
26	142.95	42.76
27	146.71	46.06
28	150.28	49.56
29	153.65	53.26
30	156.80	57.14
31	159.73	61.19
32	162.43	65.40
33	164.88	69.76

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34	167.09	74.24
35	169.04	78.85
36	170.74	83.55
37	171.17	85.00

Circle Center At X = 86.2 ; Y = 111.3 and Radius, 89.0

*** 2.442 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	17.70	44.00
2	21.66	40.94
3	25.76	38.09
4	30.01	35.45
5	34.39	33.04
6	38.89	30.85
7	43.49	28.91
8	48.19	27.20
9	52.98	25.74
10	57.83	24.53
11	62.73	23.57
12	67.68	22.87
13	72.66	22.42
14	77.66	22.23
15	82.66	22.31
16	87.65	22.64
17	92.62	23.22
18	97.54	24.07
19	102.42	25.17
20	107.24	26.52
21	111.97	28.11
22	116.62	29.95
23	121.17	32.03
24	125.60	34.34
25	129.91	36.88
26	134.08	39.64
27	138.11	42.61
28	141.97	45.78
29	145.66	49.15
30	149.18	52.71
31	152.50	56.44
32	155.63	60.34
33	158.55	64.40
34	161.26	68.60
35	163.75	72.94
36	166.01	77.40
37	168.03	81.97
38	169.19	85.00

Circle Center At X = 78.8 ; Y = 118.7 and Radius, 96.5

*** 2.449 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	23.57	44.00
2	27.43	40.82
3	31.46	37.85
4	35.64	35.12
5	39.98	32.63
6	44.44	30.38
7	49.03	28.39
8	53.72	26.66
9	58.50	25.19
10	63.36	23.99
11	68.27	23.07
12	73.23	22.42
13	78.21	22.06
14	83.21	21.97
15	88.21	22.17
16	93.19	22.64
17	98.13	23.39
18	103.02	24.42
19	107.85	25.72
20	112.60	27.29
21	117.25	29.12
22	121.79	31.21
23	126.21	33.55
24	130.49	36.14
25	134.62	38.96
26	138.58	42.01
27	142.37	45.27
28	145.97	48.74
29	149.36	52.41
30	152.55	56.27
31	155.51	60.29
32	158.25	64.48
33	160.74	68.81
34	162.99	73.28
35	164.99	77.86
36	166.72	82.55
37	167.48	85.00

Circle Center At X = 82.3 ; Y = 111.1 and Radius, 89.2

*** 2.449 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	17.70	44.00
2	21.62	40.89
3	25.70	38.00
4	29.93	35.33
5	34.29	32.89
6	38.78	30.68
7	43.38	28.72
8	48.07	27.01
9	52.86	25.55
10	57.71	24.35
11	62.62	23.41
12	67.57	22.73
13	72.56	22.32
14	77.56	22.18
15	82.55	22.30
16	87.54	22.69

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17	92.50	23.35
18	97.41	24.27
19	102.27	25.45
20	107.06	26.89
21	111.76	28.58
22	116.37	30.52
23	120.87	32.71
24	125.24	35.13
25	129.48	37.78
26	133.57	40.66
27	137.50	43.75
28	141.26	47.05
29	144.84	50.54
30	148.22	54.22
31	151.41	58.07
32	154.38	62.09
33	157.14	66.26
34	159.67	70.58
35	161.96	75.02
36	164.01	79.58
37	165.82	84.24
38	166.07	85.00

Circle Center At X = 77.7 ; Y = 115.7 and Radius, 93.5

*** 2.450 ***

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.51	44.00
2	30.30	40.74
3	34.28	37.72
4	38.44	34.94
5	42.76	32.42
6	47.22	30.17
7	51.82	28.20
8	56.52	26.50
9	61.32	25.10
10	66.20	23.99
11	71.13	23.18
12	76.11	22.67
13	81.10	22.47
14	86.10	22.57
15	91.08	22.97
16	96.03	23.68
17	100.93	24.68
18	105.76	25.98
19	110.50	27.57
20	115.13	29.45
21	119.65	31.60
22	124.02	34.03
23	128.23	36.72
24	132.28	39.66
25	136.14	42.83
26	139.80	46.24
27	143.24	49.87
28	146.46	53.69
29	149.44	57.71
30	152.17	61.90
31	154.64	66.24
32	156.84	70.73
33	158.77	75.35
34	160.41	80.07

35	161.76	84.88
36	161.78	85.00

Circle Center At X = 82.0 ; Y = 104.7 and Radius, 82.2

*** 2.451 ***

1

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	18.44	44.00
2	22.48	41.05
3	26.65	38.30
4	30.95	35.75
5	35.36	33.40
6	39.88	31.26
7	44.50	29.34
8	49.20	27.64
9	53.98	26.16
10	58.82	24.91
11	63.72	23.89
12	68.65	23.11
13	73.62	22.55
14	78.61	22.24
15	83.61	22.15
16	88.61	22.31
17	93.59	22.70
18	98.56	23.32
19	103.48	24.18
20	108.36	25.27
21	113.18	26.59
22	117.94	28.14
23	122.62	29.90
24	127.20	31.89
25	131.69	34.09
26	136.07	36.50
27	140.33	39.12
28	144.47	41.93
29	148.46	44.94
30	152.31	48.13
31	156.01	51.50
32	159.54	55.04
33	162.90	58.74
34	166.08	62.60
35	169.08	66.60
36	171.88	70.74
37	174.49	75.01
38	176.89	79.39
39	179.08	83.89
40	179.56	85.00

Circle Center At X = 82.8 ; Y = 128.0 and Radius, 105.8

*** 2.456 ***

Failure Surface Specified By 39 Coordinate Points

Point	X-Surf	Y-Surf

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No.	(ft)	(ft)
1	17.34	44.00
2	21.36	41.03
3	25.52	38.25
4	29.81	35.68
5	34.21	33.32
6	38.73	31.18
7	43.35	29.26
8	48.05	27.56
9	52.83	26.09
10	57.68	24.86
11	62.57	23.86
12	67.52	23.10
13	72.49	22.58
14	77.48	22.30
15	82.48	22.26
16	87.48	22.47
17	92.46	22.91
18	97.41	23.60
19	102.32	24.52
20	107.19	25.68
21	111.99	27.08
22	116.72	28.71
23	121.36	30.56
24	125.91	32.63
25	130.35	34.93
26	134.68	37.43
27	138.88	40.14
28	142.95	43.05
29	146.86	46.16
30	150.63	49.45
31	154.23	52.92
32	157.66	56.56
33	160.91	60.36
34	163.97	64.31
35	166.83	68.41
36	169.50	72.64
37	171.96	77.00
38	174.20	81.46
39	175.77	85.00

Circle Center At X = 80.8 ; Y = 125.6 and Radius, 103.3

*** 2.456 ***

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Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	22.47	44.00
2	26.44	40.96
3	30.57	38.13
4	34.83	35.52
5	39.23	33.14
6	43.74	30.99
7	48.36	29.08
8	53.07	27.41
9	57.87	25.98
10	62.73	24.81
11	67.64	23.90
12	72.60	23.24
13	77.58	22.84
14	82.58	22.70
15	87.58	22.82
16	92.57	23.20
17	97.52	23.84
18	102.44	24.73
19	107.31	25.89
20	112.11	27.29
21	116.83	28.94
22	121.45	30.84
23	125.98	32.97
24	130.38	35.34
25	134.66	37.93
26	138.79	40.74
27	142.77	43.76
28	146.59	46.99
29	150.24	50.41
30	153.71	54.01
31	156.98	57.80
32	160.05	61.74
33	162.91	65.84
34	165.55	70.09
35	167.97	74.46
36	170.16	78.96
37	172.11	83.56
38	172.63	85.00

Circle Center At X = 82.8 ; Y = 118.7 and Radius, 96.0

*** 2.457 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.54	44.00
2	34.43	40.86
3	38.49	37.93
4	42.70	35.24
5	47.06	32.79
6	51.55	30.58
7	56.15	28.63
8	60.85	26.94
9	65.64	25.51
10	70.51	24.35
11	75.43	23.46
12	80.39	22.85
13	85.38	22.51
14	90.38	22.46
15	95.37	22.68
16	100.35	23.18
17	105.29	23.96
18	110.18	25.01
19	115.00	26.33
20	119.74	27.92
21	124.39	29.77
22	128.92	31.87
23	133.33	34.23
24	137.60	36.83
25	141.73	39.66
26	145.68	42.71
27	149.46	45.98
28	153.06	49.46
29	156.45	53.13
30	159.63	56.99
31	162.60	61.02
32	165.33	65.20

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```
   33        167.83       69.53
   34        170.08       74.00
   35        172.08       78.58
   36        173.82       83.27
   37        174.36       85.00

Circle Center At X =   88.9 ; Y =  112.2  and Radius,   89.7


      ***     2.459   ***
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1

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            Y           A     X     I     S           F     T


            0.00     25.00     50.00     75.00    100.00    125.00
       X      0.00 +--------*+---*---*-+---------+---------+---------+
                   -
                   -                .
                   -               ...
                   -              ...1
                   -             ..1.9
                 25.00 +           ...19.4
                   -          ...194.2
                   -         ...1942..
                   -        ...1942...
                   -        ..5142....
                   -       ...142.....
       A      50.00 +       ...32.....*
                   -      ...12........
                   -      ...12.........
                   -     ...120........
                   -     ...12..........
                   -     ...10..........
       X      75.00 +    ....4..............
                   -    ....1..............
                   -    ....1..............
                   -    ....1..............
                   -    ....1..............
                   -     ...13.............
       I     100.00 +     ...46............*   *
                   -     ....1.............
                   -     ....13............
                   -      ...21............*.*       */1
                   -      ....21.....................
                   -       ...013....................
       S     125.00 +        ...013...................
                   -        ....713..................
                   -         ....713.................
                   -          ....7135...............
                   -           ....71356.............
                   -            ....72136............
                 150.00 +             ....7.1355.........
                   -              ....70193356........
                   -               .....07121355.6.6..
                   -                 .....78.13435.5.6
                   -                    .....7081.13.34
                   -                      .....77801212
       F     175.00 +                         .....7.781
                   -                             .....7
                   -
                   -
                   -
       T     200.00 +        *    *           *       *1/
```

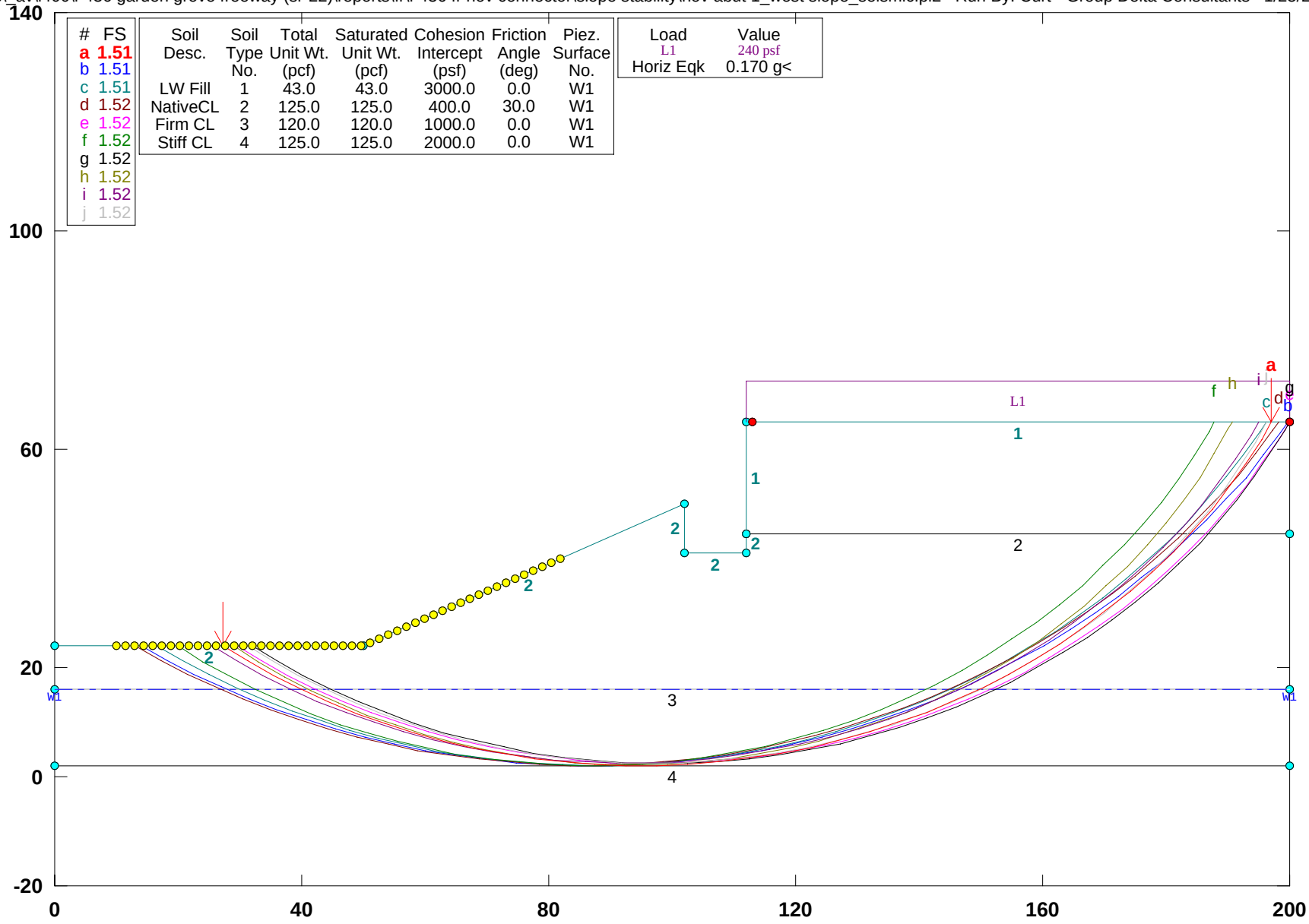
I-436 405-22 HOV Connector Separation Abutment 1_West Slope - Seismic

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\i-436 fr hov connector\slope stability\hov abut 1_west slope_seismic.pl2 Run By: Curt - Group Delta Consultants 1/25/2009 10:58AM

#	FS
a	1.51
b	1.51
c	1.51
d	1.52
e	1.52
f	1.52
g	1.52
h	1.52
i	1.52
j	1.52

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill	1	43.0	43.0	3000.0	0.0	W1
NativeCL	2	125.0	125.0	400.0	30.0	W1
Firm CL	3	120.0	120.0	1000.0	0.0	W1
Stiff CL	4	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf
Horiz Eqk	0.170 g<



PCSTABL5M/si FSmin=1.51

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 10:58AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:hov abut 1_west slope_seismic.in
Output Filename: N:hov abut 1_west slope_seismic.OUT
Unit: ENGLISH
Plotted Output Filename: N:hov abut 1_west slope_seismic.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Separation
Abutment 1_West Slope - Seismic

BOUNDARY COORDINATES

7 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	44.00	50.00	44.00	2
2	50.00	44.00	102.00	70.00	2
3	102.00	70.00	102.01	61.00	2
4	102.01	61.00	112.00	61.00	2
5	112.00	61.00	112.01	64.50	2
6	112.01	64.50	112.03	85.00	1
7	112.03	85.00	200.00	85.00	1
8	112.01	64.50	200.00	64.50	2
9	0.00	36.00	200.00	36.00	3
10	0.00	22.00	200.00	22.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	43.0	43.0	3000.0	0.0	0.00	0.0	1
2	125.0	125.0	400.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	200.00	36.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	112.03	200.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 10.00 ft.
and X = 83.00 ft.

Each Surface Terminates Between X = 113.00 ft.
and X = 200.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.24	44.00
2	31.35	41.15
3	35.57	38.47
4	39.91	35.99
5	44.35	33.69
6	48.89	31.59
7	53.52	29.69
8	58.22	28.00
9	62.99	26.51
10	67.83	25.23
11	72.71	24.16
12	77.64	23.30
13	82.60	22.67
14	87.58	22.24
15	92.57	22.04
16	97.57	22.05
17	102.57	22.28
18	107.55	22.73
19	112.50	23.40
20	117.43	24.28
21	122.30	25.37
22	127.13	26.68
23	131.90	28.19
24	136.59	29.91
25	141.20	31.84
26	145.73	33.96
27	150.16	36.28
28	154.49	38.79
29	158.70	41.49
30	162.79	44.36
31	166.75	47.41
32	170.57	50.64
33	174.25	54.02
34	177.78	57.56
35	181.15	61.26
36	184.36	65.09
37	187.39	69.07
38	190.25	73.17
39	192.93	77.39
40	195.42	81.72
41	197.12	85.00

Circle Center At X = 94.8 ; Y = 136.7 and Radius, 114.7

*** 1.505 ***

Individual data on the 49 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.1	732.4	0.0	0.0	0.0	0.0	124.5	0.0	0.0
2	4.2	2213.8	0.0	0.0	0.0	0.0	376.3	0.0	0.0
3	4.3	3646.7	0.0	0.0	0.0	0.0	619.9	0.0	0.0
4	0.0	24.9	0.0	0.0	0.0	0.0	4.2	0.0	0.0
5	4.4	5061.5	0.0	362.5	0.0	0.0	860.4	0.0	0.0
6	4.5	6367.1	0.0	1048.0	0.0	0.0	1082.4	0.0	0.0
7	1.1	1727.2	0.0	347.1	0.0	0.0	293.6	0.0	0.0
8	3.5	6258.0	0.0	1324.7	0.0	0.0	1063.9	0.0	0.0
9	4.7	10467.3	0.0	2232.7	0.0	0.0	1779.4	0.0	0.0
10	4.8	12947.6	0.0	2729.6	0.0	0.0	2201.1	0.0	0.0
11	4.8	15365.6	0.0	3161.7	0.0	0.0	2612.1	0.0	0.0
12	4.9	17699.9	0.0	3528.0	0.0	0.0	3009.0	0.0	0.0
13	4.9	19930.5	0.0	3827.9	0.0	0.0	3388.2	0.0	0.0
14	5.0	22038.4	0.0	4060.8	0.0	0.0	3746.5	0.0	0.0
15	5.0	24006.1	0.0	4226.3	0.0	0.0	4081.0	0.0	0.0
16	5.0	25817.5	0.0	4324.1	0.0	0.0	4389.0	0.0	0.0
17	5.0	27458.2	0.0	4353.9	0.0	0.0	4667.9	0.0	0.0
18	4.4	25556.0	0.0	3828.6	0.0	0.0	4344.5	0.0	0.0
19	0.0	53.4	0.0	8.6	0.0	0.0	9.1	0.0	0.0
20	0.6	2662.8	0.0	478.5	0.0	0.0	452.7	0.0	0.0
21	5.0	23624.8	0.0	4209.7	0.0	0.0	4016.2	0.0	0.0
22	4.5	20842.3	0.0	3635.4	0.0	0.0	3543.2	0.0	0.0
23	0.0	48.7	0.0	8.0	0.0	0.0	8.3	0.0	0.0
24	0.0	110.5	0.0	15.9	0.0	0.0	18.8	0.0	0.0
25	0.5	2821.0	0.0	376.5	0.0	0.0	479.6	0.0	113.6
26	4.9	29056.1	0.0	3794.7	0.0	0.0	4939.5	0.0	1181.2
27	4.9	28223.7	0.0	3486.6	0.0	0.0	4798.0	0.0	1170.9
28	4.8	27226.0	0.0	3112.2	0.0	0.0	4628.4	0.0	1158.3
29	4.8	26072.6	0.0	2672.1	0.0	0.0	4432.3	0.0	1143.6
30	4.7	24775.0	0.0	2167.3	0.0	0.0	4211.7	0.0	1126.7
31	4.6	23346.2	0.0	1598.6	0.0	0.0	3968.9	0.0	1107.6
32	4.5	21800.4	0.0	967.1	0.0	0.0	3706.1	0.0	1086.4
33	3.9	17779.6	0.0	279.5	0.0	0.0	3022.5	0.0	934.5
34	0.5	2373.3	0.0	0.0	0.0	0.0	403.5	0.0	128.7
35	4.3	18388.4	0.0	0.0	0.0	0.0	3126.0	0.0	1037.9
36	4.2	16535.9	0.0	0.0	0.0	0.0	2811.1	0.0	1010.7
37	4.1	14634.6	0.0	0.0	0.0	0.0	2487.9	0.0	981.5
38	4.0	12704.5	0.0	0.0	0.0	0.0	2159.8	0.0	950.5
39	3.8	10766.5	0.0	0.0	0.0	0.0	1830.3	0.0	917.7
40	3.7	8841.4	0.0	0.0	0.0	0.0	1503.0	0.0	883.1
41	3.5	6950.6	0.0	0.0	0.0	0.0	1181.6	0.0	846.8
42	3.4	5115.6	0.0	0.0	0.0	0.0	869.6	0.0	809.0
43	2.7	2938.4	0.0	0.0	0.0	0.0	499.5	0.0	650.5
44	0.5	431.2	0.0	0.0	0.0	0.0	73.3	0.0	119.1
45	3.0	2339.7	0.0	0.0	0.0	0.0	397.8	0.0	728.7
46	2.9	1707.6	0.0	0.0	0.0	0.0	290.3	0.0	686.5
47	2.7	1119.9	0.0	0.0	0.0	0.0	190.4	0.0	642.9
48	2.5	583.4	0.0	0.0	0.0	0.0	99.2	0.0	598.2
49	1.7	119.6	0.0	0.0	0.0	0.0	20.3	0.0	407.6

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.04	44.00
2	18.26	41.32
3	22.58	38.80
4	26.99	36.44
5	31.48	34.26
6	36.06	32.24
7	40.71	30.40
8	45.42	28.74
9	50.20	27.25
10	55.02	25.95
11	59.90	24.83
12	64.81	23.90
13	69.75	23.15
14	74.72	22.58
15	79.71	22.21
16	84.70	22.03
17	89.70	22.03
18	94.70	22.22
19	99.68	22.60

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20	104.65	23.17
21	109.59	23.93
22	114.51	24.87
23	119.38	26.00
24	124.20	27.31
25	128.97	28.80
26	133.69	30.47
27	138.33	32.32
28	142.91	34.34
29	147.40	36.53
30	151.81	38.89
31	156.12	41.42
32	160.34	44.10
33	164.45	46.95
34	168.45	49.94
35	172.34	53.09
36	176.10	56.38
37	179.74	59.81
38	183.25	63.38
39	186.61	67.07
40	189.84	70.89
41	192.92	74.83
42	195.85	78.88
43	198.62	83.04
44	199.82	85.00

Circle Center At X = 87.1 ; Y = 154.3 and Radius, 132.3

*** 1.509 ***

1

Failure Surface Specified By 43 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	16.60	44.00
2	20.78	41.26
3	25.07	38.68
4	29.45	36.28
5	33.93	34.05
6	38.49	32.01
7	43.14	30.15
8	47.85	28.47
9	52.62	26.99
10	57.45	25.69
11	62.33	24.59
12	67.24	23.69
13	72.19	22.98
14	77.17	22.47
15	82.16	22.16
16	87.16	22.04
17	92.16	22.13
18	97.15	22.42
19	102.12	22.90
20	107.08	23.59
21	112.00	24.47
22	116.88	25.54
23	121.72	26.81
24	126.50	28.28
25	131.22	29.93
26	135.87	31.76
27	140.44	33.79
28	144.93	35.99
29	149.33	38.37
30	153.63	40.92

31	157.82	43.65
32	161.90	46.53
33	165.87	49.58
34	169.70	52.79
35	173.41	56.14
36	176.98	59.64
37	180.41	63.28
38	183.69	67.05
39	186.82	70.96
40	189.79	74.98
41	192.59	79.12
42	195.23	83.36
43	196.16	85.00

Circle Center At X = 87.5 ; Y = 147.4 and Radius, 125.4

*** 1.510 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	12.94	44.00
2	17.16	41.32
3	21.48	38.80
4	25.89	36.45
5	30.39	34.27
6	34.96	32.25
7	39.61	30.42
8	44.33	28.76
9	49.11	27.28
10	53.93	25.98
11	58.81	24.87
12	63.72	23.94
13	68.67	23.20
14	73.64	22.64
15	78.62	22.28
16	83.62	22.10
17	88.62	22.11
18	93.62	22.32
19	98.60	22.71
20	103.57	23.29
21	108.51	24.06
22	113.41	25.01
23	118.28	26.15
24	123.10	27.48
25	127.87	28.98
26	132.58	30.67
27	137.22	32.53
28	141.79	34.57
29	146.27	36.78
30	150.67	39.15
31	154.98	41.69
32	159.18	44.40
33	163.28	47.26
34	167.27	50.27
35	171.15	53.43
36	174.90	56.74
37	178.52	60.19
38	182.01	63.77
39	185.36	67.48
40	188.57	71.32
41	191.63	75.27
42	194.53	79.34
43	197.29	83.51

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44	198.19	85.00

Circle Center At X = 85.8 ; Y = 154.0 and Radius, 131.9

*** 1.516 ***

1

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	29.44	44.00
2	33.57	41.18
3	37.82	38.55
4	42.18	36.10
5	46.64	33.84
6	51.19	31.77
7	55.83	29.90
8	60.54	28.23
9	65.33	26.77
10	70.17	25.52
11	75.06	24.47
12	79.99	23.63
13	84.95	23.01
14	89.93	22.61
15	94.93	22.41
16	99.93	22.44
17	104.92	22.68
18	109.90	23.13
19	114.86	23.80
20	119.78	24.68
21	124.66	25.77
22	129.48	27.07
23	134.25	28.58
24	138.95	30.29
25	143.57	32.20
26	148.10	34.31
27	152.54	36.61
28	156.88	39.10
29	161.10	41.78
30	165.20	44.64
31	169.18	47.66
32	173.03	50.86
33	176.73	54.22
34	180.28	57.74
35	183.68	61.41
36	186.92	65.22
37	189.99	69.16
38	192.89	73.24
39	195.61	77.43
40	198.15	81.74
41	199.88	85.00

Circle Center At X = 96.9 ; Y = 138.5 and Radius, 116.1

*** 1.516 ***

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.91	44.00
2	24.00	41.12
3	28.21	38.43
4	32.54	35.93
5	36.98	33.63
6	41.51	31.52
7	46.13	29.61
8	50.84	27.92
9	55.61	26.43
10	60.44	25.15
11	65.33	24.10
12	70.26	23.26
13	75.22	22.63
14	80.20	22.23
15	85.20	22.05
16	90.20	22.10
17	95.19	22.36
18	100.17	22.85
19	105.12	23.55
20	110.03	24.48
21	114.90	25.62
22	119.72	26.97
23	124.46	28.54
24	129.14	30.32
25	133.73	32.30
26	138.22	34.49
27	142.62	36.87
28	146.91	39.44
29	151.07	42.21
30	155.12	45.15
31	159.02	48.27
32	162.79	51.56
33	166.40	55.02
34	169.86	58.63
35	173.15	62.39
36	176.28	66.29
37	179.23	70.33
38	181.99	74.49
39	184.57	78.78
40	186.96	83.17
41	187.85	85.00

Circle Center At X = 86.7 ; Y = 134.8 and Radius, 112.7

*** 1.519 ***

1

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.01	44.00
2	36.12	41.15
3	40.35	38.49
4	44.70	36.02
5	49.15	33.74
6	53.70	31.66
7	58.33	29.78
8	63.04	28.11
9	67.82	26.65
10	72.66	25.40
11	77.56	24.36
12	82.49	23.54

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13	87.45	22.94
14	92.44	22.56
15	97.43	22.40
16	102.43	22.45
17	107.43	22.73
18	112.40	23.23
19	117.35	23.95
20	122.26	24.89
21	127.13	26.04
22	131.94	27.40
23	136.68	28.98
24	141.35	30.76
25	145.94	32.75
26	150.44	34.93
27	154.83	37.32
28	159.12	39.89
29	163.29	42.65
30	167.33	45.60
31	171.24	48.71
32	175.01	52.00
33	178.63	55.45
34	182.09	59.06
35	185.39	62.81
36	188.52	66.71
37	191.48	70.74
38	194.26	74.90
39	196.85	79.18
40	199.25	83.56
41	199.96	85.00

Circle Center At X = 98.6 ; Y = 135.8 and Radius, 113.4

*** 1.520 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	29.08	44.00
2	33.12	41.06
3	37.30	38.32
4	41.61	35.77
5	46.03	33.44
6	50.55	31.31
7	55.17	29.39
8	59.87	27.70
9	64.65	26.22
10	69.49	24.98
11	74.39	23.96
12	79.33	23.17
13	84.29	22.62
14	89.28	22.30
15	94.28	22.21
16	99.28	22.36
17	104.27	22.75
18	109.23	23.37
19	114.16	24.22
20	119.04	25.30
21	123.86	26.61
22	128.62	28.14
23	133.30	29.90
24	137.90	31.87
25	142.39	34.06
26	146.78	36.46
27	151.05	39.06
28	155.20	41.85
29	159.20	44.84
30	163.07	48.02
31	166.78	51.37
32	170.33	54.89
33	173.70	58.58
34	176.91	62.42
35	179.92	66.40
36	182.75	70.53
37	185.38	74.78
38	187.81	79.15
39	190.03	83.63
40	190.63	85.00

Circle Center At X = 93.6 ; Y = 128.6 and Radius, 106.4

*** 1.521 ***

1

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.41	44.00
2	29.54	41.18
3	33.79	38.55
4	38.15	36.10
5	42.61	33.85
6	47.17	31.79
7	51.81	29.92
8	56.52	28.27
9	61.31	26.81
10	66.15	25.57
11	71.04	24.53
12	75.98	23.71
13	80.94	23.10
14	85.92	22.71
15	90.92	22.54
16	95.92	22.58
17	100.91	22.84
18	105.89	23.31
19	110.84	24.00
20	115.76	24.90
21	120.64	26.01
22	125.46	27.34
23	130.22	28.87
24	134.91	30.60
25	139.51	32.54
26	144.04	34.68
27	148.46	37.01
28	152.78	39.52
29	156.99	42.23
30	161.07	45.11
31	165.03	48.17
32	168.85	51.39
33	172.53	54.78
34	176.05	58.32
35	179.43	62.01
36	182.63	65.85
37	185.67	69.82
38	188.54	73.92
39	191.22	78.14
40	193.72	82.47
41	195.04	85.00

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Circle Center At X = 92.5 ; Y = 138.0 and Radius, 115.5

*** 1.522 ***

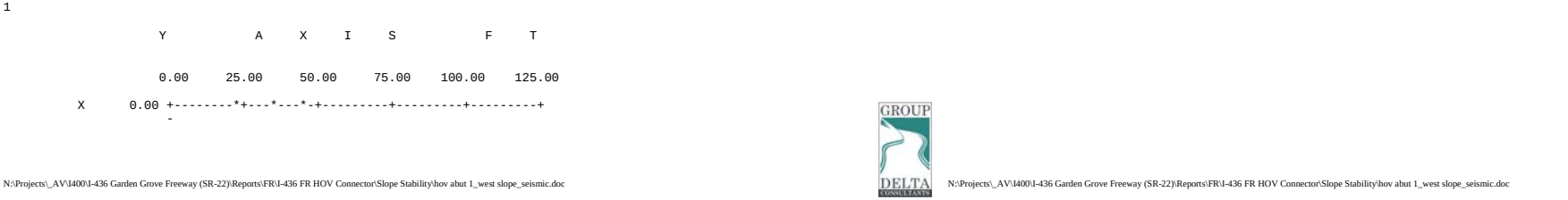
Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	31.28	44.00
2	35.37	41.13
3	39.59	38.44
4	43.92	35.95
5	48.36	33.66
6	52.91	31.57
7	57.54	29.68
8	62.25	28.01
9	67.03	26.56
10	71.88	25.32
11	76.77	24.30
12	81.71	23.50
13	86.68	22.93
14	91.67	22.59
15	96.66	22.47
16	101.66	22.57
17	106.65	22.91
18	111.62	23.46
19	116.56	24.25
20	121.46	25.25
21	126.30	26.48
22	131.09	27.92
23	135.81	29.58
24	140.45	31.45
25	144.99	33.53
26	149.44	35.81
27	153.78	38.29
28	158.01	40.96
29	162.11	43.82
30	166.07	46.87
31	169.90	50.09
32	173.57	53.48
33	177.09	57.04
34	180.44	60.74
35	183.62	64.60
36	186.63	68.60
37	189.45	72.73
38	192.08	76.98
39	194.51	81.35
40	196.34	85.00

Circle Center At X = 96.8 ; Y = 132.9 and Radius, 110.5

*** 1.524 ***

1



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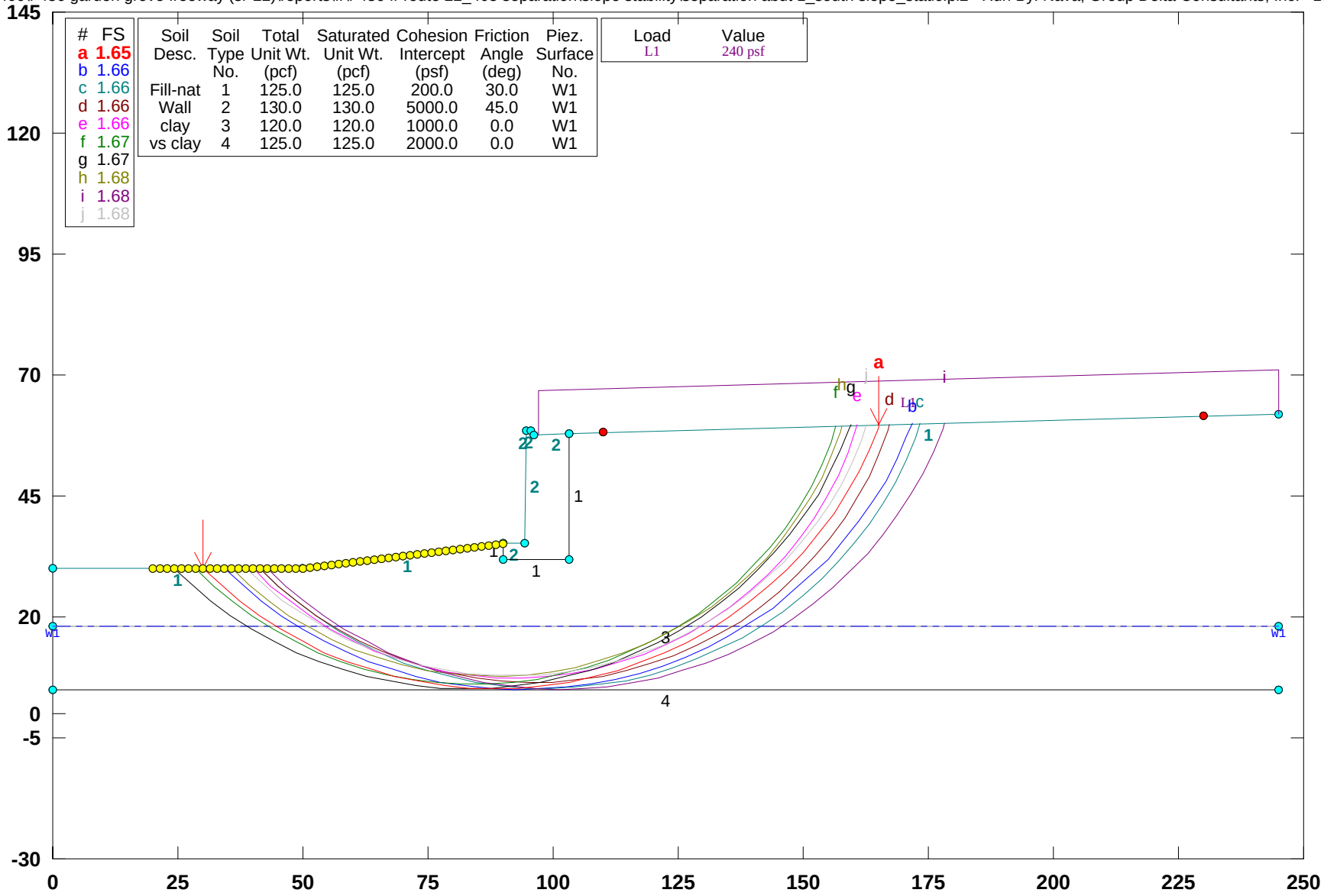
I-436 S405-E22 Connector Separation Abutment 1_South Slope - Static

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\i-436 fr route 22_405 separation\slope stability\separation abut 1_south slope_static.pl2 Run By: Nava, Group Delta Consultants, Inc. 10/15/2008 07:

#	FS
a	1.65
b	1.66
c	1.66
d	1.66
e	1.66
f	1.67
g	1.67
h	1.68
i	1.68
j	1.68

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill-nat	1	125.0	125.0	200.0	30.0	W1
Wall	2	130.0	130.0	5000.0	45.0	W1
clay	3	120.0	120.0	1000.0	0.0	W1
vs clay	4	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=1.65

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/15/2008
Time of Run: 07:25PM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:separation abut 1_south slope_static.in
Output Filename: N:separation abut 1_south slope_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:separation abut 1_south slope_static.PLT

PROBLEM DESCRIPTION I-436 S405-E22 Connector Separation
Abutment 1_South Slope - Static

BOUNDARY COORDINATES

8 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	60.00	50.00	60.00	1
2	50.00	60.00	90.00	65.10	1
3	90.00	65.10	94.42	65.10	2
4	94.42	65.10	94.50	88.57	2
5	94.50	88.57	95.46	88.57	2
6	95.46	88.57	96.09	87.57	2
7	96.09	87.57	103.30	88.00	2
8	103.30	88.00	245.00	92.00	1
9	90.00	65.10	90.01	61.74	1
10	90.01	61.74	103.25	61.74	1
11	103.25	61.74	103.30	88.00	1
12	0.00	48.00	245.00	48.00	3
13	0.00	35.00	245.00	35.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	200.0	30.0	0.00	0.0	1
2	130.0	130.0	5000.0	45.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	48.00
2	245.00	48.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	97.00	245.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2500 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 20.00 ft.
and X = 90.00 ft.

Each Surface Terminates Between X = 110.00 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 35 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.00	60.00
2	33.58	56.51
3	37.38	53.25
4	41.36	50.23
5	45.52	47.46
6	49.85	44.96
7	54.32	42.72
8	58.92	40.76
9	63.63	39.09
10	68.44	37.71
11	73.32	36.62
12	78.26	35.84
13	83.24	35.37
14	88.23	35.20
15	93.23	35.34
16	98.21	35.79
17	103.15	36.54
18	108.04	37.59
19	112.86	38.95
20	117.58	40.59
21	122.19	42.53
22	126.67	44.74
23	131.01	47.22
24	135.19	49.97
25	139.19	52.97
26	143.00	56.21
27	146.60	59.67
28	149.99	63.35
29	153.14	67.24
30	156.04	71.30
31	158.70	75.54
32	161.08	79.94
33	163.19	84.47
34	165.02	89.12
35	165.22	89.75

Circle Center At X = 88.5 ; Y = 116.5 and Radius, 81.3

*** 1.649 ***

Individual data on the 46 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.6	781.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.8	2424.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4.0	4112.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3.4	4567.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.8	1234.4	0.0	16.2	0.0	0.0	0.0	0.0	0.0
6	4.3	7416.9	0.0	558.6	0.0	0.0	0.0	0.0	0.0
7	0.2	283.3	0.0	32.6	0.0	0.0	0.0	0.0	0.0
8	4.3	8806.1	0.0	1266.5	0.0	0.0	0.0	0.0	0.0
9	4.6	10842.7	0.0	1953.8	0.0	0.0	0.0	0.0	0.0
10	4.7	12482.3	0.0	2520.3	0.0	0.0	0.0	0.0	0.0
11	4.8	13975.7	0.0	2996.5	0.0	0.0	0.0	0.0	0.0
12	4.9	15293.7	0.0	3380.5	0.0	0.0	0.0	0.0	0.0
13	4.9	16411.1	0.0	3670.9	0.0	0.0	0.0	0.0	0.0
14	5.0	17307.3	0.0	3866.5	0.0	0.0	0.0	0.0	0.0
15	5.0	17965.8	0.0	3966.7	0.0	0.0	0.0	0.0	0.0
16	1.8	6461.3	0.0	1409.1	0.0	0.0	0.0	0.0	0.0
17	0.0	36.8	0.0	8.0	0.0	0.0	0.0	0.0	0.0
18	3.2	11848.3	0.0	2554.1	0.0	0.0	0.0	0.0	0.0
19	1.2	4360.6	0.0	939.1	0.0	0.0	0.0	0.0	0.0
20	0.1	414.9	0.0	62.9	0.0	0.0	0.0	0.0	0.0
21	1.0	6437.3	0.0	751.9	0.0	0.0	0.0	0.0	0.0
22	0.6	4178.1	0.0	490.6	0.0	0.0	0.0	0.0	0.0
23	0.9	5971.7	0.0	704.7	0.0	0.0	0.0	0.0	0.0
24	1.2	7941.9	0.0	930.5	0.0	0.0	0.0	0.0	290.6
25	4.9	32285.0	0.0	3692.7	0.0	0.0	0.0	0.0	1186.4
26	0.1	624.6	0.0	70.2	0.0	0.0	0.0	0.0	23.0
27	0.1	321.9	0.0	36.5	0.0	0.0	0.0	0.0	12.0
28	4.7	29959.0	0.0	3304.3	0.0	0.0	0.0	0.0	1138.0
29	4.8	29808.9	0.0	3035.5	0.0	0.0	0.0	0.0	1155.3
30	4.7	28467.6	0.0	2567.7	0.0	0.0	0.0	0.0	1133.1
31	4.6	26889.5	0.0	2009.3	0.0	0.0	0.0	0.0	1106.7
32	4.5	25102.4	0.0	1362.6	0.0	0.0	0.0	0.0	1076.1
33	4.3	23138.1	0.0	629.8	0.0	0.0	0.0	0.0	1041.4
34	1.2	6080.1	0.0	34.3	0.0	0.0	0.0	0.0	283.5
35	3.0	14936.8	0.0	0.0	0.0	0.0	0.0	0.0	719.2
36	4.0	18751.4	0.0	0.0	0.0	0.0	0.0	0.0	960.4
37	3.8	16420.1	0.0	0.0	0.0	0.0	0.0	0.0	914.3
38	3.6	14068.4	0.0	0.0	0.0	0.0	0.0	0.0	864.8
39	3.4	11740.2	0.0	0.0	0.0	0.0	0.0	0.0	812.1
40	3.2	9479.8	0.0	0.0	0.0	0.0	0.0	0.0	756.2
41	2.9	7330.9	0.0	0.0	0.0	0.0	0.0	0.0	697.5
42	2.7	5335.8	0.0	0.0	0.0	0.0	0.0	0.0	636.2
43	2.4	3535.2	0.0	0.0	0.0	0.0	0.0	0.0	572.5
44	2.1	1967.4	0.0	0.0	0.0	0.0	0.0	0.0	506.6
45	1.8	667.1	0.0	0.0	0.0	0.0	0.0	0.0	438.7
46	0.2	7.8	0.0	0.0	0.0	0.0	0.0	0.0	48.4

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	34.29	60.00
2	37.88	56.53
3	41.69	53.28
4	45.68	50.27
5	49.84	47.50
6	54.16	44.99
7	58.63	42.74
8	63.22	40.77
9	67.93	39.07
10	72.73	37.67
11	77.60	36.55
12	82.53	35.73
13	87.50	35.21
14	92.50	34.99
15	97.50	35.07
16	102.48	35.45
17	107.44	36.13
18	112.34	37.11
19	117.18	38.38
20	121.93	39.94
21	126.57	41.79
22	131.10	43.91
23	135.49	46.30
24	139.73	48.95
25	143.81	51.85
26	147.70	54.99
27	151.39	58.36
28	154.88	61.94
29	158.14	65.73
30	161.17	69.71
31	163.95	73.86
32	166.48	78.18
33	168.74	82.64
34	170.73	87.22
35	171.72	89.93

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Circle Center At X = 93.7 ; Y = 117.9 and Radius, 83.0

*** 1.656 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.43	60.00
2	44.97	56.46
3	48.72	53.16
4	52.68	50.11
5	56.82	47.31
6	61.13	44.78
7	65.60	42.53
8	70.20	40.58
9	74.92	38.91
10	79.73	37.56
11	84.62	36.51
12	89.57	35.78
13	94.55	35.36
14	99.55	35.26
15	104.54	35.48
16	109.51	36.02
17	114.44	36.88
18	119.30	38.05
19	124.08	39.52
20	128.75	41.30
21	133.30	43.37
22	137.71	45.73
23	141.96	48.36
24	146.04	51.26
25	149.92	54.41
26	153.59	57.81
27	157.04	61.43
28	160.25	65.26
29	163.20	69.29
30	165.90	73.50
31	168.32	77.88
32	170.46	82.40
33	172.30	87.04
34	173.26	89.97

Circle Center At X = 98.6 ; Y = 113.6 and Radius, 78.3

*** 1.656 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.43	60.00
2	44.97	56.47
3	48.74	53.18
4	52.72	50.16
5	56.89	47.41
6	61.24	44.94
7	65.75	42.78
8	70.39	40.91
9	75.15	39.37
10	80.00	38.15
11	84.91	37.25
12	89.88	36.69
13	94.88	36.46
14	99.88	36.57
15	104.86	37.01
16	109.80	37.79
17	114.67	38.89
18	119.46	40.32
19	124.15	42.07
20	128.70	44.13
21	133.11	46.49
22	137.35	49.14
23	141.41	52.07
24	145.25	55.26
25	148.88	58.71
26	152.26	62.38
27	155.39	66.28
28	158.26	70.38
29	160.84	74.67
30	163.12	79.11
31	165.11	83.70
32	166.78	88.41
33	167.17	89.80

Circle Center At X = 95.8 ; Y = 111.0 and Radius, 74.5

*** 1.659 ***

1

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	60.00
2	43.54	56.47
3	47.32	53.19
4	51.32	50.19
5	55.52	47.48
6	59.90	45.07
7	64.44	42.97
8	69.11	41.19
9	73.90	39.75
10	78.77	38.65
11	83.72	37.89
12	88.70	37.48
13	93.70	37.42
14	98.69	37.71
15	103.65	38.35
16	108.55	39.34
17	113.37	40.67
18	118.09	42.33
19	122.67	44.32
20	127.11	46.63
21	131.37	49.24
22	135.44	52.14
23	139.30	55.33
24	142.92	58.77
25	146.29	62.47
26	149.40	66.39
27	152.22	70.51
28	154.74	74.83

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29	156.96	79.31
30	158.86	83.94
31	160.43	88.68
32	160.66	89.62

Circle Center At X = 92.0 ; Y = 108.6 and Radius, 71.2

*** 1.662 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.57	60.00
2	32.11	56.47
3	35.88	53.18
4	39.86	50.15
5	44.02	47.38
6	48.36	44.90
7	52.85	42.70
8	57.48	40.81
9	62.22	39.22
10	67.06	37.95
11	71.96	36.99
12	76.92	36.37
13	81.91	36.06
14	86.91	36.09
15	91.90	36.45
16	96.86	37.13
17	101.75	38.14
18	106.57	39.46
19	111.30	41.10
20	115.90	43.05
21	120.37	45.29
22	124.68	47.83
23	128.82	50.64
24	132.76	53.72
25	136.49	57.05
26	139.99	60.61
27	143.25	64.40
28	146.26	68.40
29	149.00	72.58
30	151.45	76.94
31	153.62	81.44
32	155.48	86.08
33	156.60	89.50

Circle Center At X = 84.0 ; Y = 112.1 and Radius, 76.1

*** 1.669 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	24.29	60.00
2	27.87	56.51
3	31.66	53.25
4	35.64	50.23
5	39.80	47.45
6	44.13	44.94
7	48.60	42.70
8	53.19	40.74
9	57.91	39.07
10	62.71	37.68
11	67.59	36.60
12	72.53	35.82
13	77.51	35.34
14	82.50	35.17
15	87.50	35.31
16	92.48	35.75
17	97.43	36.50
18	102.31	37.55
19	107.13	38.90
20	111.85	40.55
21	116.46	42.48
22	120.95	44.69
23	125.29	47.17
24	129.47	49.91
25	133.47	52.91
26	137.28	56.15
27	140.89	59.61
28	144.27	63.29
29	147.42	67.17
30	150.33	71.24
31	152.98	75.48
32	155.37	79.87
33	157.48	84.40
34	159.31	89.06
35	159.49	89.59

Circle Center At X = 82.8 ; Y = 116.5 and Radius, 81.3

*** 1.674 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	35.71	60.00
2	39.31	56.52
3	43.13	53.30
4	47.17	50.35
5	51.40	47.68
6	55.80	45.31
7	60.35	43.25
8	65.04	41.50
9	69.83	40.08
10	74.71	38.99
11	79.66	38.24
12	84.64	37.83
13	89.64	37.77
14	94.63	38.04
15	99.59	38.66
16	104.50	39.62
17	109.33	40.91
18	114.06	42.53
19	118.67	44.47
20	123.13	46.73
21	127.43	49.28
22	131.54	52.13
23	135.45	55.24
24	139.14	58.62

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25	142.58	62.25
26	145.77	66.10
27	148.68	70.16
28	151.31	74.42
29	153.64	78.84
30	155.67	83.41
31	157.37	88.11
32	157.78	89.54

Circle Center At X = 88.1 ; Y = 110.5 and Radius, 72.8

*** 1.676 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.86	60.00
2	46.43	56.50
3	50.21	53.23
4	54.18	50.19
5	58.34	47.41
6	62.65	44.89
7	67.12	42.64
8	71.71	40.66
9	76.42	38.98
10	81.22	37.59
11	86.10	36.49
12	91.04	35.70
13	96.01	35.22
14	101.01	35.04
15	106.01	35.17
16	110.99	35.61
17	115.94	36.35
18	120.82	37.40
19	125.64	38.74
20	130.36	40.38
21	134.98	42.31
22	139.46	44.52
23	143.80	47.00
24	147.98	49.75
25	151.99	52.74
26	155.80	55.98
27	159.40	59.44
28	162.79	63.12
29	165.94	67.01
30	168.84	71.08
31	171.49	75.32
32	173.88	79.71
33	175.98	84.24
34	177.81	88.90
35	178.20	90.11

Circle Center At X = 101.4 ; Y = 116.2 and Radius, 81.1

*** 1.678 ***

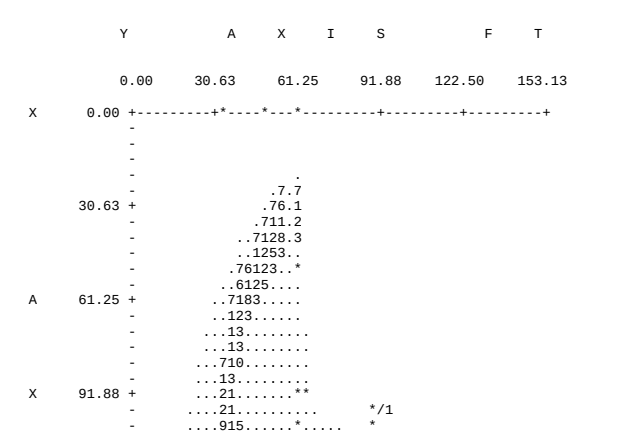
Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.57	60.00
2	42.21	56.56
3	46.06	53.38
4	50.12	50.46
5	54.36	47.82
6	58.78	45.47
7	63.34	43.42
8	68.02	41.68
9	72.82	40.25
10	77.70	39.15
11	82.64	38.38
12	87.62	37.94
13	92.62	37.84
14	97.61	38.07
15	102.58	38.63
16	107.50	39.53
17	112.35	40.75
18	117.10	42.29
19	121.74	44.15
20	126.25	46.32
21	130.60	48.78
22	134.78	51.53
23	138.76	54.55
24	142.54	57.83
25	146.08	61.35
26	149.39	65.11
27	152.43	69.07
28	155.20	73.24
29	157.69	77.57
30	159.88	82.07
31	161.76	86.70
32	162.75	89.68

Circle Center At X = 91.7 ; Y = 112.5 and Radius, 74.7

*** 1.680 ***

1



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             -      .....218............
             -      .....3158...........
I    122.50 +      .....92166...........
             -      ......32176.........
             -      ......921176........
             -      ........221566......
             -       .......9321586.....
             -       ........932151576..
S    153.13 +        ........9.22.1556766.
             -        .........9932.1.15575
             -         ...........9.22.1411
             -         ............99332224
             -          ..............99.32
             -           ................9
     183.75 +            .................
             -             ................
             -              ...............
             -               ..............
             -                 ............
             -                  ...........
F    214.38 +                    .........
             -                      ........
             -                        ......
             -                          ...
             -
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T    245.00 +          *    *            *1/
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I-436 S405-E22 Connector Separation Abutment 1_South Slope - Seismic

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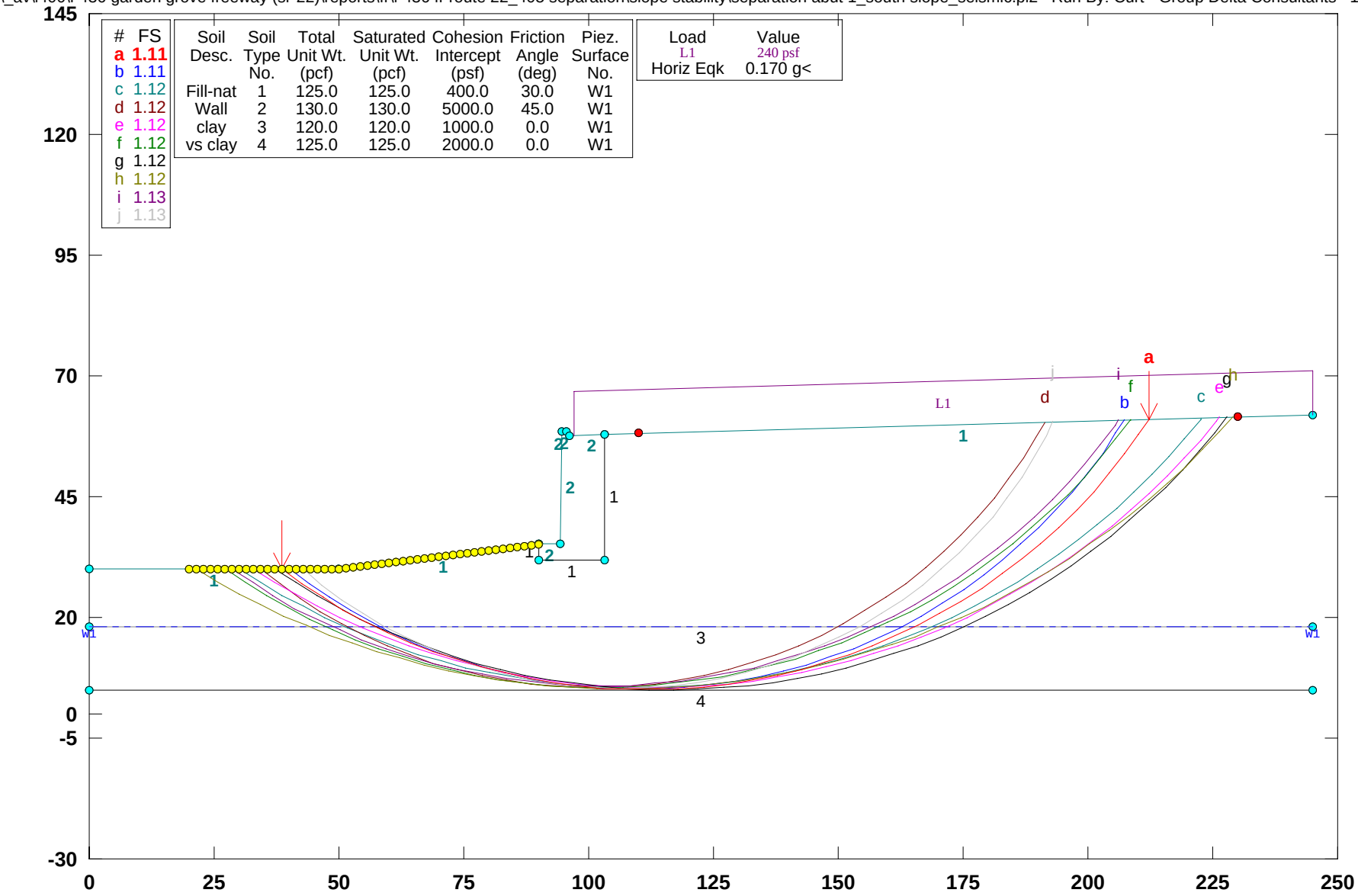
#	FS
a	1.11
b	1.11
c	1.12
d	1.12
e	1.12
f	1.12
g	1.12
h	1.12
i	1.13
j	1.13

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill-nat	1	125.0	125.0	400.0	30.0	W1
Wall	2	130.0	130.0	5000.0	45.0	W1
clay	3	120.0	120.0	1000.0	0.0	W1
vs clay	4	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf
Horiz Eqk	0.170 g<



PCSTABL5M/si FSmin=1.11

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 11:15AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:separation abut 1_south slope_seismic.in
Output Filename: N:separation abut 1_south slope_seismic.OUT
Unit: ENGLISH
Plotted Output Filename: N:separation abut 1_south slope_seismic.PLT

PROBLEM DESCRIPTION I-436 S405-E22 Connector Separation
Abutment 1_South Slope - Seismic

BOUNDARY COORDINATES

8 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	60.00	50.00	60.00	1
2	50.00	60.00	90.00	65.10	1
3	90.00	65.10	94.42	65.10	2
4	94.42	65.10	94.50	88.57	2
5	94.50	88.57	95.46	88.57	2
6	95.46	88.57	96.09	87.57	2
7	96.09	87.57	103.30	88.00	2
8	103.30	88.00	245.00	92.00	1
9	90.00	65.10	90.01	61.74	1
10	90.01	61.74	103.25	61.74	1
11	103.25	61.74	103.30	88.00	1
12	0.00	48.00	245.00	48.00	3
13	0.00	35.00	245.00	35.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	400.0	30.0	0.00	0.0	1
2	130.0	130.0	5000.0	45.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	48.00
2	245.00	48.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	97.00	245.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2500 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 20.00 ft.
and X = 90.00 ft.

Each Surface Terminates Between X = 110.00 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

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Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical

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First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.57	60.00
2	42.59	57.02
3	46.72	54.21
4	50.97	51.58
5	55.33	49.13
6	59.79	46.86
7	64.34	44.78
8	68.97	42.90
9	73.68	41.22
10	78.45	39.73
11	83.28	38.45
12	88.16	37.37
13	93.09	36.49
14	98.04	35.83
15	103.02	35.37
16	108.02	35.12
17	113.02	35.09
18	118.01	35.26
19	123.00	35.65
20	127.96	36.24
21	132.90	37.05
22	137.80	38.06
23	142.65	39.27
24	147.44	40.69
25	152.17	42.31
26	156.83	44.12
27	161.41	46.13
28	165.90	48.34
29	170.29	50.72
30	174.58	53.30
31	178.75	56.05
32	182.81	58.97
33	186.74	62.06
34	190.54	65.31
35	194.19	68.72
36	197.70	72.29
37	201.06	75.99
38	204.26	79.84
39	207.29	83.81
40	210.15	87.91
41	212.17	91.07

Circle Center At X = 111.4 ; Y = 153.8 and Radius, 118.8

*** 1.112 ***

Individual data on the 52 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.0	747.9	0.0	0.0	0.0	0.0	127.1	0.0	0.0
2	4.1	2267.3	0.0	0.0	0.0	0.0	385.4	0.0	0.0
3	3.3	2787.6	0.0	0.0	0.0	0.0	473.9	0.0	0.0
4	1.0	995.8	0.0	0.0	0.0	0.0	169.3	0.0	0.0
5	4.4	5474.5	0.0	0.0	0.0	0.0	930.7	0.0	0.0
6	2.2	3395.9	0.0	0.0	0.0	0.0	577.3	0.0	0.0
7	2.2	3824.1	0.0	89.3	0.0	0.0	650.1	0.0	0.0
8	4.5	8885.8	0.0	679.3	0.0	0.0	1510.6	0.0	0.0
9	4.6	10487.7	0.0	1296.8	0.0	0.0	1782.9	0.0	0.0
10	4.7	12016.1	0.0	1853.6	0.0	0.0	2042.7	0.0	0.0
11	4.8	13456.0	0.0	2348.5	0.0	0.0	2287.5	0.0	0.0
12	4.8	14793.7	0.0	2780.7	0.0	0.0	2514.9	0.0	0.0
13	4.9	16016.4	0.0	3149.5	0.0	0.0	2722.8	0.0	0.0
14	1.8	6274.2	0.0	1255.9	0.0	0.0	1066.6	0.0	0.0
15	0.0	34.6	0.0	6.9	0.0	0.0	5.9	0.0	0.0
16	3.1	10779.9	0.0	2191.4	0.0	0.0	1832.6	0.0	0.0
17	1.3	4723.9	0.0	972.7	0.0	0.0	803.1	0.0	0.0
18	0.1	406.6	0.0	58.9	0.0	0.0	69.1	0.0	0.0
19	1.0	6352.1	0.0	710.9	0.0	0.0	1079.9	0.0	0.0
20	0.6	4135.7	0.0	470.8	0.0	0.0	703.1	0.0	0.0
21	0.9	5929.2	0.0	685.9	0.0	0.0	1008.0	0.0	0.0
22	1.0	6822.2	0.0	795.0	0.0	0.0	1159.8	0.0	250.4
23	5.0	32852.3	0.0	3869.2	0.0	0.0	5584.9	0.0	1195.0
24	0.2	1512.1	0.0	179.6	0.0	0.0	257.1	0.0	54.6
25	0.1	329.1	0.0	39.5	0.0	0.0	56.0	0.0	12.0
26	4.7	30842.6	0.0	3759.6	0.0	0.0	5243.2	0.0	1131.9
27	5.0	32862.4	0.0	4022.7	0.0	0.0	5586.6	0.0	1200.0
28	5.0	32889.7	0.0	4001.0	0.0	0.0	5591.2	0.0	1199.3
29	5.0	32732.6	0.0	3913.7	0.0	0.0	5564.5	0.0	1196.4
30	5.0	32392.6	0.0	3761.0	0.0	0.0	5506.7	0.0	1191.5
31	4.9	31873.2	0.0	3543.0	0.0	0.0	5418.4	0.0	1184.4
32	4.9	31179.1	0.0	3260.3	0.0	0.0	5300.5	0.0	1175.3
33	4.9	30316.8	0.0	2913.2	0.0	0.0	5153.9	0.0	1164.0
34	4.8	29294.4	0.0	2502.4	0.0	0.0	4980.1	0.0	1150.7
35	4.7	28121.4	0.0	2028.7	0.0	0.0	4780.6	0.0	1135.4
36	4.7	26808.6	0.0	1492.9	0.0	0.0	4557.5	0.0	1118.0
37	4.6	25368.3	0.0	895.8	0.0	0.0	4312.6	0.0	1098.7
38	3.8	20254.8	0.0	246.7	0.0	0.0	3443.3	0.0	913.1
39	0.7	3558.7	0.0	0.0	0.0	0.0	605.0	0.0	164.3
40	4.4	22126.8	0.0	0.0	0.0	0.0	3761.6	0.0	1054.2
41	4.3	20337.2	0.0	0.0	0.0	0.0	3457.3	0.0	1029.1
42	4.2	18479.4	0.0	0.0	0.0	0.0	3141.5	0.0	1002.3
43	4.1	16571.6	0.0	0.0	0.0	0.0	2817.2	0.0	973.6
44	3.9	14632.5	0.0	0.0	0.0	0.0	2487.5	0.0	943.2
45	3.8	12681.4	0.0	0.0	0.0	0.0	2155.8	0.0	911.1
46	3.7	10737.9	0.0	0.0	0.0	0.0	1825.4	0.0	877.5
47	3.5	8821.9	0.0	0.0	0.0	0.0	1499.7	0.0	842.2
48	3.4	6953.4	0.0	0.0	0.0	0.0	1182.1	0.0	805.5
49	3.2	5152.3	0.0	0.0	0.0	0.0	875.9	0.0	767.4
50	3.0	3438.2	0.0	0.0	0.0	0.0	584.5	0.0	727.9
51	2.9	1830.5	0.0	0.0	0.0	0.0	311.2	0.0	687.1
52	2.0	391.4	0.0	0.0	0.0	0.0	66.5	0.0	483.9

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	60.00
2	43.96	56.95
3	48.05	54.07
4	52.27	51.38
5	56.60	48.88
6	61.04	46.58
7	65.57	44.48
8	70.20	42.58
9	74.90	40.89
10	79.68	39.42
11	84.52	38.15
12	89.41	37.11
13	94.34	36.28

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14	99.30	35.68
15	104.29	35.29
16	109.29	35.13
17	114.29	35.20
18	119.28	35.48
19	124.25	35.99
20	129.20	36.72
21	134.11	37.67
22	138.97	38.84
23	143.77	40.22
24	148.51	41.82
25	153.17	43.63
26	157.75	45.64
27	162.23	47.86
28	166.61	50.27
29	170.88	52.88
30	175.02	55.67
31	179.04	58.65
32	182.92	61.80
33	186.66	65.13
34	190.24	68.61
35	193.67	72.26
36	196.92	76.05
37	200.01	79.98
38	202.92	84.05
39	205.64	88.24
40	207.22	90.93

Circle Center At X = 110.4 ; Y = 147.1 and Radius, 112.0

*** 1.114 ***

1

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.00	60.00
2	34.18	57.26
3	38.45	54.66
4	42.82	52.22
5	47.26	49.93
6	51.79	47.80
7	56.38	45.83
8	61.05	44.03
9	65.77	42.39
10	70.55	40.92
11	75.38	39.62
12	80.25	38.48
13	85.15	37.53
14	90.09	36.74
15	95.05	36.13
16	100.04	35.69
17	105.03	35.43
18	110.03	35.35
19	115.03	35.44
20	120.02	35.71
21	125.00	36.16
22	129.96	36.78
23	134.90	37.57
24	139.80	38.54
25	144.67	39.68
26	149.50	41.00
27	154.27	42.48
28	158.99	44.13
29	163.65	45.94
30	168.24	47.92
31	172.76	50.06
32	177.20	52.35
33	181.56	54.80
34	185.83	57.41
35	190.01	60.16
36	194.08	63.06
37	198.05	66.10
38	201.91	69.27
39	205.66	72.58
40	209.28	76.03
41	212.79	79.59
42	216.16	83.28
43	219.41	87.09
44	222.51	91.01
45	222.78	91.37

Circle Center At X = 109.9 ; Y = 177.1 and Radius, 141.8

*** 1.117 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	34.29	60.00
2	38.16	56.84
3	42.19	53.88
4	46.36	51.12
5	50.66	48.56
6	55.07	46.22
7	59.60	44.10
8	64.23	42.20
9	68.94	40.53
10	73.73	39.09
11	78.58	37.88
12	83.49	36.92
13	88.43	36.20
14	93.41	35.72
15	98.40	35.48
16	103.40	35.49
17	108.40	35.74
18	113.37	36.24
19	118.32	36.98
20	123.22	37.96
21	128.07	39.18
22	132.85	40.64
23	137.56	42.32
24	142.18	44.24
25	146.70	46.38
26	151.11	48.74
27	155.40	51.31
28	159.55	54.08
29	163.57	57.06
30	167.44	60.23
31	171.14	63.59
32	174.68	67.12
33	178.04	70.82
34	181.22	74.68
35	184.20	78.69
36	186.99	82.85
37	189.57	87.13
38	191.37	90.49

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Circle Center At X = 100.7 ; Y = 137.6 and Radius, 102.2

*** 1.119 ***

1

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.86	60.00
2	37.04	57.27
3	41.32	54.68
4	45.69	52.25
5	50.14	49.97
6	54.67	47.85
7	59.27	45.88
8	63.93	44.08
9	68.66	42.45
10	73.44	40.98
11	78.27	39.68
12	83.14	38.55
13	88.04	37.59
14	92.98	36.81
15	97.94	36.20
16	102.92	35.76
17	107.92	35.49
18	112.92	35.41
19	117.92	35.49
20	122.91	35.76
21	127.89	36.19
22	132.85	36.81
23	137.79	37.59
24	142.70	38.55
25	147.57	39.68
26	152.40	40.98
27	157.18	42.45
28	161.90	44.08
29	166.57	45.88
30	171.17	47.84
31	175.69	49.96
32	180.14	52.24
33	184.51	54.68
34	188.79	57.26
35	192.98	59.99
36	197.07	62.87
37	201.05	65.89
38	204.93	69.05
39	208.69	72.34
40	212.34	75.77
41	215.86	79.31
42	219.26	82.98
43	222.52	86.77
44	225.66	90.67
45	226.26	91.47

Circle Center At X = 112.9 ; Y = 178.0 and Radius, 142.6

*** 1.120 ***

Failure Surface Specified By 43 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.14	60.00
2	31.25	57.15
3	35.46	54.45
4	39.78	51.93
5	44.19	49.57
6	48.69	47.39
7	53.26	45.38
8	57.92	43.55
9	62.64	41.90
10	67.42	40.44
11	72.25	39.17
12	77.14	38.08
13	82.05	37.18
14	87.00	36.48
15	91.98	35.97
16	96.97	35.65
17	101.97	35.52
18	106.97	35.59
19	111.96	35.85
20	116.94	36.31
21	121.90	36.96
22	126.82	37.80
23	131.72	38.83
24	136.57	40.05
25	141.36	41.46
26	146.10	43.05
27	150.78	44.83
28	155.38	46.79
29	159.90	48.92
30	164.34	51.23
31	168.68	53.70
32	172.92	56.35
33	177.06	59.15
34	181.09	62.12
35	184.99	65.24
36	188.78	68.51
37	192.43	71.92
38	195.95	75.47
39	199.33	79.16
40	202.56	82.97
41	205.64	86.91
42	208.57	90.96
43	208.58	90.97

Circle Center At X = 102.7 ; Y = 164.3 and Radius, 128.8

*** 1.120 ***

1

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	37.14	60.00
2	41.29	57.20
3	45.53	54.56
4	49.87	52.07
5	54.29	49.74
6	58.80	47.57
7	63.38	45.57
8	68.03	43.73

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9	72.74	42.07
10	77.51	40.57
11	82.34	39.25
12	87.20	38.10
13	92.11	37.14
14	97.05	36.35
15	102.01	35.73
16	106.99	35.30
17	111.98	35.05
18	116.98	34.98
19	121.98	35.10
20	126.97	35.39
21	131.95	35.86
22	136.91	36.52
23	141.84	37.35
24	146.74	38.36
25	151.59	39.55
26	156.40	40.91
27	161.16	42.45
28	165.86	44.15
29	170.50	46.03
30	175.06	48.07
31	179.55	50.28
32	183.95	52.65
33	188.26	55.17
34	192.48	57.86
35	196.61	60.69
36	200.62	63.67
37	204.53	66.79
38	208.32	70.05
39	211.98	73.45
40	215.53	76.98
41	218.94	80.63
42	222.22	84.40
43	225.36	88.30
44	227.77	91.51

Circle Center At X = 116.4 ; Y = 173.0 and Radius, 138.0

*** 1.121 ***

Failure Surface Specified By 47 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	21.43	60.00
2	25.69	57.39
3	30.03	54.91
4	34.45	52.57
5	38.94	50.36
6	43.50	48.30
7	48.11	46.39
8	52.79	44.61
9	57.52	42.99
10	62.30	41.51
11	67.12	40.19
12	71.98	39.01
13	76.87	37.99
14	81.79	37.12
15	86.74	36.40
16	91.71	35.85
17	96.70	35.44
18	101.69	35.19
19	106.69	35.10
20	111.69	35.17

21	116.68	35.39
22	121.67	35.77
23	126.64	36.30
24	131.59	36.99
25	136.52	37.83
26	141.42	38.82
27	146.29	39.97
28	151.11	41.27
29	155.90	42.73
30	160.64	44.32
31	165.32	46.07
32	169.95	47.96
33	174.52	50.00
34	179.02	52.18
35	183.45	54.50
36	187.80	56.95
37	192.08	59.54
38	196.27	62.27
39	200.38	65.12
40	204.39	68.10
41	208.31	71.20
42	212.14	74.43
43	215.85	77.77
44	219.47	81.23
45	222.97	84.79
46	226.36	88.47
47	229.02	91.55

Circle Center At X = 107.1 ; Y = 195.0 and Radius, 159.9

*** 1.121 ***

1

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.57	60.00
2	32.66	57.13
3	36.87	54.42
4	41.18	51.88
5	45.58	49.52
6	50.08	47.34
7	54.66	45.34
8	59.32	43.52
9	64.05	41.89
10	68.84	40.45
11	73.68	39.20
12	78.56	38.14
13	83.49	37.29
14	88.45	36.62
15	93.43	36.16
16	98.42	35.90
17	103.42	35.84
18	108.42	35.97
19	113.41	36.31
20	118.38	36.85
21	123.32	37.58
22	128.23	38.51
23	133.11	39.64
24	137.93	40.95
25	142.70	42.47
26	147.40	44.17
27	152.03	46.05
28	156.58	48.12

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29	161.04	50.37
30	165.42	52.80
31	169.69	55.40
32	173.85	58.17
33	177.90	61.10
34	181.83	64.19
35	185.63	67.44
36	189.30	70.83
37	192.83	74.37
38	196.22	78.05
39	199.46	81.86
40	202.54	85.80
41	205.47	89.85
42	206.16	90.90

Circle Center At X = 102.5 ; Y = 161.0 and Radius, 125.1

*** 1.125 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.86	60.00
2	46.65	56.74
3	50.61	53.69
4	54.72	50.85
5	58.98	48.22
6	63.37	45.83
7	67.88	43.67
8	72.49	41.75
9	77.20	40.07
10	82.00	38.64
11	86.86	37.47
12	91.77	36.55
13	96.73	35.90
14	101.71	35.50
15	106.71	35.37
16	111.71	35.50
17	116.69	35.89
18	121.65	36.54
19	126.57	37.46
20	131.43	38.63
21	136.22	40.05
22	140.93	41.72
23	145.55	43.64
24	150.06	45.80
25	154.45	48.19
26	158.71	50.81
27	162.83	53.65
28	166.79	56.70
29	170.58	59.96
30	174.20	63.41
31	177.63	67.04
32	180.87	70.85
33	183.90	74.83
34	186.72	78.96
35	189.32	83.23
36	191.69	87.63
37	193.06	90.53

Circle Center At X = 106.7 ; Y = 130.5 and Radius, 95.2

*** 1.129 ***

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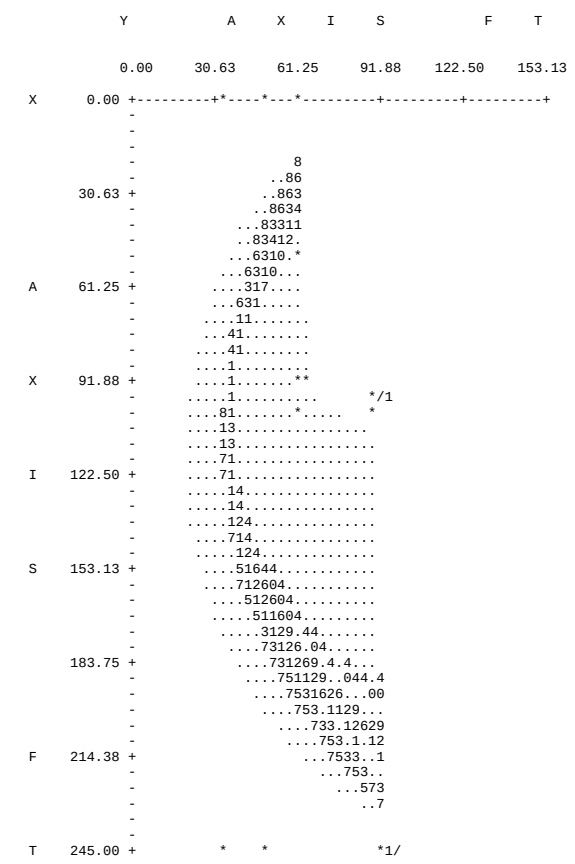

I-436 S405-E22 Connector Separation Abutment 4_North Slope - Static

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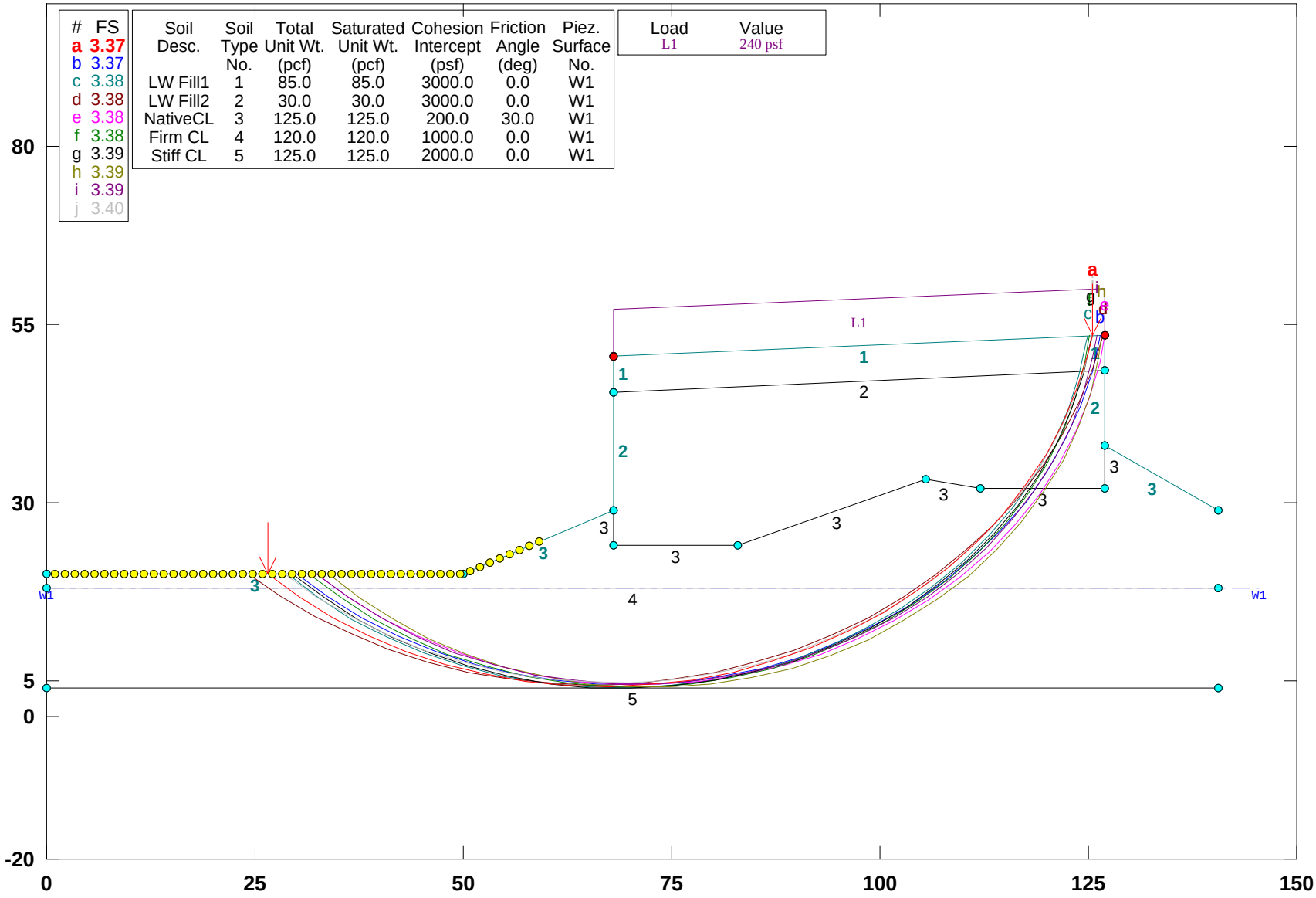
#	FS
a	3.37
b	3.37
c	3.38
d	3.38
e	3.38
f	3.38
g	3.39
h	3.39
i	3.39
j	3.40

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill1	1	85.0	85.0	3000.0	0.0	W1
LW Fill2	2	30.0	30.0	3000.0	0.0	W1
NativeCL	3	125.0	125.0	200.0	30.0	W1
Firm CL	4	120.0	120.0	1000.0	0.0	W1
Stiff CL	5	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=3.37

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

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--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/15/2008
Time of Run: 07:13PM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:Separation abut 4_north slope_static.in
Output Filename: N:Separation abut 4_north slope_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:Separation abut 4_north slope_static.PLT

PROBLEM DESCRIPTION I-436 S405-E22 Connector Separation
Abutment 4_North Slope - Static

BOUNDARY COORDINATES

8 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	40.00	50.00	40.00	3
2	50.00	40.00	68.00	49.00	3
3	68.00	49.00	68.01	65.50	2
4	68.01	65.50	68.03	70.50	1
5	68.03	70.50	127.00	73.50	1
6	127.00	73.50	127.01	68.50	1
7	127.01	68.50	127.03	58.00	2
8	127.03	58.00	140.50	49.00	3
9	68.01	65.50	127.01	68.50	2
10	68.00	49.00	68.01	44.00	3
11	68.01	44.00	83.00	44.00	3
12	83.00	44.00	105.50	53.25	3
13	105.50	53.25	112.00	52.00	3
14	112.00	52.00	127.00	52.00	3
15	127.00	52.00	127.03	58.00	3
16	0.00	38.00	140.50	38.00	4
17	0.00	24.00	140.50	24.00	5

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ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	85.0	85.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	200.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1

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1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	38.00
2	145.50	38.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	68.03	127.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 1.00 ft.
and X = 60.00 ft.

Each Surface Terminates Between X = 68.03 ft.
and X = 127.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

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Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.50	40.00
2	30.31	36.76
3	34.38	33.86
4	38.68	31.31
5	43.18	29.13
6	47.84	27.33
7	52.64	25.93
8	57.55	24.94
9	62.51	24.36
10	67.51	24.21
11	72.50	24.47
12	77.46	25.15
13	82.33	26.25
14	87.10	27.75
15	91.73	29.65
16	96.18	31.93
17	100.42	34.57
18	104.43	37.56
19	108.17	40.88
20	111.62	44.50
21	114.75	48.40
22	117.55	52.54
23	119.98	56.91
24	122.05	61.47
25	123.72	66.18
26	124.99	71.01
27	125.41	73.42

Circle Center At X = 66.9 ; Y = 83.7 and Radius, 59.5

*** 3.369 ***

Individual data on the 37 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.4	294.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1.5	471.9	0.0	73.6	0.0	0.0	0.0	0.0	0.0
3	4.1	2330.3	0.0	838.7	0.0	0.0	0.0	0.0	0.0
4	4.3	3869.4	0.0	1689.9	0.0	0.0	0.0	0.0	0.0
5	4.5	5326.5	0.0	2428.5	0.0	0.0	0.0	0.0	0.0
6	4.7	6638.6	0.0	3049.2	0.0	0.0	0.0	0.0	0.0
7	2.2	3381.2	0.0	1539.4	0.0	0.0	0.0	0.0	0.0
8	2.6	4587.5	0.0	2008.2	0.0	0.0	0.0	0.0	0.0
9	4.9	10175.4	0.0	3920.3	0.0	0.0	0.0	0.0	0.0
10	5.0	12310.4	0.0	4164.5	0.0	0.0	0.0	0.0	0.0
11	5.0	14162.1	0.0	4278.6	0.0	0.0	0.0	0.0	0.0
12	0.5	1477.4	0.0	422.2	0.0	0.0	0.0	0.0	0.0
13	0.0	30.4	0.0	8.6	0.0	0.0	0.0	0.0	0.0
14	0.0	65.2	0.0	17.2	0.0	0.0	0.0	0.0	0.0
15	4.5	15479.4	0.0	3813.8	0.0	0.0	0.0	0.0	1073.4
16	5.0	16904.9	0.0	4114.2	0.0	0.0	0.0	0.0	1188.8
17	4.9	16165.7	0.0	3836.7	0.0	0.0	0.0	0.0	1170.8
18	0.7	2156.6	0.0	507.1	0.0	0.0	0.0	0.0	159.8
19	4.1	13267.6	0.0	2924.3	0.0	0.0	0.0	0.0	984.8
20	4.6	14892.0	0.0	2901.2	0.0	0.0	0.0	0.0	1110.3
21	4.5	14031.2	0.0	2249.8	0.0	0.0	0.0	0.0	1068.1
22	4.2	12873.4	0.0	1481.8	0.0	0.0	0.0	0.0	1018.4
23	4.0	11470.0	0.0	602.6	0.0	0.0	0.0	0.0	961.5
24	0.5	1349.9	0.0	8.9	0.0	0.0	0.0	0.0	117.9
25	0.6	1570.4	0.0	0.0	0.0	0.0	0.0	0.0	139.0
26	2.7	6734.1	0.0	0.0	0.0	0.0	0.0	0.0	641.0
27	3.4	7229.0	0.0	0.0	0.0	0.0	0.0	0.0	827.8
28	0.4	687.1	0.0	0.0	0.0	0.0	0.0	0.0	91.2
29	2.8	4304.0	0.0	0.0	0.0	0.0	0.0	0.0	660.7
30	2.4	2739.0	0.0	0.0	0.0	0.0	0.0	0.0	582.6
31	0.4	329.3	0.0	0.0	0.0	0.0	0.0	0.0	88.1
32	2.4	2011.7	0.0	0.0	0.0	0.0	0.0	0.0	584.8
33	2.1	1433.1	0.0	0.0	0.0	0.0	0.0	0.0	494.7
34	1.7	934.5	0.0	0.0	0.0	0.0	0.0	0.0	401.2
35	0.6	262.2	0.0	0.0	0.0	0.0	0.0	0.0	137.6
36	0.7	218.6	0.0	0.0	0.0	0.0	0.0	0.0	167.2
37	0.4	42.5	0.0	0.0	0.0	0.0	0.0	0.0	100.7

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.06	40.00
2	33.85	36.75
3	37.91	33.83
4	42.22	31.28
5	46.72	29.11
6	51.40	27.34
7	56.21	25.98
8	61.12	25.05
9	66.09	24.54
10	71.09	24.46
11	76.08	24.82
12	81.02	25.61
13	85.87	26.82
14	90.60	28.45
15	95.16	30.49
16	99.54	32.91
17	103.69	35.70
18	107.58	38.84
19	111.19	42.30
20	114.48	46.06
21	117.43	50.10
22	120.02	54.37
23	122.24	58.86
24	124.05	63.52
25	125.46	68.31
26	126.44	73.22
27	126.47	73.47

Circle Center At X = 69.5 ; Y = 82.1 and Radius, 57.7

*** 3.373 ***

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Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.87	40.00
2	32.61	36.68
3	36.63	33.71
4	40.90	31.10

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5	45.37	28.87
6	50.03	27.05
7	54.82	25.64
8	59.73	24.65
9	64.70	24.10
10	69.69	23.99
11	74.68	24.32
12	79.63	25.08
13	84.48	26.27
14	89.21	27.89
15	93.79	29.91
16	98.16	32.33
17	102.31	35.12
18	106.20	38.26
19	109.80	41.74
20	113.07	45.51
21	116.01	49.56
22	118.58	53.85
23	120.76	58.35
24	122.54	63.02
25	123.90	67.83
26	124.84	72.74
27	124.90	73.39

Circle Center At X = 68.5 ; Y = 80.9 and Radius, 57.0

*** 3.379 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	24.13	40.00
2	28.02	36.86
3	32.15	34.04
4	36.49	31.56
5	41.01	29.43
6	45.69	27.66
7	50.49	26.27
8	55.39	25.27
9	60.35	24.66
10	65.35	24.45
11	70.34	24.64
12	75.31	25.22
13	80.21	26.19
14	85.03	27.55
15	89.71	29.29
16	94.25	31.40
17	98.60	33.86
18	102.74	36.66
19	106.65	39.78
20	110.30	43.20
21	113.67	46.90
22	116.73	50.85
23	119.46	55.03
24	121.86	59.42
25	123.90	63.99
26	125.56	68.70
27	126.84	73.49

Circle Center At X = 65.5 ; Y = 87.3 and Radius, 62.9

*** 3.380 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.43	40.00
2	36.19	36.71
3	40.24	33.77
4	44.53	31.20
5	49.03	29.02
6	53.70	27.25
7	58.52	25.91
8	63.44	24.99
9	68.41	24.52
10	73.41	24.49
11	78.40	24.90
12	83.32	25.76
13	88.15	27.05
14	92.85	28.77
15	97.38	30.89
16	101.69	33.41
17	105.77	36.30
18	109.58	39.55
19	113.08	43.11
20	116.25	46.98
21	119.07	51.11
22	121.50	55.48
23	123.54	60.04
24	125.17	64.77
25	126.36	69.63
26	126.96	73.50

Circle Center At X = 71.2 ; Y = 80.6 and Radius, 56.2

*** 3.381 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	31.54	40.00
2	35.26	36.66
3	39.26	33.66
4	43.52	31.04
5	48.00	28.82
6	52.66	27.01
7	57.47	25.64
8	62.38	24.70
9	67.35	24.21
10	72.35	24.17
11	77.34	24.59
12	82.26	25.45
13	87.09	26.76
14	91.78	28.50
15	96.29	30.65
16	100.59	33.21
17	104.63	36.14
18	108.40	39.43
19	111.85	43.05
20	114.97	46.96

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21	117.71	51.14
22	120.07	55.55
23	122.01	60.15
24	123.54	64.92
25	124.62	69.80
26	125.09	73.40

Circle Center At X = 70.3 ; Y = 79.3 and Radius, 55.1

*** 3.383 ***

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Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	29.46	40.00
2	33.20	36.68
3	37.22	33.70
4	41.48	31.09
5	45.95	28.86
6	50.61	27.03
7	55.41	25.62
8	60.31	24.64
9	65.28	24.09
10	70.28	23.98
11	75.27	24.32
12	80.21	25.09
13	85.06	26.29
14	89.79	27.91
15	94.36	29.95
16	98.73	32.37
17	102.87	35.18
18	106.74	38.33
19	110.33	41.82
20	113.59	45.61
21	116.51	49.67
22	119.06	53.97
23	121.22	58.48
24	122.98	63.16
25	124.31	67.98
26	125.22	72.89
27	125.27	73.41

Circle Center At X = 69.0 ; Y = 80.7 and Radius, 56.8

*** 3.386 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.91	40.00
2	37.61	36.64
3	41.60	33.62
4	45.85	30.99
5	50.32	28.76
6	54.98	26.95
7	59.79	25.57

8	64.70	24.64
9	69.68	24.16
10	74.68	24.14
11	79.66	24.59
12	84.58	25.48
13	89.40	26.82
14	94.07	28.60
15	98.56	30.80
16	102.83	33.41
17	106.84	36.39
18	110.56	39.73
19	113.96	43.39
20	117.01	47.35
21	119.69	51.58
22	121.96	56.03
23	123.82	60.67
24	125.24	65.47
25	126.22	70.37
26	126.55	73.48

Circle Center At X = 72.4 ; Y = 78.5 and Radius, 54.4

*** 3.393 ***

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Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.43	40.00
2	36.19	36.70
3	40.22	33.75
4	44.51	31.18
5	49.01	29.01
6	53.69	27.25
7	58.51	25.91
8	63.43	25.02
9	68.41	24.57
10	73.41	24.57
11	78.39	25.02
12	83.31	25.92
13	88.13	27.26
14	92.81	29.02
15	97.31	31.20
16	101.59	33.78
17	105.63	36.73
18	109.39	40.03
19	112.83	43.65
20	115.93	47.58
21	118.67	51.76
22	121.02	56.17
23	122.96	60.78
24	124.48	65.54
25	125.57	70.42
26	125.96	73.45

Circle Center At X = 70.9 ; Y = 80.0 and Radius, 55.5

*** 3.393 ***

Failure Surface Specified By 27 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.57	40.00
2	32.41	36.80
3	36.51	33.93
4	40.84	31.43
5	45.36	29.30
6	50.05	27.57
7	54.88	26.25
8	59.79	25.34
9	64.77	24.86
10	69.77	24.80
11	74.76	25.18
12	79.69	25.97
13	84.54	27.19
14	89.27	28.82
15	93.84	30.84
16	98.22	33.25
17	102.38	36.02
18	106.29	39.14
19	109.92	42.58
20	113.24	46.32
21	116.22	50.33
22	118.86	54.58
23	121.12	59.04
24	122.99	63.68
25	124.46	68.46
26	125.51	73.35
27	125.52	73.42

Circle Center At X = 67.9 ; Y = 83.2 and Radius, 58.4

*** 3.395 ***

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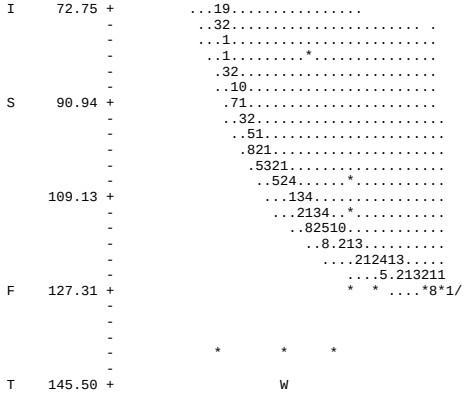

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I-436 S405-E22 Connector Separation Abutment 4_North Slope - Seismic

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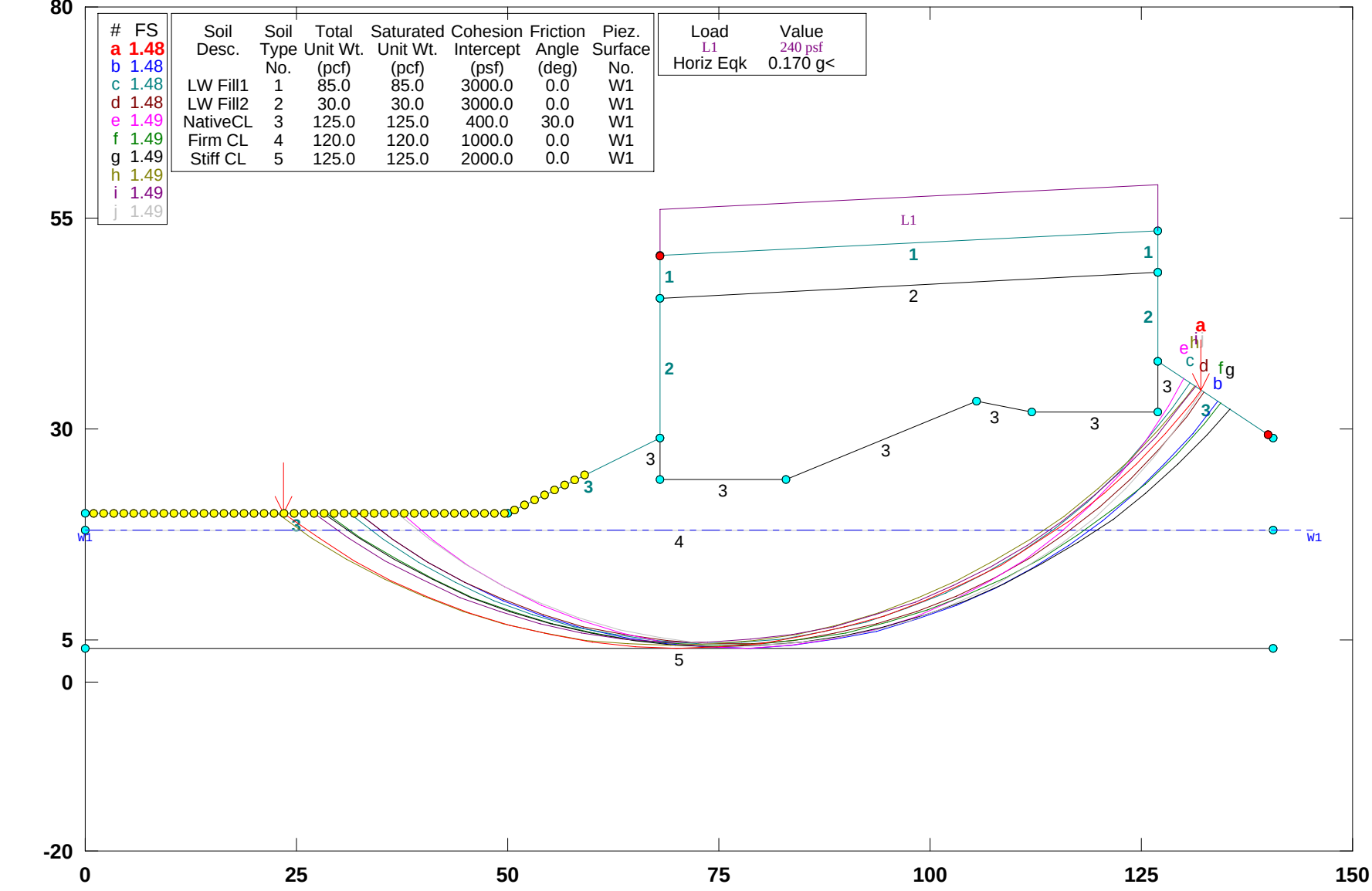
#	FS
a	1.48
b	1.48
c	1.48
d	1.48
e	1.49
f	1.49
g	1.49
h	1.49
i	1.49
j	1.49

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill1	1	85.0	85.0	3000.0	0.0	W1
LW Fill2	2	30.0	30.0	3000.0	0.0	W1
NativeCL	3	125.0	125.0	400.0	30.0	W1
Firm CL	4	120.0	120.0	1000.0	0.0	W1
Stiff CL	5	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf
Horiz Eqk	0.170 g<



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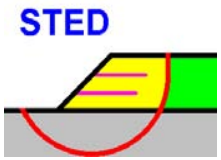
Safety Factors Are Calculated By The Modified Bishop Method

STED



** PCSTABL5M **

by
Purdue University

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--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 11:44AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:separation abut 4_north slope_seismic.in
Output Filename: N:separation abut 4_north slope_seismic.OUT
Unit: ENGLISH
Plotted Output Filename: N:separation abut 4_north slope_seismic.PLT

PROBLEM DESCRIPTION I-436 S405-E22 Connector Separation
Abutment 4_North Slope - Seismic

BOUNDARY COORDINATES

8 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	40.00	50.00	40.00	3
2	50.00	40.00	68.00	49.00	3
3	68.00	49.00	68.01	65.50	2
4	68.01	65.50	68.03	70.50	1
5	68.03	70.50	127.00	73.50	1
6	127.00	73.50	127.01	68.50	1
7	127.01	68.50	127.03	58.00	2
8	127.03	58.00	140.50	49.00	3
9	68.01	65.50	127.01	68.50	2
10	68.00	49.00	68.01	44.00	3
11	68.01	44.00	83.00	44.00	3
12	83.00	44.00	105.50	53.25	3
13	105.50	53.25	112.00	52.00	3
14	112.00	52.00	127.00	52.00	3
15	127.00	52.00	127.03	58.00	3
16	0.00	38.00	140.50	38.00	4
17	0.00	24.00	140.50	24.00	5

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	85.0	85.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	400.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	38.00
2	145.50	38.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	68.03	127.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 1.00 ft.
and X = 60.00 ft.

Each Surface Terminates Between X = 68.03 ft.
and X = 140.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

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Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	23.53	40.00
2	27.60	37.09
3	31.84	34.45
4	36.25	32.09
5	40.80	30.02
6	45.48	28.24
7	50.26	26.77
8	55.12	25.62
9	60.05	24.78
10	65.02	24.26
11	70.02	24.06
12	75.02	24.19
13	80.00	24.64
14	84.94	25.41
15	89.82	26.50
16	94.62	27.90
17	99.32	29.61
18	103.90	31.61
19	108.34	33.91
20	112.62	36.49
21	116.73	39.35
22	120.64	42.46
23	124.34	45.82
24	127.82	49.41
25	131.06	53.21
26	132.10	54.61

Circle Center At X = 70.5 ; Y = 101.4 and Radius, 77.3

*** 1.480 ***

Individual data on the 37 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.8	349.3	0.0	0.0	0.0	0.0	59.4	0.0	0.0
2	1.3	387.2	0.0	44.4	0.0	0.0	65.8	0.0	0.0
3	4.2	2197.7	0.0	695.9	0.0	0.0	373.6	0.0	0.0
4	4.4	3604.2	0.0	1476.3	0.0	0.0	612.7	0.0	0.0
5	4.6	4931.8	0.0	2167.8	0.0	0.0	838.4	0.0	0.0
6	4.7	6145.1	0.0	2767.6	0.0	0.0	1044.7	0.0	0.0
7	4.5	6802.6	0.0	3085.4	0.0	0.0	1156.4	0.0	0.0
8	0.3	411.8	0.0	187.9	0.0	0.0	70.0	0.0	0.0
9	4.9	8923.8	0.0	3682.5	0.0	0.0	1517.1	0.0	0.0
10	4.9	11140.7	0.0	3993.7	0.0	0.0	1893.9	0.0	0.0
11	5.0	13184.1	0.0	4205.6	0.0	0.0	2241.3	0.0	0.0
12	3.0	8742.7	0.0	2564.3	0.0	0.0	1486.3	0.0	0.0
13	0.0	30.5	0.0	8.7	0.0	0.0	5.2	0.0	0.0
14	0.0	65.4	0.0	17.3	0.0	0.0	11.1	0.0	0.0
15	2.0	6943.6	0.0	1727.0	0.0	0.0	1180.4	0.0	477.6
16	5.0	17451.9	0.0	4328.2	0.0	0.0	2966.8	0.0	1199.6
17	5.0	17252.9	0.0	4238.4	0.0	0.0	2933.0	0.0	1195.1
18	3.0	10252.8	0.0	2488.3	0.0	0.0	1743.0	0.0	720.4
19	1.9	6613.0	0.0	1559.9	0.0	0.0	1124.2	0.0	465.3
20	4.9	16915.6	0.0	3758.5	0.0	0.0	2875.7	0.0	1171.3
21	4.8	16863.1	0.0	3370.4	0.0	0.0	2866.7	0.0	1152.0
22	4.7	16539.5	0.0	2885.5	0.0	0.0	2811.7	0.0	1127.9
23	4.6	15958.2	0.0	2306.0	0.0	0.0	2712.9	0.0	1099.0
24	1.6	5512.8	0.0	672.5	0.0	0.0	937.2	0.0	384.6
25	2.8	9394.6	0.0	961.6	0.0	0.0	1597.1	0.0	681.0
26	3.7	11118.9	0.0	796.3	0.0	0.0	1890.2	0.0	879.0
27	0.6	1766.6	0.0	76.5	0.0	0.0	300.3	0.0	148.7
28	2.2	5943.2	0.0	124.1	0.0	0.0	1010.3	0.0	520.5
29	1.9	4977.0	0.0	0.0	0.0	0.0	846.1	0.0	465.0
30	3.9	8980.3	0.0	0.0	0.0	0.0	1526.6	0.0	939.3
31	3.7	7023.8	0.0	0.0	0.0	0.0	1194.1	0.0	889.1
32	2.7	4036.1	0.0	0.0	0.0	0.0	686.1	0.0	637.4
33	0.0	12.3	0.0	0.0	0.0	0.0	2.1	0.0	0.0
34	0.0	22.9	0.0	0.0	0.0	0.0	3.9	0.0	0.0
35	0.8	867.3	0.0	0.0	0.0	0.0	147.4	0.0	0.0
36	3.2	2056.4	0.0	0.0	0.0	0.0	349.6	0.0	0.0
37	1.0	135.9	0.0	0.0	0.0	0.0	23.1	0.0	0.0

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.43	40.00
2	36.40	36.97
3	40.59	34.23
4	44.95	31.79
5	49.48	29.67
6	54.15	27.88
7	58.93	26.43
8	63.81	25.32
9	68.75	24.56
10	73.73	24.15
11	78.73	24.10
12	83.72	24.40
13	88.68	25.06
14	93.58	26.07
15	98.39	27.42
16	103.10	29.12
17	107.67	31.14
18	112.08	33.49
19	116.32	36.14
20	120.36	39.09
21	124.18	42.32
22	127.76	45.81
23	131.08	49.54
24	134.00	53.34

Circle Center At X = 77.0 ; Y = 94.3 and Radius, 70.2

*** 1.480 ***

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Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	31.24	40.00
2	35.21	36.96

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3	39.40	34.23
4	43.78	31.82
5	48.33	29.73
6	53.01	27.99
7	57.82	26.61
8	62.71	25.58
9	67.67	24.91
10	72.66	24.62
11	77.66	24.70
12	82.64	25.15
13	87.57	25.96
14	92.43	27.14
15	97.19	28.68
16	101.82	30.56
17	106.30	32.79
18	110.60	35.34
19	114.70	38.20
20	118.57	41.35
21	122.21	44.79
22	125.57	48.49
23	128.66	52.42
24	130.74	55.52

Circle Center At X = 74.1 ; Y = 91.9 and Radius, 67.3

*** 1.481 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.43	40.00
2	36.41	36.98
3	40.60	34.25
4	44.98	31.84
5	49.53	29.76
6	54.21	28.01
7	59.01	26.61
8	63.90	25.56
9	68.85	24.87
10	73.84	24.55
11	78.84	24.59
12	83.83	24.99
13	88.77	25.76
14	93.64	26.88
15	98.42	28.36
16	103.07	30.18
17	107.58	32.34
18	111.93	34.82
19	116.07	37.61
20	120.01	40.70
21	123.71	44.06
22	127.15	47.68
23	130.32	51.55
24	132.36	54.44

Circle Center At X = 75.8 ; Y = 93.0 and Radius, 68.4

*** 1.483 ***

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Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	37.47	40.00
2	41.26	36.74
3	45.31	33.81
4	49.59	31.23
5	54.08	29.03
6	58.74	27.22
7	63.54	25.81
8	68.44	24.81
9	73.41	24.24
10	78.41	24.08
11	83.40	24.36
12	88.35	25.05
13	93.22	26.17
14	97.99	27.69
15	102.60	29.61
16	107.04	31.92
17	111.26	34.60
18	115.24	37.63
19	118.95	40.98
20	122.36	44.63
21	125.45	48.57
22	128.19	52.75
23	129.97	56.04

Circle Center At X = 77.7 ; Y = 82.9 and Radius, 58.8

*** 1.487 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.57	40.00
2	32.65	37.10
3	36.90	34.47
4	41.32	32.13
5	45.88	30.08
6	50.56	28.33
7	55.35	26.89
8	60.22	25.78
9	65.16	24.98
10	70.14	24.51
11	75.14	24.36
12	80.13	24.54
13	85.11	25.05
14	90.04	25.88
15	94.90	27.04
16	99.68	28.51
17	104.35	30.29
18	108.90	32.37
19	113.30	34.75
20	117.53	37.41
21	121.58	40.34
22	125.43	43.53
23	129.07	46.96
24	132.47	50.63
25	134.44	53.05

Circle Center At X = 74.9 ; Y = 100.7 and Radius, 76.3

*** 1.487 ***

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Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.28	40.00
2	32.36	37.11
3	36.62	34.49
4	41.04	32.15
5	45.59	30.10
6	50.28	28.34
7	55.06	26.88
8	59.93	25.74
9	64.86	24.91
10	69.83	24.39
11	74.83	24.19
12	79.82	24.32
13	84.80	24.76
14	89.75	25.52
15	94.63	26.60
16	99.43	27.99
17	104.14	29.68
18	108.73	31.67
19	113.18	33.95
20	117.47	36.50
21	121.60	39.33
22	125.53	42.42
23	129.26	45.75
24	132.77	49.31
25	135.43	52.39

Circle Center At X = 75.4 ; Y = 102.3 and Radius, 78.1

*** 1.488 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	22.64	40.00
2	26.73	37.12
3	30.99	34.50
4	35.41	32.17
5	39.98	30.13
6	44.66	28.38
7	49.45	26.94
8	54.32	25.81
9	59.25	24.99
10	64.23	24.50
11	69.23	24.32
12	74.22	24.47
13	79.20	24.93
14	84.14	25.72
15	89.02	26.82
16	93.81	28.24
17	98.51	29.96
18	103.08	31.98
19	107.52	34.28
20	111.79	36.87
21	115.90	39.73
22	119.81	42.85
23	123.51	46.21
24	126.99	49.80
25	130.23	53.61
26	131.35	55.12

Circle Center At X = 69.4 ; Y = 102.0 and Radius, 77.6

*** 1.489 ***

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Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.09	40.00
2	31.15	37.09
3	35.41	34.45
4	39.83	32.12
5	44.39	30.09
6	49.09	28.37
7	53.89	26.98
8	58.78	25.92
9	63.73	25.19
10	68.71	24.80
11	73.71	24.75
12	78.70	25.04
13	83.66	25.66
14	88.57	26.63
15	93.40	27.92
16	98.13	29.54
17	102.74	31.48
18	107.20	33.73
19	111.51	36.27
20	115.63	39.11
21	119.55	42.21
22	123.25	45.58
23	126.71	49.18
24	129.91	53.02
25	131.41	55.07

Circle Center At X = 72.0 ; Y = 98.2 and Radius, 73.5

*** 1.489 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	36.87	40.00
2	40.76	36.85
3	44.88	34.02
4	49.22	31.53
5	53.73	29.39
6	58.41	27.61
7	63.21	26.21
8	68.10	25.19
9	73.06	24.57
10	78.06	24.34
11	83.06	24.51
12	88.02	25.07
13	92.93	26.02
14	97.75	27.36
15	102.45	29.08
16	106.99	31.16

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   17        111.36       33.60
   18        115.51       36.38
   19        119.44       39.48
   20        123.11       42.87
   21        126.49       46.55
   22        129.58       50.49
   23        132.25       54.52

Circle Center At X =   78.5 ; Y =   87.4  and Radius,   63.0


     ***     1.491   ***


1

            Y           A     X     I     S           F     T


           0.00     18.19     36.38     54.56     72.75     90.94

X      0.00 +---------+--*------+**-------+---------+---------+
            -                    . .
            -                    ...
            -                   .....
            -                  ......
            -               . ......
      18.19 +               ........
            -             .........8
            -           ..........1
            -           ........1.6
            -          ........89.3
            -         .........16.2
A     36.38 +         ........162.5
            -        ........1920..
            -        ........36.5..
            -       .........1245...
            -       .......825....*
            -       .......16.......
X     54.56 +      .......125........
            -      .......92.........
            -      .......1...........
            -      ......12...........
            -      .......3.........*..*        *  */1
            -      ......12.............
I     72.75 +      ......23.................. .
            -      ......1..................... .. .
            -      ......21.........................
            -       .....03.........*...............
            -       .....21.........................
            -       ......28.........................
S     90.94 +       ......61.........................
            -        .....218.........................
            -         .....23.........................
            -         .....71.........................
            -          .....218.........................
            -          ......038.........*...........
     109.13 +           .....261.........................
            -            .....241........*...........
            -             ......238...................
            -              .....7613..................
            -               .....24183................
            -                ......241.3.............
F    127.31 +                  ......241.*..*.....*.*1/
            -                   .....7624183
            -                    ......7621
            -                      ......7
            -           *       *    .*.
            -
T    145.50 +                    W
```

I-436 S405-E22 Connector Separation Abutment 4_South Slope - Static

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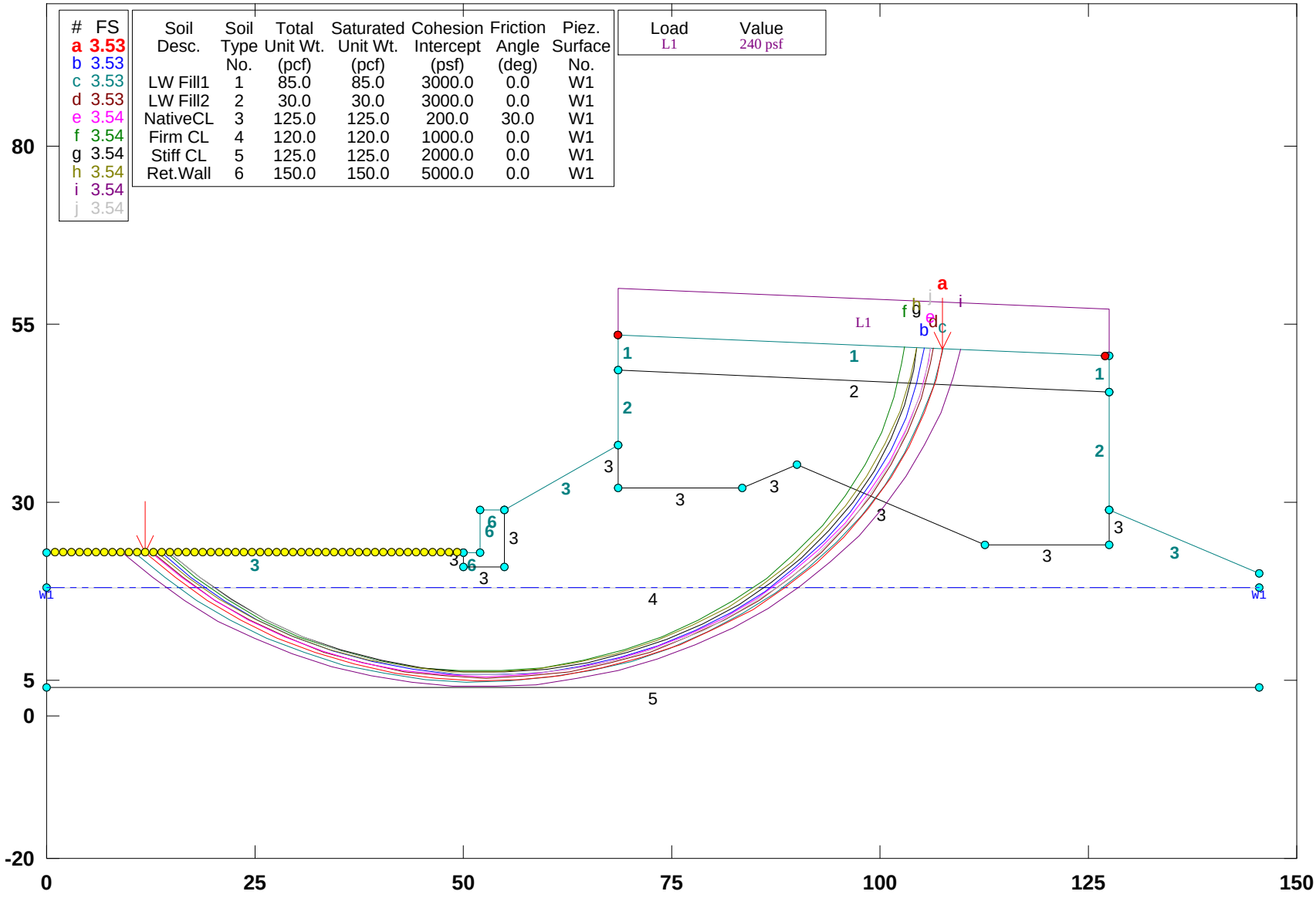

PCSTABL5M/si FSmin=3.53

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/15/2008
Time of Run: 06:42PM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:Separation abut 4_south slope_static.in
Output Filename: N:Separation abut 4_south slope_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:Separation abut 4_south slope_static.PLT

PROBLEM DESCRIPTION I-436 S405-E22 Connector Separation
Abutment 4_South Slope - Static

BOUNDARY COORDINATES

11 Top Boundaries
23 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	43.00	50.00	43.00	3
2	50.00	43.00	52.00	43.00	6
3	52.00	43.00	52.01	49.00	6
4	52.01	49.00	55.01	49.00	6
5	55.01	49.00	68.50	58.00	3
6	68.50	58.00	68.51	68.50	2
7	68.51	68.50	68.53	73.50	1
8	68.53	73.50	127.50	70.50	1
9	127.50	70.50	127.51	65.50	1
10	127.51	65.50	127.53	49.00	2
11	127.53	49.00	145.50	40.00	3
12	68.51	68.50	127.52	65.50	2
13	68.50	58.00	68.51	52.00	3
14	68.51	52.00	83.50	52.00	3
15	83.50	52.00	90.00	55.25	3
16	90.00	55.25	112.50	44.00	3
17	112.50	44.00	127.50	44.00	3
18	127.50	44.00	127.53	49.00	3
19	50.00	43.00	50.01	41.00	3
20	50.01	41.00	55.00	41.00	3
21	55.00	41.00	55.01	49.00	3
22	0.00	38.00	145.50	38.00	4
23	0.00	24.00	145.50	24.00	5

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	85.0	85.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	200.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1
6	150.0	150.0	5000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	38.00
2	145.50	38.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	68.53	127.50	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 1.00 ft.
and X = 50.00 ft.

Each Surface Terminates Between X = 68.53 ft.
and X = 127.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

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Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	11.83	43.00
2	15.37	39.47
3	19.21	36.26
4	23.32	33.42
5	27.68	30.96
6	32.23	28.90
7	36.95	27.26
8	41.81	26.05
9	46.75	25.28
10	51.74	24.95
11	56.73	25.08
12	61.70	25.66
13	66.60	26.68
14	71.38	28.14
15	76.01	30.02
16	80.45	32.31
17	84.67	35.00
18	88.63	38.05
19	92.31	41.44
20	95.66	45.15
21	98.66	49.15
22	101.29	53.40
23	103.53	57.87
24	105.36	62.53
25	106.76	67.33
26	107.58	71.51

Circle Center At X = 52.8 ; Y = 80.4 and Radius, 55.5

*** 3.532 ***

Individual data on the 40 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1.8	937.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.1	1518.5	0.0	146.9	0.0	0.0	0.0	0.0	0.0
4	4.1	4129.1	0.0	985.3	0.0	0.0	0.0	0.0	0.0
5	4.4	5754.4	0.0	1812.9	0.0	0.0	0.0	0.0	0.0
6	4.6	7260.1	0.0	2518.4	0.0	0.0	0.0	0.0	0.0
7	4.7	8575.2	0.0	3096.0	0.0	0.0	0.0	0.0	0.0
8	4.9	9639.0	0.0	3541.0	0.0	0.0	0.0	0.0	0.0
9	4.9	10403.2	0.0	3849.9	0.0	0.0	0.0	0.0	0.0
10	3.3	7042.2	0.0	2609.9	0.0	0.0	0.0	0.0	0.0
11	0.0	22.0	0.0	8.1	0.0	0.0	0.0	0.0	0.0
12	1.7	3855.8	0.0	1402.0	0.0	0.0	0.0	0.0	0.0
13	0.3	591.2	0.0	214.8	0.0	0.0	0.0	0.0	0.0
14	0.0	26.9	0.0	8.1	0.0	0.0	0.0	0.0	0.0
15	3.0	9373.8	0.0	2426.3	0.0	0.0	0.0	0.0	0.0
16	0.0	30.3	0.0	8.1	0.0	0.0	0.0	0.0	0.0
17	1.7	5172.7	0.0	1392.8	0.0	0.0	0.0	0.0	0.0
18	5.0	16098.1	0.0	3940.1	0.0	0.0	0.0	0.0	0.0
19	4.9	17407.1	0.0	3690.5	0.0	0.0	0.0	0.0	0.0
20	1.9	7130.5	0.0	1370.1	0.0	0.0	0.0	0.0	0.0
21	0.0	36.6	0.0	7.0	0.0	0.0	0.0	0.0	0.0
22	0.0	74.9	0.0	14.0	0.0	0.0	0.0	0.0	0.0
23	2.8	11116.1	0.0	1912.5	0.0	0.0	0.0	0.0	683.5
24	4.6	17288.3	0.0	2782.4	0.0	0.0	0.0	0.0	1111.7
25	4.4	15442.2	0.0	2131.2	0.0	0.0	0.0	0.0	1066.5
26	3.0	9794.7	0.0	1062.4	0.0	0.0	0.0	0.0	731.1
27	1.2	3614.0	0.0	293.0	0.0	0.0	0.0	0.0	281.7
28	3.9	11583.4	0.0	461.1	0.0	0.0	0.0	0.0	935.7
29	0.1	179.6	0.0	0.0	0.0	0.0	0.0	0.0	15.0
30	1.4	3862.6	0.0	0.0	0.0	0.0	0.0	0.0	327.6
31	2.3	5977.4	0.0	0.0	0.0	0.0	0.0	0.0	553.4
32	3.4	6997.4	0.0	0.0	0.0	0.0	0.0	0.0	804.1
33	3.0	4357.1	0.0	0.0	0.0	0.0	0.0	0.0	720.7
34	0.8	854.6	0.0	0.0	0.0	0.0	0.0	0.0	200.6
35	1.8	1567.0	0.0	0.0	0.0	0.0	0.0	0.0	430.9
36	2.2	1698.9	0.0	0.0	0.0	0.0	0.0	0.0	537.1
37	1.8	1130.9	0.0	0.0	0.0	0.0	0.0	0.0	438.4
38	1.2	573.1	0.0	0.0	0.0	0.0	0.0	0.0	282.8
39	0.2	87.2	0.0	0.0	0.0	0.0	0.0	0.0	53.4
40	0.8	147.5	0.0	0.0	0.0	0.0	0.0	0.0	197.1

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.80	43.00
2	17.34	39.47
3	21.20	36.28
4	25.34	33.48
5	29.72	31.08
6	34.32	29.10
7	39.08	27.57
8	43.96	26.49
9	48.92	25.88
10	53.92	25.74
11	58.91	26.08
12	63.84	26.88
13	68.68	28.15
14	73.38	29.86
15	77.89	32.02
16	82.18	34.59
17	86.20	37.55
18	89.93	40.88
19	93.33	44.55
20	96.37	48.52
21	99.01	52.77
22	101.25	57.24
23	103.05	61.90
24	104.40	66.72
25	105.29	71.63

Circle Center At X = 52.9 ; Y = 78.6 and Radius, 52.9

*** 3.533 ***

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Failure Surface Specified By 27 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	10.60	43.00
2	14.14	39.47
3	17.98	36.26
4	22.09	33.41
5	26.43	30.93
6	30.98	28.85
7	35.69	27.19
8	40.53	25.94
9	45.47	25.14
10	50.45	24.77
11	55.45	24.85
12	60.43	25.38
13	65.33	26.34
14	70.13	27.73
15	74.79	29.55
16	79.27	31.77
17	83.53	34.39
18	87.55	37.37
19	91.28	40.69
20	94.71	44.34
21	97.79	48.27
22	100.52	52.46
23	102.86	56.88
24	104.80	61.49
25	106.32	66.25
26	107.41	71.13
27	107.46	71.52

Circle Center At X = 52.1 ; Y = 81.0 and Radius, 56.2

*** 3.534 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	12.82	43.00
2	16.36	39.47
3	20.21	36.28
4	24.33	33.45
5	28.70	31.02
6	33.28	29.01
7	38.02	27.42
8	42.89	26.27
9	47.84	25.58
10	52.83	25.35
11	57.83	25.58
12	62.78	26.27
13	67.65	27.41
14	72.39	29.00
15	76.97	31.01
16	81.34	33.44
17	85.47	36.26
18	89.32	39.45
19	92.86	42.98
20	96.06	46.82
21	98.89	50.94
22	101.33	55.31
23	103.36	59.88
24	104.96	64.62
25	106.11	69.48
26	106.41	71.57

Circle Center At X = 52.8 ; Y = 79.5 and Radius, 54.2

*** 3.534 ***

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Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	12.57	43.00
2	16.13	39.49
3	20.00	36.32
4	24.14	33.52
5	28.52	31.11
6	33.11	29.11
7	37.85	27.55
8	42.73	26.42
9	47.68	25.75
10	52.68	25.54
11	57.67	25.79
12	62.62	26.50
13	67.48	27.66
14	72.22	29.26
15	76.79	31.29
16	81.15	33.73
17	85.27	36.57
18	89.12	39.77
19	92.65	43.30
20	95.84	47.15
21	98.66	51.28
22	101.10	55.65
23	103.12	60.22
24	104.71	64.96
25	105.86	69.83
26	106.10	71.59

Circle Center At X = 52.5 ; Y = 79.8 and Radius, 54.3

*** 3.536 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.30	43.00
2	17.84	39.47
3	21.70	36.30
4	25.86	33.52
5	30.27	31.16
6	34.89	29.25
7	39.67	27.79
8	44.57	26.81
9	49.55	26.31
10	54.55	26.31
11	59.53	26.79
12	64.43	27.75
13	69.22	29.19
14	73.84	31.09

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15	78.26	33.44
16	82.43	36.20
17	86.30	39.36
18	89.85	42.88
19	93.04	46.73
20	95.84	50.88
21	98.22	55.27
22	100.15	59.88
23	101.63	64.66
24	102.63	69.56
25	102.86	71.75

Circle Center At X = 52.1 ; Y = 77.3 and Radius, 51.1

*** 3.539 ***

1

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.79	43.00
2	18.33	39.47
3	22.20	36.30
4	26.35	33.52
5	30.76	31.15
6	35.37	29.22
7	40.15	27.74
8	45.04	26.73
9	50.01	26.19
10	55.01	26.14
11	59.99	26.56
12	64.91	27.47
13	69.72	28.84
14	74.37	30.68
15	78.82	32.95
16	83.04	35.64
17	86.97	38.72
18	90.59	42.17
19	93.87	45.95
20	96.76	50.03
21	99.24	54.37
22	101.30	58.93
23	102.90	63.66
24	104.04	68.53
25	104.47	71.67

Circle Center At X = 53.1 ; Y = 77.9 and Radius, 51.8

*** 3.539 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.31	43.00
2	16.89	39.51
3	20.78	36.37
4	24.96	33.61
5	29.37	31.26
6	33.98	29.34
7	38.76	27.86
8	43.65	26.84
9	48.62	26.28
10	53.62	26.19
11	58.61	26.58
12	63.53	27.43
13	68.36	28.75
14	73.03	30.52
15	77.53	32.71
16	81.79	35.33
17	85.79	38.33
18	89.48	41.70
19	92.85	45.40
20	95.85	49.40
21	98.45	53.66
22	100.65	58.16
23	102.41	62.84
24	103.72	67.66
25	104.41	71.67

Circle Center At X = 52.0 ; Y = 79.1 and Radius, 52.9

*** 3.540 ***

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Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	9.13	43.00
2	12.67	39.47
3	16.49	36.25
4	20.58	33.37
5	24.90	30.85
6	29.42	28.71
7	34.10	26.96
8	38.92	25.62
9	43.83	24.69
10	48.80	24.18
11	53.80	24.10
12	58.79	24.45
13	63.73	25.22
14	68.59	26.41
15	73.33	28.00
16	77.91	30.00
17	82.31	32.38
18	86.49	35.13
19	90.42	38.22
20	94.07	41.63
21	97.41	45.35
22	100.43	49.34
23	103.10	53.56
24	105.40	58.01
25	107.31	62.63
26	108.82	67.39
27	109.72	71.40

Circle Center At X = 52.2 ; Y = 82.7 and Radius, 58.6

*** 3.540 ***

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Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.79	43.00
2	18.33	39.47
3	22.18	36.28
4	26.32	33.48
5	30.71	31.08
6	35.30	29.11
7	40.06	27.58
8	44.95	26.50
9	49.91	25.90
10	54.91	25.77
11	59.90	26.11
12	64.83	26.92
13	69.67	28.20
14	74.36	29.93
15	78.86	32.09
16	83.15	34.67
17	87.17	37.65
18	90.88	40.99
19	94.27	44.67
20	97.29	48.65
21	99.92	52.90
22	102.14	57.38
23	103.93	62.05
24	105.26	66.87
25	106.09	71.59

Circle Center At X = 53.8 ; Y = 78.5 and Radius, 52.8

*** 3.540 ***

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I-436 S405-E22 Connector Separation Abutment 4_South Slope - Seismic

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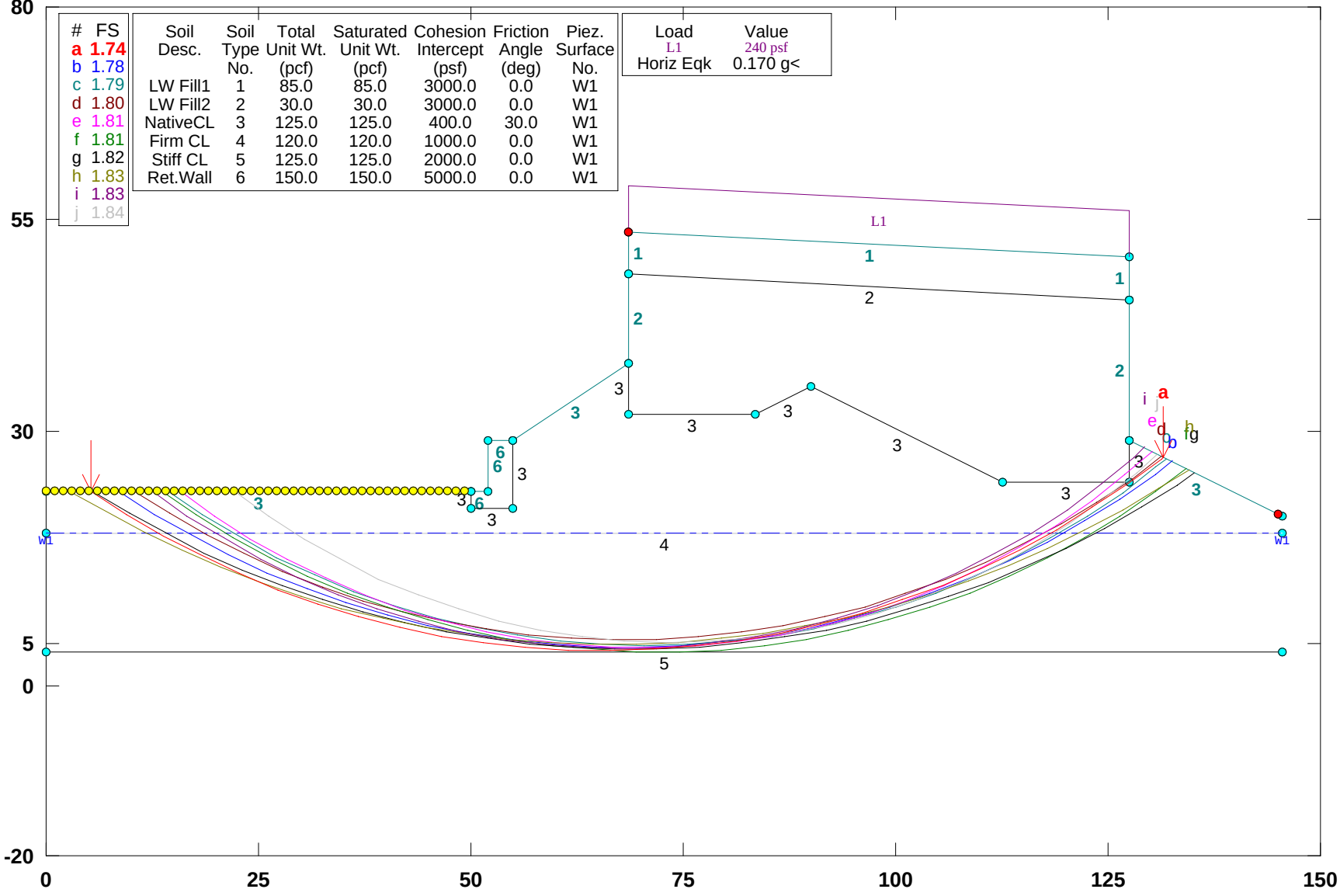
#	FS
a	1.74
b	1.78
c	1.79
d	1.80
e	1.81
f	1.81
g	1.82
h	1.83
i	1.83
j	1.84

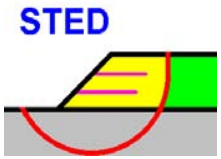
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill1	1	85.0	85.0	3000.0	0.0	W1
LW Fill2	2	30.0	30.0	3000.0	0.0	W1
NativeCL	3	125.0	125.0	400.0	30.0	W1
Firm CL	4	120.0	120.0	1000.0	0.0	W1
Stiff CL	5	125.0	125.0	2000.0	0.0	W1
Ret.Wall	6	150.0	150.0	5000.0	0.0	W1

Load	Value
L1	240 psf
Horiz Eqk	0.170 g<



PCSTABL5M/si FSmin=1.74

Safety Factors Are Calculated By The Modified Bishop Method



** PCSTABL5M **

by
Purdue University

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--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 12:02PM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:separation abut 4_south slope_seismic.in
Output Filename: N:separation abut 4_south slope_seismic.OUT
Unit: ENGLISH
Plotted Output Filename: N:separation abut 4_south slope_seismic.PLT

PROBLEM DESCRIPTION I-436 S405-E22 Connector Separation
Abutment 4_South Slope - Seismic

BOUNDARY COORDINATES

11 Top Boundaries
23 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	43.00	50.00	43.00	3
2	50.00	43.00	52.00	43.00	6
3	52.00	43.00	52.01	49.00	6
4	52.01	49.00	55.01	49.00	6
5	55.01	49.00	68.50	58.00	3
6	68.50	58.00	68.51	68.50	2
7	68.51	68.50	68.53	73.50	1
8	68.53	73.50	127.50	70.50	1
9	127.50	70.50	127.51	65.50	1
10	127.51	65.50	127.53	49.00	2
11	127.53	49.00	145.50	40.00	3
12	68.51	68.50	127.52	65.50	2
13	68.50	58.00	68.51	52.00	3
14	68.51	52.00	83.50	52.00	3
15	83.50	52.00	90.00	55.25	3
16	90.00	55.25	112.50	44.00	3
17	112.50	44.00	127.50	44.00	3
18	127.50	44.00	127.53	49.00	3
19	50.00	43.00	50.01	41.00	3
20	50.01	41.00	55.00	41.00	3
21	55.00	41.00	55.01	49.00	3
22	0.00	38.00	145.50	38.00	4
23	0.00	24.00	145.50	24.00	5

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ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	85.0	85.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	400.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1
6	150.0	150.0	5000.0	0.0	0.00	0.0	1

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1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	38.00
2	145.50	38.00

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BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	68.53	127.50	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

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A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.
and X = 50.00 ft.

Each Surface Terminates Between X = 68.53 ft.

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and X = 145.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	5.28	43.00
2	9.46	40.26
3	13.76	37.71
4	18.18	35.38
5	22.71	33.25
6	27.33	31.34
7	32.03	29.64
8	36.81	28.17
9	41.65	26.93
10	46.55	25.91
11	51.49	25.13
12	56.46	24.57
13	61.45	24.25
14	66.44	24.17
15	71.44	24.32
16	76.43	24.71
17	81.39	25.33
18	86.32	26.18
19	91.20	27.26
20	96.02	28.57
21	100.78	30.11
22	105.46	31.87
23	110.05	33.84
24	114.55	36.03
25	118.94	38.43
26	123.21	41.03
27	127.35	43.83
28	131.36	46.82
29	131.55	46.98

Circle Center At X = 65.7 ; Y = 130.6 and Radius, 106.4

*** 1.739 ***

Individual data on the 46 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.2	716.6	0.0	0.0	0.0	0.0	121.8	0.0	0.0
2	3.8	1849.4	0.0	0.0	0.0	0.0	314.4	0.0	0.0
3	0.5	310.3	0.0	5.0	0.0	0.0	52.7	0.0	0.0
4	4.4	3533.7	0.0	453.8	0.0	0.0	600.7	0.0	0.0
5	4.5	4830.0	0.0	1150.4	0.0	0.0	821.1	0.0	0.0
6	4.6	6051.3	0.0	1780.8	0.0	0.0	1028.7	0.0	0.0
7	4.7	7180.4	0.0	2343.5	0.0	0.0	1220.7	0.0	0.0
8	4.8	8201.3	0.0	2837.2	0.0	0.0	1394.2	0.0	0.0
9	4.8	9100.0	0.0	3260.9	0.0	0.0	1547.0	0.0	0.0
10	4.9	9864.0	0.0	3613.6	0.0	0.0	1676.9	0.0	0.0
11	3.5	7279.4	0.0	2696.8	0.0	0.0	1237.5	0.0	0.0
12	0.0	21.7	0.0	8.0	0.0	0.0	3.7	0.0	0.0
13	1.5	3255.8	0.0	1189.7	0.0	0.0	553.5	0.0	0.0
14	0.5	1143.0	0.0	416.5	0.0	0.0	194.3	0.0	0.0
15	0.0	26.8	0.0	8.1	0.0	0.0	4.5	0.0	0.0
16	3.0	9409.3	0.0	2459.1	0.0	0.0	1599.6	0.0	0.0
17	0.0	30.7	0.0	8.3	0.0	0.0	5.2	0.0	0.0
18	1.4	4389.4	0.0	1211.2	0.0	0.0	746.2	0.0	0.0
19	5.0	16636.0	0.0	4238.9	0.0	0.0	2828.1	0.0	0.0
20	5.0	18870.2	0.0	4301.6	0.0	0.0	3207.9	0.0	0.0
21	2.1	8365.8	0.0	1770.5	0.0	0.0	1422.2	0.0	0.0
22	0.0	40.3	0.0	8.6	0.0	0.0	6.8	0.0	0.0
23	0.0	82.2	0.0	17.2	0.0	0.0	14.0	0.0	0.0
24	2.9	12564.5	0.0	2494.6	0.0	0.0	2136.0	0.0	698.9
25	5.0	21335.6	0.0	4207.1	0.0	0.0	3627.1	0.0	1196.4
26	5.0	20897.3	0.0	4050.2	0.0	0.0	3552.5	0.0	1190.7
27	2.1	8756.4	0.0	1669.7	0.0	0.0	1488.6	0.0	506.7
28	2.8	11711.2	0.0	2150.8	0.0	0.0	1990.9	0.0	675.7
29	3.7	15587.3	0.0	2687.1	0.0	0.0	2649.8	0.0	884.3
30	1.2	5052.3	0.0	831.6	0.0	0.0	858.9	0.0	287.3
31	4.8	19198.1	0.0	3145.3	0.0	0.0	3263.7	0.0	1158.0
32	4.8	17001.4	0.0	2701.2	0.0	0.0	2890.2	0.0	1142.0
33	4.7	14716.7	0.0	2187.4	0.0	0.0	2501.8	0.0	1123.4
34	4.6	12367.8	0.0	1605.0	0.0	0.0	2102.5	0.0	1102.3
35	2.4	5698.8	0.0	604.5	0.0	0.0	968.8	0.0	587.0
36	2.0	4380.4	0.0	350.8	0.0	0.0	744.7	0.0	491.9
37	3.6	7036.9	0.0	251.8	0.0	0.0	1196.3	0.0	863.9
38	0.8	1423.8	0.0	0.0	0.0	0.0	242.0	0.0	189.1
39	4.3	6888.9	0.0	0.0	0.0	0.0	1171.1	0.0	1024.8
40	4.1	5259.1	0.0	0.0	0.0	0.0	894.1	0.0	994.3
41	0.1	162.6	0.0	0.0	0.0	0.0	27.6	0.0	36.0
42	0.0	9.4	0.0	0.0	0.0	0.0	1.6	0.0	0.0
43	0.0	7.6	0.0	0.0	0.0	0.0	1.3	0.0	0.0
44	0.0	6.7	0.0	0.0	0.0	0.0	1.1	0.0	0.0
45	3.8	1266.8	0.0	0.0	0.0	0.0	215.3	0.0	0.0
46	0.2	3.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.54	43.00
2	12.74	40.28
3	17.06	37.76
4	21.49	35.45
5	26.03	33.34
6	30.66	31.46
7	35.37	29.80
8	40.16	28.36
9	45.01	27.15
10	49.92	26.17
11	54.86	25.42
12	59.83	24.91
13	64.83	24.64
14	69.83	24.60
15	74.82	24.79
16	79.80	25.23
17	84.76	25.89
18	89.68	26.80
19	94.55	27.93
20	99.36	29.29

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21	104.10	30.88
22	108.76	32.69
23	113.33	34.72
24	117.80	36.96
25	122.16	39.41
26	126.39	42.06
27	130.50	44.92
28	132.55	46.49

Circle Center At X = 68.1 ; Y = 130.2 and Radius, 105.6

*** 1.779 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.32	43.00
2	18.45	40.18
3	22.72	37.57
4	27.11	35.19
5	31.63	33.04
6	36.25	31.13
7	40.96	29.46
8	45.76	28.04
9	50.62	26.87
10	55.53	25.96
11	60.49	25.30
12	65.47	24.90
13	70.47	24.76
14	75.47	24.88
15	80.46	25.27
16	85.41	25.90
17	90.33	26.80
18	95.20	27.95
19	100.00	29.35
20	104.72	31.00
21	109.35	32.90
22	113.87	35.03
23	118.28	37.39
24	122.55	39.98
25	126.69	42.79
26	130.67	45.81
27	131.87	46.82

Circle Center At X = 70.7 ; Y = 120.9 and Radius, 96.1

*** 1.786 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	10.30	43.00
2	14.52	40.31
3	18.86	37.83
4	23.31	35.56
5	27.87	33.51
6	32.53	31.68
7	37.26	30.08
8	42.07	28.71
9	46.94	27.57

10	51.86	26.67
11	56.81	26.01
12	61.80	25.58
13	66.79	25.40
14	71.79	25.46
15	76.78	25.77
16	81.75	26.31
17	86.69	27.09
18	91.59	28.11
19	96.43	29.37
20	101.20	30.85
21	105.90	32.57
22	110.50	34.51
23	115.01	36.67
24	119.41	39.05
25	123.69	41.64
26	127.84	44.43
27	131.38	47.07

Circle Center At X = 68.0 ; Y = 128.9 and Radius, 103.5

*** 1.796 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	15.83	43.00
2	19.88	40.06
3	24.08	37.36
4	28.43	34.89
5	32.91	32.68
6	37.51	30.71
7	42.21	29.01
8	47.00	27.57
9	51.86	26.40
10	56.78	25.51
11	61.74	24.90
12	66.73	24.56
13	71.73	24.50
14	76.73	24.73
15	81.70	25.23
16	86.64	26.01
17	91.53	27.07
18	96.35	28.39
19	101.09	29.99
20	105.73	31.85
21	110.26	33.96
22	114.66	36.33
23	118.93	38.94
24	123.04	41.78
25	126.99	44.85
26	130.21	47.66

Circle Center At X = 70.2 ; Y = 113.7 and Radius, 89.2

*** 1.810 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

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1	13.57	43.00
2	17.69	40.17
3	21.94	37.54
4	26.33	35.13
5	30.82	32.95
6	35.42	30.99
7	40.12	29.27
8	44.89	27.78
9	49.74	26.54
10	54.63	25.54
11	59.58	24.79
12	64.55	24.28
13	69.55	24.03
14	74.55	24.02
15	79.54	24.27
16	84.51	24.77
17	89.46	25.51
18	94.36	26.50
19	99.20	27.74
20	103.98	29.22
21	108.68	30.94
22	113.28	32.88
23	117.78	35.06
24	122.17	37.46
25	126.43	40.08
26	130.55	42.91
27	134.18	45.67

Circle Center At X = 72.1 ; Y = 123.7 and Radius, 99.7

*** 1.811 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	5.53	43.00
2	9.79	40.38
3	14.15	37.94
4	18.62	35.69
5	23.18	33.64
6	27.82	31.78
7	32.54	30.12
8	37.32	28.67
9	42.16	27.43
10	47.05	26.39
11	51.98	25.56
12	56.95	24.95
13	61.93	24.55
14	66.93	24.36
15	71.93	24.39
16	76.92	24.63
17	81.90	25.09
18	86.86	25.75
19	91.78	26.64
20	96.66	27.73
21	101.48	29.03
22	106.25	30.53
23	110.95	32.24
24	115.57	34.15
25	120.11	36.25
26	124.55	38.55
27	128.89	41.04
28	133.12	43.70
29	135.21	45.15

Circle Center At X = 68.8 ; Y = 140.9 and Radius, 116.6

*** 1.820 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	2.76	43.00
2	7.08	40.47
3	11.49	38.12
4	16.00	35.95
5	20.59	33.97
6	25.26	32.18
7	29.99	30.58
8	34.79	29.18
9	39.64	27.97
10	44.54	26.96
11	49.48	26.16
12	54.44	25.55
13	59.42	25.15
14	64.42	24.95
15	69.42	24.96
16	74.41	25.18
17	79.40	25.59
18	84.36	26.21
19	89.29	27.03
20	94.18	28.06
21	99.03	29.28
22	103.83	30.70
23	108.56	32.31
24	113.22	34.12
25	117.81	36.12
26	122.31	38.30
27	126.71	40.66
28	131.02	43.20
29	134.55	45.49

Circle Center At X = 66.7 ; Y = 147.2 and Radius, 122.3

*** 1.828 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	12.56	43.00
2	16.63	40.09
3	20.85	37.41
4	25.21	34.96
5	29.69	32.75
6	34.30	30.79
7	39.00	29.09
8	43.78	27.64
9	48.64	26.46
10	53.56	25.54
11	58.51	24.90
12	63.50	24.52
13	68.50	24.42
14	73.50	24.59
15	78.48	25.04
16	83.42	25.75

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17	88.33	26.74
18	93.17	27.99
19	97.93	29.50
20	102.61	31.27
21	107.18	33.29
22	111.64	35.56
23	115.96	38.07
24	120.14	40.81
25	124.17	43.78
26	128.03	46.96
27	129.29	48.12

Circle Center At X = 67.9 ; Y = 116.0 and Radius, 91.6

*** 1.828 ***

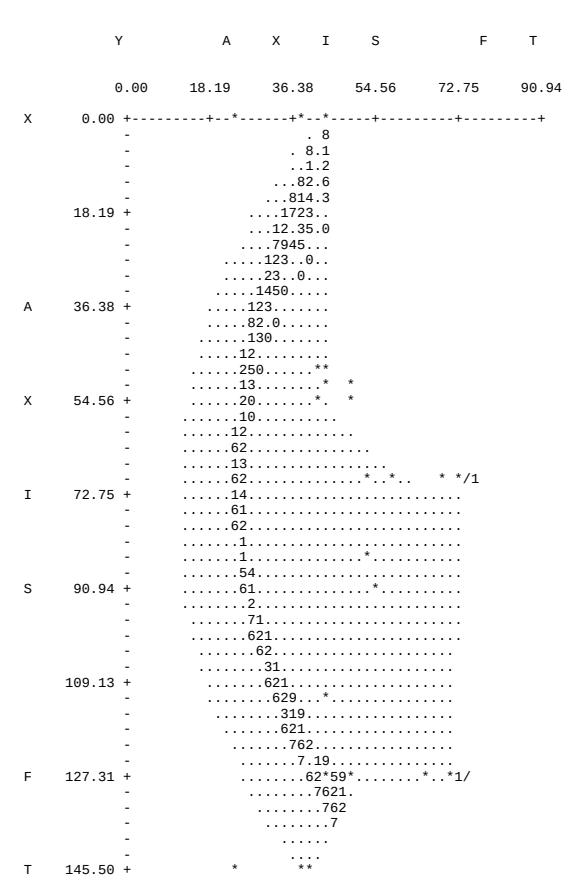
Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	22.11	43.00
2	26.14	40.03
3	30.33	37.31
4	34.68	34.85
5	39.17	32.64
6	43.78	30.71
7	48.50	29.05
8	53.31	27.68
9	58.19	26.60
10	63.12	25.81
11	68.10	25.31
12	73.10	25.12
13	78.09	25.22
14	83.08	25.61
15	88.03	26.30
16	92.93	27.29
17	97.77	28.57
18	102.52	30.13
19	107.17	31.97
20	111.70	34.08
21	116.09	36.46
22	120.34	39.10
23	124.42	41.99
24	128.33	45.11
25	130.81	47.36

Circle Center At X = 73.9 ; Y = 109.1 and Radius, 84.0

*** 1.842 ***

1



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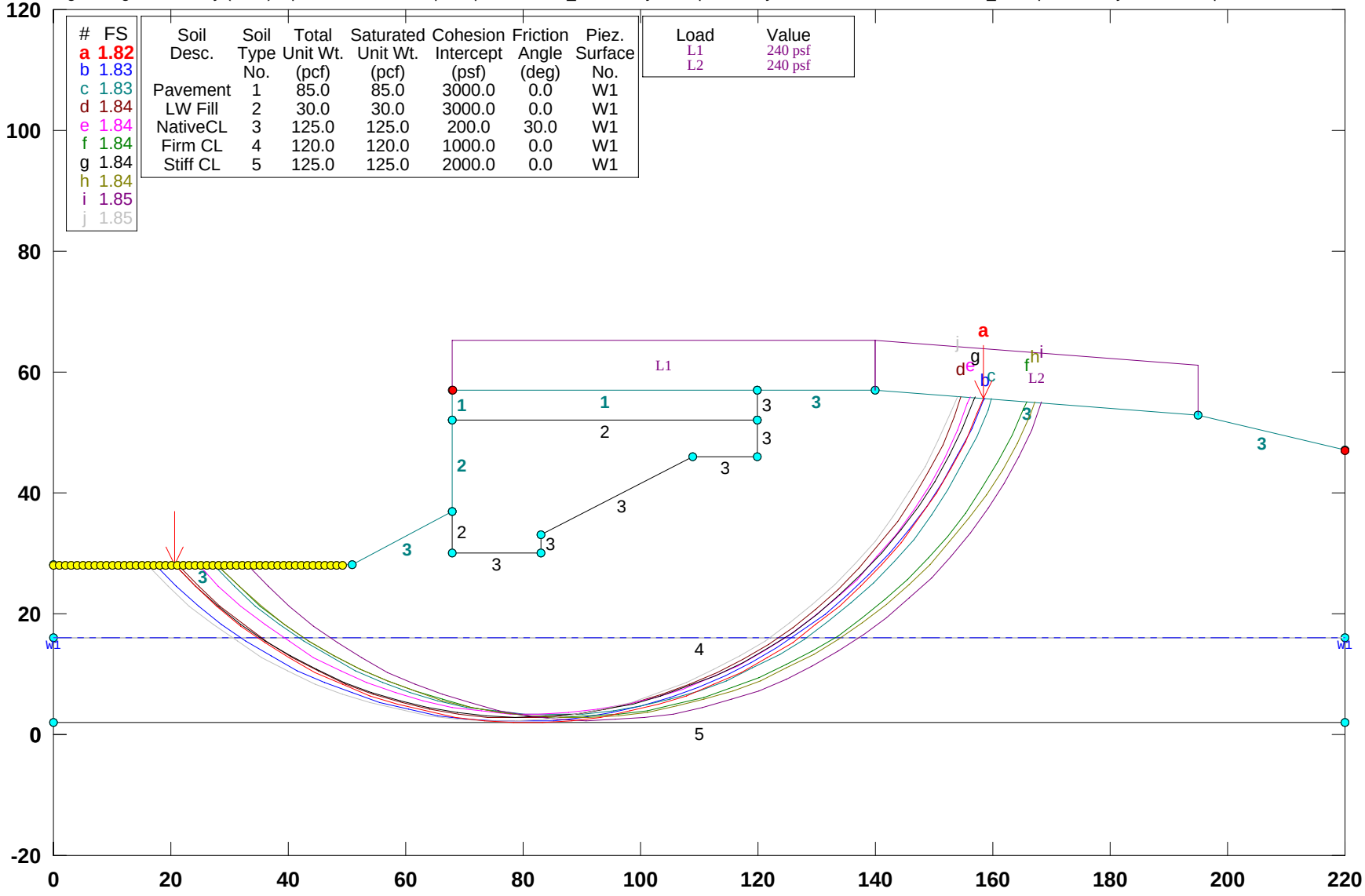
Wall RW1300 at St "H" 1309+36_Static

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\mse walls\reports\pclw rw 1300_1299\analysis\slope stability\rw1299 & 1300 at st 1309+36_static.pl2 Run By: Curt - Group Delta Consultants 1/25/2009 01:1



PCSTABL5M/si FSmin=1.82

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 01:11PM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:rw1299 & 1300 at st 1309+36_static.in
Output Filename: N:rw1299 & 1300 at st 1309+36_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1299 & 1300 at st 1309+36_static.PLT

PROBLEM DESCRIPTION Wall RW1300
at St "H" 1309+36_Static

BOUNDARY COORDINATES

8 Top Boundaries
18 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	48.00	51.00	48.00	3
2	51.00	48.00	68.00	57.00	3
3	68.00	57.00	68.01	72.00	2
4	68.01	72.00	68.02	77.00	1
5	68.02	77.00	120.00	77.00	1
6	120.00	77.00	140.00	77.00	3
7	140.00	77.00	195.00	73.00	3
8	195.00	73.00	220.00	67.00	3
9	68.01	72.00	119.99	72.00	2
10	119.99	72.00	120.00	77.00	3
11	67.99	50.00	68.00	57.00	2
12	67.99	50.00	83.00	50.00	3
13	83.00	50.00	83.01	53.00	3
14	83.01	53.00	109.00	66.00	3
15	109.00	66.00	119.98	66.00	3
16	119.98	66.00	119.99	72.00	3
17	0.00	36.00	220.00	36.00	4
18	0.00	22.00	220.00	22.00	5

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	85.0	85.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	200.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	220.00	36.00

1

BOUNDARY LOAD(S)

2 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	68.02	140.00	240.0	0.0
2	140.01	195.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.
and X = 50.00 ft.

Each Surface Terminates Between X = 68.02 ft.
and X = 220.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

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* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.60	48.00
2	24.14	44.46
3	27.88	41.15
4	31.82	38.07
5	35.93	35.23
6	40.21	32.64
7	44.64	30.32
8	49.20	28.27
9	53.88	26.49
10	58.65	25.01
11	63.50	23.81
12	68.42	22.91
13	73.39	22.31
14	78.38	22.01
15	83.38	22.01
16	88.37	22.31
17	93.33	22.92
18	98.25	23.82
19	103.10	25.02
20	107.88	26.51
21	112.55	28.28
22	117.11	30.34
23	121.54	32.66
24	125.81	35.25
25	129.93	38.09
26	133.86	41.18
27	137.60	44.49
28	141.14	48.03
29	144.45	51.78
30	147.53	55.71
31	150.37	59.83
32	152.96	64.11
33	155.28	68.54
34	157.33	73.10
35	158.30	75.67

Circle Center At X = 80.9 ; Y = 104.7 and Radius, 82.8

*** 1.815 ***

Individual data on the 49 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.7	2429.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3.9	4129.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3.0	4104.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.1	1733.5	0.0	32.9	0.0	0.0	0.0	0.0	0.0
6	4.3	7480.1	0.0	644.8	0.0	0.0	0.0	0.0	0.0
7	4.4	9043.6	0.0	1410.6	0.0	0.0	0.0	0.0	0.0
8	4.6	10510.4	0.0	2093.0	0.0	0.0	0.0	0.0	0.0
9	1.8	4443.2	0.0	969.7	0.0	0.0	0.0	0.0	0.0
10	2.9	7679.7	0.0	1719.7	0.0	0.0	0.0	0.0	0.0
11	4.8	14695.0	0.0	3197.8	0.0	0.0	0.0	0.0	0.0
12	4.9	17272.6	0.0	3616.2	0.0	0.0	0.0	0.0	0.0
13	4.5	17886.7	0.0	3584.8	0.0	0.0	0.0	0.0	0.0
14	0.0	38.5	0.0	8.3	0.0	0.0	0.0	0.0	0.0
15	0.0	37.5	0.0	8.3	0.0	0.0	0.0	0.0	0.0
16	0.0	41.8	0.0	8.3	0.0	0.0	0.0	0.0	0.0
17	0.4	1773.4	0.0	333.6	0.0	0.0	0.0	0.0	96.7
18	5.0	22047.3	0.0	4177.4	0.0	0.0	0.0	0.0	1191.3
19	5.0	22438.5	0.0	4318.2	0.0	0.0	0.0	0.0	1197.8
20	4.6	20864.8	0.0	4035.3	0.0	0.0	0.0	0.0	1109.4
21	0.0	46.6	0.0	8.7	0.0	0.0	0.0	0.0	2.4
22	0.4	1767.0	0.0	320.9	0.0	0.0	0.0	0.0	88.2
23	5.0	24537.6	0.0	4317.4	0.0	0.0	0.0	0.0	1197.8
24	5.0	25306.3	0.0	4175.8	0.0	0.0	0.0	0.0	1191.2
25	4.9	25784.0	0.0	3940.7	0.0	0.0	0.0	0.0	1180.3
26	4.9	25966.3	0.0	3613.0	0.0	0.0	0.0	0.0	1165.0
27	4.8	25854.0	0.0	3193.8	0.0	0.0	0.0	0.0	1145.5
28	1.1	6111.3	0.0	695.5	0.0	0.0	0.0	0.0	269.5
29	3.6	19042.6	0.0	1989.1	0.0	0.0	0.0	0.0	852.3
30	4.6	23513.3	0.0	2087.4	0.0	0.0	0.0	0.0	1094.1
31	2.9	14188.9	0.0	993.1	0.0	0.0	0.0	0.0	688.8
32	0.0	51.4	0.0	2.9	0.0	0.0	0.0	0.0	2.4
33	0.0	55.2	0.0	2.9	0.0	0.0	0.0	0.0	2.4
34	1.5	8564.8	0.0	405.3	0.0	0.0	0.0	0.0	368.8
35	4.3	22973.4	0.0	637.7	0.0	0.0	0.0	0.0	1026.7
36	1.1	5610.9	0.0	30.9	0.0	0.0	0.0	0.0	260.5
37	3.0	15124.9	0.0	0.0	0.0	0.0	0.0	0.0	726.8
38	3.9	18377.2	0.0	0.0	0.0	0.0	0.0	0.0	944.3
39	3.7	15976.3	0.0	0.0	0.0	0.0	0.0	0.0	897.9
40	2.4	9376.5	0.0	0.0	0.0	0.0	0.0	0.0	575.1
41	0.0	37.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	1.1	4157.7	0.0	0.0	0.0	0.0	0.0	0.0	270.7
43	3.3	11139.9	0.0	0.0	0.0	0.0	0.0	0.0	795.3
44	3.1	8790.3	0.0	0.0	0.0	0.0	0.0	0.0	739.6
45	2.8	6590.9	0.0	0.0	0.0	0.0	0.0	0.0	681.2
46	2.6	4581.6	0.0	0.0	0.0	0.0	0.0	0.0	620.3
47	2.3	2799.8	0.0	0.0	0.0	0.0	0.0	0.0	557.1
48	2.0	1279.9	0.0	0.0	0.0	0.0	0.0	0.0	491.9
49	1.0	160.6	0.0	0.0	0.0	0.0	0.0	0.0	233.5

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	17.34	48.00
2	20.94	44.53
3	24.73	41.28
4	28.71	38.25
5	32.86	35.46
6	37.16	32.91
7	41.60	30.61
8	46.17	28.58
9	50.85	26.82
10	55.63	25.33
11	60.48	24.12
12	65.39	23.19
13	70.35	22.55
14	75.34	22.20
15	80.34	22.14
16	85.33	22.37
17	90.30	22.89
18	95.24	23.70
19	100.12	24.79
20	104.93	26.16
21	109.65	27.81
22	114.26	29.73
23	118.76	31.92
24	123.12	34.36
25	127.34	37.05

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26	131.39	39.98
27	135.26	43.14
28	138.95	46.52
29	142.43	50.11
30	145.69	53.90
31	148.74	57.86
32	151.54	62.00
33	154.11	66.29
34	156.42	70.73
35	158.46	75.29
36	158.60	75.65

Circle Center At X = 78.9 ; Y = 108.3 and Radius, 86.1

*** 1.830 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.14	48.00
2	30.70	44.49
3	34.47	41.21
4	38.44	38.17
5	42.60	35.39
6	46.92	32.87
7	51.39	30.63
8	55.99	28.67
9	60.70	27.01
10	65.51	25.64
11	70.40	24.58
12	75.34	23.82
13	80.32	23.38
14	85.32	23.25
15	90.31	23.43
16	95.29	23.93
17	100.22	24.73
18	105.10	25.84
19	109.89	27.26
20	114.59	28.97
21	119.17	30.98
22	123.62	33.26
23	127.91	35.83
24	132.04	38.65
25	135.98	41.73
26	139.72	45.05
27	143.24	48.59
28	146.54	52.35
29	149.59	56.31
30	152.39	60.46
31	154.93	64.77
32	157.19	69.23
33	159.16	73.82
34	159.79	75.56

Circle Center At X = 84.9 ; Y = 103.0 and Radius, 79.8

*** 1.834 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	21.11	48.00
2	24.64	44.46
3	28.39	41.16
4	32.34	38.09
5	36.47	35.28
6	40.77	32.73
7	45.23	30.45
8	49.81	28.46
9	54.51	26.75
10	59.31	25.35
11	64.19	24.24
12	69.12	23.45
13	74.10	22.96
14	79.10	22.78
15	84.09	22.92
16	89.07	23.37
17	94.02	24.13
18	98.90	25.20
19	103.71	26.57
20	108.42	28.24
21	113.02	30.20
22	117.49	32.45
23	121.81	34.96
24	125.96	37.75
25	129.93	40.79
26	133.71	44.07
27	137.27	47.58
28	140.60	51.30
29	143.70	55.23
30	146.54	59.34
31	149.13	63.62
32	151.43	68.06
33	153.46	72.63
34	154.69	75.93

Circle Center At X = 79.4 ; Y = 102.7 and Radius, 79.9

*** 1.837 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	24.62	48.00
2	28.17	44.48
3	31.94	41.19
4	35.90	38.14
5	40.05	35.35
6	44.37	32.83
7	48.84	30.59
8	53.44	28.64
9	58.16	26.99
10	62.98	25.64
11	67.87	24.59
12	72.81	23.86
13	77.80	23.44
14	82.79	23.34
15	87.79	23.56
16	92.76	24.10

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17	97.69	24.95
18	102.55	26.11
19	107.33	27.57
20	112.01	29.34
21	116.56	31.40
22	120.98	33.75
23	125.24	36.37
24	129.32	39.25
25	133.21	42.39
26	136.90	45.77
27	140.36	49.38
28	143.59	53.20
29	146.57	57.21
30	149.28	61.41
31	151.73	65.77
32	153.89	70.28
33	155.77	74.91
34	156.07	75.83

Circle Center At X = 81.8 ; Y = 102.1 and Radius, 78.7

*** 1.839 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.89	48.00
2	31.51	44.55
3	35.32	41.32
4	39.32	38.32
5	43.49	35.56
6	47.82	33.06
7	52.29	30.81
8	56.88	28.84
9	61.59	27.14
10	66.38	25.72
11	71.25	24.59
12	76.18	23.75
13	81.15	23.21
14	86.15	22.96
15	91.15	23.01
16	96.13	23.35
17	101.09	23.99
18	106.01	24.92
19	110.85	26.14
20	115.62	27.65
21	120.29	29.44
22	124.85	31.50
23	129.27	33.83
24	133.55	36.41
25	137.67	39.25
26	141.61	42.32
27	145.37	45.63
28	148.92	49.15
29	152.25	52.87
30	155.36	56.79
31	158.23	60.88
32	160.86	65.13
33	163.23	69.54
34	165.33	74.08
35	165.74	75.13

Circle Center At X = 87.8 ; Y = 107.2 and Radius, 84.3

*** 1.840 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.60	48.00
2	24.19	44.52
3	27.98	41.26
4	31.97	38.24
5	36.12	35.46
6	40.44	32.94
7	44.91	30.69
8	49.50	28.71
9	54.20	27.01
10	59.00	25.60
11	63.87	24.48
12	68.80	23.66
13	73.78	23.14
14	78.77	22.92
15	83.77	23.00
16	88.76	23.39
17	93.71	24.08
18	98.61	25.06
19	103.44	26.34
20	108.19	27.91
21	112.83	29.77
22	117.36	31.90
23	121.74	34.31
24	125.97	36.97
25	130.04	39.88
26	133.91	43.04
27	137.60	46.42
28	141.06	50.02
29	144.31	53.83
30	147.32	57.82
31	150.08	61.99
32	152.58	66.32
33	154.82	70.79
34	156.79	75.38
35	156.92	75.77

Circle Center At X = 79.9 ; Y = 105.5 and Radius, 82.6

*** 1.840 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.89	48.00
2	31.52	44.56
3	35.34	41.34
4	39.35	38.34
5	43.52	35.59
6	47.85	33.08
7	52.31	30.84
8	56.90	28.85

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9	61.60	27.14
10	66.39	25.71
11	71.26	24.56
12	76.18	23.69
13	81.15	23.12
14	86.14	22.83
15	91.14	22.84
16	96.13	23.14
17	101.09	23.73
18	106.02	24.61
19	110.88	25.78
20	115.66	27.23
21	120.36	28.96
22	124.94	30.95
23	129.40	33.22
24	133.72	35.74
25	137.88	38.50
26	141.88	41.51
27	145.69	44.75
28	149.31	48.20
29	152.71	51.86
30	155.90	55.71
31	158.86	59.74
32	161.58	63.93
33	164.05	68.28
34	166.26	72.77
35	167.21	75.02

Circle Center At X = 88.5 ; Y = 108.3 and Radius, 85.5

*** 1.841 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.92	48.00
2	36.45	44.47
3	40.20	41.15
4	44.14	38.08
5	48.27	35.25
6	52.56	32.68
7	57.00	30.38
8	61.57	28.36
9	66.26	26.62
10	71.04	25.17
11	75.91	24.02
12	80.83	23.17
13	85.80	22.63
14	90.80	22.38
15	95.80	22.45
16	100.78	22.82
17	105.74	23.50
18	110.64	24.48
19	115.47	25.76
20	120.22	27.34
21	124.86	29.20
22	129.38	31.35
23	133.75	33.76
24	137.97	36.44
25	142.02	39.38
26	145.88	42.56
27	149.54	45.97
28	152.98	49.59
29	156.19	53.43
30	159.16	57.45
31	161.88	61.64
32	164.34	66.00
33	166.52	70.50
34	168.35	74.94

Circle Center At X = 92.2 ; Y = 103.8 and Radius, 81.4

*** 1.847 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	15.83	48.00
2	19.39	44.49
3	23.16	41.21
4	27.12	38.15
5	31.25	35.34
6	35.55	32.78
7	39.99	30.48
8	44.56	28.45
9	49.24	26.71
10	54.02	25.24
11	58.88	24.07
12	63.81	23.18
13	68.77	22.60
14	73.76	22.31
15	78.76	22.33
16	83.75	22.64
17	88.72	23.25
18	93.63	24.16
19	98.49	25.36
20	103.26	26.85
21	107.93	28.63
22	112.49	30.68
23	116.92	33.00
24	121.20	35.58
25	125.32	38.42
26	129.26	41.49
27	133.01	44.80
28	136.56	48.33
29	139.88	52.06
30	142.98	55.99
31	145.84	60.09
32	148.44	64.36
33	150.78	68.78
34	152.86	73.33
35	153.88	75.99

Circle Center At X = 76.0 ; Y = 105.6 and Radius, 83.3

*** 1.848 ***

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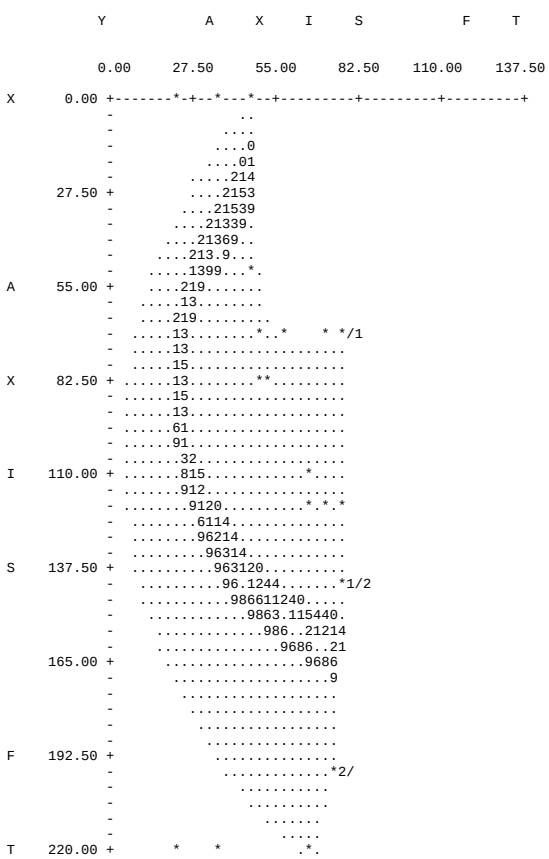
Y A X I S F T
0.00 27.50 55.00 82.50 110.00 137.50
X 0.00
27.50
A 55.00
X 82.50
I 110.00
S 137.50
165.00
F 192.50
T 220.00

Wall RW1300 at St "H" 1309+36_Seismic

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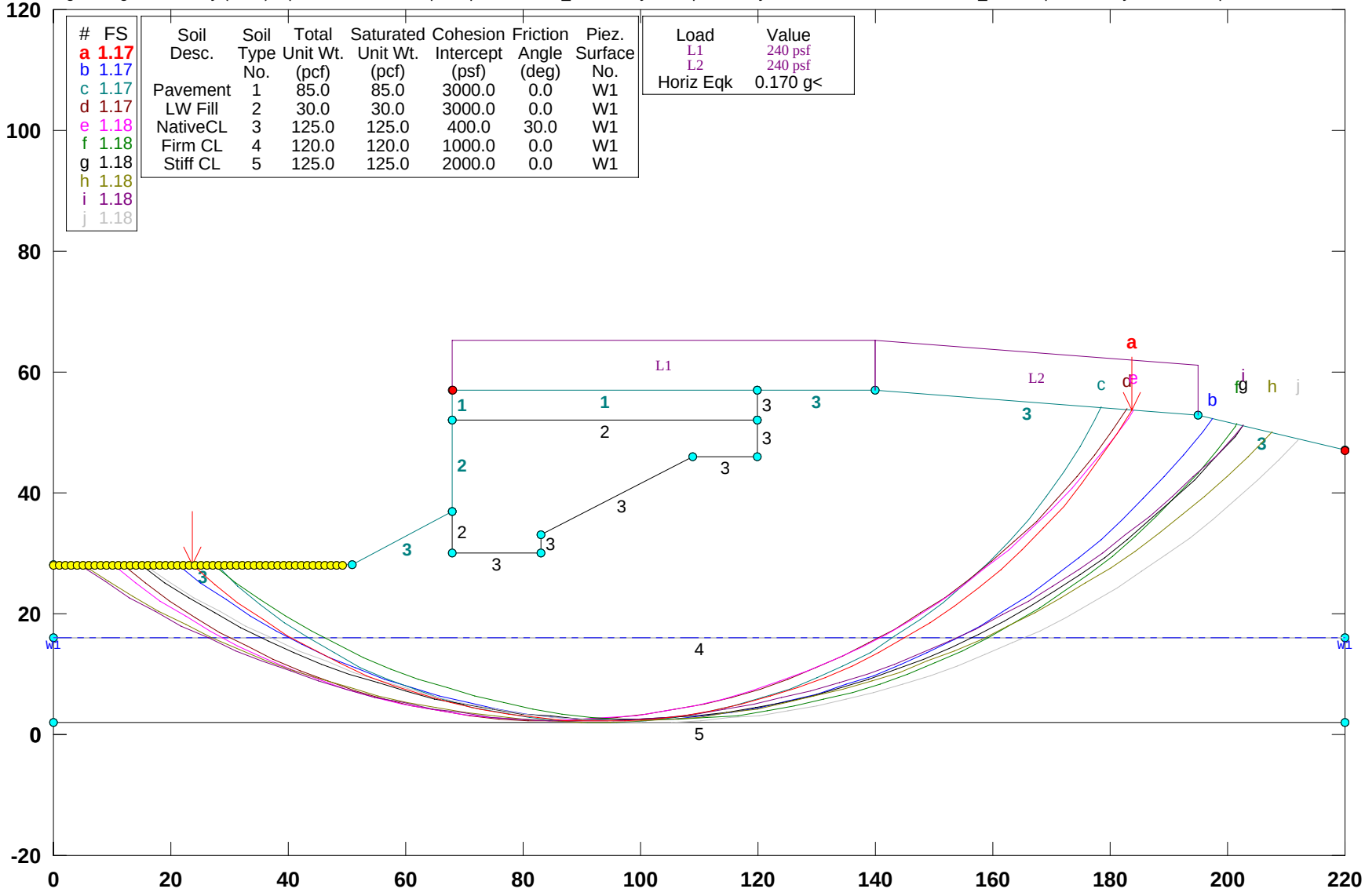
#	FS
a	1.17
b	1.17
c	1.17
d	1.17
e	1.18
f	1.18
g	1.18
h	1.18
i	1.18
j	1.18

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Pavement	1	85.0	85.0	3000.0	0.0	W1
LW Fill	2	30.0	30.0	3000.0	0.0	W1
NativeCL	3	125.0	125.0	400.0	30.0	W1
Firm CL	4	120.0	120.0	1000.0	0.0	W1
Stiff CL	5	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf
L2	240 psf
Horiz Eqk	0.170 g<



PCSTABL5M/si FSmin=1.17

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 01:03PM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:rw1299 & 1300 at st 1309+36_seismic.in
Output Filename: N:rw1299 & 1300 at st 1309+36_seismic.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1299 & 1300 at st 1309+36_seismic.PLT

PROBLEM DESCRIPTION Wall RW1300
at St "H" 1309+36_Seismic

BOUNDARY COORDINATES

8 Top Boundaries
18 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	48.00	51.00	48.00	3
2	51.00	48.00	68.00	57.00	3
3	68.00	57.00	68.01	72.00	2
4	68.01	72.00	68.02	77.00	1
5	68.02	77.00	120.00	77.00	1
6	120.00	77.00	140.00	77.00	3
7	140.00	77.00	195.00	73.00	3
8	195.00	73.00	220.00	67.00	3
9	68.01	72.00	119.99	72.00	2
10	119.99	72.00	120.00	77.00	3
11	67.99	50.00	68.00	57.00	2
12	67.99	50.00	83.00	50.00	3
13	83.00	50.00	83.01	53.00	3
14	83.01	53.00	109.00	66.00	3
15	109.00	66.00	119.98	66.00	3
16	119.98	66.00	119.99	72.00	3
17	0.00	36.00	220.00	36.00	4
18	0.00	22.00	220.00	22.00	5

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	85.0	85.0	3000.0	0.0	0.00	0.0	1
2	30.0	30.0	3000.0	0.0	0.00	0.0	1
3	125.0	125.0	400.0	30.0	0.00	0.0	1
4	120.0	120.0	1000.0	0.0	0.00	0.0	1
5	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	36.00
2	220.00	36.00

1

BOUNDARY LOAD(S)

2 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	68.02	140.00	240.0	0.0
2	140.01	195.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.
and X = 50.00 ft.

Each Surface Terminates Between X = 68.02 ft.
and X = 220.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

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5.00 ft. Line Segments Define Each Trial Failure Surface.

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Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	23.62	48.00
2	27.47	44.82
3	31.47	41.82
4	35.61	39.01
5	39.88	36.40
6	44.26	34.00
7	48.76	31.81
8	53.35	29.83
9	58.03	28.07
10	62.79	26.54
11	67.62	25.23
12	72.50	24.15
13	77.43	23.31
14	82.39	22.69
15	87.37	22.32
16	92.37	22.17
17	97.37	22.27
18	102.36	22.60
19	107.33	23.17
20	112.26	23.97
21	117.15	25.00
22	121.99	26.27
23	126.76	27.76
24	131.46	29.48
25	136.07	31.41
26	140.59	33.56
27	144.99	35.92
28	149.28	38.49
29	153.45	41.26
30	157.47	44.22
31	161.36	47.37
32	165.09	50.70
33	168.66	54.20
34	172.06	57.87
35	175.28	61.69
36	178.32	65.66
37	181.16	69.77
38	183.69	73.82

Circle Center At X = 92.9 ; Y = 127.9 and Radius, 105.7

*** 1.166 ***

Individual data on the 52 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.9	767.2	0.0	0.0	0.0	0.0	130.4	0.0	0.0
2	4.0	2342.4	0.0	0.0	0.0	0.0	398.2	0.0	0.0
3	4.1	3924.2	0.0	0.0	0.0	0.0	667.1	0.0	0.0
4	4.3	5489.0	0.0	0.0	0.0	0.0	933.1	0.0	0.0
5	0.7	1087.7	0.0	0.0	0.0	0.0	184.9	0.0	0.0
6	3.6	5908.5	0.0	259.3	0.0	0.0	1004.4	0.0	0.0
7	4.5	8409.3	0.0	965.5	0.0	0.0	1429.6	0.0	0.0
8	2.2	4620.0	0.0	711.8	0.0	0.0	785.4	0.0	0.0
9	2.4	5305.7	0.0	904.2	0.0	0.0	902.0	0.0	0.0
10	4.7	12432.5	0.0	2198.8	0.0	0.0	2113.5	0.0	0.0
11	4.8	15065.8	0.0	2712.5	0.0	0.0	2561.2	0.0	0.0
12	4.8	17632.4	0.0	3156.0	0.0	0.0	2997.5	0.0	0.0
13	0.4	1463.6	0.0	258.7	0.0	0.0	248.8	0.0	0.0
14	0.0	36.0	0.0	6.9	0.0	0.0	6.1	0.0	0.0
15	0.0	34.9	0.0	6.9	0.0	0.0	5.9	0.0	0.0
16	0.0	39.2	0.0	6.9	0.0	0.0	6.7	0.0	0.0
17	4.5	18795.6	0.0	3248.9	0.0	0.0	3195.3	0.0	1074.7
18	4.9	21226.9	0.0	3828.7	0.0	0.0	3608.6	0.0	1182.7
19	5.0	21810.0	0.0	4056.3	0.0	0.0	3707.7	0.0	1191.0
20	0.6	2713.8	0.0	510.5	0.0	0.0	461.3	0.0	146.9
21	0.0	45.8	0.0	8.4	0.0	0.0	7.8	0.0	2.4
22	4.4	21147.0	0.0	3691.8	0.0	0.0	3595.0	0.0	1047.3
23	5.0	25473.3	0.0	4291.5	0.0	0.0	4330.5	0.0	1199.5
24	5.0	26679.9	0.0	4298.6	0.0	0.0	4535.6	0.0	1199.8
25	5.0	27682.1	0.0	4232.0	0.0	0.0	4705.9	0.0	1197.4
26	5.0	28471.3	0.0	4091.8	0.0	0.0	4840.1	0.0	1192.3
27	1.7	9764.6	0.0	1342.2	0.0	0.0	1660.0	0.0	401.4
28	3.3	19024.1	0.0	2536.1	0.0	0.0	3234.1	0.0	783.1
29	4.9	28062.6	0.0	3591.9	0.0	0.0	4770.6	0.0	1174.1
30	2.8	15906.0	0.0	1936.2	0.0	0.0	2704.0	0.0	678.0
31	0.0	58.7	0.0	6.6	0.0	0.0	10.0	0.0	2.4
32	0.0	62.6	0.0	6.6	0.0	0.0	10.6	0.0	2.4
33	2.0	12600.3	0.0	1284.0	0.0	0.0	2142.0	0.0	478.2
34	4.8	29604.5	0.0	2803.6	0.0	0.0	5032.8	0.0	1145.4
35	4.7	28230.3	0.0	2303.3	0.0	0.0	4799.2	0.0	1127.2
36	4.6	26701.3	0.0	1733.8	0.0	0.0	4539.2	0.0	1106.4
37	3.9	21855.4	0.0	992.0	0.0	0.0	3715.4	0.0	942.8
38	0.0	54.5	0.0	1.9	0.0	0.0	9.3	0.0	0.0
39	0.6	3123.1	0.0	102.3	0.0	0.0	530.9	0.0	138.0
40	4.4	23137.2	0.0	392.1	0.0	0.0	3933.3	0.0	1057.6
41	0.1	640.5	0.0	0.3	0.0	0.0	108.9	0.0	30.2
42	4.2	20419.7	0.0	0.0	0.0	0.0	3471.3	0.0	999.4
43	4.2	18891.9	0.0	0.0	0.0	0.0	3211.6	0.0	999.3
44	4.0	16684.3	0.0	0.0	0.0	0.0	2836.3	0.0	966.8
45	3.9	14462.6	0.0	0.0	0.0	0.0	2458.6	0.0	932.1
46	3.7	12252.4	0.0	0.0	0.0	0.0	2082.9	0.0	895.3
47	3.6	10079.6	0.0	0.0	0.0	0.0	1713.5	0.0	856.5
48	3.4	7970.0	0.0	0.0	0.0	0.0	1354.9	0.0	815.9
49	3.2	5949.2	0.0	0.0	0.0	0.0	1011.4	0.0	773.3
50	3.0	4042.5	0.0	0.0	0.0	0.0	687.2	0.0	729.1
51	2.8	2274.0	0.0	0.0	0.0	0.0	386.6	0.0	683.2
52	2.5	668.9	0.0	0.0	0.0	0.0	113.7	0.0	606.9

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	21.11	48.00
2	25.15	45.05
3	29.30	42.27
4	33.56	39.66
5	37.92	37.21
6	42.38	34.94
7	46.92	32.85
8	51.54	30.95
9	56.24	29.23

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10	61.00	27.70
11	65.82	26.35
12	70.68	25.20
13	75.59	24.25
14	80.53	23.49
15	85.50	22.93
16	90.49	22.57
17	95.48	22.41
18	100.48	22.44
19	105.48	22.68
20	110.46	23.11
21	115.42	23.74
22	120.35	24.57
23	125.24	25.59
24	130.09	26.81
25	134.89	28.22
26	139.63	29.82
27	144.30	31.61
28	148.89	33.58
29	153.41	35.73
30	157.83	38.06
31	162.16	40.57
32	166.38	43.25
33	170.49	46.09
34	174.49	49.09
35	178.37	52.25
36	182.11	55.56
37	185.72	59.02
38	189.19	62.62
39	192.52	66.36
40	195.69	70.22
41	197.36	72.43

Circle Center At X = 97.1 ; Y = 147.9 and Radius, 125.6

*** 1.169 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.64	48.00
2	31.37	44.67
3	35.27	41.54
4	39.32	38.62
5	43.53	35.91
6	47.87	33.43
7	52.33	31.17
8	56.91	29.16
9	61.58	27.38
10	66.34	25.85
11	71.18	24.58
12	76.07	23.55
13	81.01	22.78
14	85.98	22.28
15	90.98	22.03
16	95.98	22.04
17	100.97	22.32
18	105.94	22.85
19	110.88	23.65
20	115.77	24.70
21	120.59	26.00
22	125.35	27.56
23	130.01	29.36

24	134.57	31.40
25	139.02	33.68
26	143.35	36.19
27	147.54	38.92
28	151.58	41.86
29	155.46	45.02
30	159.17	48.37
31	162.70	51.91
32	166.05	55.62
33	169.19	59.51
34	172.12	63.56
35	174.84	67.76
36	177.34	72.09
37	178.42	74.21

Circle Center At X = 93.2 ; Y = 117.7 and Radius, 95.7

*** 1.173 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	11.81	48.00
2	15.79	44.97
3	19.89	42.11
4	24.11	39.43
5	28.44	36.93
6	32.87	34.61
7	37.39	32.48
8	42.00	30.55
9	46.69	28.81
10	51.45	27.27
11	56.27	25.94
12	61.14	24.81
13	66.05	23.89
14	71.00	23.17
15	75.98	22.67
16	80.97	22.38
17	85.97	22.29
18	90.97	22.43
19	95.95	22.77
20	100.92	23.32
21	105.86	24.08
22	110.77	25.05
23	115.63	26.23
24	120.43	27.61
25	125.18	29.19
26	129.85	30.98
27	134.44	32.96
28	138.94	35.13
29	143.35	37.49
30	147.66	40.03
31	151.85	42.76
32	155.92	45.65
33	159.87	48.72
34	163.68	51.96
35	167.36	55.35
36	170.89	58.89
37	174.26	62.58
38	177.47	66.41
39	180.52	70.37
40	182.99	73.87

Circle Center At X = 85.4 ; Y = 140.4 and Radius, 118.1

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*** 1.174 ***

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Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	10.05	48.00
2	14.06	45.01
3	18.19	42.19
4	22.43	39.54
5	26.77	37.07
6	31.22	34.77
7	35.75	32.67
8	40.37	30.75
9	45.06	29.02
10	49.82	27.48
11	54.64	26.15
12	59.50	25.01
13	64.42	24.07
14	69.36	23.34
15	74.33	22.81
16	79.32	22.48
17	84.32	22.36
18	89.32	22.45
19	94.31	22.74
20	99.29	23.23
21	104.24	23.93
22	109.16	24.83
23	114.03	25.94
24	118.86	27.24
25	123.63	28.74
26	128.33	30.43
27	132.96	32.32
28	137.51	34.40
29	141.97	36.66
30	146.34	39.10
31	150.59	41.72
32	154.74	44.51
33	158.77	47.47
34	162.68	50.59
35	166.45	53.88
36	170.08	57.31
37	173.57	60.89
38	176.92	64.61
39	180.10	68.46
40	183.12	72.45
41	184.06	73.80

Circle Center At X = 84.8 ; Y = 144.0 and Radius, 121.6

*** 1.177 ***

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.14	48.00
2	31.17	45.04
3	35.32	42.25
4	39.58	39.63
5	43.93	37.18
6	48.39	34.91
7	52.93	32.82
8	57.55	30.91
9	62.25	29.19
10	67.01	27.67
11	71.83	26.33
12	76.69	25.19
13	81.60	24.24
14	86.55	23.49
15	91.52	22.94
16	96.51	22.60
17	101.50	22.45
18	106.50	22.50
19	111.50	22.75
20	116.48	23.21
21	121.43	23.86
22	126.36	24.72
23	131.25	25.77
24	136.09	27.01
25	140.88	28.45
26	145.61	30.08
27	150.26	31.90
28	154.84	33.90
29	159.34	36.09
30	163.74	38.46
31	168.05	41.00
32	172.25	43.71
33	176.34	46.59
34	180.31	49.63
35	184.15	52.83
36	187.87	56.17
37	191.44	59.67
38	194.87	63.31
39	198.16	67.08
40	201.28	70.98
41	201.61	71.41

Circle Center At X = 102.7 ; Y = 146.9 and Radius, 124.4

*** 1.178 ***

1

Failure Surface Specified By 43 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.82	48.00
2	18.98	45.22
3	23.23	42.58
4	27.56	40.09
5	31.99	37.76
6	36.49	35.59
7	41.07	33.57
8	45.71	31.72
9	50.42	30.04
10	55.18	28.52
11	59.99	27.16
12	64.85	25.98
13	69.75	24.97
14	74.68	24.14
15	79.64	23.48

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16	84.61	22.99
17	89.60	22.68
18	94.60	22.55
19	99.60	22.59
20	104.60	22.81
21	109.58	23.20
22	114.55	23.77
23	119.49	24.51
24	124.41	25.43
25	129.29	26.52
26	134.13	27.78
27	138.92	29.21
28	143.65	30.81
29	148.33	32.57
30	152.95	34.50
31	157.49	36.59
32	161.95	38.84
33	166.34	41.24
34	170.64	43.80
35	174.84	46.51
36	178.95	49.36
37	182.95	52.36
38	186.84	55.49
39	190.62	58.76
40	194.29	62.16
41	197.83	65.69
42	201.25	69.35
43	202.80	71.13

Circle Center At X = 95.9 ; Y = 164.4 and Radius, 141.9

*** 1.179 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	5.03	48.00
2	9.26	45.34
3	13.58	42.82
4	17.97	40.43
5	22.43	38.18
6	26.96	36.06
7	31.56	34.09
8	36.21	32.26
9	40.92	30.58
10	45.68	29.05
11	50.48	27.66
12	55.33	26.42
13	60.21	25.34
14	65.12	24.40
15	70.06	23.62
16	75.02	22.99
17	80.00	22.51
18	84.99	22.20
19	89.98	22.03
20	94.98	22.02
21	99.98	22.17
22	104.97	22.47
23	109.95	22.92
24	114.92	23.53
25	119.86	24.29
26	124.77	25.21
27	129.66	26.27
28	134.51	27.49

29	139.32	28.86
30	144.08	30.38
31	148.79	32.04
32	153.46	33.85
33	158.06	35.80
34	162.60	37.90
35	167.07	40.13
36	171.47	42.51
37	175.80	45.01
38	180.04	47.65
39	184.21	50.42
40	188.28	53.32
41	192.26	56.35
42	196.15	59.49
43	199.94	62.76
44	203.62	66.14
45	207.20	69.63
46	207.54	69.99

Circle Center At X = 92.8 ; Y = 183.2 and Radius, 161.2

*** 1.180 ***

1

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	4.52	48.00
2	8.73	45.30
3	13.02	42.74
4	17.40	40.31
5	21.85	38.03
6	26.37	35.90
7	30.96	33.91
8	35.61	32.07
9	40.31	30.39
10	45.07	28.86
11	49.88	27.48
12	54.73	26.26
13	59.61	25.19
14	64.53	24.29
15	69.48	23.54
16	74.44	22.96
17	79.42	22.54
18	84.42	22.27
19	89.42	22.17
20	94.42	22.24
21	99.41	22.46
22	104.40	22.84
23	109.37	23.39
24	114.32	24.10
25	119.24	24.97
26	124.13	25.99
27	128.99	27.18
28	133.81	28.52
29	138.58	30.01
30	143.30	31.66
31	147.96	33.46
32	152.57	35.42
33	157.10	37.52
34	161.57	39.76
35	165.96	42.15
36	170.28	44.68
37	174.50	47.35

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38	178.64	50.16
39	182.69	53.09
40	186.64	56.16
41	190.49	59.35
42	194.23	62.67
43	197.86	66.10
44	201.38	69.65
45	202.76	71.14

Circle Center At X = 90.0 ; Y = 176.5 and Radius, 154.4

*** 1.181 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	15.33	48.00
2	19.53	45.30
3	23.83	42.73
4	28.20	40.31
5	32.65	38.03
6	37.17	35.89
7	41.75	33.90
8	46.40	32.06
9	51.11	30.37
10	55.87	28.83
11	60.67	27.44
12	65.52	26.21
13	70.40	25.14
14	75.32	24.23
15	80.26	23.48
16	85.22	22.88
17	90.21	22.45
18	95.20	22.17
19	100.20	22.06
20	105.20	22.11
21	110.19	22.32
22	115.18	22.69
23	120.15	23.23
24	125.10	23.92
25	130.03	24.77
26	134.93	25.78
27	139.79	26.95
28	144.61	28.27
29	149.38	29.75
30	154.11	31.38
31	158.78	33.17
32	163.39	35.10
33	167.94	37.18
34	172.42	39.41
35	176.82	41.78
36	181.14	44.29
37	185.38	46.94
38	189.54	49.72
39	193.60	52.64
40	197.56	55.68
41	201.43	58.86
42	205.19	62.15
43	208.84	65.57
44	212.16	68.88

Circle Center At X = 101.2 ; Y = 177.0 and Radius, 155.0

*** 1.181 ***

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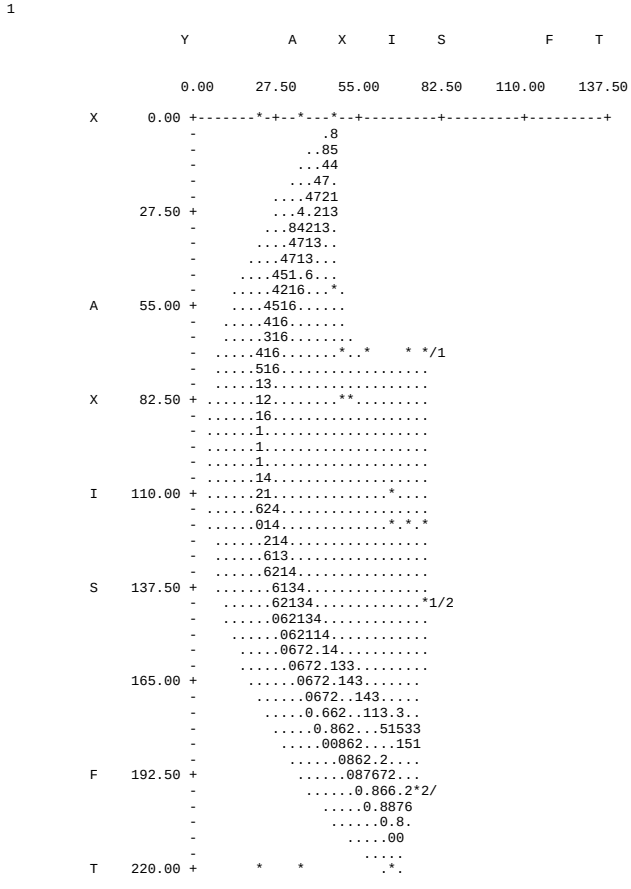

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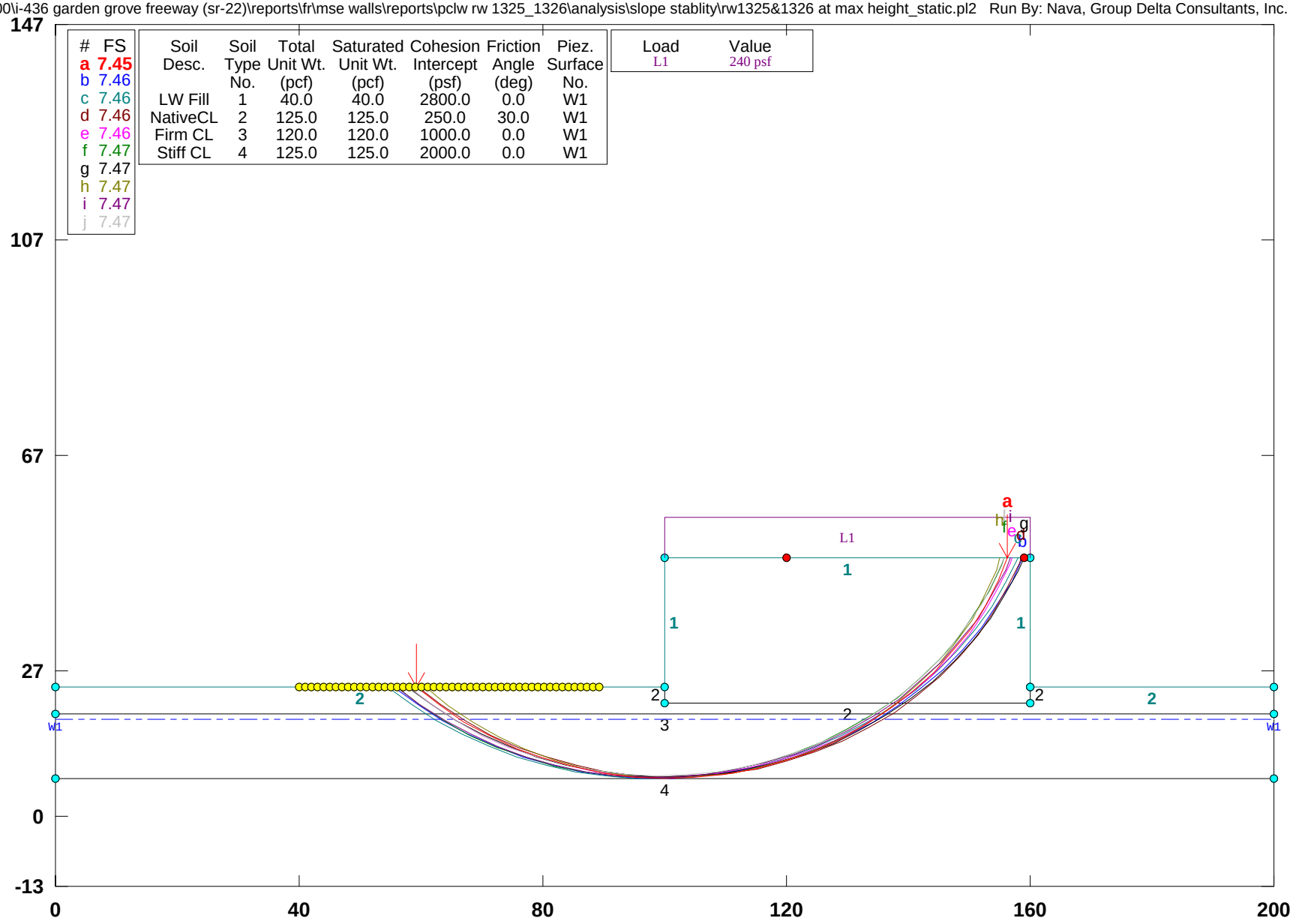
I-436 405-22 HOV Connector Segment RW 1325 & 1326 at Maximum Height_Static

n:\projects_av\i400\i-436 garden grove freeway (sr-22)\reports\fr\mse walls\reports\pclw rw 1325_1326\analysis\slope stablity\rw1325&1326 at max height_static.pl2 Run By: Nava, Group Delta Consultants, Inc. 10/29/2008 1

#	FS
a	7.45
b	7.46
c	7.46
d	7.46
e	7.46
f	7.47
g	7.47
h	7.47
i	7.47
j	7.47

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill	1	40.0	40.0	2800.0	0.0	W1
NativeCL	2	125.0	125.0	250.0	30.0	W1
Firm CL	3	120.0	120.0	1000.0	0.0	W1
Stiff CL	4	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=7.45

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/29/2008
Time of Run: 11:19AM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:rw1325&1326 at max height_static.in
Output Filename: N:rw1325&1326 at max height_static.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1325&1326 at max height_static.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Segment
RW 1325 & 1326 at Maximum Height_Static

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	37.00	100.00	37.00	2
2	100.00	37.00	100.01	61.00	1
3	100.01	61.00	160.00	61.00	1
4	160.00	61.00	160.01	37.00	1
5	160.01	37.00	200.00	37.00	2
6	100.00	37.00	100.01	34.00	2
7	100.01	34.00	160.00	34.00	2
8	160.00	34.00	160.01	37.00	2
9	0.00	32.00	200.00	32.00	3
10	0.00	20.00	200.00	20.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	40.0	40.0	2800.0	0.0	0.00	0.0	1
2	125.0	125.0	250.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	31.00
2	200.00	31.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	100.01	160.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 40.00 ft.
and X = 90.00 ft.

Each Surface Terminates Between X = 120.00 ft.
and X = 159.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

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1	59.35	37.00
2	63.05	33.64
3	67.02	30.61
4	71.24	27.92
5	75.68	25.61
6	80.29	23.69
7	85.05	22.16
8	89.93	21.05
9	94.88	20.36
10	99.87	20.10
11	104.87	20.26
12	109.84	20.85
13	114.73	21.86
14	119.53	23.28
15	124.18	25.11
16	128.66	27.33
17	132.93	29.93
18	136.97	32.88
19	140.74	36.16
20	144.21	39.76
21	147.37	43.64
22	150.18	47.77
23	152.63	52.13
24	154.70	56.68
25	156.23	61.00

Circle Center At X = 100.5 ; Y = 78.6 and Radius, 58.5

*** 7.447 ***

Individual data on the 31 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.7	777.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.1	1122.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.3	897.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.5	397.2	0.0	8.0	0.0	0.0	0.0	0.0	0.0
5	4.2	4022.4	0.0	541.4	0.0	0.0	0.0	0.0	0.0
6	4.4	5554.5	0.0	1320.5	0.0	0.0	0.0	0.0	0.0
7	4.6	6954.7	0.0	1981.4	0.0	0.0	0.0	0.0	0.0
8	4.8	8162.4	0.0	2519.3	0.0	0.0	0.0	0.0	0.0
9	4.9	9126.2	0.0	2930.3	0.0	0.0	0.0	0.0	0.0
10	5.0	9805.9	0.0	3211.4	0.0	0.0	0.0	0.0	0.0
11	5.0	10173.1	0.0	3360.5	0.0	0.0	0.0	0.0	0.0
12	0.1	258.9	0.0	85.8	0.0	0.0	0.0	0.0	0.0
13	0.0	24.1	0.0	6.8	0.0	0.0	0.0	0.0	0.0
14	4.9	13360.5	0.0	3283.8	0.0	0.0	0.0	0.0	1166.7
15	5.0	13423.7	0.0	3259.3	0.0	0.0	0.0	0.0	1191.7
16	4.9	12768.7	0.0	3009.7	0.0	0.0	0.0	0.0	1175.2
17	4.8	11796.3	0.0	2629.7	0.0	0.0	0.0	0.0	1150.2
18	4.7	10544.7	0.0	2121.9	0.0	0.0	0.0	0.0	1116.8
19	4.5	9063.3	0.0	1490.1	0.0	0.0	0.0	0.0	1075.2
20	4.3	7411.6	0.0	738.9	0.0	0.0	0.0	0.0	1025.7
21	1.5	2217.8	0.0	60.6	0.0	0.0	0.0	0.0	351.5
22	1.4	1901.6	0.0	0.0	0.0	0.0	0.0	0.0	328.3
23	1.2	1534.9	0.0	0.0	0.0	0.0	0.0	0.0	288.9
24	1.3	1478.2	0.0	0.0	0.0	0.0	0.0	0.0	308.5
25	2.5	2575.5	0.0	0.0	0.0	0.0	0.0	0.0	596.2
26	3.5	3202.6	0.0	0.0	0.0	0.0	0.0	0.0	834.1
27	3.2	2436.3	0.0	0.0	0.0	0.0	0.0	0.0	757.3
28	2.8	1720.8	0.0	0.0	0.0	0.0	0.0	0.0	675.1
29	2.4	1082.5	0.0	0.0	0.0	0.0	0.0	0.0	587.8
30	2.1	545.4	0.0	0.0	0.0	0.0	0.0	0.0	496.3

31	1.5	132.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	367.5

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.58	37.00
2	59.38	33.75
3	63.42	30.81
4	67.68	28.19
5	72.13	25.92
6	76.75	23.99
7	81.50	22.44
8	86.36	21.25
9	91.30	20.46
10	96.28	20.04
11	101.28	20.02
12	106.26	20.39
13	111.21	21.15
14	116.08	22.29
15	120.84	23.81
16	125.47	25.69
17	129.94	27.93
18	134.22	30.51
19	138.29	33.42
20	142.12	36.63
21	145.69	40.14
22	148.97	43.91
23	151.95	47.92
24	154.60	52.16
25	156.92	56.59
26	158.80	61.00

Circle Center At X = 99.0 ; Y = 84.0 and Radius, 64.0

*** 7.455 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.57	37.00
2	58.38	33.76
3	62.43	30.83
4	66.69	28.21
5	71.15	25.94
6	75.76	24.02
7	80.52	22.47
8	85.37	21.29
9	90.31	20.49
10	95.29	20.07
11	100.29	20.05
12	105.28	20.41
13	110.22	21.16
14	115.09	22.29
15	119.86	23.79
16	124.50	25.66
17	128.98	27.89
18	133.27	30.46
19	137.35	33.35
20	141.19	36.55
21	144.77	40.04

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22	148.07	43.80
23	151.06	47.80
24	153.74	52.02
25	156.08	56.44
26	158.06	61.00

Circle Center At X = 98.1 ; Y = 84.3 and Radius, 64.3

*** 7.456 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.60	37.00
2	63.36	33.70
3	67.37	30.72
4	71.62	28.09
5	76.07	25.81
6	80.70	23.91
7	85.46	22.40
8	90.34	21.28
9	95.29	20.57
10	100.28	20.27
11	105.28	20.38
12	110.25	20.91
13	115.16	21.84
14	119.98	23.18
15	124.67	24.91
16	129.20	27.02
17	133.55	29.49
18	137.67	32.32
19	141.55	35.48
20	145.15	38.94
21	148.46	42.69
22	151.44	46.70
23	154.09	50.95
24	156.37	55.39
25	158.28	60.02
26	158.60	61.00

Circle Center At X = 101.4 ; Y = 80.8 and Radius, 60.5

*** 7.459 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.09	37.00
2	61.85	33.70
3	65.87	30.73
4	70.12	28.10
5	74.58	25.83
6	79.20	23.93
7	83.97	22.42
8	88.84	21.31
9	93.79	20.60
10	98.79	20.31
11	103.78	20.43
12	108.76	20.96
13	113.67	21.90
14	118.48	23.24
15	123.17	24.97
16	127.70	27.08
17	132.05	29.57
18	136.17	32.40
19	140.04	35.56
20	143.64	39.03
21	146.94	42.78
22	149.93	46.79
23	152.57	51.04
24	154.85	55.49
25	156.75	60.11
26	157.03	61.00

Circle Center At X = 99.8 ; Y = 80.8 and Radius, 60.5

*** 7.464 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.08	37.00
2	59.84	33.70
3	63.86	30.72
4	68.10	28.08
5	72.55	25.80
6	77.17	23.89
7	81.93	22.36
8	86.80	21.23
9	91.75	20.50
10	96.74	20.18
11	101.74	20.27
12	106.71	20.76
13	111.63	21.66
14	116.46	22.97
15	121.16	24.66
16	125.71	26.73
17	130.08	29.17
18	134.23	31.96
19	138.14	35.07
20	141.78	38.50
21	145.13	42.22
22	148.16	46.19
23	150.86	50.40
24	153.20	54.82
25	155.17	59.41
26	155.70	61.00

Circle Center At X = 98.2 ; Y = 81.1 and Radius, 61.0

*** 7.468 ***

1

Failure Surface Specified By 26 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	57.84	37.00
2	61.64	33.75
3	65.69	30.82
4	69.96	28.21
5	74.42	25.96
6	79.05	24.07
7	83.82	22.56
8	88.69	21.43
9	93.63	20.69
10	98.62	20.35
11	103.62	20.41
12	108.60	20.87
13	113.52	21.73
14	118.37	22.98
15	123.09	24.61
16	127.68	26.61
17	132.08	28.97
18	136.29	31.67
19	140.26	34.71
20	143.98	38.05
21	147.43	41.67
22	150.57	45.56
23	153.39	49.69
24	155.87	54.03
25	158.00	58.56
26	158.91	61.00

Circle Center At X = 100.3 ; Y = 82.8 and Radius, 62.5

*** 7.470 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.85	37.00
2	64.51	33.59
3	68.45	30.52
4	72.66	27.81
5	77.08	25.48
6	81.70	23.55
7	86.46	22.05
8	91.35	20.97
9	96.31	20.33
10	101.30	20.13
11	106.30	20.38
12	111.25	21.07
13	116.12	22.20
14	120.87	23.75
15	125.47	25.72
16	129.87	28.09
17	134.04	30.85
18	137.95	33.96
19	141.58	37.41
20	144.88	41.16
21	147.83	45.20
22	150.41	49.48
23	152.61	53.97
24	154.39	58.64
25	155.06	61.00

Circle Center At X = 101.0 ; Y = 76.4 and Radius, 56.2

*** 7.470 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.08	37.00
2	59.87	33.74
3	63.91	30.79
4	68.17	28.17
5	72.62	25.91
6	77.25	24.01
7	82.01	22.49
8	86.88	21.36
9	91.83	20.62
10	96.82	20.29
11	101.82	20.35
12	106.80	20.82
13	111.72	21.69
14	116.56	22.95
15	121.28	24.60
16	125.85	26.62
17	130.25	29.00
18	134.44	31.73
19	138.40	34.79
20	142.09	38.15
21	145.51	41.80
22	148.62	45.72
23	151.41	49.87
24	153.85	54.23
25	155.93	58.78
26	156.74	61.00

Circle Center At X = 98.5 ; Y = 82.3 and Radius, 62.0

*** 7.472 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.09	37.00
2	61.85	33.70
3	65.86	30.72
4	70.12	28.10
5	74.58	25.84
6	79.21	23.96
7	83.99	22.48
8	88.87	21.40
9	93.83	20.74
10	98.82	20.49
11	103.82	20.67
12	108.78	21.26
13	113.68	22.27
14	118.47	23.68
15	123.13	25.50
16	127.63	27.69

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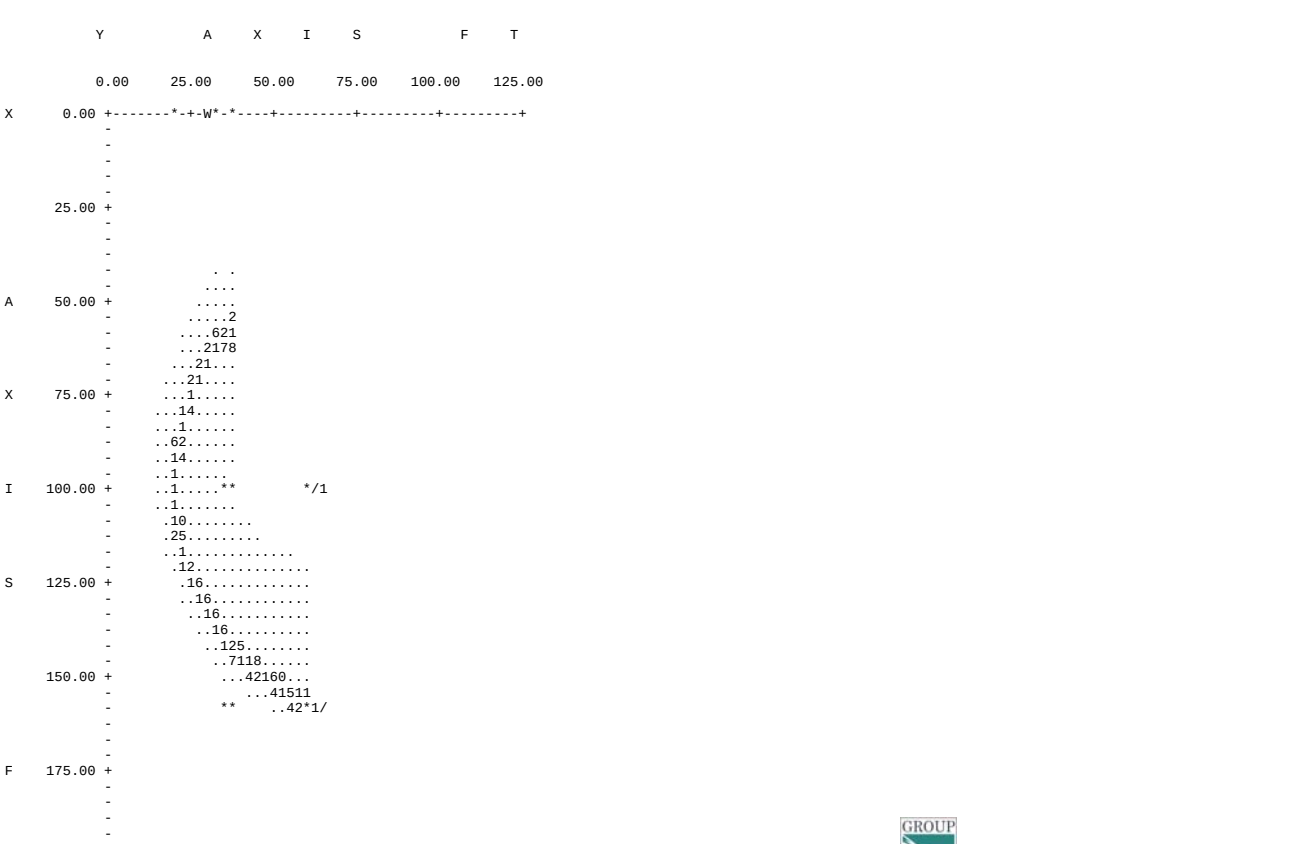
17	131.92	30.26
18	135.98	33.18
19	139.78	36.43
20	143.29	39.98
21	146.50	43.82
22	149.37	47.91
23	151.88	52.23
24	154.03	56.75
25	155.63	61.00

Circle Center At X = 99.2 ; Y = 80.0 and Radius, 59.5

*** 7.474 ***

1



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I-436 405-22 HOV Connector Segment RW 1325 & 1326 at Maximum Height_Seismic

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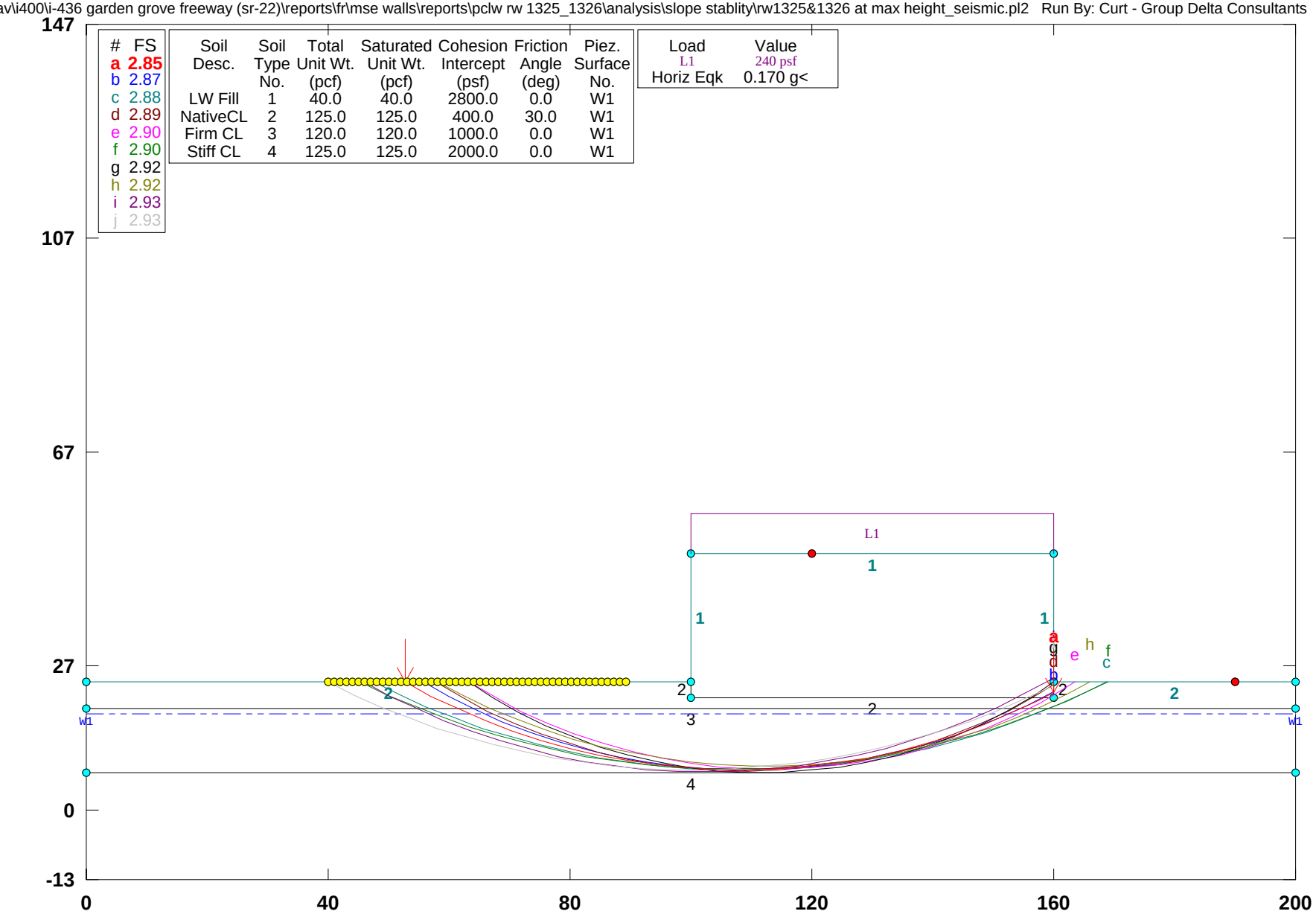

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Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/29/2008
Time of Run: 03:32PM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:rw1325&1326 at max height_seismic.in
Output Filename: N:rw1325&1326 at max height_seismic.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1325&1326 at max height_seismic.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Segment
RW 1325 & 1326 at Maximum Height_Seismic

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	37.00	100.00	37.00	2
2	100.00	37.00	100.01	61.00	1
3	100.01	61.00	160.00	61.00	1
4	160.00	61.00	160.01	37.00	1
5	160.01	37.00	200.00	37.00	2
6	100.00	37.00	100.01	34.00	2
7	100.01	34.00	160.00	34.00	2
8	160.00	34.00	160.01	37.00	2
9	0.00	32.00	200.00	32.00	3
10	0.00	20.00	200.00	20.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	40.0	40.0	2800.0	0.0	0.00	0.0	1
2	125.0	125.0	400.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	31.00
2	200.00	31.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	100.01	160.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

4000 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 1.00 ft.
and X = 70.00 ft.

Each Surface Terminates Between X = 120.00 ft.
and X = 160.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

N:\Projects_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\MSE Walls\Reports\PCLW RW 1325_1326\Analysis\Slope Stablity\rw1325&1326 at max height_seismic.doc

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.54	37.00
2	53.44	33.86
3	57.55	31.02
4	61.85	28.47
5	66.33	26.25
6	70.95	24.35
7	75.71	22.79
8	80.56	21.58
9	85.48	20.72
10	90.46	20.22
11	95.46	20.08
12	100.45	20.31
13	105.42	20.89
14	110.33	21.83
15	115.16	23.12
16	119.88	24.76
17	124.48	26.73
18	128.92	29.03
19	133.18	31.65
20	137.24	34.57
21	141.08	37.77
22	144.68	41.24
23	148.02	44.96
24	151.08	48.91
25	153.85	53.08
26	156.31	57.43
27	158.00	61.00

Circle Center At X = 94.9 ; Y = 89.3 and Radius, 69.2

*** 4.045 ***

Individual data on the 33 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.9	763.4	0.0	0.0	0.0	0.0	129.8	0.0	0.0
2	2.7	1367.3	0.0	0.0	0.0	0.0	232.4	0.0	0.0
3	1.4	972.3	0.0	0.0	0.0	0.0	165.3	0.0	0.0
4	0.0	19.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0
5	4.3	3837.1	0.0	392.1	0.0	0.0	652.3	0.0	0.0
6	4.5	5291.9	0.0	1136.1	0.0	0.0	899.6	0.0	0.0
7	4.6	6612.5	0.0	1779.3	0.0	0.0	1124.1	0.0	0.0
8	4.8	7775.9	0.0	2318.3	0.0	0.0	1321.9	0.0	0.0
9	4.9	8745.6	0.0	2750.2	0.0	0.0	1486.7	0.0	0.0
10	4.9	9491.6	0.0	3072.8	0.0	0.0	1613.6	0.0	0.0
11	5.0	9991.1	0.0	3284.5	0.0	0.0	1698.5	0.0	0.0
12	5.0	10228.8	0.0	3384.0	0.0	0.0	1738.9	0.0	0.0
13	4.5	9282.8	0.0	3069.6	0.0	0.0	1578.1	0.0	0.0
14	0.0	23.8	0.0	6.7	0.0	0.0	4.1	0.0	0.0
15	0.4	1205.0	0.0	294.6	0.0	0.0	204.9	0.0	105.8
16	5.0	13399.1	0.0	3245.3	0.0	0.0	2277.9	0.0	1191.8
17	4.9	12802.1	0.0	3007.9	0.0	0.0	2176.3	0.0	1178.6
18	4.8	11945.0	0.0	2659.7	0.0	0.0	2030.7	0.0	1159.3
19	4.7	10852.8	0.0	2202.8	0.0	0.0	1845.0	0.0	1133.8
20	4.6	9557.4	0.0	1639.4	0.0	0.0	1624.8	0.0	1102.5
21	4.4	8097.2	0.0	972.5	0.0	0.0	1376.5	0.0	1065.4
22	3.2	5024.3	0.0	230.7	0.0	0.0	854.1	0.0	769.0
23	1.1	1491.7	0.0	0.0	0.0	0.0	253.6	0.0	253.7
24	0.5	660.8	0.0	0.0	0.0	0.0	112.3	0.0	117.4
25	2.8	3356.4	0.0	0.0	0.0	0.0	570.6	0.0	668.5
26	0.8	841.0	0.0	0.0	0.0	0.0	143.0	0.0	188.9
27	3.8	3814.8	0.0	0.0	0.0	0.0	648.5	0.0	921.7
28	3.6	3094.8	0.0	0.0	0.0	0.0	526.1	0.0	863.8
29	3.3	2390.9	0.0	0.0	0.0	0.0	406.5	0.0	801.4
30	3.1	1722.3	0.0	0.0	0.0	0.0	292.8	0.0	734.8
31	2.8	1107.8	0.0	0.0	0.0	0.0	188.3	0.0	664.3
32	2.5	565.6	0.0	0.0	0.0	0.0	96.1	0.0	590.4
33	1.7	120.7	0.0	0.0	0.0	0.0	20.5	0.0	405.7

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.45	37.00
2	42.51	34.09
3	46.75	31.43
4	51.14	29.03
5	55.66	26.91
6	60.31	25.06
7	65.06	23.50
8	69.90	22.23
9	74.80	21.26
10	79.75	20.59
11	84.74	20.22
12	89.74	20.16
13	94.73	20.39
14	99.71	20.94
15	104.63	21.78
16	109.50	22.92
17	114.29	24.36
18	118.99	26.08
19	123.57	28.08
20	128.01	30.37
21	132.32	32.91
22	136.46	35.72
23	140.42	38.77
24	144.19	42.05
25	147.75	45.56
26	151.09	49.28
27	154.20	53.19
28	157.07	57.29
29	159.34	61.00

Circle Center At X = 88.3 ; Y = 102.3 and Radius, 82.2

*** 4.053 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.54	37.00
2	53.43	33.85
3	57.53	31.00
4	61.84	28.45

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5	66.31	26.22
6	70.94	24.33
7	75.69	22.77
8	80.54	21.57
9	85.47	20.72
10	90.45	20.23
11	95.45	20.11
12	100.44	20.35
13	105.40	20.95
14	110.31	21.92
15	115.13	23.23
16	119.85	24.90
17	124.43	26.90
18	128.85	29.24
19	133.09	31.88
20	137.13	34.83
21	140.94	38.07
22	144.51	41.57
23	147.81	45.33
24	150.83	49.31
25	153.55	53.51
26	155.96	57.89
27	157.38	61.00

Circle Center At X = 94.6 ; Y = 88.7 and Radius, 68.6

*** 4.055 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	45.04	37.00
2	49.04	34.01
3	53.24	31.29
4	57.60	28.85
5	62.12	26.70
6	66.77	24.86
7	71.52	23.32
8	76.37	22.10
9	81.29	21.20
10	86.26	20.63
11	91.25	20.39
12	96.25	20.47
13	101.23	20.88
14	106.18	21.62
15	111.07	22.68
16	115.87	24.07
17	120.57	25.76
18	125.16	27.76
19	129.60	30.06
20	133.88	32.64
21	137.98	35.50
22	141.88	38.62
23	145.58	42.00
24	149.04	45.61
25	152.25	49.43
26	155.21	53.47
27	157.90	57.68
28	159.71	61.00

Circle Center At X = 92.5 ; Y = 96.3 and Radius, 76.0

*** 4.059 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.79	37.00
2	42.88	34.12
3	47.13	31.49
4	51.54	29.12
5	56.08	27.03
6	60.74	25.21
7	65.49	23.67
8	70.34	22.43
9	75.25	21.48
10	80.20	20.83
11	85.19	20.48
12	90.19	20.43
13	95.18	20.69
14	100.15	21.25
15	105.08	22.10
16	109.95	23.25
17	114.73	24.69
18	119.42	26.42
19	124.00	28.43
20	128.45	30.72
21	132.75	33.26
22	136.89	36.07
23	140.86	39.12
24	144.63	42.40
25	148.20	45.90
26	151.55	49.61
27	154.66	53.52
28	157.54	57.61
29	159.63	61.00

Circle Center At X = 88.5 ; Y = 103.1 and Radius, 82.7

*** 4.085 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.01	37.00
2	56.85	33.80
3	60.93	30.90
4	65.21	28.31
5	69.67	26.06
6	74.28	24.14
7	79.03	22.57
8	83.88	21.36
9	88.81	20.52
10	93.79	20.06
11	98.79	19.96
12	103.78	20.24
13	108.74	20.90
14	113.63	21.92
15	118.44	23.31
16	123.12	25.06

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17	127.66	27.15
18	132.04	29.57
19	136.21	32.32
20	140.18	35.37
21	143.90	38.71
22	147.36	42.32
23	150.54	46.18
24	153.42	50.27
25	155.98	54.56
26	158.22	59.03
27	159.03	61.00

Circle Center At X = 97.5 ; Y = 86.6 and Radius, 66.7

*** 4.088 ***

1

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	46.42	37.00
2	50.41	33.98
3	54.59	31.24
4	58.95	28.79
5	63.46	26.64
6	68.11	24.80
7	72.88	23.28
8	77.73	22.09
9	82.66	21.23
10	87.63	20.71
11	92.63	20.52
12	97.62	20.68
13	102.60	21.17
14	107.53	22.00
15	112.39	23.16
16	117.17	24.65
17	121.83	26.46
18	126.35	28.58
19	130.73	31.01
20	134.92	33.73
21	138.93	36.72
22	142.72	39.98
23	146.28	43.49
24	149.60	47.23
25	152.65	51.19
26	155.43	55.35
27	157.92	59.68
28	158.56	61.00

Circle Center At X = 92.8 ; Y = 94.1 and Radius, 73.6

*** 4.089 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.40	37.00

2	58.21	33.77
3	62.27	30.85
4	66.55	28.26
5	71.01	26.00
6	75.64	24.11
7	80.40	22.58
8	85.26	21.43
9	90.20	20.66
10	95.19	20.28
11	100.19	20.29
12	105.17	20.70
13	110.11	21.49
14	114.97	22.67
15	119.72	24.22
16	124.34	26.14
17	128.79	28.41
18	133.06	31.03
19	137.10	33.97
20	140.90	37.22
21	144.44	40.75
22	147.68	44.55
23	150.62	48.60
24	153.24	52.86
25	155.52	57.31
26	157.05	61.00

Circle Center At X = 97.5 ; Y = 84.1 and Radius, 63.8

*** 4.093 ***

1

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.05	37.00
2	32.22	34.25
3	36.54	31.73
4	40.99	29.44
5	45.55	27.39
6	50.21	25.59
7	54.96	24.03
8	59.79	22.72
9	64.68	21.67
10	69.61	20.88
11	74.58	20.36
12	79.58	20.09
13	84.58	20.09
14	89.57	20.36
15	94.54	20.88
16	99.48	21.67
17	104.37	22.72
18	109.20	24.03
19	113.95	25.59
20	118.61	27.39
21	123.17	29.45
22	127.61	31.74
23	131.93	34.26
24	136.11	37.00
25	140.14	39.96
26	144.00	43.14
27	147.70	46.51
28	151.20	50.07
29	154.52	53.81
30	157.64	57.72

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   31        159.97       61.00

Circle Center At X =   82.1 ; Y =  114.7  and Radius,   94.6

      ***     4.098   ***



Failure Surface Specified By 27 Coordinate Points

  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1         46.08       37.00
    2         49.99       33.88
    3         54.11       31.06
    4         58.42       28.53
    5         62.91       26.32
    6         67.54       24.43
    7         72.29       22.89
    8         77.15       21.68
    9         82.07       20.83
   10         87.05       20.33
   11         92.05       20.19
   12         97.04       20.40
   13        102.01       20.98
   14        106.92       21.90
   15        111.76       23.18
   16        116.49       24.80
   17        121.09       26.75
   18        125.54       29.03
   19        129.82       31.62
   20        133.90       34.50
   21        137.76       37.68
   22        141.39       41.12
   23        144.76       44.81
   24        147.86       48.74
   25        150.67       52.87
   26        153.18       57.20
   27        155.03       61.00

Circle Center At X =   91.5 ; Y =   90.0  and Radius,   69.8

      ***     4.098   ***


1
             Y           A     X     I     S           F     T


            0.00     25.00     50.00     75.00    100.00    125.00

X      0.00 +-------*-+-W*-*----+---------+---------+---------+
            -           ...
            -           ....
            -          .....
            -         ......
            -        .......
      25.00 +       ........
            -      .........9
            -     ........9.
            -    ........9.2
            -    .......9.2.
            -   .......9.2.4
A     50.00 +   ......9.2.41
            -  .......927416
            -  ......9201.6.
            -  .......516...
            -  ......216....
            -  .....921.....
X     75.00 +  .....916....
            -  .....21.....
            -  .....26.....
            -  .....1......
            -   ....1......
            -   ....1......
I    100.00 +   ....19....**        */1
            -    ...12......
            -    ...619.......
            -     ...42.........
            -      ..149.........
            -      ...15.........
S    125.00 +       ..619.........
            -        ..619.........
            -         ..619........
            -          ..617........
            -           ..612.......
            -             .61229.....
     150.00 +              ...1710...
            -                 ..41630
            -            **    ...1*1/
            -
            -
            -
F    175.00 +
            -
            -
            -
            -
            -
T    200.00 +       *   W* *
```


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I-436 405-22 HOV Connector Segment RW 1325 & 1326 at Maximum Height_Static

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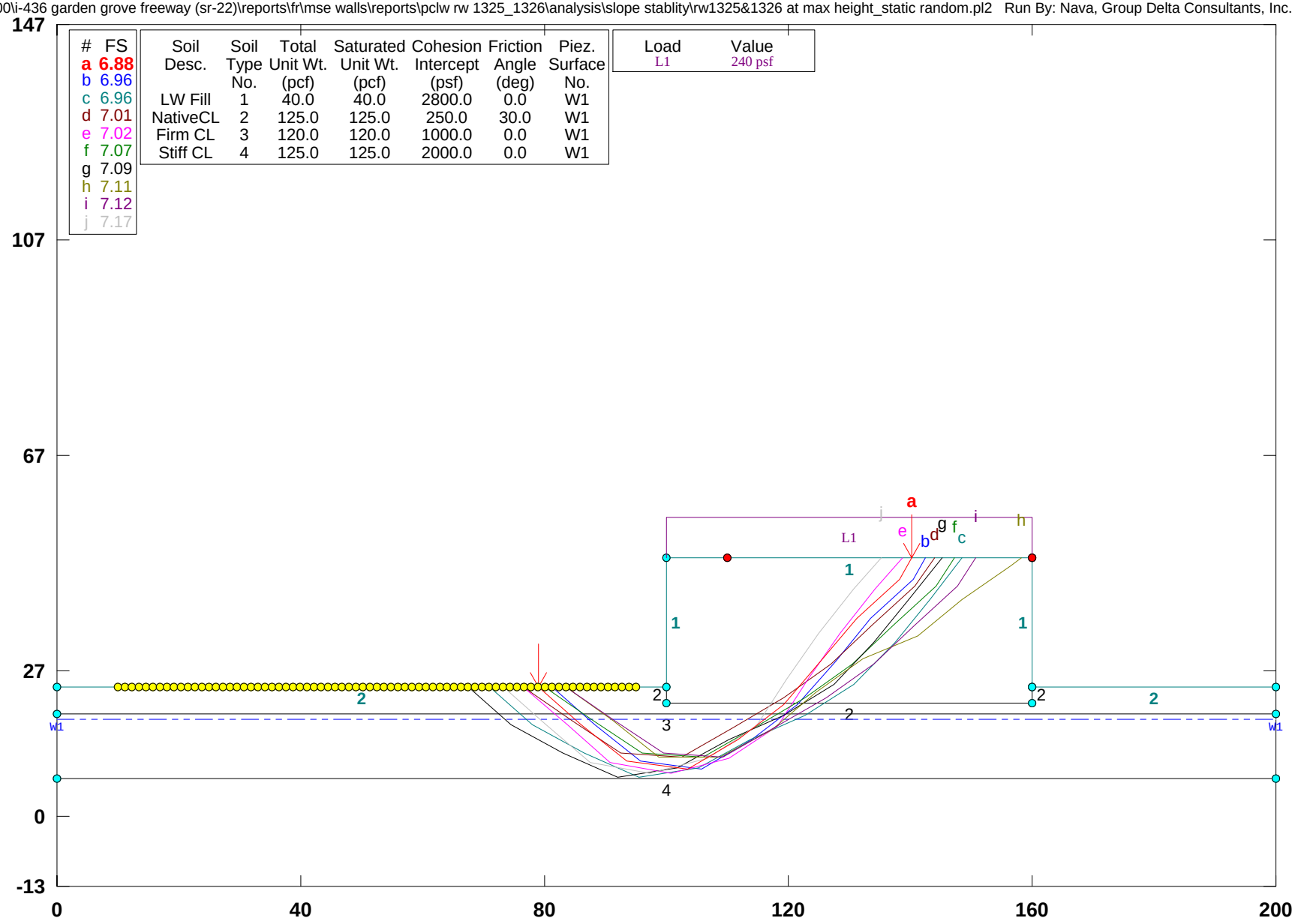
#	FS
a	6.88
b	6.96
c	6.96
d	7.01
e	7.02
f	7.07
g	7.09
h	7.11
i	7.12
j	7.17

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill	1	40.0	40.0	2800.0	0.0	W1
NativeCL	2	125.0	125.0	250.0	30.0	W1
Firm CL	3	120.0	120.0	1000.0	0.0	W1
Stiff CL	4	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=6.88

Safety Factors Are Calculated By The Modified Janbu Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/29/2008
Time of Run: 11:30AM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:rw1325&1326 at max height_static random.in
Output Filename: N:rw1325&1326 at max height_static random.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1325&1326 at max height_static random.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Segment
RW 1325 & 1326 at Maximum Height_Static

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	37.00	100.00	37.00	2
2	100.00	37.00	100.01	61.00	1
3	100.01	61.00	160.00	61.00	1
4	160.00	61.00	160.01	37.00	1
5	160.01	37.00	200.00	37.00	2
6	100.00	37.00	100.01	34.00	2
7	100.01	34.00	160.00	34.00	2
8	160.00	34.00	160.01	37.00	2
9	0.00	32.00	200.00	32.00	3
10	0.00	20.00	200.00	20.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	40.0	40.0	2800.0	0.0	0.00	0.0	1
2	125.0	125.0	250.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	31.00
2	200.00	31.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	100.01	160.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Irregular Surfaces, Has Been Specified.

3750 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 75 Points Equally Spaced
Along The Ground Surface Between X = 10.00 ft.
and X = 95.00 ft.

Each Surface Terminates Between X = 110.00 ft.
and X = 160.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 20.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

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1	78.92	37.00
2	86.01	29.95
3	93.50	23.32
4	103.38	21.80
5	111.71	27.34
6	119.28	33.86
7	125.35	41.82
8	131.29	49.86
9	138.20	57.09
10	140.31	61.00

*** 6.882 ***

Individual data on the 16 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	1571.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1.0	688.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.1	854.1	0.0	48.9	0.0	0.0	0.0	0.0	0.0
4	7.5	9501.1	0.0	2723.6	0.0	0.0	0.0	0.0	0.0
5	6.5	11224.2	0.0	3357.2	0.0	0.0	0.0	0.0	0.0
6	0.0	21.4	0.0	5.5	0.0	0.0	0.0	0.0	0.0
7	3.4	8508.2	0.0	1903.8	0.0	0.0	0.0	0.0	809.3
8	8.3	18501.3	0.0	4013.9	0.0	0.0	0.0	0.0	1998.4
9	4.3	7099.8	0.0	641.6	0.0	0.0	0.0	0.0	1020.4
10	1.2	1613.1	0.0	0.0	0.0	0.0	0.0	0.0	278.5
11	2.2	2625.1	0.0	0.0	0.0	0.0	0.0	0.0	519.2
12	0.1	112.9	0.0	0.0	0.0	0.0	0.0	0.0	24.9
13	6.0	5506.1	0.0	0.0	0.0	0.0	0.0	0.0	1430.6
14	5.9	3604.5	0.0	0.0	0.0	0.0	0.0	0.0	1426.2
15	6.9	2081.0	0.0	0.0	0.0	0.0	0.0	0.0	1658.5
16	2.1	165.4	0.0	0.0	0.0	0.0	0.0	0.0	507.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.22	37.00
2	88.31	29.95
3	95.80	23.32
4	105.68	21.80
5	114.01	27.34
6	121.58	33.86
7	127.65	41.82
8	133.59	49.86
9	140.50	57.09
10	142.61	61.00

*** 6.956 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	70.88	37.00
2	77.95	29.93
3	86.54	24.81
4	95.44	20.25
5	105.28	22.01
6	113.75	27.33
7	122.72	31.75
8	130.84	37.59
9	137.39	45.15
10	143.13	53.34
11	148.58	61.00

*** 6.963 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.62	37.00
2	84.51	30.86
3	92.50	24.84
4	102.47	24.11
5	110.97	29.38
6	119.32	34.89
7	127.01	41.28
8	133.86	48.57
9	140.79	55.78
10	143.90	61.00

*** 7.010 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.62	37.00
2	83.73	29.97
3	90.86	22.96
4	100.65	20.91
5	110.21	23.86
6	118.22	29.84
7	123.17	38.53
8	128.53	46.97
9	134.24	55.18
10	138.76	61.00

*** 7.019 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

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1	80.07	37.00
2	87.96	30.86
3	95.95	24.84
4	105.92	24.11
5	114.42	29.38
6	122.76	34.89
7	130.46	41.28
8	137.31	48.57
9	144.24	55.78
10	147.34	61.00

*** 7.067 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.43	37.00
2	74.50	29.93
3	83.09	24.81
4	91.99	20.25
5	101.84	22.01
6	110.30	27.33
7	119.28	31.75
8	127.39	37.59
9	133.94	45.15
10	139.68	53.34
11	145.13	61.00

*** 7.089 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.51	37.00
2	91.25	30.66
3	98.66	23.95
4	108.66	23.90
5	117.21	29.10
6	124.55	35.89
7	132.20	42.33
8	141.32	46.43
9	148.61	53.27
10	156.46	59.47
11	158.30	61.00

*** 7.107 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.51	37.00
2	91.41	30.86
3	99.39	24.84
4	109.37	24.11
5	117.87	29.38
6	126.21	34.89
7	133.91	41.28
8	140.75	48.57
9	147.68	55.78
10	150.79	61.00

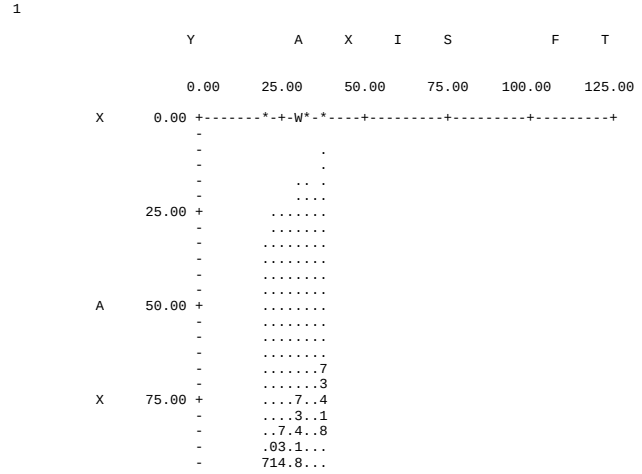
*** 7.124 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.18	37.00
2	80.29	29.97
3	87.42	22.96
4	97.21	20.91
5	106.76	23.86
6	114.78	29.84
7	119.72	38.53
8	125.09	46.97
9	130.80	55.18
10	135.32	61.00

*** 7.170 ***

1



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I-436 405-22 HOV Connector Segment RW 1325 & 1326 at Maximum Height_Seismic

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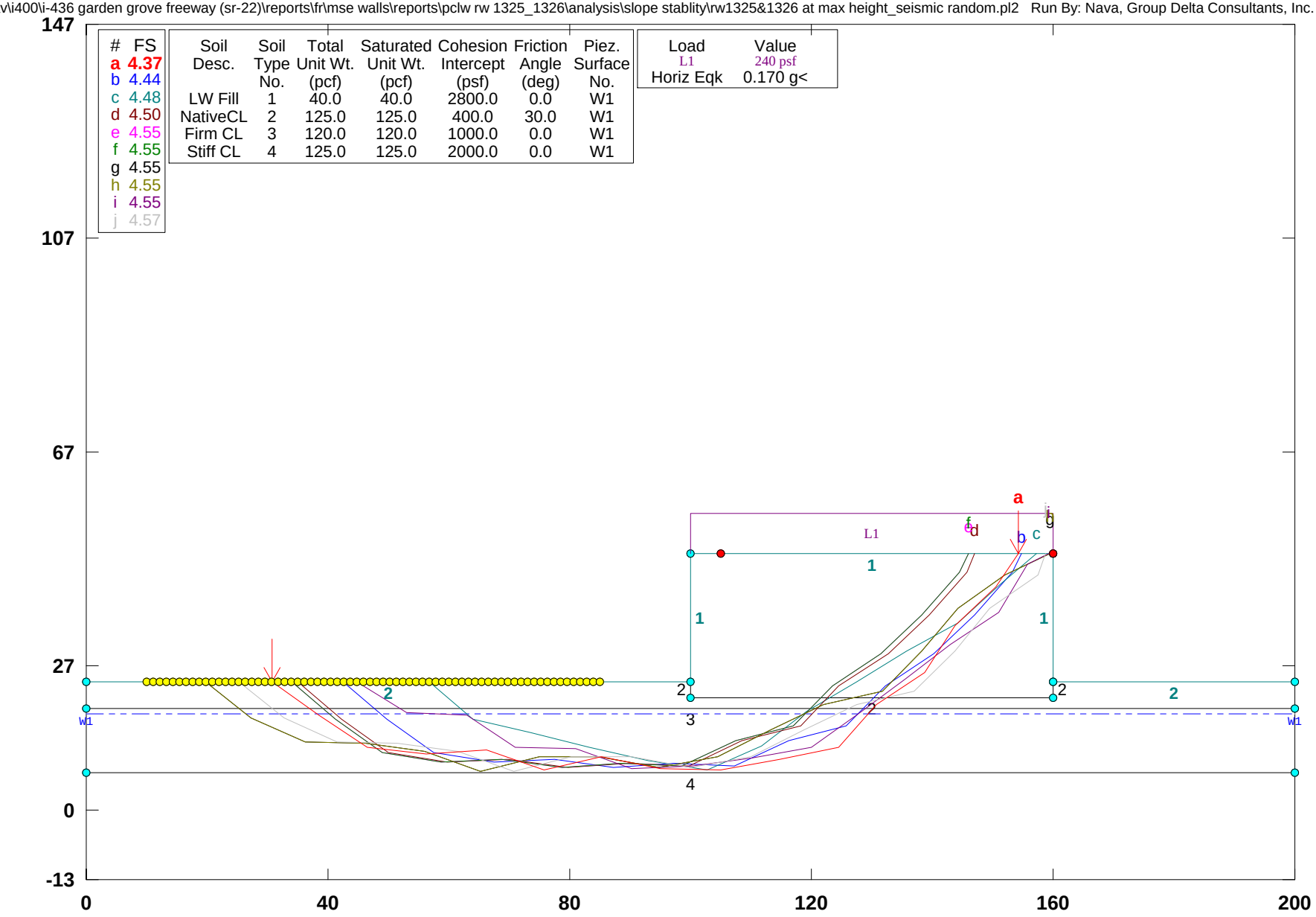

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Safety Factors Are Calculated By The Modified Janbu Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/29/2008
Time of Run: 11:23AM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:rw1325&1326 at max height_seismic random.in
Output Filename: N:rw1325&1326 at max height_seismic random.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1325&1326 at max height_seismic random.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Segment
RW 1325 & 1326 at Maximum Height_Seismic

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	37.00	100.00	37.00	2
2	100.00	37.00	100.01	61.00	1
3	100.01	61.00	160.00	61.00	1
4	160.00	61.00	160.01	37.00	1
5	160.01	37.00	200.00	37.00	2
6	100.00	37.00	100.01	34.00	2
7	100.01	34.00	160.00	34.00	2
8	160.00	34.00	160.01	37.00	2
9	0.00	32.00	200.00	32.00	3
10	0.00	20.00	200.00	20.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	40.0	40.0	2800.0	0.0	0.00	0.0	1
2	125.0	125.0	400.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	31.00
2	200.00	31.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	100.01	160.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Irregular Surfaces, Has Been Specified.

3500 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 70 Points Equally Spaced
Along The Ground Surface Between X = 10.00 ft.
and X = 85.00 ft.

Each Surface Terminates Between X = 105.00 ft.
and X = 160.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 20.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

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* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.65	37.00
2	38.52	30.82
3	46.41	24.68
4	56.34	23.51
5	66.31	24.24
6	75.63	20.61
7	85.32	23.09
8	95.05	20.79
9	105.05	20.55
10	114.85	22.53
11	124.58	24.85
12	130.81	32.67
13	138.72	38.79
14	143.64	47.50
15	150.45	54.81
16	154.14	61.00

*** 4.374 ***

Individual data on the 22 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.4	1989.0	0.0	0.0	0.0	0.0	338.1	0.0	0.0
2	1.3	872.0	0.0	0.0	0.0	0.0	148.2	0.0	0.0
3	0.2	170.8	0.0	1.6	0.0	0.0	29.0	0.0	0.0
4	7.9	8956.7	0.0	2026.1	0.0	0.0	1522.6	0.0	0.0
5	9.9	15625.3	0.0	4307.7	0.0	0.0	2656.3	0.0	0.0
6	10.0	15960.7	0.0	4447.5	0.0	0.0	2713.3	0.0	0.0
7	9.3	16535.3	0.0	5353.5	0.0	0.0	2811.0	0.0	0.0
8	9.7	17854.7	0.0	5710.9	0.0	0.0	3035.3	0.0	0.0
9	9.7	17831.4	0.0	5654.6	0.0	0.0	3031.3	0.0	0.0
10	4.9	9789.0	0.0	3173.7	0.0	0.0	1664.1	0.0	0.0
11	0.0	23.4	0.0	6.5	0.0	0.0	4.0	0.0	0.0
12	5.0	13586.7	0.0	3267.7	0.0	0.0	2309.7	0.0	1209.0
13	9.8	25338.1	0.0	5903.1	0.0	0.0	4307.5	0.0	2352.3
14	9.7	22636.6	0.0	4560.7	0.0	0.0	3848.2	0.0	2334.6
15	4.9	8924.5	0.0	1509.4	0.0	0.0	1517.2	0.0	1177.5
16	0.8	1109.0	0.0	0.0	0.0	0.0	188.5	0.0	191.5
17	0.5	685.9	0.0	0.0	0.0	0.0	116.6	0.0	127.8
18	1.7	2002.5	0.0	0.0	0.0	0.0	340.4	0.0	413.1
19	6.2	6088.4	0.0	0.0	0.0	0.0	1035.0	0.0	1484.6
20	4.9	3510.9	0.0	0.0	0.0	0.0	596.9	0.0	1179.7
21	6.8	2684.3	0.0	0.0	0.0	0.0	456.3	0.0	1636.1
22	3.7	456.1	0.0	0.0	0.0	0.0	77.5	0.0	884.7

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.61	37.00
2	49.86	30.11
3	57.58	23.76
4	67.44	22.11
5	77.44	22.43
6	87.34	21.00
7	97.31	21.66
8	107.31	21.31
9	116.20	25.89
10	125.80	28.67
11	132.19	36.37
12	140.28	42.25
13	147.05	49.61
14	153.30	57.41
15	154.69	61.00

*** 4.435 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.74	37.00
2	63.93	30.05
3	73.60	27.51
4	83.21	24.73
5	92.90	22.27
6	102.75	20.53
7	111.71	24.97
8	119.32	31.46
9	127.62	37.03
10	135.74	42.87
11	144.26	48.10
12	151.27	55.24
13	157.31	61.00

*** 4.481 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	35.00	37.00
2	42.25	30.11
3	49.97	23.76
4	59.84	22.11
5	69.83	22.43
6	79.73	21.00
7	89.71	21.66
8	99.70	21.31
9	108.59	25.89
10	118.20	28.67
11	124.58	36.37
12	132.67	42.25
13	139.44	49.61
14	145.69	57.41
15	147.08	61.00

*** 4.495 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.91	37.00
2	41.16	30.11
3	48.89	23.76
4	58.75	22.11
5	68.74	22.43
6	78.64	21.00
7	88.62	21.66
8	98.61	21.31
9	107.50	25.89
10	117.11	28.67
11	123.50	36.37
12	131.58	42.25
13	138.35	49.61
14	144.61	57.41
15	145.99	61.00

*** 4.545 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.91	37.00
2	41.16	30.11
3	48.89	23.76
4	58.75	22.11
5	68.74	22.43
6	78.64	21.00
7	88.62	21.66
8	98.61	21.31
9	107.50	25.89
10	117.11	28.67
11	123.50	36.37
12	131.58	42.25
13	138.35	49.61
14	144.61	57.41
15	145.99	61.00

*** 4.545 ***

1

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.78	37.00
2	27.22	30.32
3	36.16	25.84
4	46.16	25.56
5	56.05	24.09
6	65.25	20.17
7	74.88	22.88
8	84.87	23.04
9	94.67	21.04
10	104.47	23.04
11	113.20	27.91
12	121.99	32.69
13	131.65	35.26
14	138.26	42.77
15	144.18	50.82
16	152.02	57.03
17	159.53	61.00

*** 4.550 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.78	37.00
2	27.22	30.32
3	36.16	25.84
4	46.16	25.56
5	56.05	24.09
6	65.25	20.17
7	74.88	22.88
8	84.87	23.04
9	94.67	21.04
10	104.47	23.04
11	113.20	27.91
12	121.99	32.69
13	131.65	35.26
14	138.26	42.77
15	144.18	50.82
16	152.02	57.03
17	159.53	61.00

*** 4.550 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	44.78	37.00
2	52.94	31.21
3	62.92	30.64
4	71.06	24.83
5	81.05	24.55
6	90.28	20.70
7	100.27	21.27
8	110.15	22.82
9	119.93	24.87
10	127.79	31.06
11	135.51	37.41
12	143.09	43.94
13	150.98	50.08

14	155.66	58.92
15	159.32	61.00

*** 4.552 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.22	37.00
2	32.66	30.32
3	41.60	25.84
4	51.59	25.56
5	61.48	24.09
6	70.69	20.17
7	80.31	22.88
8	90.31	23.04
9	100.11	21.04
10	109.91	23.04
11	118.64	27.91
12	127.42	32.69
13	137.09	35.26
14	143.69	42.77
15	149.62	50.82
16	157.46	57.03
17	158.87	61.00

*** 4.568 ***

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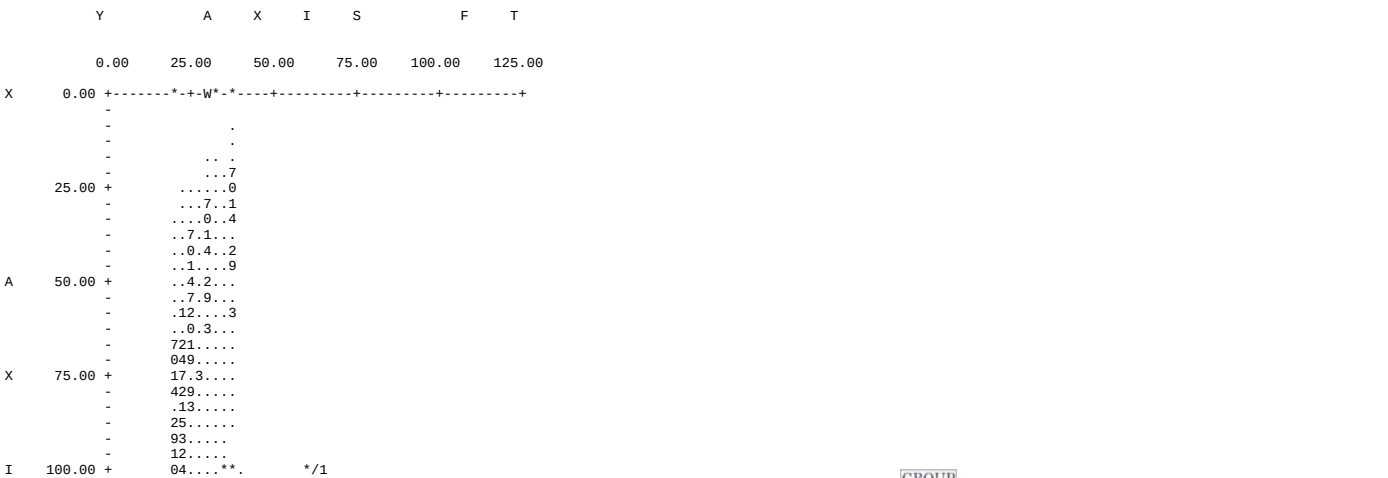

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I-436 405-22 HOV Connector Segment RW 1325 & 1326 at Maximum Height_Static

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b	7.82
c	7.82
d	7.82
e	7.82
f	7.82
g	7.82
h	7.82
i	7.82
j	7.82

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill	1	40.0	40.0	2800.0	0.0	W1
NativeCL	2	125.0	125.0	250.0	30.0	W1
Firm CL	3	120.0	120.0	1000.0	0.0	W1
Stiff CL	4	125.0	125.0	2000.0	0.0	W1

Load	Value
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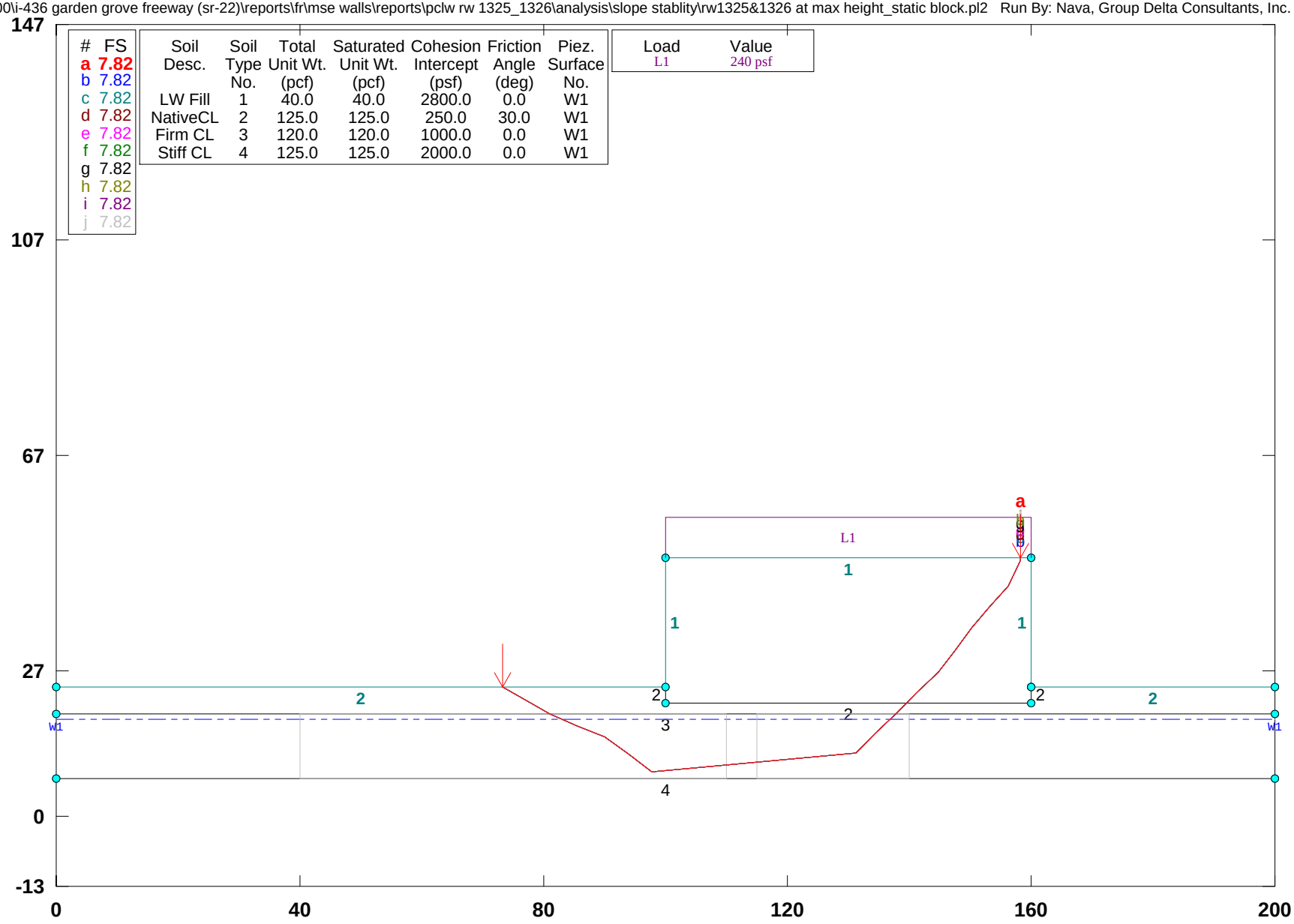

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Safety Factors Are Calculated By The Modified Janbu Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/29/2008
Time of Run: 11:23AM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:rw1325&1326 at max height_static block.in
Output Filename: N:rw1325&1326 at max height_static block.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1325&1326 at max height_static block.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Segment
RW 1325 & 1326 at Maximum Height_Static

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	37.00	100.00	37.00	2
2	100.00	37.00	100.01	61.00	1
3	100.01	61.00	160.00	61.00	1
4	160.00	61.00	160.01	37.00	1
5	160.01	37.00	200.00	37.00	2
6	100.00	37.00	100.01	34.00	2
7	100.01	34.00	160.00	34.00	2
8	160.00	34.00	160.01	37.00	2
9	0.00	32.00	200.00	32.00	3
10	0.00	20.00	200.00	20.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	40.0	40.0	2800.0	0.0	0.00	0.0	1
2	125.0	125.0	250.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	31.00
2	200.00	31.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	100.01	160.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

5000 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	40.00	26.00	110.00	26.00	12.00
2	115.00	26.00	140.00	26.00	12.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.35	37.00
2	76.79	34.72
3	81.02	32.06

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4	85.46	29.77
5	89.99	27.65
6	93.89	24.52
7	97.64	21.21
8	131.37	24.75
9	134.56	28.60
10	138.07	32.16
11	141.28	35.99
12	144.65	39.69
13	147.57	43.75
14	150.18	48.01
15	153.17	52.02
16	156.35	55.87
17	158.15	60.54
18	158.32	61.00

*** 7.821 ***

Individual data on the 24 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.4	489.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	4.2	1908.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.1	67.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.9	1332.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2.4	1959.7	0.0	103.3	0.0	0.0	0.0	0.0	0.0
6	4.5	4618.6	0.0	714.2	0.0	0.0	0.0	0.0	0.0
7	3.9	5205.4	0.0	1532.5	0.0	0.0	0.0	0.0	0.0
8	3.7	6445.6	0.0	2537.1	0.0	0.0	0.0	0.0	0.0
9	2.4	4495.6	0.0	1431.1	0.0	0.0	0.0	0.0	0.0
10	0.0	22.4	0.0	6.0	0.0	0.0	0.0	0.0	0.0
11	31.4	75200.5	0.0	15540.2	0.0	0.0	0.0	0.0	7527.4
12	3.2	6268.1	0.0	1349.9	0.0	0.0	0.0	0.0	763.9
13	2.4	3767.8	0.0	252.0	0.0	0.0	0.0	0.0	567.3
14	1.0	1369.8	0.0	0.0	0.0	0.0	0.0	0.0	236.5
15	0.2	211.5	0.0	0.0	0.0	0.0	0.0	0.0	38.5
16	1.5	1844.3	0.0	0.0	0.0	0.0	0.0	0.0	370.5
17	1.7	1739.8	0.0	0.0	0.0	0.0	0.0	0.0	401.4
18	3.4	3115.2	0.0	0.0	0.0	0.0	0.0	0.0	807.1
19	2.9	2254.2	0.0	0.0	0.0	0.0	0.0	0.0	701.5
20	2.6	1577.6	0.0	0.0	0.0	0.0	0.0	0.0	626.1
21	3.0	1313.4	0.0	0.0	0.0	0.0	0.0	0.0	717.5
22	3.2	898.6	0.0	0.0	0.0	0.0	0.0	0.0	764.6
23	1.8	200.8	0.0	0.0	0.0	0.0	0.0	0.0	431.5
24	0.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	41.6

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.35	37.00
2	76.79	34.72
3	81.02	32.06
4	85.46	29.77
5	89.99	27.65
6	93.89	24.52
7	97.64	21.21
8	131.37	24.75
9	134.56	28.60
10	138.07	32.16
11	141.28	35.99

12	144.65	39.69
13	147.57	43.75
14	150.18	48.01
15	153.17	52.02
16	156.35	55.87
17	158.15	60.54
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*** 7.821 ***

1

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*** 7.821 ***

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Failure Surface Specified By 18 Coordinate Points

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16	156.35	55.87
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*** 7.821 ***

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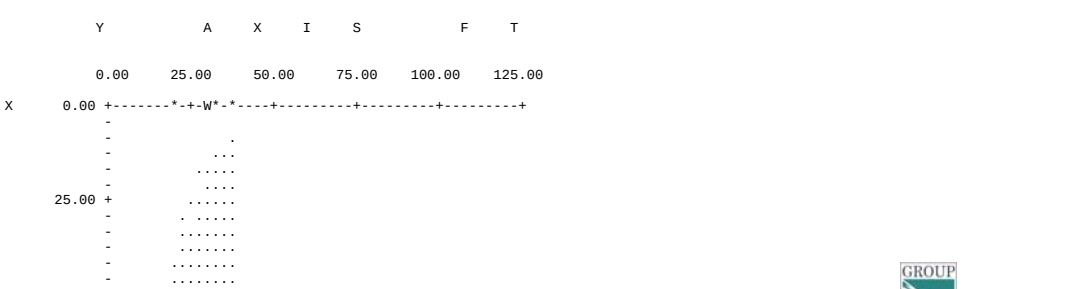

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I-436 405-22 HOV Connector Segment RW 1325 & 1326 at Maximum Height_Seismic

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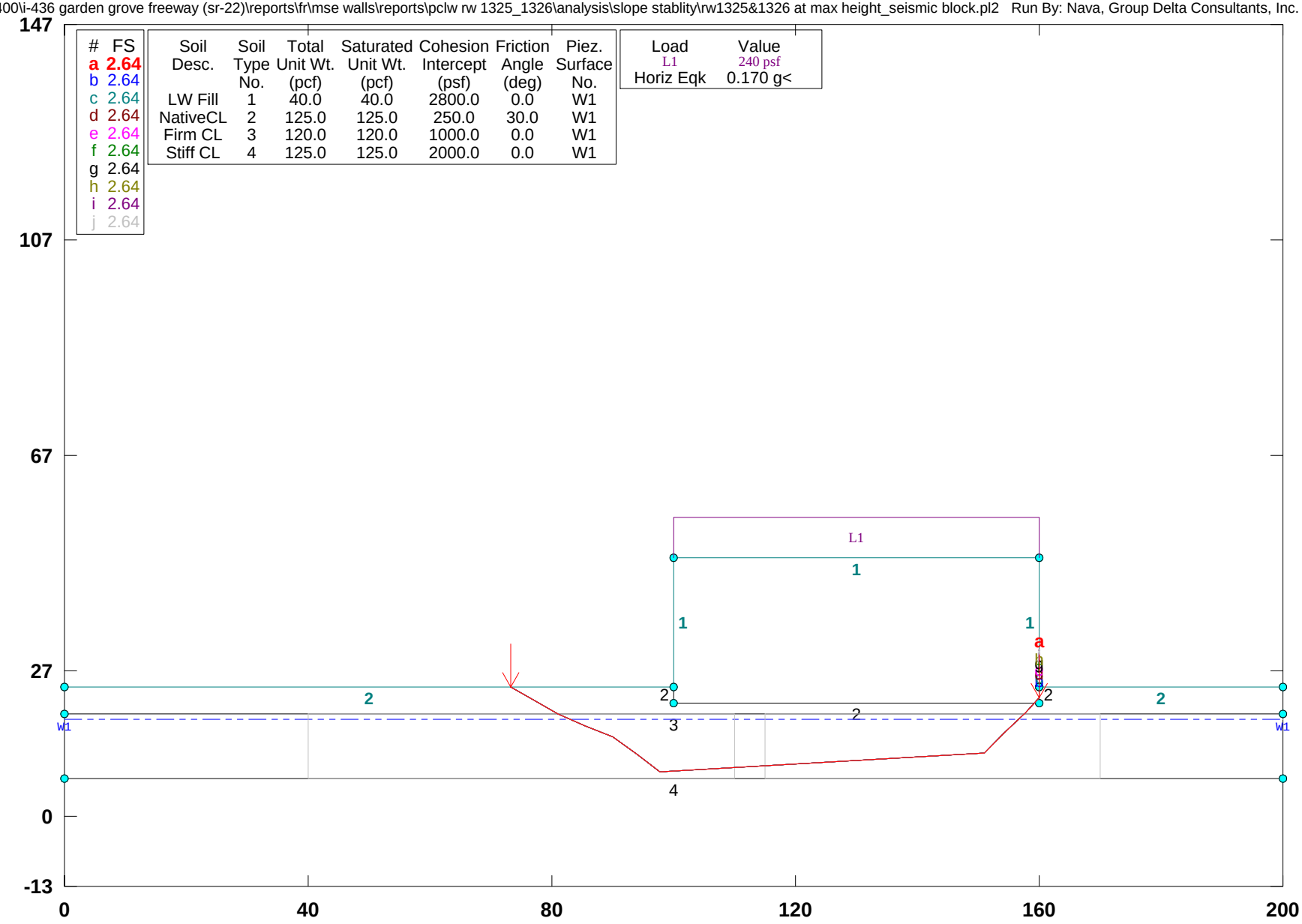
#	FS
a	2.64
b	2.64
c	2.64
d	2.64
e	2.64
f	2.64
g	2.64
h	2.64
i	2.64
j	2.64

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
LW Fill	1	40.0	40.0	2800.0	0.0	W1
NativeCL	2	125.0	125.0	250.0	30.0	W1
Firm CL	3	120.0	120.0	1000.0	0.0	W1
Stiff CL	4	125.0	125.0	2000.0	0.0	W1

Load	Value
L1	240 psf
Horiz Eqk	0.170 g<



PCSTABL5M/si FSmin=2.64

Safety Factors Are Calculated By The Modified Janbu Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 10/29/2008
Time of Run: 11:21AM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:rw1325&1326 at max height_seismic block.in
Output Filename: N:rw1325&1326 at max height_seismic block.OUT
Unit: ENGLISH
Plotted Output Filename: N:rw1325&1326 at max height_seismic block.PLT

PROBLEM DESCRIPTION I-436 405-22 HOV Connector Segment
RW 1325 & 1326 at Maximum Height_Seismic

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	37.00	100.00	37.00	2
2	100.00	37.00	100.01	61.00	1
3	100.01	61.00	160.00	61.00	1
4	160.00	61.00	160.01	37.00	1
5	160.01	37.00	200.00	37.00	2
6	100.00	37.00	100.01	34.00	2
7	100.01	34.00	160.00	34.00	2
8	160.00	34.00	160.01	37.00	2
9	0.00	32.00	200.00	32.00	3
10	0.00	20.00	200.00	20.00	4

1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	40.0	40.0	2800.0	0.0	0.00	0.0	1
2	125.0	125.0	250.0	30.0	0.00	0.0	1
3	120.0	120.0	1000.0	0.0	0.00	0.0	1
4	125.0	125.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	31.00
2	200.00	31.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	100.01	160.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.

5000 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	40.00	26.00	110.00	26.00	12.00
2	115.00	26.00	170.00	26.00	12.00

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

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Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.35	37.00
2	76.79	34.72
3	81.02	32.06
4	85.46	29.77
5	89.99	27.65
6	93.89	24.52
7	97.64	21.21
8	151.02	24.75
9	154.21	28.60
10	157.72	32.16
11	160.01	34.89

*** 2.640 ***

Individual data on the 19 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.4	489.3	0.0	0.0	0.0	0.0	83.2	0.0	0.0
2	4.2	1908.6	0.0	0.0	0.0	0.0	324.5	0.0	0.0
3	0.1	67.2	0.0	0.0	0.0	0.0	11.4	0.0	0.0
4	1.9	1332.6	0.0	0.0	0.0	0.0	226.5	0.0	0.0
5	2.4	1959.7	0.0	103.3	0.0	0.0	333.2	0.0	0.0
6	4.5	4618.6	0.0	714.2	0.0	0.0	785.2	0.0	0.0
7	3.9	5205.4	0.0	1532.5	0.0	0.0	884.9	0.0	0.0
8	3.7	6445.6	0.0	2537.1	0.0	0.0	1095.7	0.0	0.0
9	2.4	4508.4	0.0	1433.2	0.0	0.0	766.4	0.0	0.0
10	0.0	22.5	0.0	6.0	0.0	0.0	3.8	0.0	0.0
11	51.0	122591.8	0.0	25339.1	0.0	0.0	20840.6	0.0	12243.2
12	3.2	6268.1	0.0	1349.9	0.0	0.0	1065.6	0.0	763.9
13	2.4	3767.8	0.0	252.0	0.0	0.0	640.5	0.0	567.3
14	1.0	1369.8	0.0	0.0	0.0	0.0	232.9	0.0	236.5
15	0.2	211.5	0.0	0.0	0.0	0.0	36.0	0.0	38.5
16	1.5	1844.3	0.0	0.0	0.0	0.0	313.5	0.0	370.5
17	0.7	786.8	0.0	0.0	0.0	0.0	133.7	0.0	177.7
18	0.0	2.7	0.0	0.0	0.0	0.0	0.5	0.0	0.0
19	0.0	3.8	0.0	0.0	0.0	0.0	0.6	0.0	0.0

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.35	37.00
2	76.79	34.72
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6	93.89	24.52
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8	151.02	24.75
9	154.21	28.60
10	157.72	32.16
11	160.01	34.89

*** 2.640 ***

1

Failure Surface Specified By 11 Coordinate Points

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5	89.99	27.65
6	93.89	24.52
7	97.64	21.21
8	151.02	24.75
9	154.21	28.60
10	157.72	32.16
11	160.01	34.89

*** 2.640 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.35	37.00
2	76.79	34.72
3	81.02	32.06
4	85.46	29.77
5	89.99	27.65
6	93.89	24.52
7	97.64	21.21
8	151.02	24.75

9	154.21	28.60
10	157.72	32.16
11	160.01	34.89

*** 2.640 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.35	37.00
2	76.79	34.72
3	81.02	32.06
4	85.46	29.77
5	89.99	27.65
6	93.89	24.52
7	97.64	21.21
8	151.02	24.75
9	154.21	28.60
10	157.72	32.16
11	160.01	34.89

*** 2.640 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.35	37.00
2	76.79	34.72
3	81.02	32.06
4	85.46	29.77
5	89.99	27.65
6	93.89	24.52
7	97.64	21.21
8	151.02	24.75
9	154.21	28.60
10	157.72	32.16
11	160.01	34.89

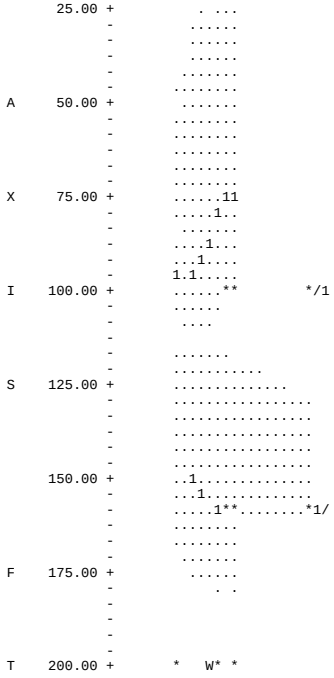
*** 2.640 ***

1

```
          Y           A     X     I     S           F     T


          0.00     25.00     50.00     75.00    100.00    125.00

X      0.00 +-------*-+-W*-*----+---------+---------+---------+
            -
            -             ..
            -              .
            -            ...
            -           ....
```


25.00
A 50.00
X 75.00
I 100.00
S 125.00
150.00
F 175.00
T 200.00

Appendix F.4
Settlement Calculations

SETTLEMENT CALCULATIONS
BOLSA CHICA ROAD OC

SETTLEMENT CALCULATION

PROJECT NAME: WCC 405/22 HOV **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: Fill Settlement top of north abutment - middle of fill

Loaded Area	Length, L	200	ft	L≥B	(A)
	Width, B	120	ft		(B)
	Load, Q	500	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.53** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'v (psf)	OCR	σ'p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
1-Clay Fill	0	26	13	26	125	1,625	7	11,375	0.9954	498	C		0.018		1	0.00208863	0.65
2-Firm Clay	26	40	33	14	57.6	3,653	1.08	3,945	0.9413	471	C		0.016	0.17	2	0.003799684	0.64
3-Stiff Clay	40	44	42	4	62.6	4,182	2	8,363	0.8963	448	C		0.019		1	0.000840126	0.04
3a-Dense Sand	44	49	46.5	5	62.6	4,463	2	8,927	0.8706	435	E	1750			N/A	0.000248729	0.01
3-Stiff Clay	49	60	54.5	11	62.6	4,964	2	9,928	0.8213	411	C		0.019		1	0.000655801	0.09
4.1-SM/ML	60	70	65	10	62.6	5,621	2	11,243	0.7535	377	E	1000			N/A	0.000376746	0.05
4.2-SP	70	90	80	20	62.6	6,560	2	13,121	0.6583	329	E	2000			N/A	0.000164564	0.04
5.1-Clay	90	107	98.5	17	62.6	7,719	2	15,437	0.5521	276	C				1	0	0.00
5.2-Sand	107	117	112	10	62.6	8,564	2	17,127	0.4849	242	E	3000			N/A	8.08219E-05	0.01

TOTAL= **1.53** inches

SETTLEMENT CALCULATION

INSTRUCTIONS:

1	Program calculates settlement under center, short edge, long edge, or corner of shaded rectangular loaded areas, using Boussinesq stress distribution and consolidation theory or elastic modulus compressibility.
2	Input data in shaded fields. Unshaded fields are automatically calculated. Up to 26 soil layers may be used.
3	Explanation of the calculation procedure and guidance for input of data in rows (A) through (E) and columns (1) through (16) is provided below.

ROW AND COLUMN NOTES

(A)	Input length (long side) of rectangular loaded area.
(B)	Input width (short side) of rectangular loaded area.
(C)	Input applied load at the base of the loaded area (pounds per square foot)
(D)	Input depth of applied load below the ground surface (the depth must coincide with a bottom-of-layer boundary specified in Column (2)
(E)	Input 1, 2, 3, or 4 to calculate the settlement under the center, midpoint of short edge, midpoint of long edge, or corner, respectively, of the rectangular loaded area.
(1)	Input Soil Layer number and/or description (optional).
(2)	Starting with the ground surface (depth = 0) input the depth to top and bottom of each soil layer below the ground surface. The depth to center of the layer is automatically calculated.
(3)	The layer height or thickness is automatically computed (H=depth to top of layer minus depth to bottom of layer).
(4)	Input unit weight of soil in the layer (total unit weight above the water table, buoyant unit weight below the water table).
(5)	Vertical effective stress (pounds per square foot) at the center of each layer prior to the new loading is automatically computed.
(6)	Input Overconsolidation Ratio (OCR) defined as the ratio of maximum past preconsolidation pressure (column (7)) to current effective vertical stress (Column (5)). OCR=1 is Normally Consolidated.
(7)	Maximum past preconsolidation pressure is calculated as the product of Column (5) and Column (6), or $\sigma'_p = OCR * \sigma'_v$.
(8)	The stress increase coefficient ($I\sigma$) at the center of each layer is computed using Newmark integration of Boussinesq theory based on vertical depth below bottom of loaded area and position on loaded area input in Row E.
(9)	The increase in stress ($\Delta\sigma$) at the center of each layer due to the loaded area is computed as the product of $I\ \sigma$ (Column (8)) and load Q (Row (C)).
(10)	Input compressibility type for each layer. "E" means elastic modulus (slope of stress versus strain curve) is used, "C" means consolidation theory is used (slope of log stress versus strain curve) is used.
(11)	Input elastic modulus (E in ksf) value for each layer where "E" is selected in Column 10.
(12)	Input Recompression Ratio, or slope of log stress versus strain curve, in the overconsolidated range (if soil is normally consolidated this value need not be input).
(13)	Input Virgin Compression Ratio, or slope of log stress versus strain curve, in the normally consolidated range.
(14)	Virgin and/or Recomp. Case determined ("C" Comp. Type Only). Case 1 = entire loading is within recompression range, Case 2 - Loading patially recompression partially virgin, Case 3 - entirely virgin (norm cons.)
(15)	Strain ε is calculated as $\Delta\sigma$ / E if "E" is specified in Column (10), or by consolidation theory using the appropriate recompression and/or virgin slopes if "C" is specified in Column (10).
(16)	Layer settlement (inches) is computed as Strain (Column (15)) times Height (Column (3) converted to inches). Total settlement (inches) of all layers is summed up at the bottom of Column (16).

SETTLEMENT CALCULATION

PROJECT NAME: WCC 405/22 HOV **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: Fill Settlement top of north abutment - edge of fill

Loaded Area	Length, L	200	ft	L≥B	(A)
	Width, B	120	ft		(B)
	Load, Q	500	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.56** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'v (psf)	OCR	σ'p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
1-Clay Fill	0	26	13	26	125	1,625	7	11,375	0.4994	250	C		0.018		1	0.001117322	0.35
2-Firm Clay	26	40	33	14	57.6	3,653	1.1	4,019	0.4905	245	C		0.016	0.17	1	0.000451484	0.08
3-Stiff Clay	40	44	42	4	62.6	4,182	2	8,363	0.4817	241	C		0.019		1	0.000462081	0.02
3a-Dense Sand	44	49	46.5	5	62.6	4,463	2	8,927	0.4761	238	E	1750			N/A	0.00013603	0.01
3-Stiff Clay	49	60	54.5	11	62.6	4,964	2	9,928	0.4643	232	C		0.019		1	0.000377176	0.05
4.1-SM/ML	60	70	65	10	62.6	5,621	2	11,243	0.4458	223	E	1000			N/A	0.000222911	0.03
4.2-SP	70	90	80	20	62.6	6,560	2	13,121	0.4150	207	E	2000			N/A	0.000103749	0.02
5.1-Clay	90	107	98.5	17	62.6	7,719	2	15,437	0.3736	187	C				1	0	0.00
5.2-Sand	107	117	112	10	62.6	8,564	2	17,127	0.3432	172	E	3000			N/A	5.72011E-05	0.01

SETTLEMENT CALCULATION

PROJECT NAME: WCC 405/22 HOV **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: Fill Settlement side of north abutment 13' of fill - middle of embankment

Loaded Area	Length, L	200	ft	L>B	(A)
	Width, B	120	ft		(B)
	Load, Q	1,625	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **3.11** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'v (psf)	OCR	σ'p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
1-Clay Fill	0	8	4	8	125	500	7	3,500	0.9999	1,625	C		0.018		1	0.01131	1.09
2-Firm Clay	8	22	15	14	57.6	1,403	2.5	3,508	0.9930	1,614	C		0.016	0.17	1	0.005319	0.89
3-Stiff Clay	22	26	24	4	62.6	1,932	2	3,863	0.9742	1,583	C		0.019		1	0.004939	0.24
3a-Dense Sand	26	31	28.5	5	62.6	2,213	2	4,427	0.9595	1,559	E	1750			N/A	0.000891	0.05
3-Stiff Clay	31	42	36.5	11	62.6	2,714	2	5,428	0.9250	1,503	C		0.019		1	0.003637	0.48
4.1-SM/ML	42	52	47	10	62.6	3,371	2	6,743	0.8676	1,410	E	1000			N/A	0.00141	0.17
4.2-SP	52	72	62	20	62.6	4,310	2	8,621	0.7730	1,256	E	2000			N/A	0.000628	0.15
5.1-Clay	72	89	80.5	17	62.6	5,469	2	10,937	0.6552	1,065	C				1	0	0.00
5.2-Sand	89	99	94	10	62.6	6,314	2	12,627	0.5765	937	E	3000			N/A	0.000312	0.04

TOTAL= **3.11** inches

SETTLEMENT CALCULATION

PROJECT NAME: WCC 405/22 HOV **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: Fill Settlement top of south abutment - middle of fill

Loaded Area	Length, L	200	ft	L≥B	(A)
	Width, B	120	ft		(B)
	Load, Q	300	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.48** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'v (psf)	OCR	σ'p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
1-Clay Fill	0	26	13	26	125	1,625	7	11,375	0.9954	299	C		0.018		1	0.001318783	0.41
2-Firm Clay	26	40	33	14	57.6	3,653	1	3,653	0.9413	282	C		0.016	0.17	3	0.005497152	0.92
3-Stiff Clay	40	44	42	4	62.6	4,182	2	8,363	0.8963	269	C		0.019		1	0.000514267	0.02
3a-Dense Sand	44	49	46.5	5	62.6	4,463	2	8,927	0.8706	261	E	1750			N/A	0.000149238	0.01
3-Stiff Clay	49	60	54.5	11	62.6	4,964	2	9,928	0.8213	246	C		0.019		1	0.0003997	0.05
4.1-SM/ML	60	70	65	10	62.6	5,621	2	11,243	0.7535	226	E	1000			N/A	0.000226047	0.03
4.2-SP	70	90	80	20	62.6	6,560	2	13,121	0.6583	197	E	2000			N/A	9.87383E-05	0.02
5.1-Clay	90	107	98.5	17	62.6	7,719	2	15,437	0.5521	166	C				1	0	0.00
5.2-Sand	107	117	112	10	62.6	8,564	2	17,127	0.4849	145	E	3000			N/A	4.84932E-05	0.01

TOTAL= **1.48** inches

SETTLEMENT CALCULATION

PROJECT NAME: WCC 405/22 HOV **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: Fill Settlement top of south abutment - edge of fill

Loaded Area					
	Length, L	200	ft	L≥B	(A)
	Width, B	120	ft		(B)
	Load, Q	300	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

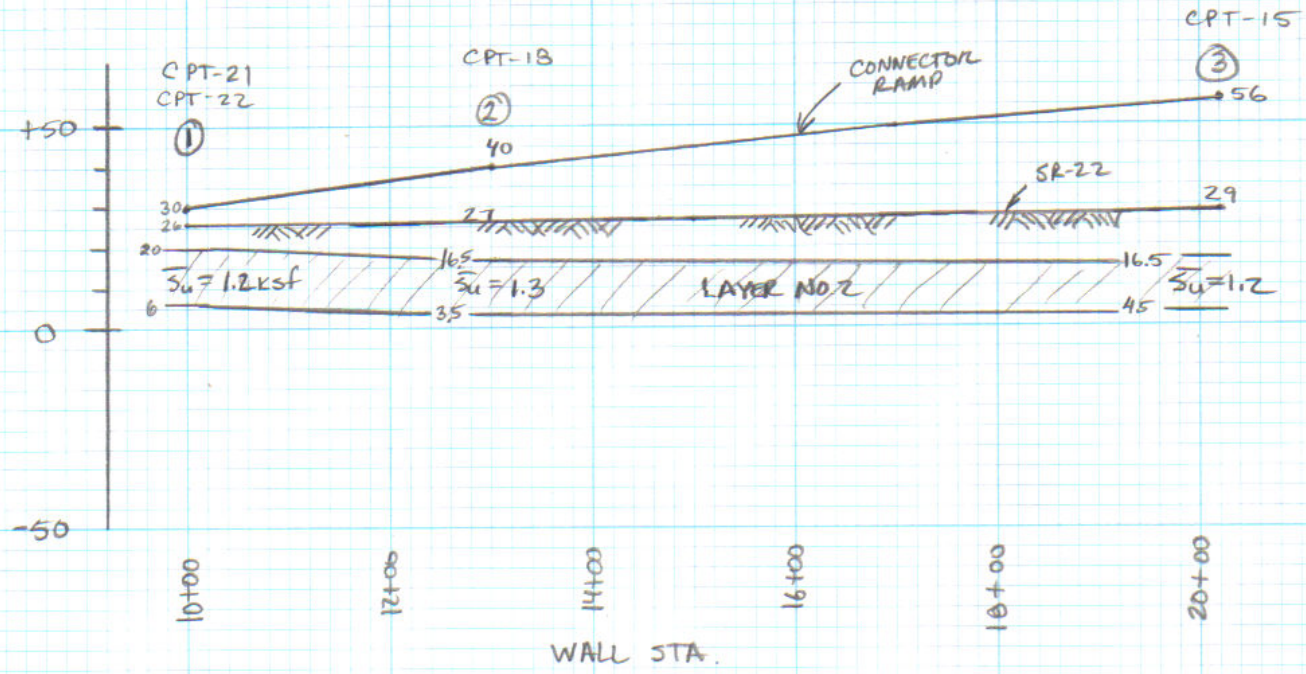
TOTAL= **0.79** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'v (psf)	OCR	σ'p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
1-Clay Fill	0	26	13	26	125	1,625	7	11,375	0.4994	150	C		0.018		1	0.000689361	0.22
2-Firm Clay	26	40	33	14	57.6	3,653	1	3,653	0.4905	147	C		0.016	0.17	3	0.002915444	0.49
3-Stiff Clay	40	44	42	4	62.6	4,182	2	8,363	0.4817	145	C		0.019		1	0.000280342	0.01
3a-Dense Sand	44	49	46.5	5	62.6	4,463	2	8,927	0.4761	143	E	1750			N/A	8.16181E-05	0.00
3-Stiff Clay	49	60	54.5	11	62.6	4,964	2	9,928	0.4643	139	C		0.019		1	0.000228368	0.03
4.1-SM/ML	60	70	65	10	62.6	5,621	2	11,243	0.4458	134	E	1000			N/A	0.000133747	0.02
4.2-SP	70	90	80	20	62.6	6,560	2	13,121	0.4150	124	E	2000			N/A	6.22494E-05	0.01
5.1-Clay	90	107	98.5	17	62.6	7,719	2	15,437	0.3736	112	C				1	0	0.00
5.2-Sand	107	117	112	10	62.6	8,564	2	17,127	0.3432	103	E	3000			N/A	3.43206E-05	0.00

TOTAL= **0.79** inches

RW 1299+1300
SETTLEMENT CALCULATIONS

ESTIMATION OF PRE-CONSOLIDATION PRESSURE



① EAST END
CPT-21
CPT-22

$\sigma'_{vo} = 125(6) + 120(4) + 5(57.6) \cong 1.5$ ksf

$\bar{S}_u/\sigma'_{vo} = 1.2/1.5 = 0.8$ $\quad (\bar{S}_u/\sigma'_{vo})_{NC} = 0.3$

$(\bar{S}_u/\sigma'_{vo})/(\bar{S}_u/\sigma'_{vo})_{NC} = 0.8/0.3 = 2.67$

LADD + FOOT → $OCR \cong 3.0$, $\sigma'_p = OCR \times \sigma'_{vo} = 3.0 \times 1.5 \cong 4.5$

---

② MIDDLE
CPT-18

$\sigma'_{vo} = 125(43.5 - 16.5) + 6.5(57.6) = 3.75$ ksf

$\bar{S}_u/\sigma'_{vo} = 1.3/3.75 = 0.35$ $\quad (\bar{S}_u/P_o)/(\bar{S}_u/P_o)_{NC} = \frac{0.35}{0.3} = 1.15$

LADD + FOOT → $OCR \cong 1.17$ $\quad \sigma'_p = 1.17(3.75) = 4.4$ ksf

---

③ WEST END

$\sigma'_{vo} = 125(29 - 16.5) + 57.6(6.0) = 1.9$ ksf

$\bar{S}_u/\sigma'_{vo} = 1.2/1.9 = 0.63$ $\quad (\bar{S}_u/P_o)/(\bar{S}_u/P_o)_{NC} = .63/.30 = 2.1$

→ $OCR \cong 2.3$ $\quad \sigma'_p = 2.3(1.9) = 4.3$ ksf

⇒ USE $\sigma'_p = 4.2$ ksf

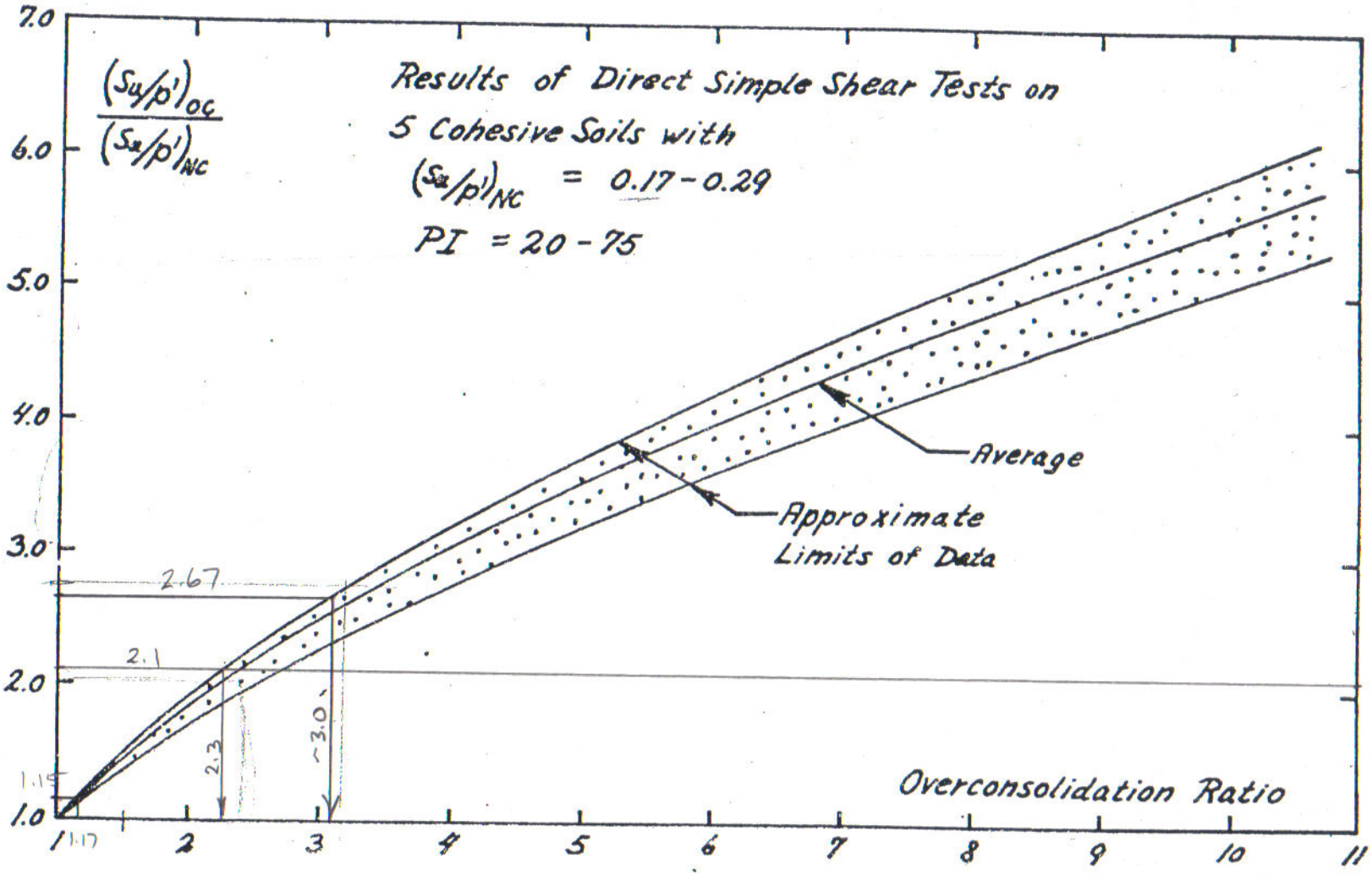


Fig. 19. Normalized Variation of s_u/p' - Ratio for Overconsolidated Clay (Modified from Ladd and Foot, 1974).

SURCHARGE

$u = u_i (1 - U_z)$

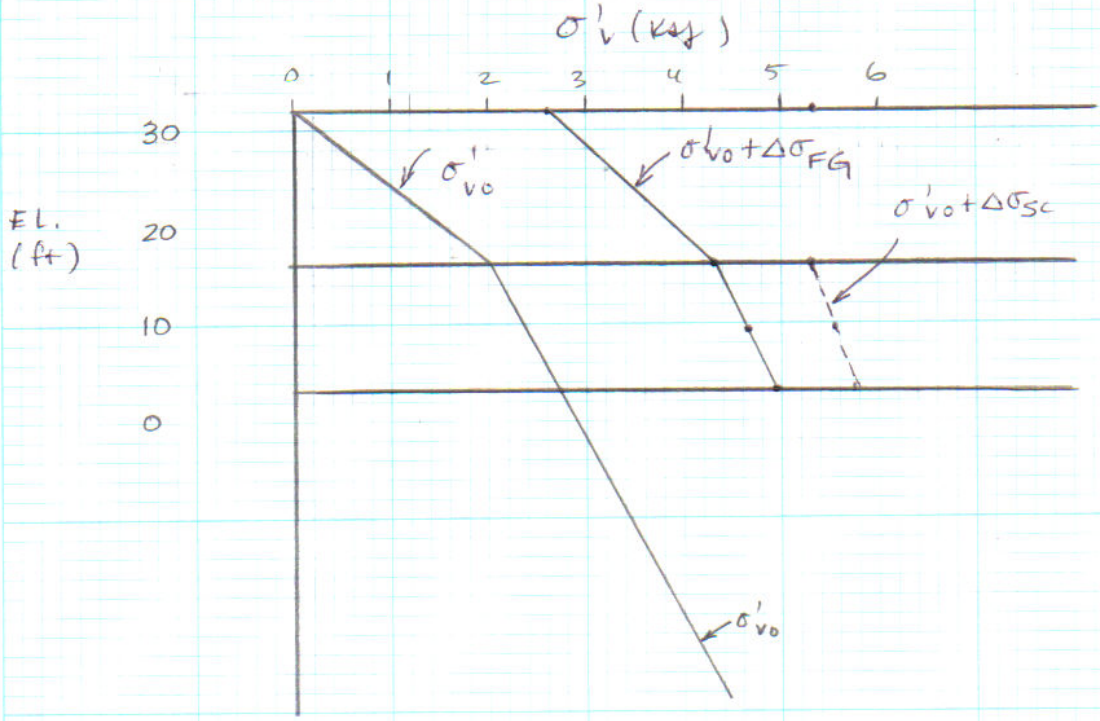
MAXIMUM SETTLEMENT @ POINT NO. 4 (EL. +32)

center

$\sigma'_{vo} = 2374$

$\Delta\sigma_{SUR.} = 3161$ $\quad (\sigma'_{vo} + \Delta\sigma)_{SUR} = 5535$ $\quad u_i = 3161$

$\Delta\sigma_{FG} = 2277$ $\quad (\sigma'_{vo} + \Delta\sigma)_{FG} = 4651$ $\quad u_i = 2277$



σ'_{vo}	$\Delta\sigma_{FG}$	$\sigma'_{vo}+\Delta\sigma$
0	2600	
2000	2300	4300
2374	2271	4651
2749	2200	4949

UNDER SURCHARGE

$\Delta\sigma_{TOP} = 3310$ $\quad \sigma'_{vo} + \Delta\sigma = 5310$

$\Delta\sigma_{MID.} = 3161$ $\quad = 5535$

$\Delta\sigma_{BOT} = 3000$ $\quad = 5749$

U_z	T	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.848	0.9
	TOP	1	1	1	1	1	1	1	1	1
	MID	.45	.57	.66	.74	.8	.84	.88	.89	.9
	BOT	.23	.40	.525	.63	.71	.78	.82	.84	.87

GROUP DELTA CONSULTANTS

PROJECT NAME: 405/22 HOV

PROJECT NUMBER: I-436 DATE: 11/10/08

DRAWN BY: CJ

CHECKED BY: _____

PAGE: _____ OF _____

@ CENTER

$$(\sigma'_{vo} + \Delta\sigma_{SUR}) - u(t) = (\sigma'_{vo} + \Delta\sigma_{FG})$$

$u(t) = 5535 - 4651 = 884$ psf $= u_i (1 - U_z)$

$u_{i_{SUR}} = 3161$

$$1 - U_z = \frac{884}{3161} = 0.28$$

$\rightarrow U_z = 1 - 0.28 = 0.72$

$\rightarrow T \approx 0.5$

@ BOTTOM

$5749 - u(t) = 4949$

$u(t) = 5749 - 4949 = 800 = 3000(1 - U_z)$

$$1 - U_z = \frac{800}{3000} = 0.27$$

$U_z = 0.73 \rightarrow T \approx 0.65$

$$t = \frac{T \cdot H_d^2}{C_v} = \frac{0.65(13\text{ft})^2}{0.33\ \text{ft}^2/\text{day}} = 332 \text{ days}$$

$\rightarrow$ 48 weeks or 11 mos.

Check $\sigma'_{vo} + \Delta\sigma_{FG}$ (@ bottom) $= 2749 + 2200 = 4949$ psf

$T = 0.65 \rightarrow U_z$ @ $z/H_d = 1 = 0.745$

excess $u = u_i(1 - U_z) = 3000(1 - .745) = 765$ psf @ 332 days

@ 332 days .... $\sigma'_v = \sigma'_{vo} + \Delta\sigma_{SC} - u_{excess}$

$= 2749 + 3000 - 765 = 4984$ psf $> (\sigma'_{vo} + \Delta\sigma_{FG})$

OK

@ $T = 0.65$

$$U_{Avg} = 100 - 10^{\frac{1.781 - T}{0.933}} \simeq 84\%$$

TABLE 9-1

U_{avg}	T
0.1	0.008
0.2	0.031
0.3	0.071
0.4	0.126
0.5	0.197
0.6	0.287
0.7	0.403
0.8	0.567
0.9	0.848
0.95	1.163
1.0	∞

where the initial pore pressure distribution is sinusoidal, half sine, and triangular are presented by Leonards (1962).

Casagrande (1938) and Taylor (1948) provide the following useful approximations:

For $U < 60\%$,

$$T = \frac{\pi}{4} U^2 = \frac{\pi}{4}\left(\frac{U\%}{100}\right)^2 \tag{9-10}$$

For $U > 60\%$,

$$T = 1.781 - 0.933 \log (100 - U\%) \tag{9-11}$$

EXAMPLE 9.3

Given:

$T = 0.05$ for a compressible clay deposit.

Required:

Average degree of consolidation and the percent consolidation at the center and at $z/H = 0.1$.

Solution:

From Table 9-1 and Fig. 9.5, $U_{avg} = 26\%$. Therefore the clay is 26% consolidated, on the average. From Fig. 9.3 you can see that the center of the layer is less than 0.5% consolidated, while at the "1 0.1) the clay is 73% consolidated. But, *on the average* th the clay is 26% consolidated.

What does the average consolidation mean in te U_{avg} can be expressed as

$$U_{avg} = \frac{s(t)}{s_c}$$

where $s(t)$ is the settlement at any time, and s_c is th consolidation (primary) settlement at $t = \infty$.

EXAMPLE 9.4

Given:

The data of Example 9.3.

Required:

Find the settlement when U_{avg} is 26%, if the final conso is 1 m.

Solution:

From Eq. 9-12, $s(t) = U_{avg}(s_c)$. Therefore

$$s(t) = 26\% \text{ (1 m)} = 0.26 \text{ m}$$

EXAMPLE 9.5

Given:

The soil profile and properties of Examples 9.1 and 9.2.

Required:

Compute the time required for the clay layer to settle 0.

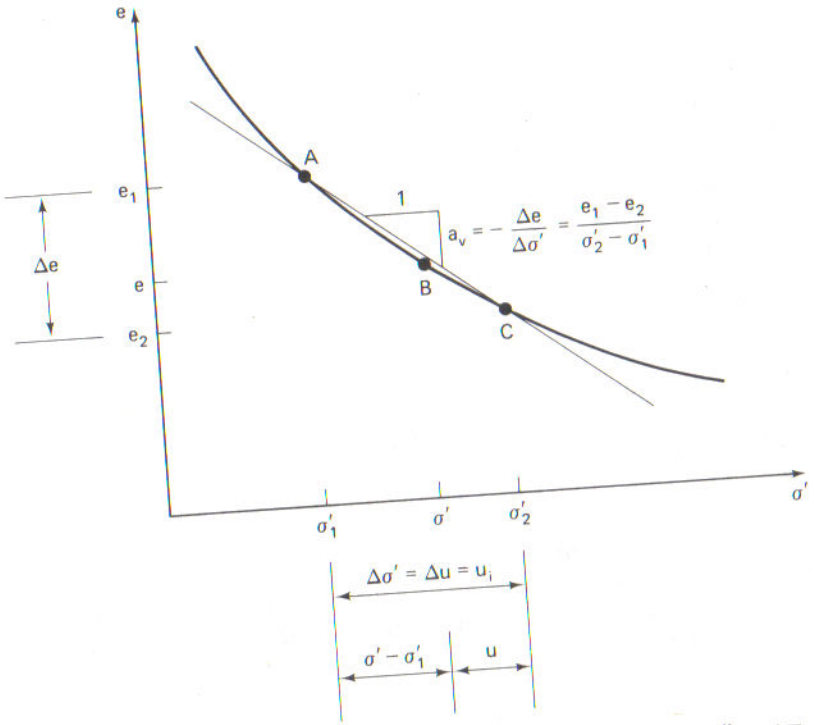


Fig. 9.2 Laboratory compression curve. Note: $\sigma' - \sigma'_1 = (\sigma'_2 - \sigma'_1) - u = u_i - u$.

consolidation ratio, Eq. 9-8, or

$$U_z = 1 - \sum_{n=0}^{\infty} f_1(Z) f_2(T) \tag{9-9}$$

The solution to this equation is shown graphically in Fig. 9.3 in terms of the dimensionless parameters already defined. The tedious calculations involved in solving Eq. 9-9 are no longer necessary. From Fig. 9.3 it is possible to find the amount or degree of consolidation (and therefore u and σ') for any real time after the start of loading and at any point in the consolidating layer. All you need to know is the c_v for the particular soil deposit, the total thickness of the layer, and boundary drainage conditions. With these items, the time factor T can be calculated from Eq. 9-5. It is applicable to any one-dimensional loading situation where the soil properties can be assumed to be the same throughout the compressible layer.

Figure 9.3 also is a picture of the *progress of consolidation*. The

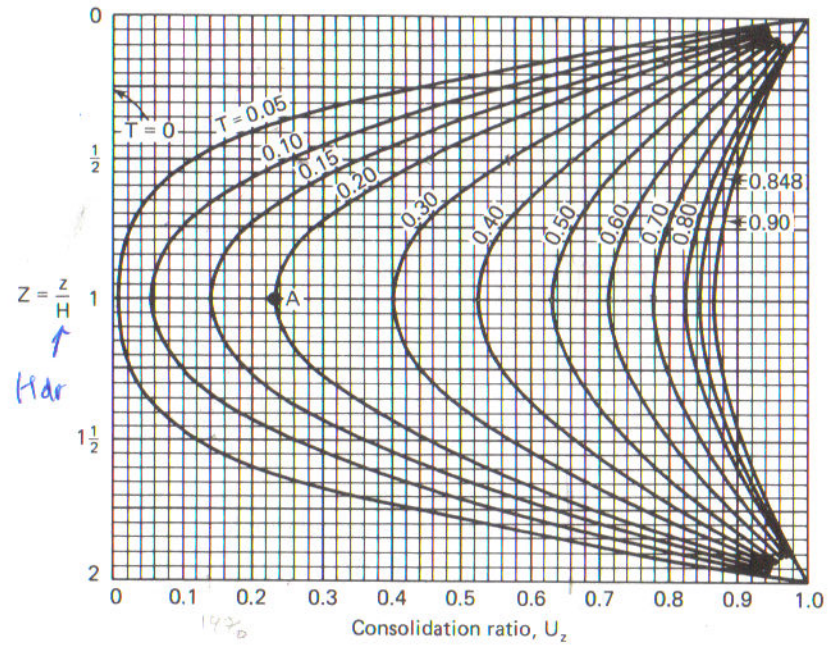


Fig. 9.3 Consolidation for any location and time factor in a doubly drained layer (after Taylor, 1948).

consolidation for a given time factor throughout the compressible layer. For example, the percent consolidation at midheight of a doubly drained layer (total thickness = $2H$) for a time factor equal to 0.2 is approximately 23% (see point A in Fig. 9.3). However at the same time (and time factor) at other locations within the soil layer, the degree of consolidation is different. At 25% of the depth, for example, $z/H = \frac{1}{2}$ and $U_z = 44\%$. Similarly, near the drainage surfaces at $z/H = 0.1$, for the same time factor, because the gradients are much higher, the clay is already 86% consolidated, which means that at that depth and time, 86% of the original excess pore pressure has dissipated and the effective stress has increased by a corresponding amount.

EXAMPLE 9.1

Given:

A 12 m thick layer of Chicago clay is *doubly drained*. (This means that a very pervious layer compared to the clay exists on top of and under the 12 m clay layer.) The coefficient of consolidation $c_v = 8.0 \times 10^{-8}$ m^2/s.

Based on correlations with Liquid Limit, considering the average LL of 36 for Layer No. 2, we estimated the overconsolidated Coefficient of Consolidation (C_v) for Layer 2 as 2.1 ft^2/day, and normally consolidated Cv of 0.33 ft^2/day (NAVFAC DM7.01). Following Terzaghi's theory of consolidation we assumed single drainage condition for Layer 2 (due to stiff clay layer below) and drainage height of 13 feet. Time (t) to complete a given average percent consolidation (U_{avg}) or percent of total predicted settlement may be determined from the Time Factor (T), drainage height (H_d), and Coefficient of Consolidation (C_v) as follows:

$$T = C_v * t / (H_d)^2$$

$$T = \pi/4 * (U_{avg}/100)^2 \quad \text{For } U_{avg} < 60\%$$

$$T = 1.781 - 0.933 * \log (100 - U_{avg}) \quad \text{For } U_{avg} > 60\%$$

OVERCONSOLIDATED PERCENT CONSOLIDATION vs. TIME (LAYER NO. 2)

U_{avg} (%)	60	70	80	90	95
T	0.286	0.403	0.567	0.848	1.129
t (days)	23	32	45	68	90

Overconsolidated $C_v = 2.1$ ft^2/day

Other than Layer No. 2, all other soils are very stiff and will complete most of the settlements within about 30 days after completion of embankment.

NORMALLY CONSOLIDATED % CONSOLIDATION vs. TIME (LAYER NO. 2)

U_{avg} (%)	60	70	80	90	95
T	0.286	0.403	0.567	0.848	1.129
t (days)	146	204	286	432	572

Normally consolidated $C_v = 0.33$ ft^2/day

AREA 1 SETTLEMENT ESTIMATE

Wall Station	Wall / Fill Height (ft)	Fill Type	Average Gross Loading (psf)	Depth Below OG (feet)	Net Load (psf)	Calculated Settlement (inches)		Estimated Settlement for Design (inches)
						Center	Edge	
10+00 to 11+00	4 to 8	LW Only	456	0	456	1.15	0.7	0.75-1.25
		LW + Soil	603		603	1.45	0.9	1.0-1.5
11+00 to 12+00	8 to 11	LW Only	576	1	451	1.14	0.7	0.75-1.25
		LW + Soil	913		788	1.8	1.14	1.25-2.0
12+00 to 13+00	11 to 16	LW Only	726	1	601	1.45	0.9	1.0-1.5
		LW + Soil	1300		1175	2.45	1.60	1.5-2.5

Note: Layer 2 settlement is about 30% of the total.

AREA 2 SETTLEMENT ESTIMATE

Wall Station	Wall / Fill Height (ft)	Fill Type	Average Gross Loading (psf)	Depth Below OG (feet)	Net Load (psf)	Calculated Settlement (inches)		Estimated Settlement for Design (inches)
						Center	Edge	
13+00 to 14+00	**16 to 20**	**LW**	**816**	**1**	**691**	**1.58**	**1.00**	**0.75-1.75**
14+00 to 15+00	**20 to 25**	**LW**	**951**	**1.5**	**764**	**1.71**	**1.10**	**1.0-2.0**
15+00 to 16+50	**25 to 29**	**LW**	**1086**	**0**	**1086**	**2.31**	**1.53**	**1.5-2.5**

Note: Layer 2 settlement is about 30% of the total.

AREA 3 SETTLEMENT ESTIMATE

Wall Station	Wall / Fill Height (ft)	Fill Type	Average Gross Loading (psf)	Depth Below OG (feet)	Net Load (psf)	Calculated Settlement (inches)		Estimated Settlement for Design (inches)
						Center	Edge	
16+50 to 19+00	**26 to 28**	**LW**	**1086**	**0**	**1086**	**2.46**	**1.61**	**1.5-2.5**

Note: Layer 2 settlement is about 30% of the total.
Assumes partial surcharge is completed before wall construction

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 10+00 to 11+00 (LW Fill, Center)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	456	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.15** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9982	455	C		0.018		1	0.00506	0.49
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9318	425	C		0.016	0.17	1	0.001838	0.31
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.7131	325	C		0.019		1	0.001072	0.23
Dense SM	40	66	53	26	63.6	3,706			0.4517	206	E	1000			N/A	0.000206	0.06
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2875	131	C		0.017		1	0.000186	0.04
Dense SM	86	103	94.5	17	62.6	6,297			0.2079	95	E	3000			N/A	3.16E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1717	78	C		0.017		1	8.16E-05	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1448	66	E	3000			N/A	2.2E-05	0.00

TOTAL= **1.15** inches

SETTLEMENT CALCULATION

INSTRUCTIONS:

1 Program calculates settlement under center, short edge, long edge, or corner of shaded rectangular loaded areas, using Boussinesq stress distribution and consolidation theory or elastic modulus compressibility.

2 Input data in shaded fields. Unshaded fields are automatically calculated. Up to 26 soil layers may be used.

3 Explanation of the calculation procedure and guidance for input of data in rows (A) through (E) and columns (1) through (16) is provided below.

ROW AND COLUMN NOTES

(A)	Input length (long side) of rectangular loaded area.
(B)	Input width (short side) of rectangular loaded area.
(C)	Input applied load at the base of the loaded area (pounds per square foot)
(D)	Input depth of applied load below the ground surface (the depth must coincide with a bottom-of-layer boundary specified in Column (2)
(E)	Input 1, 2, 3, or 4 to calculate the settlement under the center, midpoint of short edge, midpoint of long edge, or corner, respectively, of the rectangular loaded area.
(1)	Input Soil Layer number and/or description (optional).
(2)	Starting with the ground surface (depth = 0) input the depth to top and bottom of each soil layer below the ground surface. The depth to center of the layer is automatically calculated.
(3)	The layer height or thickness is automatically computed (H=depth to top of layer minus depth to bottom of layer).
(4)	Input unit weight of soil in the layer (total unit weight above the water table, buoyant unit weight below the water table).
(5)	Vertical effective stress (pounds per square foot) at the center of each layer prior to the new loading is automatically computed.
(6)	Input Overconsolidation Ratio (OCR) defined as the ratio of maximum past preconsolidation pressure (column (7)) to current effective vertical stress (Column (5)). OCR=1 is Normally Consolidated.
(7)	Maximum past preconsolidation pressure is calculated as the product of Column (5) and Column (6), or $\sigma'_p = OCR * \sigma'_v$.
(8)	The stress increase coefficient ($I\sigma$) at the center of each layer is computed using Newmark integration of Boussinesq theory based on vertical depth below bottom of loaded area and position on loaded area input in Row E.
(9)	The increase in stress ($\Delta\sigma$) at the center of each layer due to the loaded area is computed as the product of $I\sigma$ (Column (8)) and load Q (Row (C)).
(10)	Input compressibility type for each layer. "E" means elastic modulus (slope of stress versus strain curve) is used, "C" means consolidation theory is used (slope of log stress versus strain curve) is used.
(11)	Input elastic modulus (E in ksf) value for each layer where "E" is selected in Column 10.
(12)	Input Recompression Ratio, or slope of log stress versus strain curve, in the overconsolidated range (if soil is normally consolidated this value need not be input).
(13)	Input Virgin Compression Ratio, or slope of log stress versus strain curve, in the normally consolidated range.
(14)	Virgin and/or Recomp. Case determined ("C" Comp. Type Only). Case 1 = entire loading is within recompression range, Case 2 - Loading patially recompression partially virgin, Case 3 - entirely virgin (norm cons.)
(15)	Strain ε is calculated as $\Delta\sigma$ / E if "E" is specified in Column (10), or by consolidation theory using the appropriate recompression and/or virgin slopes if "C" is specified in Column (10).
(16)	Layer settlement (inches) is computed as Strain (Column (15)) times Height (Column (3) converted to inches). Total settlement (inches) of all layers is summed up at the bottom of Column (16).

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 10+00 to 11+00 (LW Fill, Edge)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	456	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.70** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	228	C		0.018		1	0.002936	0.28
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4909	224	C		0.016	0.17	1	0.001029	0.17
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4416	201	C		0.019		1	0.00068	0.15
Dense SM	40	66	53	26	63.6	3,706			0.3359	153	E	1000			N/A	0.000153	0.05
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2385	109	C		0.017		1	0.000154	0.04
Dense SM	86	103	94.5	17	62.6	6,297			0.1817	83	E	3000			N/A	2.76E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1536	70	C		0.017		1	7.3E-05	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1318	60	E	3000			N/A	2E-05	0.00

TOTAL= **0.70** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 10+00 to 11+00 (LW+Reg Fill, Center)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	603	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.45** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9982	602	C		0.018		1	0.006177	0.59
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9318	562	C		0.016	0.17	1	0.00234	0.39
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.7131	430	C		0.019		1	0.00139	0.30
Dense SM	40	66	53	26	63.6	3,706			0.4517	272	E	1000			N/A	0.000272	0.08
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2875	173	C		0.017		1	0.000244	0.06
Dense SM	86	103	94.5	17	62.6	6,297			0.2079	125	E	3000			N/A	4.18E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1717	104	C		0.017		1	0.000108	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1448	87	E	3000			N/A	2.91E-05	0.01

TOTAL= **1.45** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 10+00 to 11+00 (LW+Reg Fill, Edge)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	603	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.90** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	301	C		0.018		1	0.003688	0.35
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4909	296	C		0.016	0.17	1	0.00133	0.22
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4416	266	C		0.019		1	0.000888	0.19
Dense SM	40	66	53	26	63.6	3,706			0.3359	203	E	1000			N/A	0.000203	0.06
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2385	144	C		0.017		1	0.000203	0.05
Dense SM	86	103	94.5	17	62.6	6,297			0.1817	110	E	3000			N/A	3.65E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1536	93	C		0.017		1	9.64E-05	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1318	79	E	3000			N/A	2.65E-05	0.01

TOTAL= **0.90** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 11+00 to 12+00 (LW Fill, Center)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	451	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.14** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9982	450	C		0.018		1	0.005019	0.48
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9318	420	C		0.016	0.17	1	0.00182	0.31
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.7131	322	C		0.019		1	0.001061	0.23
Dense SM	40	66	53	26	63.6	3,706			0.4517	204	E	1000			N/A	0.000204	0.06
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2875	130	C		0.017		1	0.000184	0.04
Dense SM	86	103	94.5	17	62.6	6,297			0.2079	94	E	3000			N/A	3.13E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1717	77	C		0.017		1	8.07E-05	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1448	65	E	3000			N/A	2.18E-05	0.00

TOTAL= **1.14** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 11+00 to 12+00 (LW Fill, Edge)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	451	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.70** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	225	C		0.018		1	0.002909	0.28
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4909	221	C		0.016	0.17	1	0.001018	0.17
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4416	199	C		0.019		1	0.000673	0.15
Dense SM	40	66	53	26	63.6	3,706			0.3359	151	E	1000			N/A	0.000151	0.05
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2385	108	C		0.017		1	0.000153	0.04
Dense SM	86	103	94.5	17	62.6	6,297			0.1817	82	E	3000			N/A	2.73E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1536	69	C		0.017		1	7.22E-05	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1318	59	E	3000			N/A	1.98E-05	0.00

TOTAL= **0.70** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 11+00 to 12+00 (LW+Reg Fill, Center)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	788	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.80** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9982	787	C		0.018		1	0.007388	0.71
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9318	734	C		0.016	0.17	1	0.002925	0.49
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.7131	562	C		0.019		1	0.001774	0.38
Dense SM	40	66	53	26	63.6	3,706			0.4517	356	E	1000			N/A	0.000356	0.11
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2875	227	C		0.017		1	0.000318	0.08
Dense SM	86	103	94.5	17	62.6	6,297			0.2079	164	E	3000			N/A	5.46E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1717	135	C		0.017		1	0.00014	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1448	114	E	3000			N/A	3.8E-05	0.01

TOTAL= **1.80** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 11+00 to 12+00 (LW+Reg Fill, Edge)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	788	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.14** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	394	C		0.018		1	0.004541	0.44
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4909	387	C		0.016	0.17	1	0.001692	0.28
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4416	348	C		0.019		1	0.001143	0.25
Dense SM	40	66	53	26	63.6	3,706			0.3359	265	E	1000			N/A	0.000265	0.08
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2385	188	C		0.017		1	0.000265	0.06
Dense SM	86	103	94.5	17	62.6	6,297			0.1817	143	E	3000			N/A	4.77E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1536	121	C		0.017		1	0.000126	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1318	104	E	3000			N/A	3.46E-05	0.01

TOTAL= **1.14** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 12+00 to 13+00 (LW Fill, Center)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	601	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.45** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9982	600	C		0.018		1	0.006163	0.59
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9318	560	C		0.016	0.17	1	0.002334	0.39
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.7131	429	C		0.019		1	0.001386	0.30
Dense SM	40	66	53	26	63.6	3,706			0.4517	271	E	1000			N/A	0.000271	0.08
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2875	173	C		0.017		1	0.000244	0.06
Dense SM	86	103	94.5	17	62.6	6,297			0.2079	125	E	3000			N/A	4.17E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1717	103	C		0.017		1	0.000107	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1448	87	E	3000			N/A	2.9E-05	0.01

TOTAL= **1.45** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 12+00 to 13+00 (LW Fill, Edge)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	601	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.90** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	300	C		0.018		1	0.003678	0.35
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4909	295	C		0.016	0.17	1	0.001326	0.22
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4416	265	C		0.019		1	0.000885	0.19
Dense SM	40	66	53	26	63.6	3,706			0.3359	202	E	1000			N/A	0.000202	0.06
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2385	143	C		0.017		1	0.000203	0.05
Dense SM	86	103	94.5	17	62.6	6,297			0.1817	109	E	3000			N/A	3.64E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1536	92	C		0.017		1	9.61E-05	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1318	79	E	3000			N/A	2.64E-05	0.01

TOTAL= **0.90** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 12+00 to 13+00 (LW+Reg Fill, Center)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	1,175	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **2.45** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9982	1,173	C		0.018		1	0.009441	0.91
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9318	1,095	C		0.016	0.17	1	0.004008	0.67
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.7131	838	C		0.019		1	0.002523	0.54
Dense SM	40	66	53	26	63.6	3,706			0.4517	531	E	1000			N/A	0.000531	0.17
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2875	338	C		0.017		1	0.000469	0.11
Dense SM	86	103	94.5	17	62.6	6,297			0.2079	244	E	3000			N/A	8.14E-05	0.02
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1717	202	C		0.017		1	0.000208	0.02
Dense SM	110	126	118	16	62.6	7,768			0.1448	170	E	3000			N/A	5.67E-05	0.01

TOTAL= **2.45** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 12+00 to 13+00 (LW+Reg Fill, Edge)

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	50	ft		(B)
	Load, Q	1,175	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.60** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	587	C		0.018		1	0.006073	0.58
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4909	577	C		0.016	0.17	1	0.002393	0.40
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4416	519	C		0.019		1	0.001651	0.36
Dense SM	40	66	53	26	63.6	3,706			0.3359	395	E	1000			N/A	0.000395	0.12
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2385	280	C		0.017		1	0.000391	0.09
Dense SM	86	103	94.5	17	62.6	6,297			0.1817	213	E	3000			N/A	7.12E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1536	180	C		0.017		1	0.000187	0.02
Dense SM	110	126	118	16	62.6	7,768			0.1318	155	E	3000			N/A	5.16E-05	0.01

TOTAL= **1.60** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 13+00 to 14+00 edge

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	45	ft		(B)
	Load, Q	691	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.00** inches

(1) Soil Layer	(2) Depth (feet) top	bottom	center	(3) Layer Height (feet)	(4) γ (pcf)	(5) σ'v (psf)	(6) OCR	(7) σ'p (psf)	(8) Stress Distribution Iσ	Δσ (psf)	(10) Compress. Type E or C	(11) E (ksf)	(12) Cr 1+e0	(13) Cc 1+e0	(14) OCR Case	(15) Strain ε (in/in)	(16) Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	345	C		0.018		1	0.004105	0.39
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4894	338	C		0.016	0.17	1	0.0015	0.25
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4338	300	C		0.019		1	0.000993	0.21
Dense SM	40	66	53	26	63.6	3,706			0.3217	222	E	1000			N/A	0.000222	0.07
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2239	155	C		0.017		1	0.000219	0.05
Dense SM	86	103	94.5	17	62.6	6,297			0.1687	117	E	3000			N/A	3.89E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1419	98	C		0.017		1	0.000102	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1213	84	E	3000			N/A	2.79E-05	0.01

TOTAL= **1.00** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 13+00 to 14+00 center

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	45	ft		(B)
	Load, Q	691	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.58** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9976	689	C		0.018		1	0.006774	0.65
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9149	632	C		0.016	0.17	1	0.002585	0.43
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.6749	466	C		0.019		1	0.001498	0.32
Dense SM	40	66	53	26	63.6	3,706			0.4167	288	E	1000			N/A	0.000288	0.09
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2624	181	C		0.017		1	0.000255	0.06
Dense SM	86	103	94.5	17	62.6	6,297			0.1889	131	E	3000			N/A	4.35E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1557	108	C		0.017		1	0.000112	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1311	91	E	3000			N/A	3.02E-05	0.01

TOTAL= **1.58** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 14+00 to 15+00 center

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	45	ft		(B)
	Load, Q	764	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.71** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9976	762	C		0.018		1	0.007239	0.69
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9149	699	C		0.016	0.17	1	0.002809	0.47
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.6749	516	C		0.019		1	0.001641	0.35
Dense SM	40	66	53	26	63.6	3,706			0.4167	318	E	1000			N/A	0.000318	0.10
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2624	200	C		0.017		1	0.000282	0.07
Dense SM	86	103	94.5	17	62.6	6,297			0.1889	144	E	3000			N/A	4.81E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1557	119	C		0.017		1	0.000124	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1311	100	E	3000			N/A	3.34E-05	0.01

TOTAL= **1.71** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 14+00 to 15+00 edge

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	45	ft		(B)
	Load, Q	764	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.10** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	382	C		0.018		1	0.004435	0.43
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4894	374	C		0.016	0.17	1	0.001641	0.28
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4338	331	C		0.019		1	0.001092	0.24
Dense SM	40	66	53	26	63.6	3,706			0.3217	246	E	1000			N/A	0.000246	0.08
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2239	171	C		0.017		1	0.000241	0.06
Dense SM	86	103	94.5	17	62.6	6,297			0.1687	129	E	3000			N/A	4.3E-05	0.01
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1419	108	C		0.017		1	0.000113	0.01
Dense SM	110	126	118	16	62.6	7,768			0.1213	93	E	3000			N/A	3.09E-05	0.01

TOTAL= **1.10** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 15+00 to 16+50 center

Loaded Area					
	Length, L	150	ft	L≥B	(A)
	Width, B	45	ft		(B)
	Load, Q	1,086	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **2.31** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9977	1,083	C		0.018		1	0.009012	0.87
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9185	997	C		0.016	0.17	1	0.003731	0.63
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.6949	755	C		0.019		1	0.002304	0.50
Dense SM	40	66	53	26	63.6	3,706			0.4598	499	E	1000			N/A	0.000499	0.16
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.3125	339	C		0.017		1	0.000471	0.11
Dense SM	86	103	94.5	17	62.6	6,297			0.2365	257	E	3000			N/A	8.56E-05	0.02
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.2000	217	C		0.017		1	0.000224	0.02
Dense SM	110	126	118	16	62.6	7,768			0.1719	187	E	3000			N/A	6.22E-05	0.01

TOTAL= **2.31** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 15+00 to 16+50 edge

Loaded Area					
	Length, L	150	ft	L≥B	(A)
	Width, B	45	ft		(B)
	Load, Q	1,086	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.53** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4998	543	C		0.018		1	0.005746	0.55
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4922	534	C		0.016	0.17	1	0.002243	0.38
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4500	489	C		0.019		1	0.001563	0.34
Dense SM	40	66	53	26	63.6	3,706			0.3585	389	E	1000			N/A	0.000389	0.12
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.2686	292	C		0.017		1	0.000407	0.10
Dense SM	86	103	94.5	17	62.6	6,297			0.2123	231	E	3000			N/A	7.68E-05	0.02
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.1830	199	C		0.017		1	0.000205	0.02
Dense SM	110	126	118	16	62.6	7,768			0.1595	173	E	3000			N/A	5.77E-05	0.01

TOTAL= **1.53** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 16+50to 19+00 center

Loaded Area					
	Length, L	250	ft	L≥B	(A)
	Width, B	55	ft		(B)
	Load, Q	1,086	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **2.46** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.9987	1,085	C		0.018		1	0.009017	0.87
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.9496	1,031	C		0.016	0.17	1	0.003828	0.64
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.7766	843	C		0.019		1	0.002537	0.55
Dense SM	40	66	53	26	63.6	3,706			0.5590	607	E	1000			N/A	0.000607	0.19
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.4111	446	C		0.017		1	0.000614	0.15
Dense SM	86	103	94.5	17	62.6	6,297			0.3302	359	E	3000			N/A	0.00012	0.02
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.2895	314	C		0.017		1	0.000322	0.03
Dense SM	110	126	118	16	62.6	7,768			0.2568	279	E	3000			N/A	9.3E-05	0.02

TOTAL= **2.46** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 16+50to 19+00 edge

Loaded Area					
	Length, L	250	ft	L≥B	(A)
	Width, B	55	ft		(B)
	Load, Q	1,086	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.61** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	7	3,500	0.4999	543	C		0.018		1	0.005747	0.55
Firm CL	8	22	15	14	57.6	1,403	2.5	3,508	0.4959	539	C		0.016	0.17	1	0.002257	0.38
V. Stiff CL	22	40	31	18	59.6	2,343	3	7,028	0.4715	512	C		0.019		1	0.001631	0.35
Dense SM	40	66	53	26	63.6	3,706			0.4094	445	E	1000			N/A	0.000445	0.14
V. Stiff CL	66	86	76	20	61.6	5,149	2	10,298	0.3377	367	C		0.017		1	0.000508	0.12
Dense SM	86	103	94.5	17	62.6	6,297			0.2863	311	E	3000			N/A	0.000104	0.02
Hard CL	103	110	106.5	7	62.6	7,048	2	14,096	0.2571	279	C		0.017		1	0.000287	0.02
Dense SM	110	126	118	16	62.6	7,768			0.2322	252	E	3000			N/A	8.41E-05	0.02

TOTAL= **1.61** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1299 & 1300 - 1000psf 60x400 at El 54' St E 3307-3311 [8 ft of fill on top of existing connector ramp]

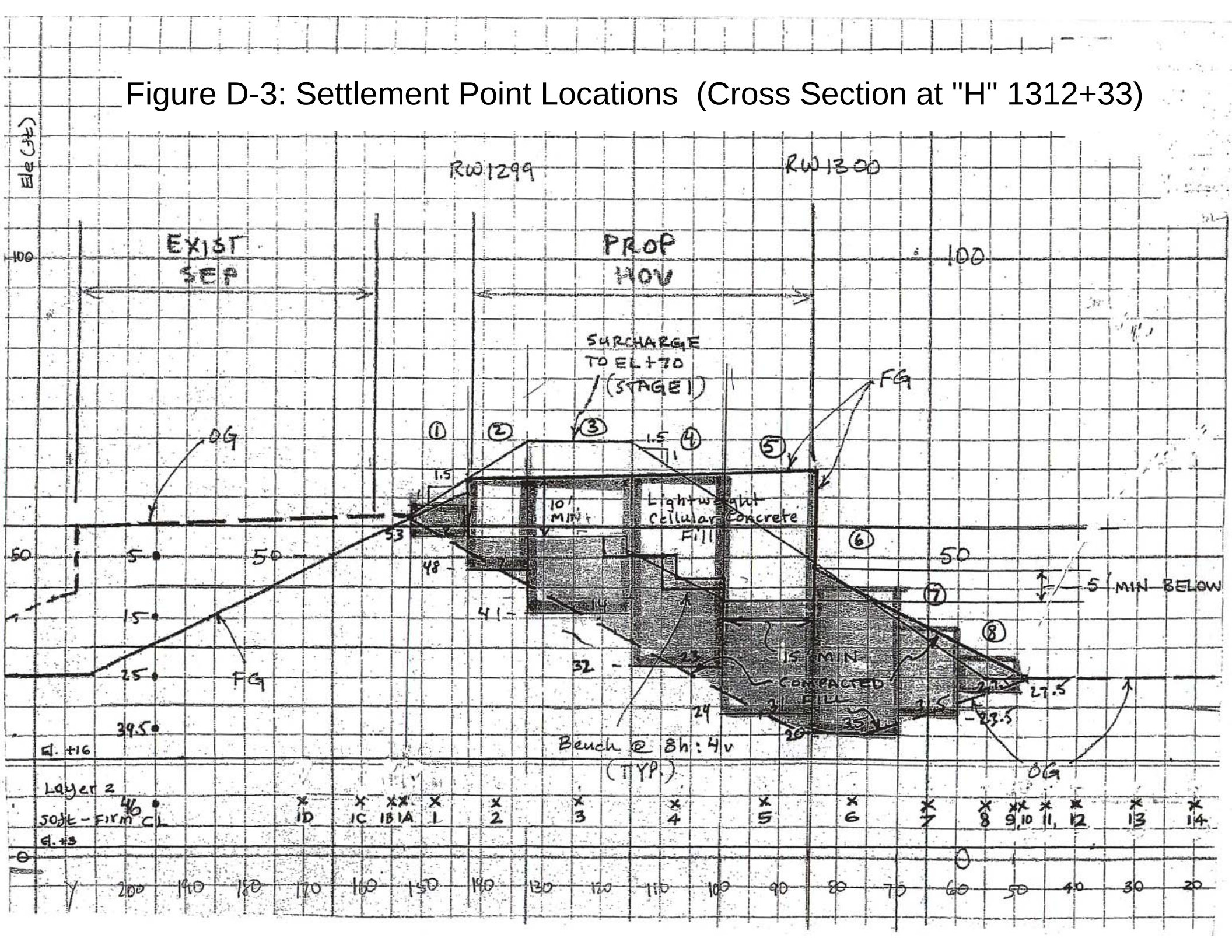
Loaded Area	Length, L	400	ft	L≥B	(A)
	Width, B	60	ft		(B)
	Load, Q	1,000	psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

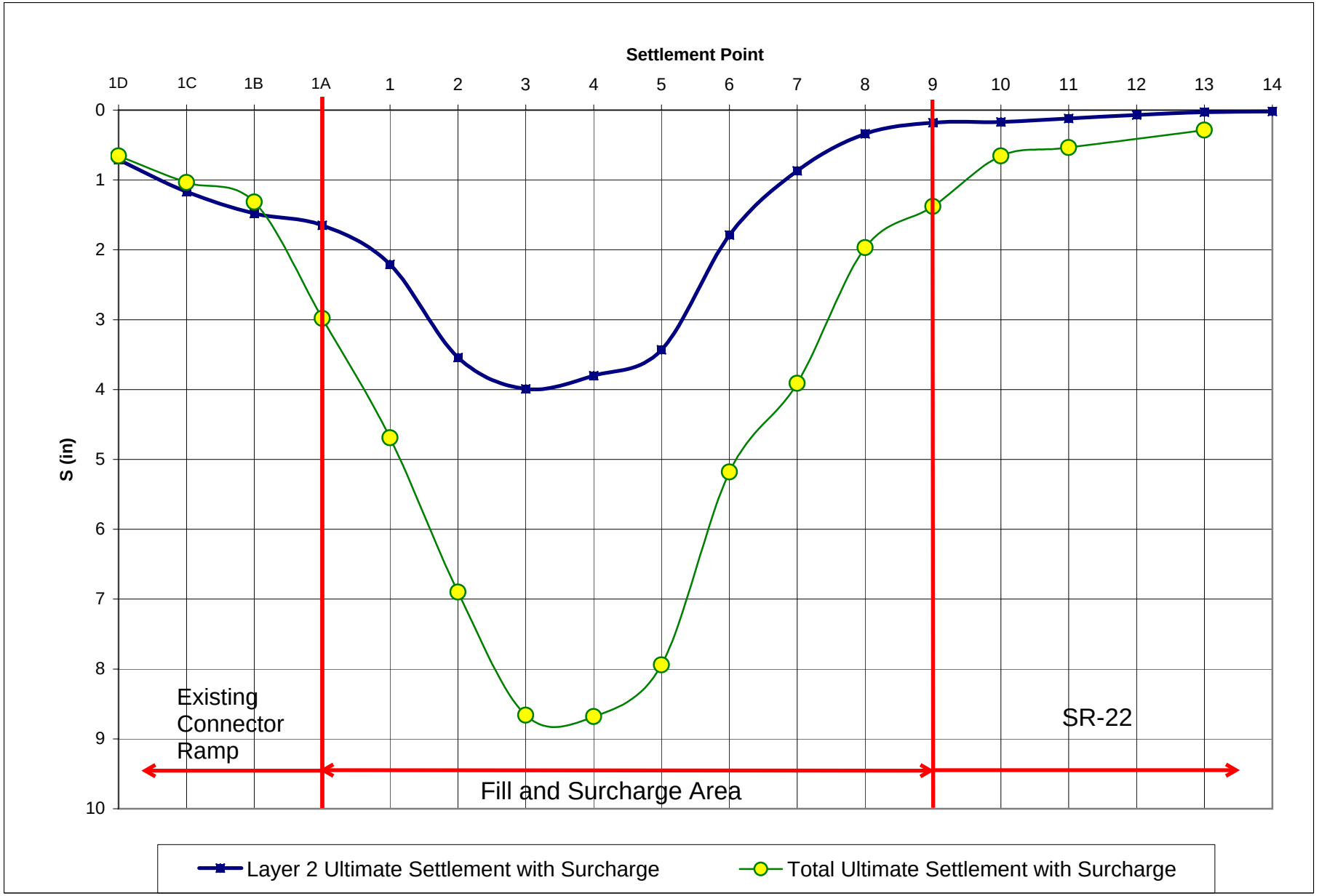
TOTAL= **3.57** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'v (psf)	OCR	σ'p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	5	2,500	0.9990	999	C		0.018		1	0.008583	0.82
Stiff CL	8	18	13	10	125	1,625	5	8,125	0.9719	972	C		0.018		1	0.003665	0.44
Stiff CL	18	28	23	10	125	2,875	5	14,375	0.8909	891	C		0.018		1	0.00211	0.25
Stiff CL	28	38	33	10	125	4,125	5	20,625	0.7863	786	C		0.018		1	0.001364	0.16
Firm CL	38	52	45	14	57.6	5,153	1	5,153	0.6674	667	C		0.016	0.17	3	0.008992	1.51
V. Stiff CL	52	68	60	16	60	6,036	3	18,109	0.5482	548	C		0.019		1	0.000717	0.14
Dense SM	68	94	81	26	64	7,348	2	14,697	0.4295	430	E	1000			N/A	0.00043	0.13
Hard CL	94	106	100	12	64	8,564	2	17,129	0.3547	355	C		0.017		1	0.0003	0.04
Dense SM	106	124	115	18	64	9,524	2	19,049	0.3096	310	E	3000			N/A	0.000103	0.02
Hard CL	124	134	129	10	64	10,420	2	20,841	0.2753	275	C		0.017		1	0.000193	0.02
Dense SM	134	154	144	20	64	11,380	2	22,761	0.2447	245	E	3000			N/A	8.16E-05	0.02

TOTAL= **3.57** inches

Figure D-3: Settlement Point Locations (Cross Section at "H" 1312+33)





Notes:
1. Layer 2 is the firm to stiff clay layer as shown in Table 1 and Figure 5 of main report.
2. See previous sheet for settlement point locations and cross section

BOUSSINESQ STRESS DISTRIBUTION (El+55 Reference Elevation)

Surchage

			Δσ, ksf																
Layer	**DEPTH FT**	**ELEV FT**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**1A**	**1B**	**1C**	**1D**
1	**5**	**50**	0.787	0.025	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.416	0.1	0.009	0.001
2	**15**	**40**	0.730	1.642	3.647	0.014	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.414	0.303	0.147	0.034
3	**25**	**30**	0.848	1.714	2.964	4.394	0.086	0.019	0.008	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.571	0.462	0.297	0.119
4	**34.5**	**20.5**	0.973	1.659	2.561	3.500	4.403	0.211	1.490	0.245	0.139	0.116	0.050	0.021	0.008	0.005	0.718	0.612	0.441	0.223
5 (soft Layer)	**46**	**9**	1.062	1.575	2.339	3.161	3.720	3.359	1.626	0.657	0.396	0.357	0.240	0.149	0.065	0.033	0.847	0.752	0.588	0.35
6	**61**	**-6**	1.113	1.504	2.092	2.737	3.047	2.665	1.770	1.064	0.796	0.750	0.589	0.434	0.240	0.138	0.94	0.861	0.716	0.486
7	**82**	**-27**	1.087	1.358	1.741	2.110	2.219	1.981	1.558	1.176	0.998	0.964	0.837	0.695	0.472	0.319	0.961	0.901	0.789	0.594
8	**101**	**-46**	0.993	1.179	1.425	1.635	1.677	1.534	1.298	1.073	0.959	0.937	0.850	0.747	0.566	0.422	0.902	0.858	0.773	0.619
9	**116**	**-61**	0.897	1.033	1.204	1.340	1.361	1.264	1.108	0.955	0.876	0.860	0.797	0.720	0.578	0.456	0.828	0.795	0.729	0.605
10	**130**	**-75**	0.805	0.906	1.028	1.120	1.131	1.062	0.954	0.845	0.788	0.776	0.729	0.671	0.560	0.459	0.752	0.726	0.675	0.576
11	**145**	**-90**	0.711	0.785	0.871	0.933	0.938	0.890	0.814	0.738	0.696	0.688	0.653	0.610	0.525	0.445	0.672	0.652	0.613	0.535

```
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*           DISTRIBUTION ANALYSIS           *
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*     ORANGE, CA 92665.  (714) 496-8861     *
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NUMBER OF LOADED AREAS = 8

NUMBER OF SOIL LAYERS = 11

NUMBER OF STRESS POINTS = 18

POISSONS RATIO = .40

STRESS DISTRIBUTION CODE = 1

"RW1299&1300 Settlement_Surcharge

"

SURFACE NUMBER	LOADING INTENSITY KSF	DEPTH FEET	LOADED SURFACES X1	Y1	X2	Y2	CORNER CO-ORDINATES X3	Y3	X4	Y4
1	.840	2.0	50.0	142.5	50.0	152.5	200.0	152.5	200.0	142.5
2	2.280	7.0	50.0	132.5	50.0	142.5	200.0	142.5	200.0	132.5
3	3.480	14.0	50.0	115.0	50.0	132.5	200.0	132.5	200.0	115.0
4	3.840	23.0	50.0	100.0	50.0	115.0	200.0	115.0	200.0	100.0
5	3.720	31.0	50.0	85.0	50.0	100.0	200.0	100.0	200.0	85.0
6	3.000	35.0	50.0	70.0	50.0	85.0	200.0	85.0	200.0	70.0
7	1.500	31.5	50.0	60.0	50.0	70.0	200.0	70.0	200.0	60.0
8	.250	27.5	50.0	50.0	50.0	60.0	200.0	60.0	200.0	50.0

SETTLEMENT ANALYSIS

TABLE OF STRESS POINT COORDINATES

POINT NO.	X-COORDINATE	Y-COORDINATE, FEET
1	125.0	147.5
2	125.0	137.5
3	125.0	123.8
4	125.0	107.5
5	125.0	92.5
6	125.0	77.5
7	125.0	65.0
8	125.0	55.0
9	125.0	50.0
10	125.0	49.0
11	125.0	45.0
12	125.0	40.0
13	125.0	30.0
14	125.0	20.0
15	125.0	152.5
16	125.0	155.0
17	125.0	160.0
18	125.0	170.0

SETTLEMENT ANALYSIS

****** BOUSSINESQ STRESS DISTRIBUTION ******

STRESS POINT NO.	1	2	3	4	5	6	7	8	9	10	11
DEPTH FEET / STRESS KSF											
5.0	.787	.025	.001	.000	.000	.000	.000	.000	.000	.000	.000
15.0	.730	1.642	3.647	.014	.003	.001	.000	.000	.000	.000	.000
25.0	.848	1.714	2.964	4.394	.086	.019	.008	.004	.003	.003	.002
34.5	.973	1.659	2.561	3.500	4.403	.211	1.490	.245	.139	.116	.050
46.0	1.062	1.575	2.339	3.161	3.720	3.359	1.626	.657	.396	.357	.240
61.0	1.113	1.504	2.092	2.737	3.047	2.665	1.770	1.064	.796	.750	.589
82.0	1.087	1.358	1.741	2.110	2.219	1.981	1.558	1.176	.998	.964	.837
101.0	.993	1.179	1.425	1.635	1.677	1.534	1.298	1.073	.959	.937	.850
116.0	.897	1.033	1.204	1.340	1.361	1.264	1.108	.955	.876	.860	.797
130.0	.805	.906	1.028	1.120	1.131	1.062	.954	.845	.788	.776	.729
145.0	.711	.785	.871	.933	.938	.890	.814	.738	.696	.688	.653

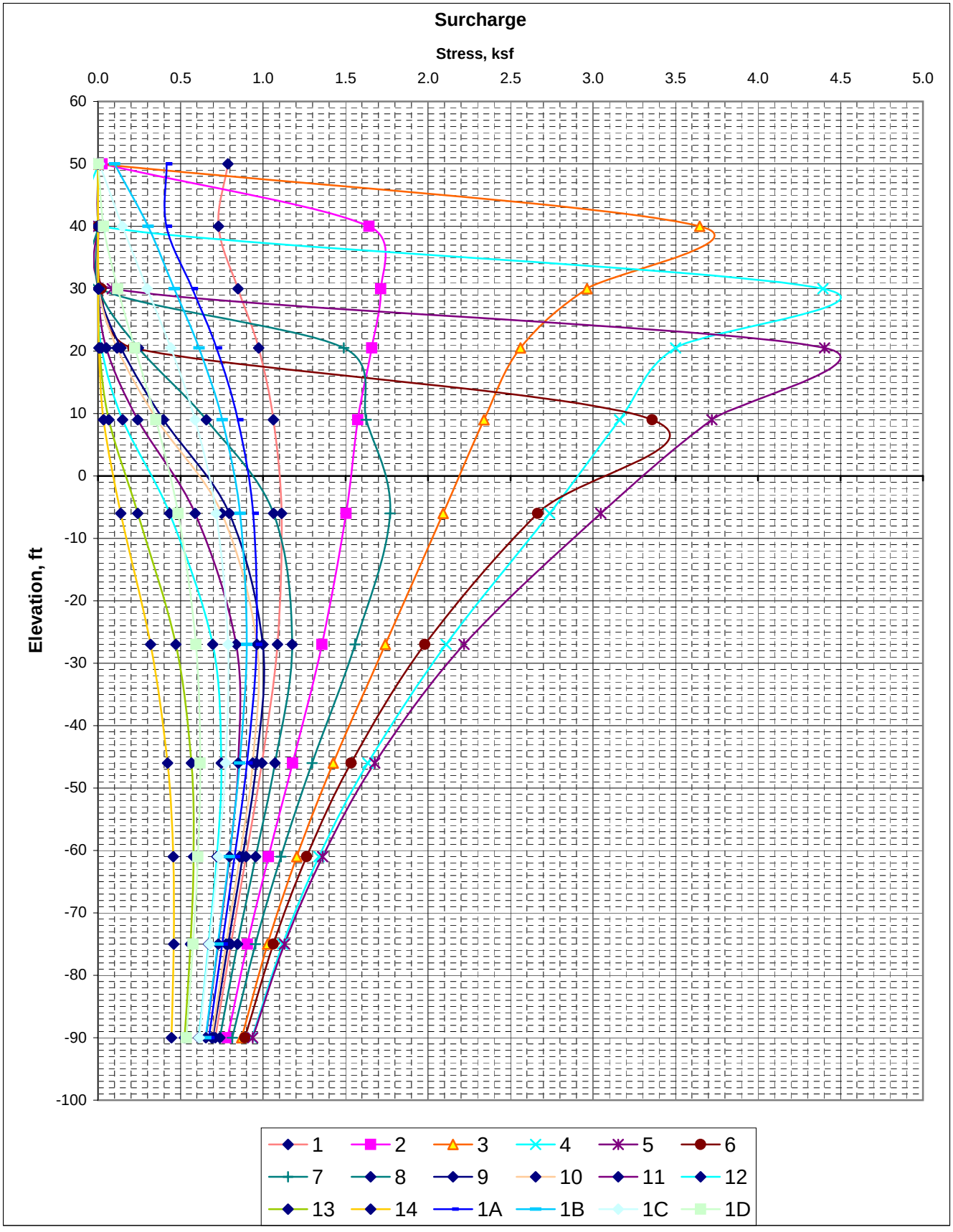
SETTLEMENT ANALYSIS

****** BOUSSINESQ STRESS DISTRIBUTION ******

STRESS POINT NO.	12	13	14	1A	1B	1C	1D
DEPTH FEET / STRESS KSF							
5.0	.000	.000	.000	.416	.100	.009	.001
15.0	.000	.000	.000	.414	.303	.147	.034
25.0	.002	.001	.001	.571	.462	.297	.119
34.5	.021	.008	.005	.718	.612	.441	.223
46.0	.149	.065	.033	.847	.752	.588	.350
61.0	.434	.240	.138	.940	.861	.716	.486
82.0	.695	.472	.319	.961	.901	.789	.594
101.0	.747	.566	.422	.902	.858	.773	.619
116.0	.720	.578	.456	.828	.795	.729	.605
130.0	.671	.560	.459	.752	.726	.675	.576
145.0	.610	.525	.445	.672	.652	.613	.535

SETTLEMENT ANALYSIS

STRATUM	Z FT	H FT	G KCF	PO KSF	SOURCE AND OTHER INFORMATION
1	5.00	10.00	.1250	.625	Stiff CL
2	15.00	10.00	.1250	1.875	stiff CL
3	25.00	10.00	.1250	3.125	Stiff Cl
4	34.50	9.00	.1250	4.313	Stiff CL
5	46.00	14.00	.0576	5.278	Soft CL
6	61.00	16.00	.0626	6.182	Stiff CL
7	82.00	26.00	.0626	7.497	Sandy Soil
8	101.00	12.00	.0626	8.686	Hard CL
9	116.00	18.00	.0626	9.625	Sandy Soil
10	130.00	10.00	.0626	10.502	Hard CL
11	145.00	20.00	.0626	11.441	Sandy Soil


Surcharge
Stress, ksf
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Elevation, ft
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1
2
3
4
5
6
7
8
9
10
11
12
13
14
1A
1B
1C
1D

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 1D

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.31** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	9	4.5	9	125	563	13	7,313		0	C		0.018		1	0	0.00
Stiff CL	9	16	12.5	7	125	1,563	8	12,500		10	C		0.018		1	4.99E-05	0.00
Stiff CL	16	21	18.5	5	125	2,313	8	18,500		30	C		0.018		1	0.000101	0.01
Stiff CL	21	31	26	10	125	3,250	8	26,000		110	C		0.018		1	0.00026	0.03
Stiff CL	31	41	36	10	125	4,500	5	22,500		210	C		0.018		1	0.000357	0.04
Firm CL	41	54	47.5	13	57.6	5,499	1.00	5,499		350	C		0.016	0.17	3	0.004555	0.71
V. Stiff CL	54	72	63	18	57.6	6,392	3	19,177		490	C		0.019		1	0.000609	0.13
Dense SM	72	98	85	26	60	7,691	3	23,072		600	E	1000			N/A	0.0006	0.19
Hard CL	98	108	103	10	64	8,791	2	17,581		610	C		0.017		1	0.000495	0.06
Dense SM	108	125	116.5	17	64	9,655	2	19,309		600	E	3000			N/A	0.0002	0.04
Hard CL	125	135	130	10	64	10,519	2	21,037		590	C		0.017		1	0.000403	0.05
Dense SM	135	158	146.5	23	64	11,575	2	23,149		520	E	3000			N/A	0.000173	0.05
																TOTAL=	**1.31**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 1C

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **2.07** inches

(1) Soil Layer	(2) Depth (feet) top	bottom	center	(3) Layer Height (feet)	(4) γ (pcf)	(5) σ'v (psf)	(6) OCR	(7) σ'p (psf)	(8) Stress Distribution Iσ	(9) Δσ (psf)	(10) Compress. Type E or C	(11) E (ksf)	(12) Cr 1+e0	(13) Cc 1+e0	(14) OCR Case	(15) Strain ε (in/in)	(16) Layer Settle (in)
Stiff CL	0	9	4.5	9	125	563	13	7,313		0	C		0.018		1	0	0.00
Stiff CL	9	16	12.5	7	125	1,563	8	12,500		100	C		0.018		1	0.000485	0.04
Stiff CL	16	21	18.5	5	125	2,313	8	18,500		170	C		0.018		1	0.000555	0.03
Stiff CL	21	31	26	10	125	3,250	8	26,000		270	C		0.018		1	0.000624	0.07
Stiff CL	31	41	36	10	125	4,500	5	22,500		430	C		0.018		1	0.000713	0.09
Firm CL	41	54	47.5	13	57.6	5,499	1.00	5,499		588	C		0.016	0.17	3	0.0075	1.17
V. Stiff CL	54	72	63	18	57.6	6,392	3	19,177		720	C		0.019		1	0.000881	0.19
Dense SM	72	98	85	26	60	7,691	3	23,072		780	E	1000			N/A	0.00078	0.24
Hard CL	98	108	103	10	64	8,791	2	17,581		760	C		0.017		1	0.000612	0.07
Dense SM	108	125	116.5	17	64	9,655	2	19,309		730	E	3000			N/A	0.000243	0.05
Hard CL	125	135	130	10	64	10,519	2	21,037		680	C		0.017		1	0.000462	0.06
Dense SM	135	158	146.5	23	64	11,575	2	23,149		600	E	3000			N/A	0.0002	0.06

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 1B

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **2.63** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	9	4.5	9	125	563	13	7,313		0	C		0.018		1	0	0.00
Stiff CL	9	16	12.5	7	125	1,563	8	12,500		210	C		0.018		1	0.000986	0.08
Stiff CL	16	21	18.5	5	125	2,313	8	18,500		340	C		0.018		1	0.001072	0.06
Stiff CL	21	31	26	10	125	3,250	8	26,000		450	C		0.018		1	0.001014	0.12
Stiff CL	31	41	36	10	125	4,500	5	22,500		600	C		0.018		1	0.000978	0.12
Firm CL	41	54	47.5	13	57.6	5,499	1.00	5,499		752	C		0.016	0.17	3	0.009463	1.48
V. Stiff CL	54	72	63	18	57.6	6,392	3	19,177		860	C		0.019		1	0.001042	0.22
Dense SM	72	98	85	26	60	7,691	3	23,072		900	E	1000			N/A	0.0009	0.28
Hard CL	98	108	103	10	64	8,791	2	17,581		850	C		0.017		1	0.000681	0.08
Dense SM	108	125	116.5	17	64	9,655	2	19,309		800	E	3000			N/A	0.000267	0.05
Hard CL	125	135	130	10	64	10,519	2	21,037		750	C		0.017		1	0.000509	0.06
Dense SM	135	158	146.5	23	64	11,575	2	23,149		680	E	3000			N/A	0.000227	0.06
																TOTAL=	**2.63**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 1A

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **2.98** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	9	4.5	9	125	563	13	7,313		0	C		0.018		1	0	0.00
Stiff CL	9	16	12.5	7	125	1,563	8	12,500		400	C		0.018		1	0.001782	0.15
Stiff CL	16	21	18.5	5	125	2,313	8	18,500		420	C		0.018		1	0.001305	0.08
Stiff CL	21	31	26	10	125	3,250	8	26,000		550	C		0.018		1	0.001222	0.15
Stiff CL	31	41	36	10	125	4,500	5	22,500		710	C		0.018		1	0.001145	0.14
Firm CL	41	54	47.5	13	57.6	5,499	1.00	5,499		847	C		0.016	0.17	3	0.010576	1.65
V. Stiff CL	54	72	63	18	57.6	6,392	3	19,177		950	C		0.019		1	0.001143	0.25
Dense SM	72	98	85	26	60	7,691	3	23,072		970	E	1000			N/A	0.00097	0.30
Hard CL	98	108	103	10	64	8,791	2	17,581		900	C		0.017		1	0.00072	0.09
Dense SM	108	125	116.5	17	64	9,655	2	19,309		850	E	3000			N/A	0.000283	0.06
Hard CL	125	135	130	10	64	10,519	2	21,037		770	C		0.017		1	0.000522	0.06
Dense SM	135	158	146.5	23	64	11,575	2	23,149		700	E	3000			N/A	0.000233	0.06
																TOTAL=	**2.98**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 1

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **4.69** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	5	2.5	5	125	313	13	4,063		780	C		0.018		1	0.009784	0.59
Stiff CL	5	12	8.5	7	125	1,063	8	8,500		740	C		0.018		1	0.004132	0.35
Stiff CL	12	17	14.5	5	125	1,813	8	14,500		730	C		0.018		1	0.002646	0.16
Stiff CL	17	27	22	10	125	2,750	8	22,000		820	C		0.018		1	0.00204	0.24
Stiff CL	27	37	32	10	125	4,000	5	20,000		960	C		0.018		1	0.001682	0.20
Firm CL	37	50	43.5	13	57.6	4,999	1.00	4,999		1,060	C		0.016	0.17	3	0.014197	2.21
V. Stiff CL	50	68	59	18	57.6	5,892	3	17,677		1,200	C		0.019		1	0.00153	0.33
Dense SM	68	94	81	26	60	7,191	3	21,572		1,050	E	1000			N/A	0.00105	0.33
Hard CL	94	104	99	10	64	8,291	2	16,581		920	C		0.017		1	0.000777	0.09
Dense SM	104	121	112.5	17	64	9,155	2	18,309		820	E	3000			N/A	0.000273	0.06
Hard CL	121	131	126	10	64	10,019	2	20,037		750	C		0.017		1	0.000533	0.06
Dense SM	131	154	142.5	23	64	11,075	2	22,149		700	E	3000			N/A	0.000233	0.06
																TOTAL=	**4.69**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 2

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **6.90** inches

(1) Soil Layer	(2) Depth (feet) top	bottom	center	(3) Layer Height (feet)	(4) γ (pcf)	(5) σ'v (psf)	(6) OCR	(7) σ'p (psf)	(8) Stress Distribution Iσ	(9) Δσ (psf)	(10) Compress. Type E or C	(11) E (ksf)	(12) Cr 1+e0	(13) Cc 1+e0	(14) OCR Case	(15) Strain ε (in/in)	(16) Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188	13	2,438		650	C		0.018		1	0.0117	0.42
Stiff CL	3	7	5	4	125	625	8	5,000		1,300	C		0.018		1	0.008794	0.42
Stiff CL	7	12	9.5	5	125	1,188	8	9,500		1,710	C		0.018		1	0.006973	0.42
Stiff CL	12	22	17	10	125	2,125	8	17,000		1,715	C		0.018		1	0.004626	0.56
Stiff CL	22	32	27	10	125	3,375	5	16,875		1,660	C		0.018		1	0.003127	0.38
Firm CL	32	45	38.5	13	57.6	4,374	1.00	4,374		1,575	C		0.016	0.17	3	0.022704	3.54
V. Stiff CL	45	63	54	18	57.6	5,267	3	15,802		1,500	C		0.019		1	0.002068	0.45
Dense SM	63	89	76	26	60	6,566	3	19,697		1,250	E	1000			N/A	0.00125	0.39
Hard CL	89	99	94	10	64	7,666	2	15,331		1,080	C		0.017		1	0.000973	0.12
Dense SM	99	116	107.5	17	64	8,530	2	17,059		950	E	3000			N/A	0.000317	0.06
Hard CL	116	126	121	10	64	9,394	2	18,787		840	C		0.017		1	0.000632	0.08
Dense SM	126	149	137.5	23	64	10,450	2	20,899		780	E	3000			N/A	0.00026	0.07

TOTAL= **6.90**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 3

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **8.66** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'_v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'_p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	5	2.5	5	125	313	13	4,063	0.0000	3,700	C		0.018		1	0.019954	1.20
Stiff CL	5	15	10	10	125	1,250	8	10,000	0.0000	2,964	C		0.018		1	0.0095	1.14
Stiff CL	15	25	20	10	125	2,500	5	12,500	0.0000	2,561	C		0.018		1	0.005513	0.66
Firm CL	25	38	31.5	13	57.6	3,499	1.20	4,200	0.0000	2,339	C		0.016	0.17	2	0.025586	3.99
V. Stiff CL	38	56	47	18	57.6	4,392	3	13,177	0.0000	2,092	C		0.019		1	0.003214	0.69
Dense SM	56	82	69	26	60	5,691	3	17,072	0.0000	1,741	E	1000			N/A	0.001741	0.54
Hard CL	82	92	87	10	64	6,791	2	13,581	0.0000	1,425	C		0.017		1	0.001406	0.17
Dense SM	92	109	100.5	17	64	7,655	2	15,309	0.0000	1,204	E	3000			N/A	0.000401	0.08
Hard CL	109	119	114	10	64	8,519	2	17,037	0.0000	1,028	C		0.017		1	0.000841	0.10
Dense SM	119	142	130.5	23	64	9,575	2	19,149	0.0000	871	E	3000			N/A	0.00029	0.08
																TOTAL=	**8.66**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 4

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **8.68** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'_v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'_p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	7	3.5	7	125	438	12	5,250	0.0000	4,500	C		0.018		1	0.018946	1.59
Stiff CL	7	16	11.5	9	125	1,438	5	7,188	0.0000	3,500	C		0.018		1	0.009646	1.04
Firm CL	16	29	22.5	13	57.6	2,374	1.769	4,200	0.0000	3,161	C		0.016	0.17	2	0.024341	3.80
V. Stiff CL	29	46	37.5	17	57.6	3,238	3	9,715	0.0000	2,737	C		0.019		1	0.005055	1.03
Dense SM	46	72	59	26	60	4,508	3	13,524	0.0000	2,110	E	1000			N/A	0.00211	0.66
Hard CL	72	84	78	12	64	5,672	2	11,344	0.0000	1,635	C		0.017		1	0.00187	0.27
Dense SM	84	102	93	18	64	6,632	2	13,264	0.0000	1,340	E	3000			N/A	0.000447	0.10
Hard CL	102	112	107	10	64	7,528	2	15,056	0.0000	1,120	C		0.017		1	0.001024	0.12
Dense SM	112	132	122	20	64	8,488	2	16,976	0.0000	933	E	3000			N/A	0.000311	0.07
																TOTAL=	**8.68**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 5

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **7.94** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	8	4	8	125	500	12	6,000	0.0000	4,500	C		0.018	0	1	0.018	1.73
Firm CL	8	21	14.5	13	57.6	1,374	3.057	4,202	0.0000	3,720	C		0.016	0.17	2	0.021991	3.43
V. Stiff CL	21	38	29.5	17	57.6	2,238	3	6,715	0.0000	3,047	C		0.019		1	0.00709	1.45
Dense SM	38	64	51	26	60	3,508	3	10,524	0.0000	2,219	E	1000	0.009		N/A	0.002219	0.69
Hard CL	64	76	70	12	64	4,672	2	9,344	0.0000	1,677	C		0.017		1	0.002264	0.33
Dense SM	76	94	85	18	64	5,632	2	11,264	0.0000	1,361	E	3000			N/A	0.000454	0.10
Hard CL	94	104	99	10	64	6,528	2	13,056	0.0000	1,131	C		0.017		1	0.00118	0.14
Dense SM	104	124	114	20	64	7,488	2	14,976	0.0000	938	E	3000			N/A	0.000313	0.08
																TOTAL=	**7.94**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 6

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **5.18** inches

(1) Soil Layer	(2) Depth (feet) top	bottom	center	(3) Layer Height (feet)	(4) γ (pcf)	(5) σ'v (psf)	(6) OCR	(7) σ'p (psf)	(8) Stress Distribution Iσ	Δσ (psf)	(10) Compress. Type E or C	(11) E (ksf)	(12) Cr 1+e0	(13) Cc 1+e0	(14) OCR Case	(15) Strain ε (in/in)	(16) Layer Settle (in)
Stiff CL	0	4	2	4	125	250	12	3,000	0.0000	900	C		0.018	0	1	0.01193	0.57
Firm CL	4	17	10.5	13	57.6	874	4.8	4,202	0.0000	3,359	C		0.016	0.17	2	0.011459	1.79
V. Stiff CL	17	34	25.5	17	57.6	1,738	3	5,215	0.0000	2,665	C		0.019		1	0.007669	1.56
Dense SM	34	60	47	26	60	3,008	3	9,024	0.0000	1,981	E	1000	0.009		N/A	0.001981	0.62
Hard CL	60	72	66	12	64	4,172	2	8,344	0.0000	1,534	C		0.017		1	0.002312	0.33
Dense SM	72	90	81	18	64	5,132	2	10,264	0.0000	1,264	E	3000			N/A	0.000421	0.09
Hard CL	90	100	95	10	64	6,028	2	12,056	0.0000	1,062	C		0.017		1	0.001198	0.14
Dense SM	100	120	110	20	64	6,988	2	13,976	0.0000	890	E	3000			N/A	0.000297	0.07
																TOTAL=	**5.18**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 7

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **3.91** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	7.5	3.75	7.5	125	469	12	5,625	0.0000	1,520	C		0.018	0	1	0.011298	1.02
Firm CL	7.5	20.5	14	13	57.6	1,312	3.2	4,199	0.0000	1,626	C		0.016	0.17	1	0.005602	0.87
V. Stiff CL	20.5	37.5	29	17	57.6	2,176	3	6,528	0.0000	1,780	C		0.019		1	0.004933	1.01
Dense SM	37.5	63.5	50.5	26	60	3,446	3	10,337	0.0000	1,550	E	1000	0.009		N/A	0.00155	0.48
Hard CL	63.5	75.5	69.5	12	64	4,610	2	9,219	0.0000	1,300	C		0.017		1	0.001834	0.26
Dense SM	75.5	93.5	84.5	18	64	5,570	2	11,139	0.0000	1,100	E	3000			N/A	0.000367	0.08
Hard CL	93.5	103.5	98.5	10	64	6,466	2	12,931	0.0000	950	C		0.017		1	0.001012	0.12
Dense SM	103.5	123.5	113.5	20	64	7,426	2	14,851	0.0000	800	E	3000			N/A	0.000267	0.06
	123.5																
																TOTAL=	**3.91**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 8

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.97** inches

(1) Soil Layer	(2) Depth (feet) top	bottom	center	(3) Layer Height (feet)	(4) γ (pcf)	(5) σ'v (psf)	(6) OCR	(7) σ'p (psf)	(8) Stress Distribution Iσ	(9) Δσ (psf)	(10) Compress. Type E or C	(11) E (ksf)	(12) Cr 1+e0	(13) Cc 1+e0	(14) OCR Case	(15) Strain ε (in/in)	(16) Layer Settle (in)
Stiff CL	0	11.5	5.75	11.5	125	719	12	8,625	0.0000	200	C		0.018	0	1	0.001919	0.26
Firm CL	11.5	24.5	18	13	57.6	1,812	2.3	4,200	0.0000	657	C		0.016	0.17	1	0.00215	0.34
V. Stiff CL	24.5	41.5	33	17	57.6	2,676	3	8,028	0.0000	1,080	C		0.019		1	0.002798	0.57
Dense SM	41.5	67.5	54.5	26	60	3,946	3	11,837	0.0000	1,180	E	1000	0.009		N/A	0.00118	0.37
Hard CL	67.5	79.5	73.5	12	64	5,110	2	10,219	0.0000	1,080	C		0.017		1	0.001416	0.20
Dense SM	79.5	97.5	88.5	18	64	6,070	2	12,139	0.0000	950	E	3000			N/A	0.000317	0.07
Hard CL	97.5	107.5	102.5	10	64	6,966	2	13,931	0.0000	850	C		0.017		1	0.00085	0.10
Dense SM	107.5	127.5	117.5	20	64	7,926	2	15,851	0.0000	750	E	3000			N/A	0.00025	0.06
	123.5																
																TOTAL=	**1.97**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 9

Loaded Area					
	Length, L		ft	L>B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.38** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	5	2.5	5	125	313	10	3,125	0.0000	3	C		0.018		1	7.46882E-05	0.00
Stiff CL	5	14	9.5	9	125	1,188	10	11,875	0.0000	139	C		0.018		1	0.000865325	0.09
Firm CL	14	27	20.5	13	57.6	2,124	1.98	4,201	0.0000	396	C		0.016	0.17	1	0.001187731	0.19
V. Stiff CL	27	44	35.5	17	57.6	2,988	3	8,965	0.0000	796	C		0.019		1	0.001948608	0.40
Dense SM	44	70	57	26	60	4,258	3	12,774	0.0000	998	E	1000			N/A	0.000998	0.31
Hard CL	70	82	76	12	64	5,422	2	10,844	0.0000	959	C		0.017		1	0.001202397	0.17
Dense SM	82	100	91	18	64	6,382	2	12,764	0.0000	876	E	3000			N/A	0.000292	0.06
Hard CL	100	110	105	10	64	7,278	2	14,556	0.0000	788	C		0.017		1	0.000758985	0.09
Dense SM	110	130	120	20	64	8,238	2	16,476	0.0000	696	E	3000			N/A	0.000232	0.06
																TOTAL=	**1.38**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 10

Loaded Area					
	Length, L		ft	L>B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.31** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	5	2.5	5	125	313	10	3,125	0.0000	3	C		0.018		1	7.46882E-05	0.00
Stiff CL	5	14	9.5	9	125	1,188	10	11,875	0.0000	116	C		0.018		1	0.000728594	0.08
Firm CL	14	27	20.5	13	57.6	2,124	1.98	4,201	0.0000	357	C		0.016	0.17	1	0.001079368	0.17
V. Stiff CL	27	44	35.5	17	57.6	2,988	3	8,965	0.0000	750	C		0.019		1	0.001847694	0.38
Dense SM	44	70	57	26	60	4,258	3	12,774	0.0000	964	E	1000			N/A	0.000964	0.30
Hard CL	70	82	76	12	64	5,422	2	10,844	0.0000	937	C		0.017		1	0.001176898	0.17
Dense SM	82	100	91	18	64	6,382	2	12,764	0.0000	860	E	3000			N/A	0.000286667	0.06
Hard CL	100	110	105	10	64	7,278	2	14,556	0.0000	776	C		0.017		1	0.000747993	0.09
Dense SM	110	130	120	20	64	8,238	2	16,476	0.0000	688	E	3000			N/A	0.000229333	0.06
																TOTAL=	**1.31**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 11

Loaded Area					
	Length, L		ft	L>B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.07** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	5	2.5	5	125	313	10	3,125	0.0000	2	C		0.018		1	4.98713E-05	0.00
Stiff CL	5	14	9.5	9	125	1,188	10	11,875	0.0000	50	C		0.018		1	0.000322409	0.03
Firm CL	14	27	20.5	13	57.6	2,124	1.98	4,201	0.0000	240	C		0.016	0.17	1	0.000743755	0.12
V. Stiff CL	27	44	35.5	17	57.6	2,988	3	8,965	0.0000	589	C		0.019		1	0.001484447	0.30
Dense SM	44	70	57	26	60	4,258	3	12,774	0.0000	837	E	1000			N/A	0.000837	0.26
Hard CL	70	82	76	12	64	5,422	2	10,844	0.0000	850	C		0.017		1	0.001075191	0.15
Dense SM	82	100	91	18	64	6,382	2	12,764	0.0000	797	E	3000			N/A	0.000265667	0.06
Hard CL	100	110	105	10	64	7,278	2	14,556	0.0000	729	C		0.017		1	0.000704782	0.08
Dense SM	110	130	120	20	64	8,238	2	16,476	0.0000	653	E	3000			N/A	0.000217667	0.05
																TOTAL=	**1.07**

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW 1300 & 1299 at H 1312+33 - Surcharge Point 13

Loaded Area					
	Length, L		ft	L≥B	(A)
	Width, B		ft		(B)
	Load, Q		psf		(C)
	Depth, D	0	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	0	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.57** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	5	2.5	5	125	313	10	3,125	0.0000	1	C		0.018		1	2.5E-05	0.00
Stiff CL	5	14	9.5	9	125	1,188	10	11,875	0.0000	8	C		0.018		1	5.25E-05	0.01
Firm CL	14	27	20.5	13	57.6	2,124	1.98	4,201	0.0000	65	C		0.016	0.17	1	0.000209	0.03
V. Stiff CL	27	44	35.5	17	57.6	2,988	3	8,965	0.0000	240	C		0.019		1	0.000637	0.13
Dense SM	44	70	57	26	60	4,258	3	12,774	0.0000	472	E	1000			N/A	0.000472	0.15
Hard CL	70	82	76	12	64	5,422	2	10,844	0.0000	566	C		0.017		1	0.000733	0.11
Dense SM	82	100	91	18	64	6,382	2	12,764	0.0000	578	E	3000			N/A	0.000193	0.04
Hard CL	100	110	105	10	64	7,278	2	14,556	0.0000	560	C		0.017		1	0.000547	0.07
Dense SM	110	130	120	20	64	8,238	2	16,476	0.0000	525	E	3000			N/A	0.000175	0.04
																TOTAL=	**0.57**

RW1325+1326
SETTLEMENT CALCULATIONS

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Center

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.52** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'_v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'_p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	1.0000	715	C		0.018		1	0.006941	0.17
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.9913	709	C		0.016	0.17	1	0.00381	0.55
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.8577	613	C		0.019		1	0.002291	0.55
Dense SM	37	49	43	12	64	2,900	2	5,800	0.6524	466	E	1000	0.009		N/A	0.000466	0.07
Hard CL	49	69	59	20	64	3,924	2	7,848	0.4793	343	C		0.017		1	0.000618	0.15
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.3451	247	E	3000			N/A	8.22E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2771	198	C		0.017		1	0.000246	0.03

TOTAL= **1.52** inches

SETTLEMENT CALCULATION

INSTRUCTIONS:

1 Program calculates settlement under center, short edge, long edge, or corner of shaded rectangular loaded areas, using Boussinesq stress distribution and consolidation theory or elastic modulus compressibility.

2 Input data in shaded fields. Unshaded fields are automatically calculated. Up to 26 soil layers may be used.

3 Explanation of the calculation procedure and guidance for input of data in rows (A) through (E) and columns (1) through (16) is provided below.

ROW AND COLUMN NOTES

(A)	Input length (long side) of rectangular loaded area.
(B)	Input width (short side) of rectangular loaded area.
(C)	Input applied load at the base of the loaded area (pounds per square foot)
(D)	Input depth of applied load below the ground surface (the depth must coincide with a bottom-of-layer boundary specified in Column (2)
(E)	Input 1, 2, 3, or 4 to calculate the settlement under the center, midpoint of short edge, midpoint of long edge, or corner, respectively, of the rectangular loaded area.
(1)	Input Soil Layer number and/or description (optional).
(2)	Starting with the ground surface (depth = 0) input the depth to top and bottom of each soil layer below the ground surface. The depth to center of the layer is automatically calculated.
(3)	The layer height or thickness is automatically computed (H=depth to top of layer minus depth to bottom of layer).
(4)	Input unit weight of soil in the layer (total unit weight above the water table, buoyant unit weight below the water table).
(5)	Vertical effective stress (pounds per square foot) at the center of each layer prior to the new loading is automatically computed.
(6)	Input Overconsolidation Ratio (OCR) defined as the ratio of maximum past preconsolidation pressure (column (7)) to current effective vertical stress (Column (5)). OCR=1 is Normally Consolidated.
(7)	Maximum past preconsolidation pressure is calculated as the product of Column (5) and Column (6), or $\sigma'_p = OCR * \sigma'_v$.
(8)	The stress increase coefficient ($I\sigma$) at the center of each layer is computed using Newmark integration of Boussinesq theory based on vertical depth below bottom of loaded area and position on loaded area input in Row E.
(9)	The increase in stress ($\Delta\sigma$) at the center of each layer due to the loaded area is computed as the product of $I\sigma$ (Column (8)) and load Q (Row (C)).
(10)	Input compressibility type for each layer. "E" means elastic modulus (slope of stress versus strain curve) is used, "C" means consolidation theory is used (slope of log stress versus strain curve) is used.
(11)	Input elastic modulus (E in ksf) value for each layer where "E" is selected in Column 10.
(12)	Input Recompression Ratio, or slope of log stress versus strain curve, in the overconsolidated range (if soil is normally consolidated this value need not be input).
(13)	Input Virgin Compression Ratio, or slope of log stress versus strain curve, in the normally consolidated range.
(14)	Virgin and/or Recomp. Case determined ("C" Comp. Type Only). Case 1 = entire loading is within recompression range, Case 2 - Loading patially recompression partially virgin, Case 3 - entirely virgin (norm cons.)
(15)	Strain ε is calculated as $\Delta\sigma$ / E if "E" is specified in Column (10), or by consolidation theory using the appropriate recompression and/or virgin slopes if "C" is specified in Column (10).
(16)	Layer settlement (inches) is computed as Strain (Column (15)) times Height (Column (3) converted to inches). Total settlement (inches) of all layers is summed up at the bottom of Column (16).

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.92** inches

(1) Soil Layer	(2) Depth (feet) top	bottom	center	(3) Layer Height (feet)	(4) γ (pcf)	(5) σ'v (psf)	(6) OCR	(7) σ'p (psf)	(8) Stress Distribution Iσ	Δσ (psf)	(10) Compress. Type E or C	(11) E (ksf)	(12) Cr 1+e0	(13) Cc 1+e0	(14) OCR Case	(15) Strain ε (in/in)	(16) Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4988	357	C		0.016	0.17	1	0.002175	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4737	339	C		0.019		1	0.001343	0.32
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4138	296	E	1000	0.009		N/A	0.000296	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3414	244	C		0.017		1	0.000446	0.11
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.2692	192	E	3000			N/A	6.42E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2265	162	C		0.017		1	0.000202	0.02

TOTAL= **0.92** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Short Edge

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	2	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.87** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4961	355	C		0.016	0.17	1	0.002164	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4376	313	C		0.019		1	0.001248	0.30
Dense SM	37	49	43	12	64	2,900	2	5,800	0.3509	251	E	1000	0.009		N/A	0.000251	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.2780	199	C		0.017		1	0.000365	0.09
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.2184	156	E	3000			N/A	5.21E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.1857	133	C		0.017		1	0.000166	0.02

TOTAL= **0.87** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Corner

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	4	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.51** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.2500	179	C		0.018		1	0.002389	0.06
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.2497	179	C		0.016	0.17	1	0.001173	0.17
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.2433	174	C		0.019		1	0.000717	0.17
Dense SM	37	49	43	12	64	2,900	2	5,800	0.2261	162	E	1000	0.009		N/A	0.000162	0.02
Hard CL	49	69	59	20	64	3,924	2	7,848	0.2018	144	C		0.017		1	0.000267	0.06
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.1733	124	E	3000			N/A	4.13E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.1541	110	C		0.017		1	0.000138	0.02

TOTAL= **0.51** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 30ft wider for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	89	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.94** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4991	357	C		0.016	0.17	1	0.002176	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4797	343	C		0.019		1	0.001359	0.33
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4326	309	E	1000	0.009		N/A	0.000309	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3731	267	C		0.017		1	0.000486	0.12
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.3096	221	E	3000			N/A	7.38E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2695	193	C		0.017		1	0.00024	0.03

TOTAL= **0.94** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 30ft strip for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	30	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.84** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil	Depth (feet)			Layer Height	γ	σ'_v			Stress Distribution		Compress. Type	E	Cr	Cc	OCR	Strain	Layer
Layer	top	bottom	center	(feet)	(pcf)	(psf)	OCR	σ'_p (psf)	Iσ	Δσ (psf)	E or C	(ksf)	1+e0	1+e0	Case	ε (in/in)	Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4958	355	C		0.016	0.17	1	0.002163	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4308	308	C		0.019		1	0.00123	0.30
Dense SM	37	49	43	12	64	2,900	2	5,800	0.3291	235	E	1000	0.009		N/A	0.000235	0.03
Hard CL	49	69	59	20	64	3,924	2	7,848	0.2425	173	C		0.017		1	0.000319	0.08
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.1749	125	E	3000			N/A	4.17E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.1405	100	C		0.017		1	0.000126	0.02

TOTAL= **0.84** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 20ft wider for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	79	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.94** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4990	357	C		0.016	0.17	1	0.002175	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4787	342	C		0.019		1	0.001356	0.33
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4290	307	E	1000	0.009		N/A	0.000307	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3664	262	C		0.017		1	0.000477	0.11
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.3002	215	E	3000			N/A	7.15E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2589	185	C		0.017		1	0.00023	0.03

TOTAL= **0.94** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 20ft strip for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	20	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.76** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4883	349	C		0.016	0.17	1	0.002135	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.3707	265	C		0.019		1	0.001069	0.26
Dense SM	37	49	43	12	64	2,900	2	5,800	0.2547	182	E	1000	0.009		N/A	0.000182	0.03
Hard CL	49	69	59	20	64	3,924	2	7,848	0.1775	127	C		0.017		1	0.000235	0.06
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.1239	89	E	3000			N/A	2.95E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.0982	70	C		0.017		1	8.82E-05	0.01

TOTAL= **0.76** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 10ft wider for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	69	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.93** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4989	357	C		0.016	0.17	1	0.002175	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4769	341	C		0.019		1	0.001351	0.32
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4233	303	E	1000	0.009		N/A	0.000303	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3564	255	C		0.017		1	0.000464	0.11
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.2871	205	E	3000			N/A	6.84E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2448	175	C		0.017		1	0.000218	0.03

TOTAL= **0.93** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 10ft strip for superposition

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	10	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.60** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.4998	357	C		0.018		1	0.004215	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4403	315	C		0.016	0.17	1	0.001952	0.28
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.2350	168	C		0.019		1	0.000694	0.17
Dense SM	37	49	43	12	64	2,900	2	5,800	0.1424	102	E	1000	0.009		N/A	0.000102	0.01
Hard CL	49	69	59	20	64	3,924	2	7,848	0.0946	68	C		0.017		1	0.000126	0.03
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.0645	46	E	3000			N/A	1.54E-05	0.00
Hard CL	84	94	89	10	64	5,844	2	11,688	0.0506	36	C		0.017		1	4.56E-05	0.01

TOTAL= **0.60** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 5 ft strip for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	5	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.43** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.4984	356	C		0.018		1	0.004206	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.3208	229	C		0.016	0.17	1	0.001474	0.21
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.1271	91	C		0.019		1	0.000382	0.09
Dense SM	37	49	43	12	64	2,900	2	5,800	0.0735	53	E	1000	0.009		N/A	5.25E-05	0.01
Hard CL	49	69	59	20	64	3,924	2	7,848	0.0481	34	C		0.017		1	6.44E-05	0.02
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.0326	23	E	3000			N/A	7.76E-06	0.00
Hard CL	84	94	89	10	64	5,844	2	11,688	0.0255	18	C		0.017		1	2.3E-05	0.00

TOTAL= **0.43** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 5 ft wider for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	64	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.93** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4989	357	C		0.016	0.17	1	0.002175	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4755	340	C		0.019		1	0.001348	0.32
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4191	300	E	1000	0.009		N/A	0.0003	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3497	250	C		0.017		1	0.000456	0.11
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.2789	199	E	3000			N/A	6.65E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2363	169	C		0.017		1	0.00021	0.03

TOTAL= **0.93** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 1 ft wider for superposition

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	60	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.92** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	357	C		0.018		1	0.004217	0.10
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4988	357	C		0.016	0.17	1	0.002175	0.31
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4741	339	C		0.019		1	0.001344	0.32
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4150	297	E	1000	0.009		N/A	0.000297	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3432	245	C		0.017		1	0.000448	0.11
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.2713	194	E	3000			N/A	6.47E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2286	163	C		0.017		1	0.000204	0.02

TOTAL= **0.92** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - Highest Wall - Long Edge 1 ft strip for superposition

Loaded Area	Length, L	100	ft	L≥B	(A)
	Width, B	1	ft		(B)
	Load, Q	715	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.17** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.4092	293	C		0.018		1	0.003601	0.09
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.0787	56	C		0.016	0.17	1	0.000392	0.06
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.0261	19	C		0.019		1	8E-05	0.02
Dense SM	37	49	43	12	64	2,900	2	5,800	0.0148	11	E	1000	0.009		N/A	1.06E-05	0.00
Hard CL	49	69	59	20	64	3,924	2	7,848	0.0097	7	C		0.017		1	1.3E-05	0.00
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.0065	5	E	3000			N/A	1.56E-06	0.00
Hard CL	84	94	89	10	64	5,844	2	11,688	0.0051	4	C		0.017		1	4.61E-06	0.00

TOTAL= **0.17** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=22' - Center

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	560	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **1.24** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	1.0000	560	C		0.018		1	0.005873969	0.14
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.9913	555	C		0.016	0.17	1	0.003142957	0.45
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.8577	480	C		0.019		1	0.001845661	0.44
Dense SM	37	49	43	12	64	2,900	2	5,800	0.6524	365	E	1000	0.009		N/A	0.000365355	0.05
Hard CL	49	69	59	20	64	3,924	2	7,848	0.4793	268	C		0.017		1	0.000488493	0.12
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.3451	193	E	3000			N/A	6.44185E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2771	155	C		0.017		1	0.000193467	0.02

TOTAL= **1.24** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=22' - Long Edge

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	560	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.74** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	280	C		0.018		1	0.003476229	0.08
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4988	279	C		0.016	0.17	1	0.001757492	0.25
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4737	265	C		0.019		1	0.001069773	0.26
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4138	232	E	1000	0.009		N/A	0.000231737	0.03
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3414	191	C		0.017		1	0.000351228	0.08
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.2692	151	E	3000			N/A	5.02529E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2265	127	C		0.017		1	0.000158539	0.02

TOTAL= **0.74** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=17' - Center

Loaded Area					
	Length, L	200	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	411	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.98** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	1.0000	411	C		0.018		1	0.004689812	0.11
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.9922	408	C		0.016	0.17	1	0.002437247	0.35
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.8752	360	C		0.019		1	0.00141952	0.34
Dense SM	37	49	43	12	64	2,900	2	5,800	0.7019	288	E	1000	0.009		N/A	0.000288477	0.04
Hard CL	49	69	59	20	64	3,924	2	7,848	0.5561	229	C		0.017		1	0.000417931	0.10
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.4368	180	E	3000			N/A	5.98455E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.3715	153	C		0.017		1	0.000190411	0.02

TOTAL= **0.98** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=17' - Long Edge

Loaded Area					
	Length, L	200	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	411	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.58** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	205	C		0.018		1	0.002691481	0.06
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4994	205	C		0.016	0.17	1	0.001333059	0.19
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4866	200	C		0.019		1	0.000819188	0.20
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4521	186	E	1000	0.009		N/A	0.000185824	0.03
Hard CL	49	69	59	20	64	3,924	2	7,848	0.4035	166	C		0.017		1	0.000305607	0.07
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.3466	142	E	3000			N/A	4.74817E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.3081	127	C		0.017		1	0.000158277	0.02

TOTAL= **0.58** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=12' - Center

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	261	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.63** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	1.0000	261	C		0.018		1	0.003283414	0.08
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.9913	259	C		0.016	0.17	1	0.001642028	0.24
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.8577	224	C		0.019		1	0.000911729	0.22
Dense SM	37	49	43	12	64	2,900	2	5,800	0.6524	170	E	1000	0.009		N/A	0.000170281	0.02
Hard CL	49	69	59	20	64	3,924	2	7,848	0.4793	125	C		0.017		1	0.000231699	0.06
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.3451	90	E	3000			N/A	3.00236E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2771	72	C		0.017		1	9.08008E-05	0.01

TOTAL= **0.63** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=12' - Long Edge

Loaded Area					
	Length, L	100	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	261	psf		(C)
	Depth, D	3	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.36** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'v (psf)	OCR	σ'p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	3	1.5	3	125	188					C						
Stiff CL	3	5	4	2	125	500	7	3,500	0.5000	130	C		0.018		1	0.001812864	0.04
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4988	130	C		0.016	0.17	1	0.000874594	0.13
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4737	124	C		0.019		1	0.000515886	0.12
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4138	108	E	1000	0.009		N/A	0.000108006	0.02
Hard CL	49	69	59	20	64	3,924	2	7,848	0.3414	89	C		0.017		1	0.000165778	0.04
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.2692	70	E	3000			N/A	2.34215E-05	0.00
Hard CL	84	94	89	10	64	5,844	2	11,688	0.2265	59	C		0.017		1	7.43142E-05	0.01

TOTAL= **0.36** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=8' - Center

Loaded Area	Length, L	200	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	266	psf		(C)
	Depth, D	2	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	1	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.71** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	2	1	2	125	125					C						
Stiff CL	2	5	3.5	3	125	438	7	3,063	0.9999	266	C		0.018		1	0.003712983	0.13
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.9891	263	C		0.016	0.17	1	0.001666675	0.24
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.8645	230	C		0.019		1	0.000935235	0.22
Dense SM	37	49	43	12	64	2,900	2	5,800	0.6917	184	E	1000	0.009		N/A	0.000183986	0.03
Hard CL	49	69	59	20	64	3,924	2	7,848	0.5482	146	C		0.017		1	0.000269377	0.06
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.4311	115	E	3000			N/A	3.82214E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.3668	98	C		0.017		1	0.000122256	0.01

TOTAL= **0.71** inches

SETTLEMENT CALCULATION

PROJECT NAME: SR-22 405/22 HOV Conn. Segment **PROJECT NUMBER:** I-436

PROBLEM DESCRIPTION: RW1325 & 1326 - H=8' - Long Edge

Loaded Area					
	Length, L	200	ft	L≥B	(A)
	Width, B	59	ft		(B)
	Load, Q	266	psf		(C)
	Depth, D	2	ft	must be at a layer boundary	(D)
	Settlement Point Loc.	3	1=center, 2=short edge, 3=long edge, 4=corner		(E)

TOTAL= **0.41** inches

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Soil Layer	Depth (feet) top	bottom	center	Layer Height (feet)	γ (pcf)	σ'_v (psf)	OCR	σ'_p (psf)	Stress Distribution Iσ	Δσ (psf)	Compress. Type E or C	E (ksf)	Cr 1+e0	Cc 1+e0	OCR Case	Strain ε (in/in)	Layer Settle (in)
Stiff CL	0	2	1	2	125	125					C						
Stiff CL	2	5	3.5	3	125	438	7	3,063	0.5000	133	C		0.018		1	0.002074982	0.07
Firm CL	5	17	11	12	57.6	971	3.3	3,203	0.4992	133	C		0.016	0.17	1	0.000890971	0.13
V. Stiff CL	17	37	27	20	60	1,916	3	5,749	0.4851	129	C		0.019		1	0.00053772	0.13
Dense SM	37	49	43	12	64	2,900	2	5,800	0.4494	120	E	1000	0.009		N/A	0.000119535	0.02
Hard CL	49	69	59	20	64	3,924	2	7,848	0.4003	106	C		0.017		1	0.000197646	0.05
Dense SM	69	84	76.5	15	64	5,044	2	10,088	0.3434	91	E	3000			N/A	3.04483E-05	0.01
Hard CL	84	94	89	10	64	5,844	2	11,688	0.3052	81	C		0.017		1	0.000101851	0.01

TOTAL= **0.41** inches

Appendix F.5
Type I Retaining Wall Calculations
Bearing Capacity
Earth Pressures
Sliding Resistance

BEARING CAPACITY ANALYSIS
BRINCH-HANSEN METHOD

H=24 ft Type 1 Wall

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>				
Footing Type	C	C=continuous, R=rectangular		
Footing Width	4.04	m	13.25	ft
Footing Length	0.00	m		ft
Footing Depth	1.52	m	5.00	ft
Ground Inclination	26.56	deg	26.56	deg
Soil Cohesion	19.15	kPa	400.00	psf
Soil Friction Angle	30.00	deg	30.00	deg
Soil Unit Weight	19.64	kN/m^3	125.00	pcf
Water Depth	3.96	m	13.00	ft
Safety Factor	3.00		3.000	

<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>							
Shape Factors		Depth Factors		Ground Inclination Factors		Bearing Capacity Factors	
Sc=	1.000	k=	0.377	Gc=	0.819	Nq=	18.40
Sca=	0.000	Dc=	1.151	Gca=	0.181	Nc=	30.14
Sq=	1.000	Dca=	0.151	Gq=	0.237	Nγ=	15.07
Sγ=	1.000	Dq=	1.109	Gγ=	0.237		
		Dγ=	1.000				
Effective Unit Weight (kN/m3)		(pcf)		Effective Stress at Depth D			
γ'=	15.8		100.3	29.93	kPa	625	psf
Net Allowable Bearing Capacity (kPa)				Net Allowable Bearing Capacity (ksf)			
q'_{all}=	258			q'_{all}=	5.38		

BEARING CAPACITY ANALYSIS
BRINCH-HANSEN METHOD

H=20 ft Type 1 Wall

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>				
Footing Type	C	C=continuous, R=rectangular		
Footing Width	3.35	m	11.00	ft
Footing Length	0.00	m		ft
Footing Depth	1.52	m	5.00	ft
Ground Inclination	26.56	deg	26.56	deg
Soil Cohesion	19.15	kPa	400.00	psf
Soil Friction Angle	30.00	deg	30.00	deg
Soil Unit Weight	19.64	kN/m^3	125.00	pcf
Water Depth	6.10	m	20.00	ft
Safety Factor	3.00		3.000	

<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>							
Shape Factors		Depth Factors		Ground Inclination Factors		Bearing Capacity Factors	
Sc=	1.000	k=	0.455	Gc=	0.819	Nq=	18.40
Sca=	0.000	Dc=	1.182	Gca=	0.181	Nc=	30.14
Sq=	1.000	Dca=	0.182	Gq=	0.237	Nγ=	15.07
Sγ=	1.000	Dq=	1.131	Gγ=	0.237		
		Dγ=	1.000				
Effective Unit Weight (kN/m3)		(pcf)		Effective Stress at Depth D			
γ'=	19.6		125.0	29.93	kPa	625	psf
Net Allowable Bearing Capacity (kPa)				Net Allowable Bearing Capacity (ksf)			
q'_{all}=	265			q'_{all}=	5.53		

BEARING CAPACITY ANALYSIS
BRINCH-HANSEN METHOD

H=16 ft Type 1 Wall

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>				
Footing Type	C	C=continuous, R=rectangular		
Footing Width	2.74	m	9.00	ft
Footing Length	0.00	m		ft
Footing Depth	1.52	m	5.00	ft
Ground Inclination	26.56	deg	26.56	deg
Soil Cohesion	19.15	kPa	400.00	psf
Soil Friction Angle	30.00	deg	30.00	deg
Soil Unit Weight	19.64	kN/m^3	125.00	pcf
Water Depth	7.32	m	24.00	ft
Safety Factor	3.00		3.000	

<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>							
Shape Factors		Depth Factors		Ground Inclination Factors		Bearing Capacity Factors	
Sc=	1.000	k=	0.556	Gc=	0.819	Nq=	18.40
Sca=	0.000	Dc=	1.222	Gca=	0.181	Nc=	30.14
Sq=	1.000	Dca=	0.222	Gq=	0.237	Nγ=	15.07
Sγ=	1.000	Dq=	1.160	Gγ=	0.237		
		Dγ=	1.000				
Effective Unit Weight (kN/m3)		(pcf)		Effective Stress at Depth D			
γ'=	19.6		125.0	29.93	kPa	625	psf
Net Allowable Bearing Capacity (kPa)				Net Allowable Bearing Capacity (ksf)			
q'_{all}=	265			q'_{all}=	5.54		

BEARING CAPACITY ANALYSIS
BRINCH-HANSEN METHOD

H=14 ft Type 1 Wall

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>				
Footing Type	C	C=continuous, R=rectangular		
Footing Width	2.44	m	8.00	ft
Footing Length	0.00	m		ft
Footing Depth	0.91	m	3.00	ft
Ground Inclination	26.56	deg	26.56	deg
Soil Cohesion	19.15	kPa	400.00	psf
Soil Friction Angle	30.00	deg	30.00	deg
Soil Unit Weight	19.64	kN/m^3	125.00	pcf
Water Depth	8.84	m	29.00	ft
Safety Factor	3.00		3.000	

<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>							
Shape Factors		Depth Factors		Ground Inclination Factors		Bearing Capacity Factors	
Sc=	1.000	k=	0.375	Gc=	0.819	Nq=	18.40
Sca=	0.000	Dc=	1.150	Gca=	0.181	Nc=	30.14
Sq=	1.000	Dca=	0.150	Gq=	0.237	Nγ=	15.07
Sγ=	1.000	Dq=	1.108	Gγ=	0.237		
		Dγ=	1.000				
Effective Unit Weight (kN/m3)		(pcf)		Effective Stress at Depth D			
γ'=	19.6		125.0	17.96	kPa	375	psf
Net Allowable Bearing Capacity (kPa)				Net Allowable Bearing Capacity (ksf)			
q'_{all}=	233			q'_{all}=	4.86		

BEARING CAPACITY ANALYSIS
BRINCH-HANSEN METHOD

H=12 ft Type 1 Wall

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>				
Footing Type	C	C=continuous, R=rectangular		
Footing Width	2.21	m	7.25	ft
Footing Length	0.00	m		ft
Footing Depth	1.52	m	5.00	ft
Ground Inclination	26.56	deg	26.56	deg
Soil Cohesion	19.15	kPa	400.00	psf
Soil Friction Angle	30.00	deg	30.00	deg
Soil Unit Weight	19.64	kN/m^3	125.00	pcf
Water Depth	8.53	m	28.00	ft
Safety Factor	3.00		3.000	

<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>							
Shape Factors		Depth Factors		Ground Inclination Factors		Bearing Capacity Factors	
Sc=	1.000	k=	0.690	Gc=	0.819	Nq=	18.40
Sca=	0.000	Dc=	1.276	Gca=	0.181	Nc=	30.14
Sq=	1.000	Dca=	0.276	Gq=	0.237	Nγ=	15.07
Sγ=	1.000	Dq=	1.199	Gγ=	0.237		
		Dγ=	1.000				
Effective Unit Weight (kN/m3)		(pcf)		Effective Stress at Depth D			
γ'=	19.6		125.0	29.93	kPa	625	psf
Net Allowable Bearing Capacity (kPa)				Net Allowable Bearing Capacity (ksf)			
q'_{all}=	269			q'_{all}=	5.62		

COULOMB AND MONONABE-OKABE EARTH PRESSURE CALCULATIONS

			<INPUT>			
Unit Weight =	γ	=	125	pcf =	19.6	kN/m^3
Friction Angle =	ϕ	=	34	degrees =	0.593412	radians
Wall Friction Angle =	ϕ_w	=	0.0	degrees =	0	radians
Wall Inclination =	α	=	0	degrees =	0	radians
Slope Inclination =	β	=	0.000	degrees =	0	radians
Horiz. EQ Coeff. =	K_h	=	0.000			
Vert. EQ Coeff. =	K_v	=	0			

<<OUTPUT>>							
COULOMB STATIC				SEISMIC INCREMENT			
	EFP		i_A		EFP		i_{AE}
K_A	pcf	kN/m3	deg	K_{AE}-K_A	pcf	kN/m3	deg
0.283	35.34	5.55	62.0	N/A	N/A	N/A	N/A
RANKINE STATIC				max K_h=	0.674508516842427		
0.283	35.34	5.55	62.0	max β=	34.00000000000000		deg

<< COULOMB CALCULATION>>

STATIC ACTIVE EARTH PRESSURE / STATIC CRITICAL INCLINATION

	A	B	C	D	E	K_A	C1	C2	i_A
degrees	34.0	0.0	34.0	34.0	0.0				62.00
radians	0.593	0.000	0.593	0.593	0.000	0.283	1.206	1.000	1.082104

SEISMIC ACTIVE EARTH PRESSURE / SEISMIC CRITICAL INCLINATION

	θ	A'	B'	C'	D'	E'	K_{AE}	C1E	C2E	i_{AE}
degrees	0.0	34.0	0.0	34.0	34.0	0				62.00
radians	0.000	0.593	0.000	0.593	0.593	0.000	0.283	1.206	1.000	1.082104

COULOMB AND MONONABE-OKABE EARTH PRESSURE CALCULATIONS

			<INPUT>			
Unit Weight =	γ	=	125	pcf =	19.6	kN/m^3
Friction Angle =	ϕ	=	34	degrees =	0.593412	radians
Wall Friction Angle =	ϕ_w	=	0.0	degrees =	0	radians
Wall Inclination =	α	=	0	degrees =	0	radians
Slope Inclination =	β	=	0.000	degrees =	0	radians
Horiz. EQ Coeff. =	K_h	=	0.170			
Vert. EQ Coeff. =	K_v	=	0			

<<OUTPUT>>

COULOMB STATIC				SEISMIC INCREMENT			
	EFP		i_A		EFP		i_{AE}
K_A	pcf	kN/m3	deg	K_{AE}-K_A	pcf	kN/m3	deg
0.283	35.34	5.55	62.0	0.105	13.2	2.1	54.24
RANKINE STATIC				max K_h=	0.674508516842427		
0.283	35.34	5.55	62.0	max β=	24.35195468390180		deg

<< COULOMB CALCULATION>>

STATIC ACTIVE EARTH PRESSURE — STATIC CRITICAL INCLINATION

	A	B	C	D	E	K_A	C1	C2	i_A
degrees	34.0	0.0	34.0	34.0	0.0				62.00
radians	0.593	0.000	0.593	0.593	0.000	0.283	1.206	1.000	1.082104

SEISMIC ACTIVE EARTH PRESSURE — SEISMIC CRITICAL INCLINATION

	θ	A'	B'	C'	D'	E'	K_{AE}	C1E	C2E	i_{AE}
degrees	9.6	24.4	9.6	34.0	24.4	0				54.24
radians	0.168	0.425	0.168	0.593	0.425	0.000	0.388	1.287	1.453	0.946638

COULOMB AND MONONABE-OKABE EARTH PRESSURE CALCULATIONS

			<INPUT>			
Unit Weight =	γ	=	125	pcf =	19.6	kN/m^3
Friction Angle =	ϕ	=	34	degrees =	0.593412	radians
Wall Friction Angle =	ϕ_w	=	22.7	degrees =	0.395608	radians
Wall Inclination =	α	=	0	degrees =	0	radians
Slope Inclination =	β	=	26.560	degrees =	0.463559	radians
Horiz. EQ Coeff. =	K_h	=	0.000			
Vert. EQ Coeff. =	K_v	=	0			

<<OUTPUT>>							
COULOMB STATIC				SEISMIC INCREMENT			
	EFP		i_A		EFP		i_{AE}
K_A	pcf	kN/m3	deg	K_{AE}-K_A	pcf	kN/m3	deg
0.401	50.19	7.88	49.2	N/A	N/A	N/A	N/A
RANKINE STATIC				max K_h=	0.130587296076061		
0.454	56.76	8.92	62.0	max β=	34.00000000000000		deg

<< COULOMB CALCULATION>>

STATIC ACTIVE EARTH PRESSURE / STATIC CRITICAL INCLINATION

	A	B	C	D	E	K_A	C1	C2	i_A
degrees	34.0	22.7	56.7	7.4	26.6				49.16
radians	0.593	0.396	0.989	0.130	0.464	0.401	0.584	1.674	0.857982

SEISMIC ACTIVE EARTH PRESSURE / SEISMIC CRITICAL INCLINATION

	θ	A'	B'	C'	D'	E'	K_{AE}	C1E	C2E	i_{AE}
degrees	0.0	34.0	22.7	56.7	7.4	26.56				49.16
radians	0.000	0.593	0.396	0.989	0.130	0.464	0.401	0.584	1.674	0.857982

TABLE 1
Ultimate Friction Factors and Adhesion for Dissimilar Materials

Interface Materials	Friction factor, tan [delta]	Friction angle [delta] degrees
Mass concrete on the following foundation materials:		
Clean sound rock	0.70	35
Clean gravel, gravel-sand mixtures, coarse sand	0.55 to 0.60	29 to 31
Clean fine to medium sand, silty medium to coarse sand, silty or clayey gravel	0.45 to 0.55	24 to 29
Clean fine sand, silty or clayey fine to medium sand	0.35 to 0.45	19 to 24
Fine sandy silt, nonplastic silt	0.30 to 0.35	17 to 19
Very stiff and hard residual or preconsolidated clay	0.40 to 0.50	22 to 26
Medium stiff and stiff clay and silty clay	0.30 to 0.35	17 to 19
(Masonry on foundation materials has same friction factors.)		
Steel sheet piles against the following soils:		
Clean gravel, gravel-sand mixtures, well-graded rock fill with spalls	0.40	22
Clean sand, silty sand-gravel mixture, single size hard rock fill	0.30	17
Silty sand, gravel or sand mixed with silt or clay	0.25	14
Fine sandy silt, nonplastic silt	0.20	11
Formed concrete or concrete sheet piling against the following soils:		
Clean gravel, gravel-sand mixture, well-graded rock fill with spalls	0.40 to 0.50	22 to 26
Clean sand, silty sand-gravel mixture, single size hard rock fill	0.30 to 0.40	17 to 22
Silty sand, gravel or sand mixed with silt or clay	0.30	17
Fine sandy silt, nonplastic silt	0.25	14
Various structural materials:		
Masonry on masonry, igneous and metamorphic rocks:		
Dressed soft rock on dressed soft rock	0.70	35
Dressed hard rock on dressed soft rock	0.65	33
Dressed hard rock on dressed hard rock	0.55	29
Masonry on wood (cross grain)	0.50	26
Steel on steel at sheet pile interlocks	0.30	17

Interface Materials (Cohesion)	Adhesion c+a, (psf)
Very soft cohesive soil (0 - 250 psf)	0 - 250
Soft cohesive soil (250 - 500 psf)	250 - 500
Medium stiff cohesive soil (500 - 1000 psf)	500 - 750
Stiff cohesive soil (1000 - 2000 psf)	750 - 950
Very stiff cohesive soil (2000 - 4000 psf)	950 - 1,300

RANKINE PASSIVE TRIAL WEDGE CALCULATION

<<INSTRUCTIONS>>	1. Input passive height and soil parameters. 2. Click on Tools-Solver-Solve 3. Program iterates to compute the ultimate passive force, EFP, and Kp. 4. Program computes Kp for 1/2" movement for various soil types.

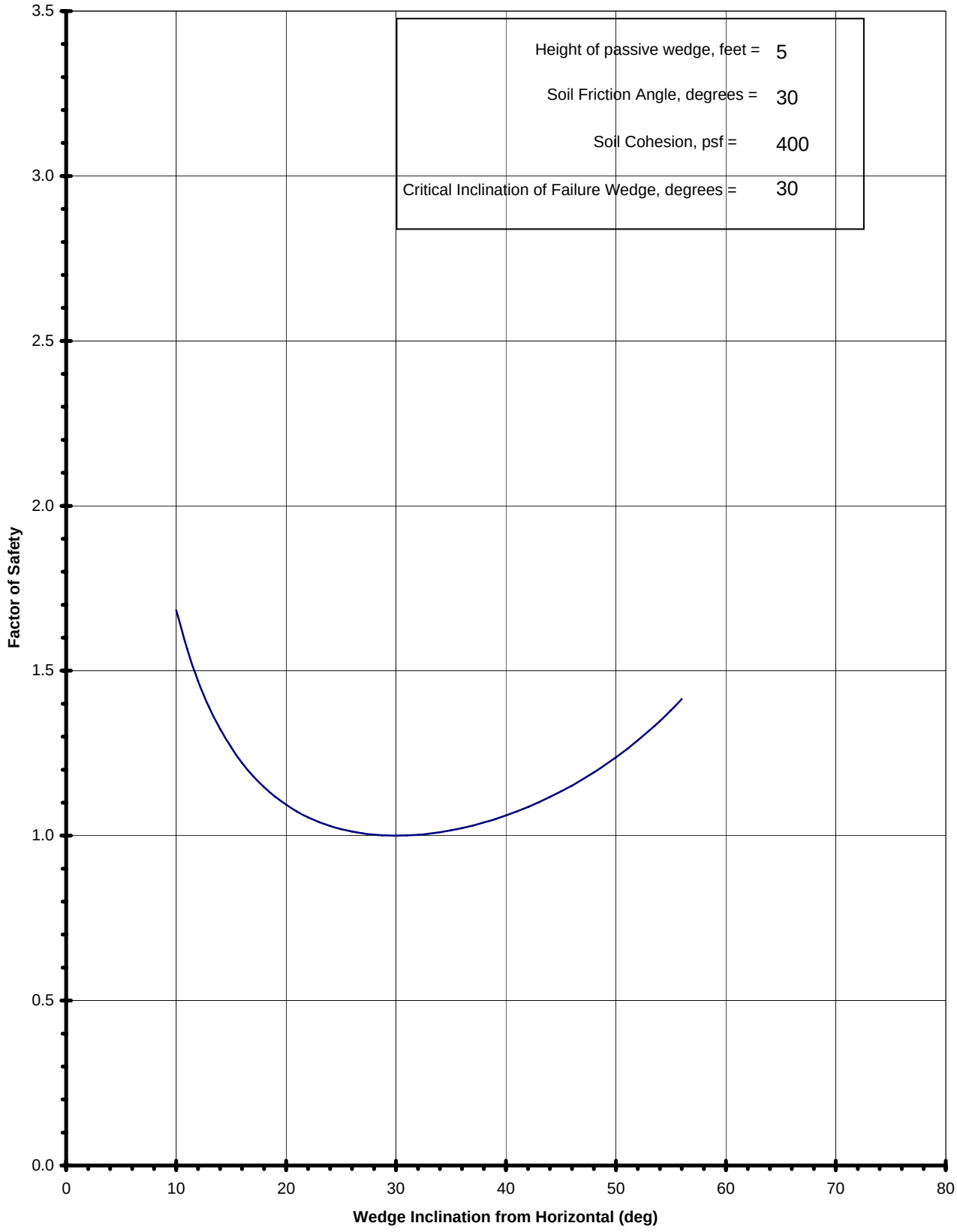
<<INPUT>>	
Passive height, H (feet)=	5
Soil Unit Weight, γ (pcf)=	125
Soil Friction Angle, ϕ (deg)=	30
Soil Cohesion, c (psf)=	400
<<ITERATE>>	
Passive Force, Pp (lb/ft)=	11,616

= 0.5236 radians

<<OUTPUT>>					
		Required Movement to Mobilize Full Passive (inches)			
Equivalent Fluid Unit Wt. (pcf)	Kp	Dense Sand, .002H	Loose Sand, .006H	Soft Clay, .04H	Stiff Clay, .02H
929	7.43	0.12	0.36	2.4	1.2
Kp for 1/2" movement=		7.43	7.43	1.55	3.10
45-ϕ/2= 30 degrees		929	929	194	387

Wedge inclination		x	L	Weight, W	Wx	Wy	Ppx	Ppy	N	
degrees	radians	(feet)	(feet)	(lb/ft)	(lb/ft)	(lb/ft)	(lb/ft)	(lb/ft)	(lb/ft)	FS
30	0.523599	8.660254	10	2706.3294	1353.16469	2343.75	10059.49	5807.852	8151.602	1.0000000
10	0.1745	28.36	28.79	8861.4	1538.8	8726.8	11439.2	2017.0	10743.8	1.6836125
11	0.1920	25.72	26.20	8038.4	1533.8	7890.7	11402.3	2216.4	10107.1	1.5655444
12	0.2094	23.52	24.05	7351.0	1528.4	7190.3	11361.9	2415.0	9605.4	1.4692559
13	0.2269	21.66	22.23	6767.9	1522.5	6594.5	11318.0	2613.0	9207.4	1.3897508
14	0.2443	20.05	20.67	6266.8	1516.1	6080.7	11270.7	2810.1	8890.8	1.3234634
15	0.2618	18.66	19.32	5831.3	1509.3	5632.6	11219.9	3006.4	8639.0	1.2677816
16	0.2793	17.44	18.14	5449.1	1502.0	5238.0	11165.7	3201.7	8439.7	1.2207491
17	0.2967	16.35	17.10	5110.7	1494.2	4887.4	11108.2	3396.1	8283.5	1.1808726
18	0.3142	15.39	16.18	4808.9	1486.0	4573.5	11047.2	3589.4	8163.0	1.1469933
19	0.3316	14.52	15.36	4537.8	1477.4	4290.6	10982.9	3781.7	8072.3	1.1181991
20	0.3491	13.74	14.62	4292.9	1468.3	4034.0	10915.2	3972.8	8006.8	1.0937629
21	0.3665	13.03	13.95	4070.5	1458.7	3800.1	10844.2	4162.7	7962.8	1.0730991
22	0.3840	12.38	13.35	3867.3	1448.7	3585.7	10769.9	4351.3	7937.0	1.0557311
23	0.4014	11.78	12.80	3681.0	1438.3	3388.4	10692.3	4538.6	7927.0	1.0412680
24	0.4189	11.23	12.29	3509.4	1427.4	3206.0	10611.5	4724.5	7930.6	1.0293869
25	0.4363	10.72	11.83	3350.8	1416.1	3036.8	10527.4	4909.0	7945.9	1.0198197
26	0.4538	10.25	11.41	3203.6	1404.4	2879.4	10440.1	5092.0	7971.4	1.0123423
27	0.4712	9.81	11.01	3066.6	1392.2	2732.3	10349.7	5273.4	8005.8	1.0067671
28	0.4887	9.40	10.65	2938.6	1379.6	2594.7	10256.1	5453.2	8047.9	1.0029364
28.1	0.4904	9.36	10.62	2926.3	1378.3	2581.4	10246.5	5471.1	8052.5	1.0026440
28.2	0.4922	9.32	10.58	2914.1	1377.0	2568.2	10237.0	5489.0	8057.2	1.0023676
28.3	0.4939	9.29	10.55	2901.9	1375.7	2555.0	10227.4	5506.9	8061.9	1.0021071
28.4	0.4957	9.25	10.51	2889.8	1374.5	2542.0	10217.7	5524.7	8066.7	1.0018622
28.5	0.4974	9.21	10.48	2877.8	1373.2	2529.0	10208.1	5542.5	8071.6	1.0016331
28.6	0.4992	9.17	10.45	2865.8	1371.8	2516.1	10198.4	5560.3	8076.5	1.0014194
28.7	0.5009	9.13	10.41	2854.0	1370.5	2503.3	10188.7	5578.1	8081.5	1.0012212
28.8	0.5027	9.09	10.38	2842.2	1369.2	2490.6	10178.9	5595.9	8086.5	1.0010382
28.9	0.5044	9.06	10.35	2830.5	1367.9	2478.0	10169.1	5613.7	8091.6	1.0008705
29	0.5061	9.02	10.31	2818.8	1366.6	2465.4	10159.3	5631.4	8096.8	1.0007179
30	0.5236	8.66	10.00	2706.3	1353.2	2343.8	10059.5	5807.9	8151.6	1.0000000
31	0.5411	8.32	9.71	2600.4	1339.3	2229.0	9956.6	5982.5	8211.5	1.0006895
32	0.5585	8.00	9.44	2500.5	1325.1	2120.6	9850.7	6155.4	8275.9	1.0027085
33	0.5760	7.70	9.18	2406.0	1310.4	2017.9	9741.7	6326.4	8344.2	1.0059928
34	0.5934	7.41	8.94	2316.5	1295.4	1920.5	9629.9	6495.4	8415.9	1.0104897
35	0.6109	7.14	8.72	2231.5	1279.9	1827.9	9515.0	6662.5	8490.4	1.0161571
36	0.6283	6.88	8.51	2150.6	1264.1	1739.9	9397.3	6827.5	8567.4	1.0229626
37	0.6458	6.64	8.31	2073.5	1247.9	1656.0	9276.7	6990.5	8646.5	1.0308820
38	0.6632	6.40	8.12	1999.9	1231.3	1575.9	9153.3	7151.3	8727.3	1.0398993
39	0.6807	6.17	7.95	1929.5	1214.3	1499.5	9027.1	7310.0	8809.5	1.0500056
40	0.6981	5.96	7.78	1862.1	1196.9	1426.5	8898.1	7466.4	8892.9	1.0611994
41	0.7156	5.75	7.62	1797.5	1179.2	1356.6	8766.5	7620.6	8977.1	1.0734858
42	0.7330	5.55	7.47	1735.3	1161.2	1289.6	8632.1	7772.4	9062.0	1.0868764
43	0.7505	5.36	7.33	1675.6	1142.7	1225.4	8495.2	7921.9	9147.3	1.1013896
44	0.7679	5.18	7.20	1618.0	1124.0	1163.9	8355.6	8068.9	9232.8	1.1170505
45	0.7854	5.00	7.07	1562.5	1104.9	1104.9	8213.5	8213.5	9318.4	1.1338908
46	0.8029	4.83	6.95	1508.9	1085.4	1048.2	8068.9	8355.6	9403.8	1.1519494
47	0.8203	4.66	6.84	1457.1	1065.6	993.7	7921.9	8495.2	9488.9	1.1712727
48	0.8378	4.50	6.73	1406.9	1045.5	941.4	7772.4	8632.1	9573.5	1.1919149
49	0.8552	4.35	6.63	1358.3	1025.1	891.1	7620.6	8766.5	9657.6	1.2139387
50	0.8727	4.20	6.53	1311.1	1004.4	842.8	7466.4	8898.1	9740.9	1.2374161
51	0.8901	4.05	6.43	1265.3	983.3	796.3	7310.0	9027.1	9823.4	1.2624293
52	0.9076	3.91	6.35	1220.8	962.0	751.6	7151.3	9153.3	9904.9	1.2890713
53	0.9250	3.77	6.26	1177.4	940.3	708.6	6990.5	9276.7	9985.3	1.3174481
54	0.9425	3.63	6.18	1135.2	918.4	667.3	6827.5	9397.3	10064.6	1.3476791
55	0.9599	3.50	6.10	1094.1	896.2	627.5	6662.5	9515.0	10142.6	1.3798998
56	0.9774	3.37	6.03	1053.9	873.7	589.3	6495.4	9629.9	10219.2	1.4142632
									Minimum FS=	1.0000000

PASSIVE TRIAL WEDGE SOLUTION



APPENDIX G
RESPONSE TO CALTRANS REVIEW COMMENTS

REVIEW COMMENT SUBMITAL
January 27, 2009

Review Submittal No. : 2nd review		**PROJECT :** SR-22/West County Connectors (WCC)
SUBMITTAL: ☐ Preliminary ☐35% ☒ 65% ☐ 95% ☐ 100%		**Design Segment :** ☒ I-405 / SR-22 HOV Connector ☐ I-405 / I 605 HOV Connector
REVIEW TYPE: ☒ Agency ☐ Safety ☐ Other		**DESIGN TASK MANAGER:**
DATE: 01-27-09	**RETURN DATE:** 02/27/09	**CONTACT INFO:**

REVIEWER: Sharid Amiri	☐ OCTA ☒ Caltrans ☐ FHWA ☐ OTHER	**DISCIPLINE:**	Geotechnical
		SUB PACKAGE:	Geotechnical Design Report

No.	Dwg./Pg.	Comment	Initial Disp.	Response	Final Disp.	LS or NDC
1	GDR	Include the Materials Report as a related report as part of the Section 3 of the Geotechnical Design Report.	C	We have listed the additional reports in section 3. The Materials Report and other reports were included in Section 13 as references.		
2		Rename "Layout" sheets to Boring/CPT Location Map.	C	The Figures have been renamed and labeled Exploration Location Plan.		
3		Explain how the frequency of borings/CPT was established along the roadway.	C	Borings/CPTs were performed at the locations of walls (boring/CPTs every 300 to 500 feet); bridges (one boring per support); and typically 1000 feet or less on roadway. A total of 24 borings and 32 CPTs were done for the 2.2 mile alignment, for an average frequency of about 1 exploration for each 200 feet of alignment. The spacing of the explorations was modified based on existing data, site access and uniformity of soil conditions.		
4		Provide CD that includes sample spread sheets for Liquefaction, earthquake induced, static settlements and bearing capacity.	C	This is provided with the revised GDR.		

DESIGNERS INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Discuss **N** = No Change **A** = Agency Action
REVIEWERS FINAL DISPOSITION CODES: **D** = Done or Approved **N/C** = No Change Required
LS =Revise in Later Submittal **NDC =** Revise Immediately

No.	Dwg./Pg.	Comment	Initial Disp.	Response	Final Disp.	LS or NDC
5		Settlement waiting periods and related items do not appear to be consistently included in the Standard Special Provisions, reconcile.	C	Will coordinate with Parsons to include in SSPs. A SSP based on format of 605/405 segment is in progress. Table 6A (settlement summary) and Table 6B (settlement plate location and monitoring procedure) have been added to the GDR, and are attached to this response.		
6		Explain why Triaxial tests were not performed and justify the validity of direct shear tests only for the laboratory program.	C	Local practice in California is to generally perform direct shear tests and Su from CPT and pocket penetrometer for strength evaluation for bearing capacity and slope stability calculations. Even with direct shear tests, generally nominal conservative values are used for design. Triaxial tests are normally used on special projects such as large dams or specialized construction or on very soft sites.		
7		Include Physiography, Geologic Structure in the text where appropriate.	C	A discussion to include physiography and geologic structure has been included in Section 7.1.		
8		Discuss and include instrumentation for settlement monitoring and related issues in Section 11 of the subject report.	C	A discussion regarding settlement monitoring is included in Section 11.		
9		Include in tabulated form the magnitude of settlement time settlement and surcharge height along the roadway stations in the appropriate section of the report.	C	Table 6A summarizing the settlement and surcharge has been included in the report.		
10		Correct the section numbering in the report.	C	Section numbering in Section 8.3 and 8.4.5 has been corrected.		
11		Is there any CH material present at the site? Justify your response	C	No CH material was encountered in a total of 39 plasticity index tests. Maximum measured liquid limit is 47.		

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No.	Dwg./Pg.	Comment	Initial Disp.	Response	Final Disp.	LS or NDC
12		If the response to comment 11 is affirmative, explain how it effects the potential for roadway and embankment settlement	C	N/A.		
13		Explain why only one test was performed for the entire site to assess the grain size distribution for the clayey material, given the importance of the potential settlement for this project.	C	We performed a total of 86 percent passing No. 200 sieve on the site soils, and 39 plasticity index tests. The grain size distribution (fraction passing each sieve or diameter) of the clayey soils is not a critical parameter for evaluation of settlement.		
14		Explain how the consolidation parameters were determined and provide a table in the Appendix for their values.	C	The degree of overconsolidation of the clays was determined from consolidation tests and Su over p0 ratio. Compressibility parameters were determined from consolidation tests by applying Schmertmann's correction. Cv was determined using plasticity (Liquid Limit) correlations from NAVFAC DM7. A summary table is included in revised Appendix B.		
15		Is there any hydrometer tests performed for the clayey samples at the site? Explain your justification	C	No. We performed a total of 86 percent passing No. 200 sieve on the site soils, and 39 plasticity index tests.		
16		Provide SLIDE software analysis for the slope stability calculations	C	GDC did not have SLIDE program when the report was prepared. At Caltrans suggestion, we purchased SLIDE program and a comparison run was performed and indicated virtually same results. This check run is included in Attachment 1.		
17		Include in tabulated form the magnitude of expansion potential along the roadway stations in the appropriate section of the report.	C	Appropriate Table 5 has been included in the report. Based on correlation with Liquid Limit and Dry Density (Mitchell and Gardner, 1975) expansion potential of the site soils is generally "Low," with one isolated sample as "Medium." See Figure 1 attached to this response.		

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No.	Dwg./Pg.	Comment	Initial Disp.	Response	Final Disp.	LS or NDC
18		Include in tabulated form the potential for liquefaction settlement and its magnitude along the roadway stations in the appropriate section of the report.	C	A summary of liquefaction settlements are included in Table 4 of the report. The station number of the appropriate CPT has been added to the table.		

Attachments:

Figure 1 Guide to Collapsibility, Compressibility, and Expansion (After Mitchell and Gardner, 1975)

Table 4 Summary of Liquefaction Settlement
Table 5 Summary of Expansion Potential
Table 6A Settlement Summary
Table 6B Settlement Plate Locations and Monitoring Procedure

Attachment 1 Slope Stability Check Run by Using Slide

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REVIEWERS FINAL DISPOSITION CODES: **D** = Done or Approved **N/C** = No Change Required
LS =Revise in Later Submittal **NDC =** Revise Immediately

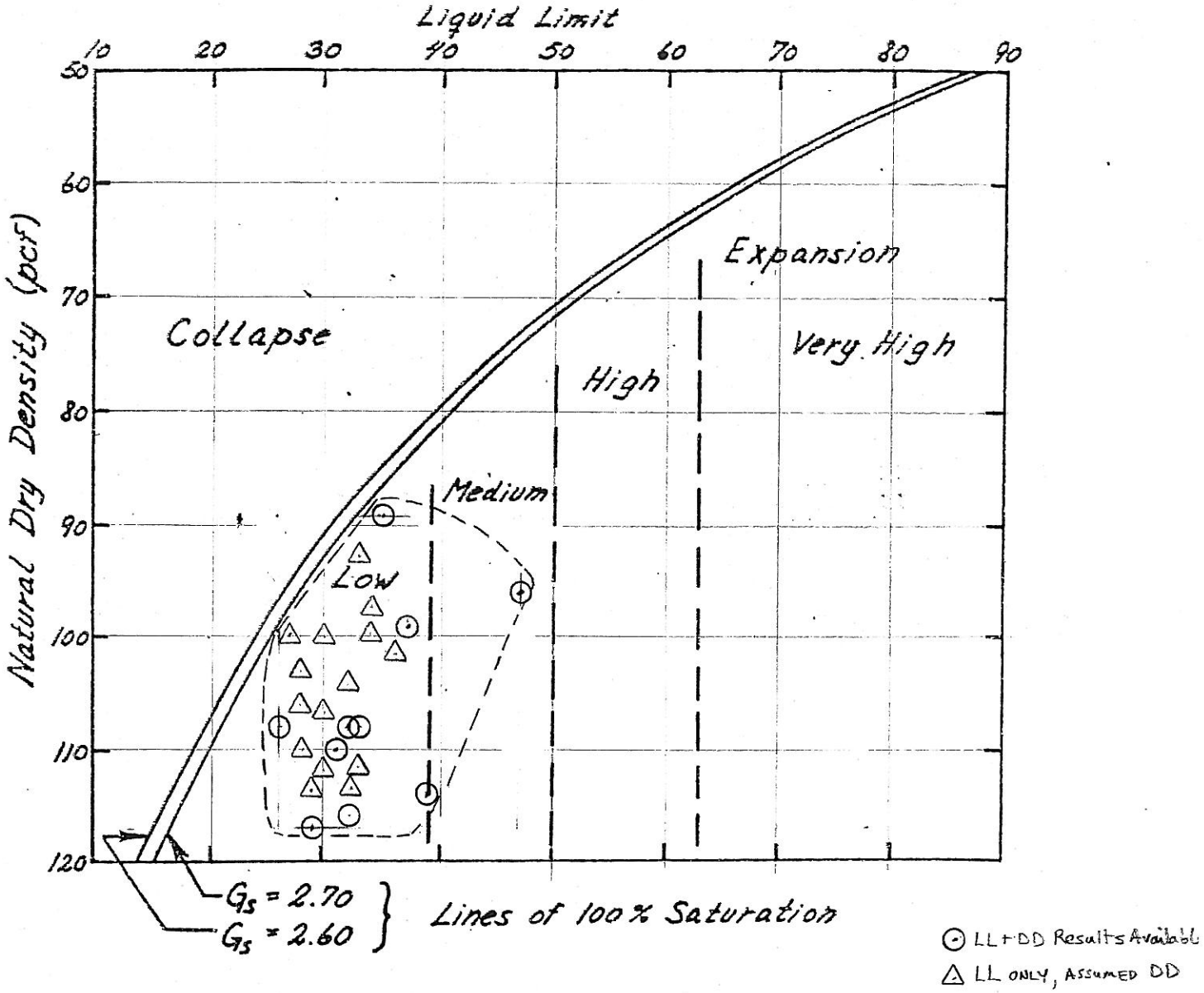


Fig. 37. Guide to Collapsibility, Compressibility, and Expansion Based on In-Situ Dry Density and Liquid Limit (After Mitchell and Gardner, 1975).

FIGURE 1

TABLE 4
LIQUEFACTION SUMMARY

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Approximate Station	Offset	Design Ground Water Elevation (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-020	"W Line" 2301+43	102 Left	16	0.15	0.00	0.15
CPT-08-022	"W" Line" 2301+98	2 Right	16	0.12	0.00	0.12
CPT-08-021	"W Line" 2302+53	40 Left	16	0.33	0.01	0.34
CPT-08-018	"W Line" 2306+56	83 Left	16	0.24	0.08	0.32
CPT-08-016	1312+20	146 Left	16	0.62	0.00	0.62
CPT-08-015	1313+33	73 Right	16	0.68	0.02	0.70
CPT-08-014B	1314+25	145 Left	16	0.08	0.01	0.09
CPT-08-014	1314+34	142 Left	16	0.37	0.02	0.39
CPT-08-013	1314+50	71 Left	16	0.78	0.02	0.80
CPT-08-009	1318+62	43 Right	16	0.26	0.02	0.28
CPT-08-008	1319+18	200 Left	16	0.02	0.02	0.04
CPT-08-007	1320+67	21 Right	16	0.28	0.00	0.28
CPT-08-006	1321+35	243 Left	16	0.00	0.00	0.00
CPT-08-121	1327+42	159 Right	18	0.20	0.00	0.20
CPT-08-003	1328+35	168 Left	18	0.26	0.00	0.26
CPT-08-002	1328+67	53 Right	18	0.92	0.00	0.92
CPT-08-001	1330+95	41 Left	18	0.17	0.00	0.17
CPT-08-119	1335+56	105 Right	16	0.37	0.00	0.37
CPT-08-117	1340+34	100 Right	16	0.28	0.00	0.28
CPT-08-110	"A Line" 363+24	106 Right	14	0.69	0.00	0.69
CPT-08-107	"A Line" 371+74	90 Left	14	0.25	0.00	0.25
CPT-08-104	"A Line" 378+20	108 Right	13	0.85	0.00	0.85
CPT-08-102	"A Line" 386+73	94 Left	12	0.12	0.00	0.12

Notes:
Stationing relative to SR-22 "H" line, except where noted otherwise. Right and left offsets defined by looking along station line in direction of increasing station.

Min	**0.00**
Max	**0.92**
Average	**0.36**

TABLE 5
SUMMARY OF EXPANSION POTENTIAL OF NEAR SURFACE SOILS

Boring No.	Station No.	Boring El. (feet)	Sample No.	Sample Depth (ft)	Sample El. (feet)	% (-)200	LL	PL	PI	USCS Classification	Dry Density γ_d (pcf)	Expansion Potential[2]
A-08-101	"A"391+12	19.5	B-1	1.0	18.5	37	31	20	11	SC	110	Low
A-08-105	"A"376+62	19.8	B-1	1.2	18.6	27	28	14	14	SC		Low
A-08-112	"A"358+50	23.0	S-4	15.0	8.0	77	NP	NP	NP	ML		Low
A-08-116	"A"345+34	22.0	R-2	6.0	16.0	86	37	20	17	CL	99	Low
A-08-119	"H"1335+66	23.0	B-1	1.0	22.0	36	32	20	12	SC		Low
A-08-120	"H"1333+97	25.9	R-4	16.0	9.9	72	36	19	17	CL		Low
A-08-122	"H"1322+20	31.9	B-1	1.0	30.9	23	26	15	11	SC	108	Low
R-08-004	"H"1325+02	31.2	B-1	1.3	29.9	66	29	17	12	CL	117	Low
R-08-005	"H"1324+48	27.8	B-1	2.0	25.8	63	29	20	9	CL		Low
R-08-005	"H"1324+48	27.8	R-1	6.0	21.8	53	32	19	13	CL	108	Low
R-08-011	"H"1316+25	29.5	S-1	5.0	24.5	47	33	19	14	SC/CL		Low
R-08-012	"H"1315+94	24.1	R-1	6.0	18.1	80	47	20	27	CL	96	Medium
R-08-017	"H"1310+90	52.5	R-2	11.0	41.5	82	35	21	14	CL	89	Low
R-08-017	"H"1310+90	52.5	S-3	15.0	37.5	55	34	20	14	CL		Low
R-08-019	"VV"38+33	53.6	S-1	5.0	48.6	59	34	20	14	CL		Low
R-08-019	"VV"38+33	53.6	R-2	11.0	42.6		39	20	19	CL	114	Low/Medium
R-08-019	"VV"38+33	53.6	R-6	31.0	22.6	71	33	21	12	CL	108	Low
R-08-023	"VV"44+88	46.2	R-1	6.0	40.2	54	32	19	13	CL	116	Low
HA-08-01	"B"293+60	26.0	B-1	2.5	23.5	56	30	20	10	CL		Low
HA-08-02	"E"3299+42	27.0	B-1	2.5	24.5	55	28	19	9	CL		Low
HA-08-03	"W"2302+04	28.0	B-1	2.5	25.5	69	32	19	13	CL		Low
HA-08-04	"E"3307+28	43.0	B-1	2.5	40.5	57	30	21	9	CL		Low
HA-08-05	"NB405"310+50	24.9	B-1	2.5	22.4	56	30	17	13	CL		Low
HA-08-06	"VV"51+08	29.0	B-1	2.5	26.5	51	28	18	10	CL		Low
HA-08-07	"NB405"314+20	28.5	B-1	2.5	26	40	27	17	10	SC		Low
HA-08-08	"A"374+70	20.0	B-1	2.5	17.5	53	33	17	16	CL/SC		Low
					Max=	86	47	21	27		117	
					Min=	23	26	14	9		89	
					Avg=	57	32	19	13		107	

Notes:
1. Soils data from near surface soil samples above the water table that could be influenced by seasonal moisture variation.
2. Reference: Mitchell, J. and Gardner W. (1975),"In Situ Measurement of Volume Change Characteristics," Proceedings, In Situ Measurement of Soil Properties, Volume II, Raleigh, NC, ASCE, pp 279-345.

TABLE 6A
SETTLEMENT SUMMARY

Area	Maximum Amount of Fill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Fill Placement	Remaining Settlement after Waiting Period
Bolsa Chica Rd OC - N. Abut. In Roadway	4	None	1-2	2	45 days before driving abutment piles	40-60	<1/2 inch
Bolsa Chica Rd OC - N. Abut. Sidehill Fill	13	None	2-4	1	45 days before driving abutment piles	40-60	<1/2 inch
Bolsa Chica Rd OC - S. Abut. In Roadway	2	None	1-2	2	45 days before driving abutment piles	40-60	<1/2 inch
Bolsa Chica Rd OC - S. Abut. Sidehill Fill	13	None	2-4	1	45 days before driving abutment piles	40-60	<1/2 inch

Note: Do not excavate abutment footing or drive abutment piles until completion of settlement period. No surcharge required.

Area		Maximum Amount of Fill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Lightweight Fill Placement	Remaining Settlement (inches), Time after Lightweight Fill Completion				
								0	15	30	60	90 days
RW 1299+1300 East Approach to HOV Conn.	east of "H" 1305+55	4-16	None	1-2.5	0	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1305+55-1309+05	16-29	None	0.75-2.75	2	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1309+05-1311+55	25-29	None	1.5-2.5	2	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1311+55-1312+70	23-24	Yes, per surcharge plan	8-10 (under surcharge) 1-1.5 (post surcharge)	4	11 mos. Surcharge period before constructing lightweight fill walls or abutment pile driving	40-60	<3/4 (<1/2 at Abut)	<1/4	<1/10	<1/10	<1/10

Note: In surcharge area: do not construct lightweight fill walls, excavate abutment footing, or drive abutment piles until completion of surcharge settlement period.

Area		Maximum Amount of Fill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Lightweight Fill Placement	Remaining Settlement (inches), Time after Lightweight Fill Completion					
								0	15	30	45	60	90 days
RW 1325+1326	"H" 1329+22 - 1331+57	8	None	0.4-0.7	0	None	40-60	<1/2	<1/4	<1/10	<1/10	<1/10	<1/10
	"H" 1328+22 - 1329+22	12	None	0.4-0.7	0	None	40-60	<1/2	<1/4	<1/10	<1/10	<1/10	<1/10
	"H" 1326+22 - 1328+22	17	None	0.6-1.0	1	None	40-60	<3/4	<1/2	<1/5	<1/10	<1/10	<1/10
	"H" 1325+22 - 1326+22	22	None	0.75-1.25	1	None	40-60	<3/4	<1/2	<1/5	<1/10	<1/10	<1/10
	"H" 1324+22 - 1325+22	27	None	1.0-1.5	2	None	40-60	<1 (<1/2 at Abut)	<1/2	<1/5	<1/10	<1/10	<1/10

Note: No settlement period required, lightweight fill may be placed against abutment, vertical joint in LW fill at back of footing required. No surcharge required.

Area	Maximum Amount of Retaining Wall Backill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Post-Surcharge Settlement Complete After Backfill of Retaining Wall	Remaining Settlement (inches), Time after Type 1 Wall Backfill Completion				
							0	15	30	60	90 days
RW 3311+3312	12-24	Yes, per surcharge plan	8-10 (under surcharge) < 1 (post surcharge)	3	6 mos. Surcharge period	40-60	<1/2	<1/4	<1/10	<10	<10

Note: In surcharge area: do not construct Type 1 walls, excavate abutment footing, or drive abutment piles until completion of surcharge settlement period.

Area	Maximum Amount of Fill [Lightweight fill only] (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Lightweight Fill Placement	Remaining Settlement (inches) after Lightweight Fill Completion
RW 3319+3320	5-16	None	0.5-1.0	2	None	60	<1/2

Note: No settlement period required, lightweight fill may be placed against abutment, vertical joint in LW fill at back of footing required. No surcharge required.

TABLE 6B
SETTLEMENT PLATE LOCATIONS AND MONITORING PROCEDURE

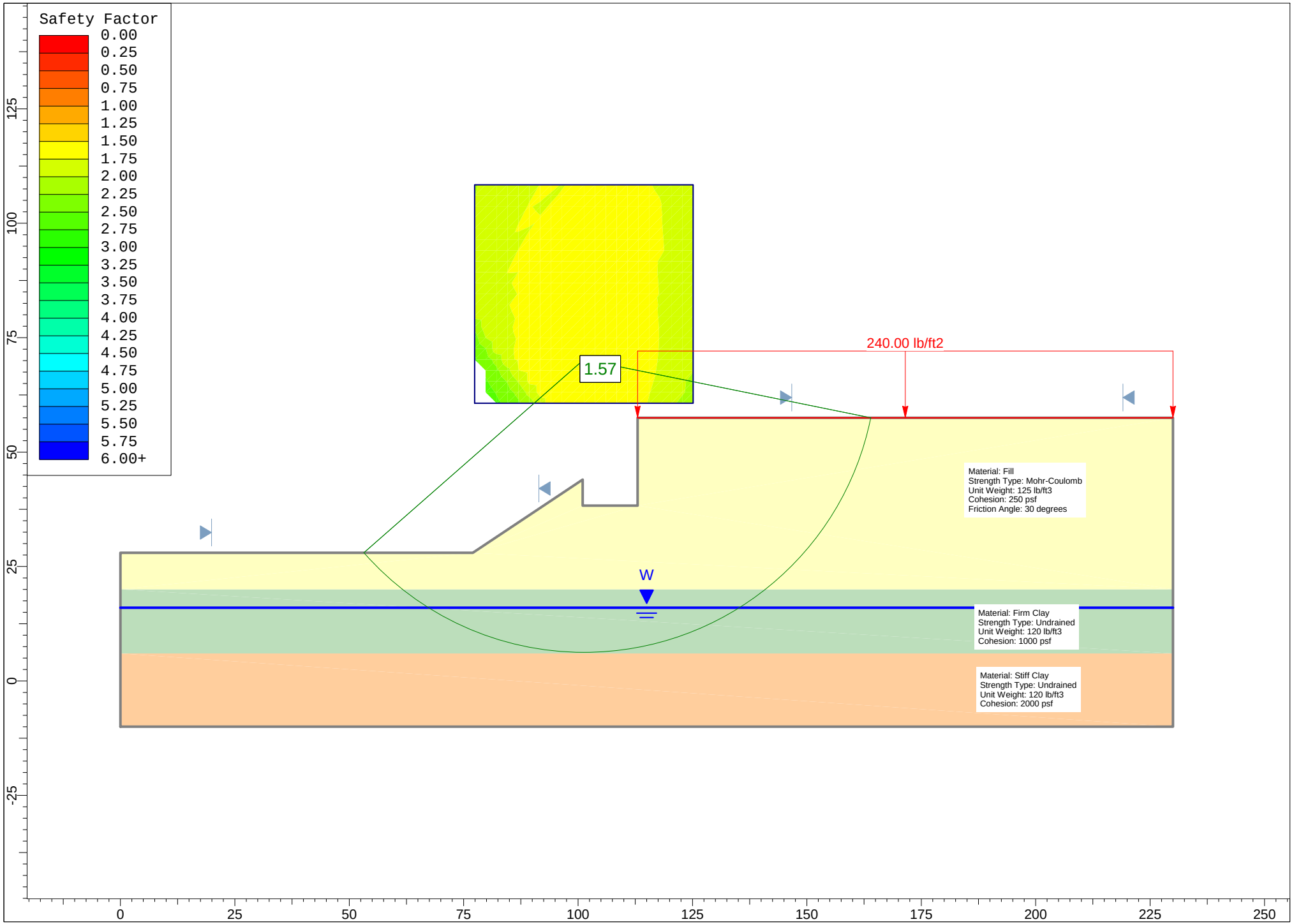
SETTLEMENT PLATE LOCATIONS				Settlement Plate Installation and Monitoring Procedure
Structure	**Station Line**	**Station**	**Offset**	
RW1299 & RW1300 and North Surcharge Area	"H"	1312+80	4 L	1. Install settlement plate in sand bedding on leveled area prior to placing any fill (see detail, Figure 6B).
	"H"	1312+40	40 L	2. Attach the first section of threaded steel pipe to the threaded fitting on plate by tightening firmly with pipe wrench.
	"H"	1312+23	10 R	3. Survey the top of plate elevation, top of threaded pipe elevation, and ground elevation before placing any fill, record date and time.
	"H"	1312+33	15 R	4. Place PVC pipe around the threaded pipe before placing any fill (Figure 6B).
	"H"	1312+28	55 R	5. Place fill around the settlement monument taking care not to damage or destroy.
	"H"	1310+92	10 L	6. Survey the top of steel pipe elevation daily as fill is placed, and weekly after fill completion, recording date, time, and elevation.
	"H"	1311+00	40 R	7. Each time the steel pipe is surveyed, survey the ground elevation at 4 locations, 5 ft north, south, east, and west of monument.
	"H"	1307+90	20 R	8. Add sections of steel pipe as needed to stay above fill. Each time a pipe section is added, do not loosen or tighten existing pipes, survey the existing top of pipe elevation, add a new section by firmly tightening with a pipe wrench, then survey the top of new section of pipe. Add additional PVC as needed to stay above the top of fill.
	"H"	1306+00	20 R	
RW 3319 & RW3320	"E"	3320+85	45 L	
	"E"	3319+75	24 L	9. Repeat steps 5 through 8 as necessary.
RW1325 & RW1326	"H"	1324+10	0	10. Transmit the settlement survey data to GDC within 24 hours of completing each survey.
	"H"	1324+55	0	11. Continue monitoring until recommended by GDC.
	"H"	1324+87	30 L	
	"H"	1325+88	30 R	
	"H"	1328+20	30 L	
Type 1 Wall 3311+3312 and South Surcharge Area	"E"	3308+90	45 L	
	"E"	3310+45	45 L	
	"E"	3311+30	20 L	
Bolsa Chica Road OC	"W"	40+25	25 L	
	"W"	40+90	65 R	
	"W"	41+50	115 R	
	"W"	44+60	25 L	
	"W"	45+20	65 R	
	"W"	46+00	110 R	

ATTACHEMENT 1
SLOPE STABILITY CHECK RUN BY USING SLIDE

Slope at Bolsa Chica South Abutment (Static and Seismic)

Factor of Safety

	Software	
	STEDwin	**Slide**
Static	1.57	1.57
Seismic	1.10	1.10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3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
1.57
240.00 lb/ft2
W
Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 250 psf
Friction Angle: 30 degrees
Material: Firm Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Material: Stiff Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion: 2000 psf
125
100
75
50
25
0
-25
0
25
50
75
100
125
150
175
200
225
250

Slide Analysis Information

Document Name

File Name: bolsa chica s abut_static.sli

Project Settings

Project Title: Bolsa Chica South Abut
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Janbu simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Enabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: -5
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 240 lb/ft2

Material Properties

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 250 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Firm Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion Type: Constant
Cohesion: 1000 psf
Water Surface: None

Material: Stiff Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion Type: Constant
Cohesion: 2000 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.571370
Center: 101.277, 70.217
Radius: 63.993
Left Slip Surface Endpoint: 53.185, 28.000
Right Slip Surface Endpoint: 163.994, 57.500
Resisting Moment=9.54044e+006 lb-ft
Driving Moment=6.0714e+006 lb-ft

Method: janbu simplified
FS: 1.410150
Center: 101.277, 63.058
Radius: 56.903
Left Slip Surface Endpoint: 56.456, 28.000
Right Slip Surface Endpoint: 157.908, 57.500
Resisting Horizontal Force=107828 lb
Driving Horizontal Force=76465.4 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 4796
Number of Invalid Surfaces: 10626
Error Codes:
Error Code -1000 reported for 10626 surfaces

Method: janbu simplified
Number of Valid Surfaces: 4796
Number of Invalid Surfaces: 10626
Error Codes:
Error Code -1000 reported for 10626 surfaces

Error Codes

The following errors were encountered during the computation:

-1000 = No valid slip surfaces are generated
at a grid center. Unable to draw a surface.

List of All Coordinates

Water Table
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230.0 16.0

Search Grid
77.460.7
125.1 60.7
125.1 108.4
77.4108.4

Search Grid
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0.0 0.0
0.0 0.0
0.0 0.0

Material Boundary
0.0 20.0
230.0 20.0

Material Boundary
0.0 6.0
230.0 6.0

External Boundary
0.0 -10.0
230.0 -10.0
230.0 6.0
230.0 20.0
230.0 57.5
113.0 57.5
113.0 38.3
101.0 38.3
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0.0 20.0
0.0 6.0

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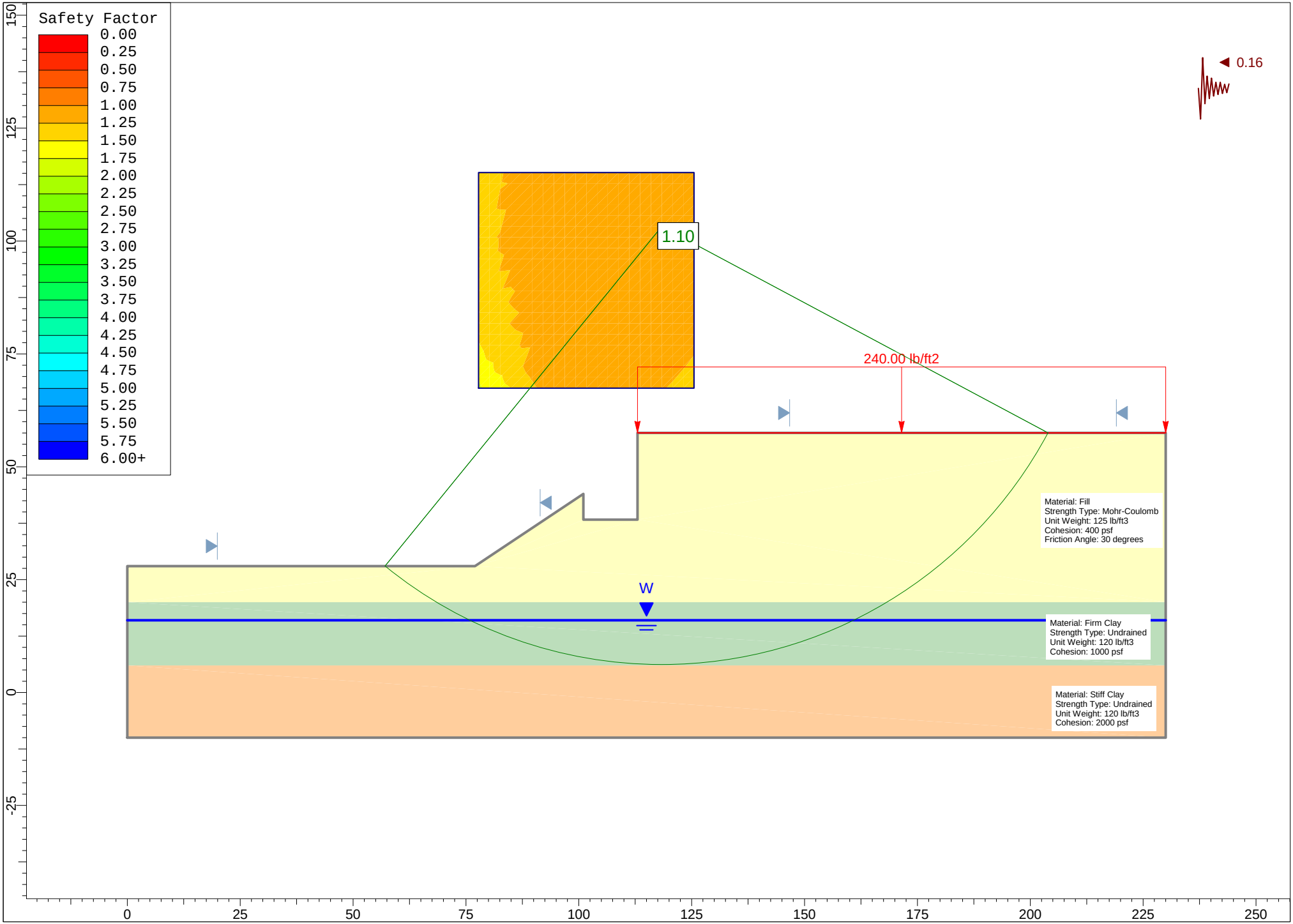
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2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
0.16
1.10
240.00 lb/ft2
W
Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 400 psf
Friction Angle: 30 degrees
Material: Firm Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion: 1000 psf
Material: Stiff Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion: 2000 psf
150
125
100
75
50
25
0
-25
0
25
50
75
100
125
150
175
200
225
250

Slide Analysis Information

Document Name

File Name: Bolsa Chica S Abut_Seismic.sli

Project Settings

Project Title: Bolsa Chica South Abut
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Janbu simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Enabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: -5
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.16
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 240 lb/ft2

Material Properties

Material: Fill
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 400 psf
Friction Angle: 30 degrees
Water Surface: Water Table

Custom Hu value: 1

Material: Firm Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion Type: Constant
Cohesion: 1000 psf
Water Surface: None

Material: Stiff Clay
Strength Type: Undrained
Unit Weight: 120 lb/ft3
Cohesion Type: Constant
Cohesion: 2000 psf
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.101710
Center: 118.362, 103.224
Radius: 97.031
Left Slip Surface Endpoint: 57.073, 28.000
Right Slip Surface Endpoint: 203.945, 57.500
Resisting Moment=1.84624e+007 lb-ft
Driving Moment=1.6758e+007 lb-ft

Method: janbu simplified
FS: 0.972941
Center: 115.976, 86.517
Radius: 80.475
Left Slip Surface Endpoint: 60.731, 28.000
Right Slip Surface Endpoint: 191.037, 57.500
Resisting Horizontal Force=143443 lb
Driving Horizontal Force=147432 lb

Valid / Invalid Surfaces

Method: bishop simplified
Number of Valid Surfaces: 4851
Number of Invalid Surfaces: 10571
Error Codes:
Error Code -1000 reported for 10571 surfaces

Method: janbu simplified
Number of Valid Surfaces: 4851
Number of Invalid Surfaces: 10571
Error Codes:
Error Code -1000 reported for 10571 surfaces

Error Codes

The following errors were encountered during the computation:

-1000 = No valid slip surfaces are generated
at a grid center. Unable to draw a surface.

List of All Coordinates

Search Grid
77.867.4
125.5 67.4
125.5 115.2
77.8115.2

Search Grid
0.0 0.0
0.0 0.0
0.0 0.0
0.0 0.0

Material Boundary
0.0 20.0
230.0 20.0

Material Boundary
0.0 6.0
230.0 6.0

External Boundary
0.0 -10.0
230.0 -10.0
230.0 6.0
230.0 20.0
230.0 57.5
113.0 57.5
113.0 38.3
101.0 38.3
101.0 44.0
77.028.0
0.0 28.0
0.0 20.0
0.0 6.0

Water Table
0.0 16.0
230.0 16.0

Distributed Load
113.0 57.5
230.0 57.5

I-436 SR-22 Bolsa Chica Road OC S. Abutment - Static

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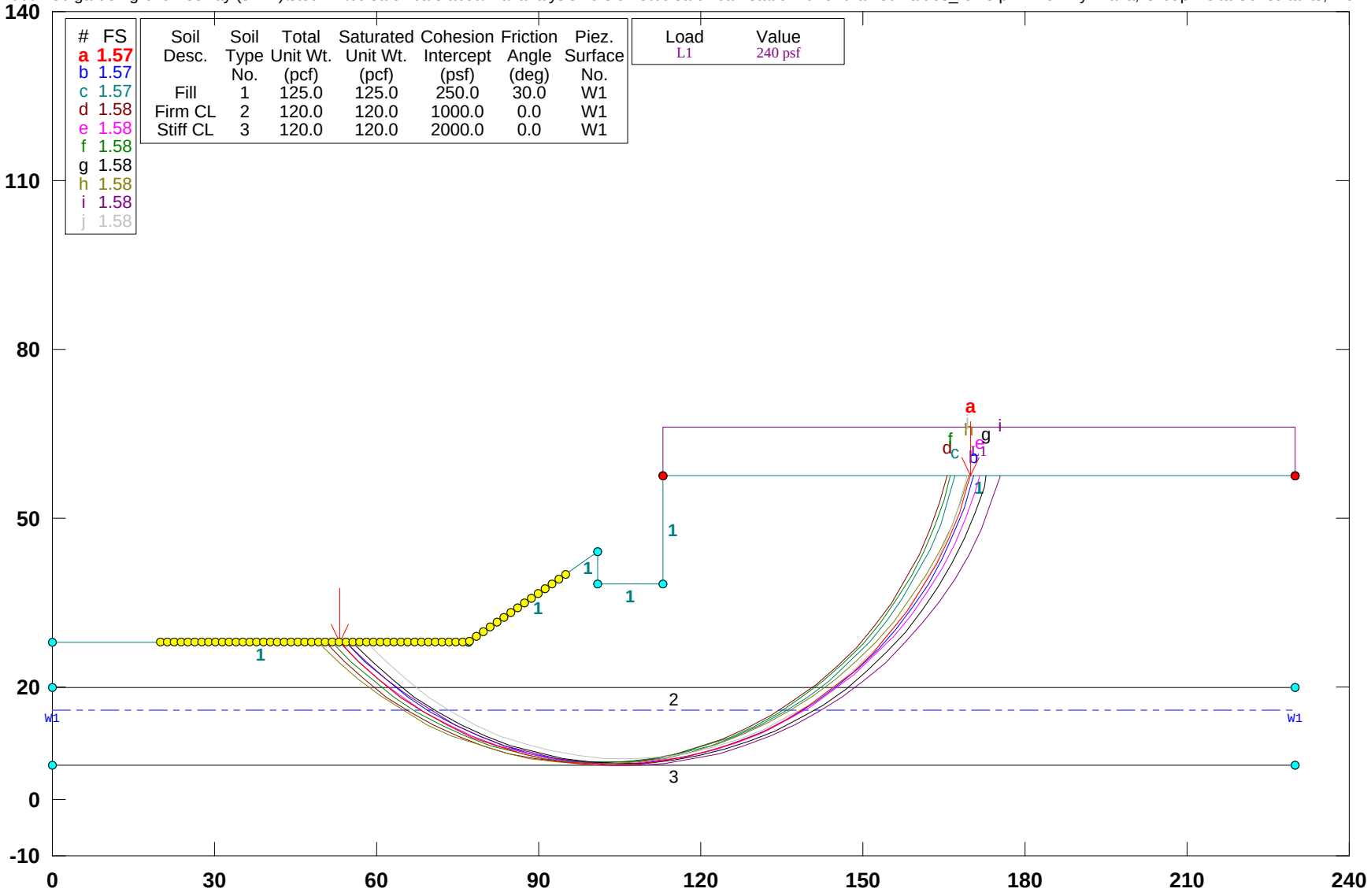
#	FS
a	1.57
b	1.57
c	1.57
d	1.58
e	1.58
f	1.58
g	1.58
h	1.58
i	1.58
j	1.58

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	125.0	125.0	250.0	30.0	W1
Firm CL	2	120.0	120.0	1000.0	0.0	W1
Stiff CL	3	120.0	120.0	2000.0	0.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=1.57

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/5/2008
Time of Run: 10:32AM
Run By: Nava, Group Delta Consultants, Inc.
Input Data Filename: N:bolsa chica - static with undrained values_rev 3.in
Output Filename: N:bolsa chica - static with undrained values_rev 3.OUT
Unit: ENGLISH
Plotted Output Filename: N:bolsa chica - static with undrained values_rev 3.PLT

PROBLEM DESCRIPTION I-436 SR-22
Bolsa Chica Road OC S. Abutment - Static

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	38.00	77.00	38.00	1
2	77.00	38.00	101.00	54.00	1
3	101.00	54.00	101.01	48.30	1
4	101.01	48.30	113.00	48.30	1
5	113.00	48.30	113.01	67.50	1
6	113.01	67.50	230.00	67.50	1
7	0.00	30.00	230.00	30.00	2
8	0.00	16.00	230.00	16.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	250.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	120.0	120.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	26.00
2	230.00	26.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	113.01	230.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

3600 Trial Surfaces Have Been Generated.

60 Surfaces Initiate From Each Of 60 Points Equally Spaced
Along The Ground Surface Between X = 20.00 ft.
and X = 95.00 ft.

Each Surface Terminates Between X = 113.01 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.05	38.00
2	56.59	34.47
3	60.38	31.20
4	64.39	28.22
5	68.61	25.54
6	73.01	23.17
7	77.58	21.13
8	82.28	19.42
9	87.09	18.06
10	91.99	17.06
11	96.94	16.41
12	101.94	16.12
13	106.93	16.20

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14	111.92	16.65
15	116.85	17.45
16	121.71	18.61
17	126.48	20.12
18	131.12	21.97
19	135.62	24.16
20	139.95	26.66
21	144.08	29.48
22	148.00	32.59
23	151.68	35.97
24	155.10	39.61
25	158.25	43.49
26	161.11	47.60
27	163.67	51.89
28	165.91	56.37
29	167.81	60.99
30	169.37	65.74
31	169.81	67.50

Circle Center At X = 103.3 ; Y = 84.8 and Radius, 68.7

*** 1.568 ***

Individual data on the 39 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.5	781.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.8	2444.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.6	1495.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2.4	2652.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3.5	4701.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.7	1099.3	0.0	12.5	0.0	0.0	0.0	0.0	0.0
7	4.4	7387.6	0.0	514.1	0.0	0.0	0.0	0.0	0.0
8	4.0	7685.3	0.0	1015.5	0.0	0.0	0.0	0.0	0.0
9	0.6	1193.4	0.0	186.7	0.0	0.0	0.0	0.0	0.0
10	4.7	11332.6	0.0	1786.9	0.0	0.0	0.0	0.0	0.0
11	4.8	14393.2	0.0	2264.9	0.0	0.0	0.0	0.0	0.0
12	4.9	17327.0	0.0	2633.7	0.0	0.0	0.0	0.0	0.0
13	5.0	20067.3	0.0	2891.5	0.0	0.0	0.0	0.0	0.0
14	4.1	18156.2	0.0	2461.0	0.0	0.0	0.0	0.0	0.0
15	0.0	43.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0
16	0.9	3654.5	0.0	569.6	0.0	0.0	0.0	0.0	0.0
17	5.0	19736.7	0.0	3068.9	0.0	0.0	0.0	0.0	0.0
18	5.0	19506.1	0.0	2987.6	0.0	0.0	0.0	0.0	0.0
19	1.1	4208.7	0.0	635.5	0.0	0.0	0.0	0.0	0.0
20	0.0	50.7	0.0	5.8	0.0	0.0	0.0	0.0	0.0
21	3.8	23928.8	0.0	2151.9	0.0	0.0	0.0	0.0	921.6
22	4.9	29785.2	0.0	2487.1	0.0	0.0	0.0	0.0	1167.3
23	4.8	28426.4	0.0	2070.5	0.0	0.0	0.0	0.0	1143.9
24	4.6	26759.3	0.0	1545.9	0.0	0.0	0.0	0.0	1114.6
25	4.5	24822.7	0.0	915.9	0.0	0.0	0.0	0.0	1079.3
26	3.2	16787.3	0.0	211.3	0.0	0.0	0.0	0.0	763.3
27	1.1	5874.8	0.0	0.0	0.0	0.0	0.0	0.0	275.0
28	4.1	20328.1	0.0	0.0	0.0	0.0	0.0	0.0	991.8
29	0.7	3102.7	0.0	0.0	0.0	0.0	0.0	0.0	157.8
30	3.3	14752.3	0.0	0.0	0.0	0.0	0.0	0.0	782.3
31	3.7	15285.4	0.0	0.0	0.0	0.0	0.0	0.0	883.4
32	3.4	12719.1	0.0	0.0	0.0	0.0	0.0	0.0	822.0
33	3.2	10220.1	0.0	0.0	0.0	0.0	0.0	0.0	756.3
34	2.9	7850.5	0.0	0.0	0.0	0.0	0.0	0.0	686.5
35	2.6	5670.4	0.0	0.0	0.0	0.0	0.0	0.0	613.2
36	2.2	3736.4	0.0	0.0	0.0	0.0	0.0	0.0	536.6
37	1.9	2100.5	0.0	0.0	0.0	0.0	0.0	0.0	457.1
38	1.6	808.4	0.0	0.0	0.0	0.0	0.0	0.0	375.2
39	0.4	48.6	0.0	0.0	0.0	0.0	0.0	0.0	105.8

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.32	38.00
2	57.87	34.48
3	61.67	31.23
4	65.70	28.26
5	69.93	25.60
6	74.34	23.25
7	78.92	21.24
8	83.63	19.56
9	88.45	18.23
10	93.35	17.25
11	98.32	16.64
12	103.31	16.39
13	108.31	16.51
14	113.28	16.99
15	118.21	17.83
16	123.07	19.03
17	127.82	20.59
18	132.45	22.48
19	136.92	24.71
20	141.22	27.26
21	145.33	30.12
22	149.21	33.27
23	152.85	36.69
24	156.24	40.37
25	159.34	44.29
26	162.15	48.43
27	164.65	52.76
28	166.83	57.26
29	168.67	61.91
30	170.17	66.68
31	170.36	67.50

Circle Center At X = 104.2 ; Y = 84.8 and Radius, 68.4

*** 1.570 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.05	38.00
2	56.59	34.46
3	60.38	31.20
4	64.40	28.23
5	68.63	25.57
6	73.05	23.24
7	77.64	21.24
8	82.36	19.58
9	87.18	18.29
10	92.10	17.36
11	97.07	16.80
12	102.06	16.61
13	107.06	16.79
14	112.03	17.35
15	116.94	18.28
16	121.77	19.57
17	126.49	21.22
18	131.08	23.21
19	135.50	25.55
20	139.73	28.20
21	143.76	31.17
22	147.55	34.43
23	151.09	37.96
24	154.36	41.75
25	157.33	45.77

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26	159.99	50.00
27	162.33	54.42
28	164.34	59.00
29	166.00	63.71
30	167.02	67.50

Circle Center At X = 102.1 ; Y = 83.5 and Radius, 66.9

*** 1.573 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.51	38.00
2	54.05	34.47
3	57.83	31.20
4	61.85	28.23
5	66.08	25.56
6	70.49	23.21
7	75.07	21.19
8	79.78	19.52
9	84.60	18.20
10	89.51	17.23
11	94.47	16.64
12	99.47	16.41
13	104.47	16.55
14	109.44	17.06
15	114.36	17.94
16	119.21	19.18
17	123.95	20.77
18	128.56	22.71
19	133.01	24.99
20	137.28	27.58
21	141.35	30.49
22	145.19	33.69
23	148.79	37.16
24	152.12	40.89
25	155.17	44.85
26	157.91	49.03
27	160.34	53.41
28	162.44	57.94
29	164.19	62.63
30	165.60	67.42
31	165.61	67.50

Circle Center At X = 100.0 ; Y = 84.0 and Radius, 67.6

*** 1.575 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.05	38.00
2	56.64	34.52
3	60.47	31.30
4	64.51	28.36
5	68.76	25.72
6	73.18	23.38
7	77.75	21.37
8	82.46	19.68
9	87.27	18.33

10	92.17	17.32
11	97.13	16.67
12	102.12	16.37
13	107.12	16.42
14	112.10	16.82
15	117.04	17.58
16	121.92	18.69
17	126.71	20.14
18	131.38	21.93
19	135.91	24.04
20	140.28	26.47
21	144.47	29.20
22	148.45	32.22
23	152.21	35.52
24	155.72	39.07
25	158.98	42.87
26	161.96	46.88
27	164.64	51.10
28	167.02	55.50
29	169.09	60.05
30	170.82	64.74
31	171.62	67.50

Circle Center At X = 103.9 ; Y = 86.8 and Radius, 70.5

*** 1.575 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	51.78	38.00
2	55.32	34.47
3	59.12	31.22
4	63.14	28.25
5	67.38	25.59
6	71.80	23.26
7	76.38	21.26
8	81.10	19.60
9	85.93	18.31
10	90.84	17.37
11	95.81	16.80
12	100.81	16.60
13	105.80	16.77
14	110.77	17.32
15	115.69	18.23
16	120.52	19.50
17	125.25	21.13
18	129.84	23.11
19	134.28	25.42
20	138.53	28.05
21	142.57	31.00
22	146.38	34.23
23	149.94	37.74
24	153.23	41.51
25	156.23	45.50
26	158.93	49.71
27	161.31	54.11
28	163.35	58.68
29	165.05	63.38
30	166.20	67.50

Circle Center At X = 101.0 ; Y = 83.8 and Radius, 67.2

*** 1.576 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.59	38.00
2	59.16	34.50
3	62.98	31.26
4	67.01	28.31
5	71.25	25.66
6	75.67	23.32
7	80.24	21.30
8	84.95	19.61
9	89.77	18.27
10	94.67	17.28
11	99.63	16.65
12	104.62	16.37
13	109.62	16.45
14	114.60	16.90
15	119.53	17.70
16	124.40	18.85
17	129.17	20.35
18	133.82	22.19
19	138.32	24.36
20	142.66	26.84
21	146.81	29.64
22	150.74	32.72
23	154.45	36.08
24	157.90	39.70
25	161.08	43.56
26	163.98	47.63
27	166.57	51.91
28	168.85	56.35
29	170.81	60.96
30	172.43	65.69
31	172.91	67.50

Circle Center At X = 106.0 ; Y = 85.8 and Radius, 69.4

*** 1.577 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.24	38.00
2	52.84	34.54
3	56.68	31.33
4	60.73	28.40
5	64.98	25.76
6	69.40	23.42
7	73.97	21.40
8	78.67	19.70
9	83.48	18.33
10	88.37	17.29
11	93.33	16.60
12	98.31	16.26
13	103.31	16.26
14	108.30	16.61
15	113.25	17.31
16	118.14	18.35
17	122.95	19.72
18	127.65	21.43
19	132.22	23.46
20	136.63	25.81
21	140.88	28.45
22	144.93	31.39
23	148.76	34.59
24	152.36	38.06
25	155.72	41.77
26	158.80	45.71
27	161.61	49.84
28	164.12	54.17
29	166.32	58.66
30	168.21	63.29
31	169.59	67.50

Circle Center At X = 100.8 ; Y = 88.1 and Radius, 71.8

*** 1.578 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.32	38.00
2	57.93	34.54
3	61.77	31.34
4	65.82	28.41
5	70.07	25.76
6	74.48	23.42
7	79.05	21.39
8	83.75	19.68
9	88.55	18.29
10	93.44	17.24
11	98.39	16.53
12	103.38	16.17
13	108.38	16.15
14	113.37	16.48
15	118.32	17.15
16	123.22	18.16
17	128.04	19.50
18	132.75	21.18
19	137.33	23.18
20	141.76	25.49
21	146.03	28.10
22	150.10	31.00
23	153.97	34.17
24	157.60	37.60
25	160.99	41.28
26	164.12	45.18
27	166.97	49.29
28	169.53	53.58
29	171.79	58.04
30	173.73	62.65
31	175.35	67.38
32	175.39	67.50

Circle Center At X = 106.2 ; Y = 88.4 and Radius, 72.3

*** 1.580 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.14	38.00
2	61.68	34.47
3	65.48	31.22
4	69.52	28.28
5	73.77	25.65

6	78.22	23.36
7	82.82	21.41
8	87.56	19.82
9	92.41	18.60
10	97.34	17.76
11	102.32	17.30
12	107.32	17.22
13	112.31	17.52
14	117.26	18.21
15	122.15	19.27
16	126.94	20.71
17	131.60	22.51
18	136.12	24.66
19	140.45	27.15
20	144.58	29.96
21	148.49	33.09
22	152.14	36.50
23	155.52	40.19
24	158.61	44.12
25	161.38	48.28
26	163.83	52.64
27	165.94	57.17
28	167.70	61.85
29	169.09	66.66
30	169.26	67.50

Circle Center At X = 105.8 ; Y = 82.3 and Radius, 65.1

*** 1.581 ***

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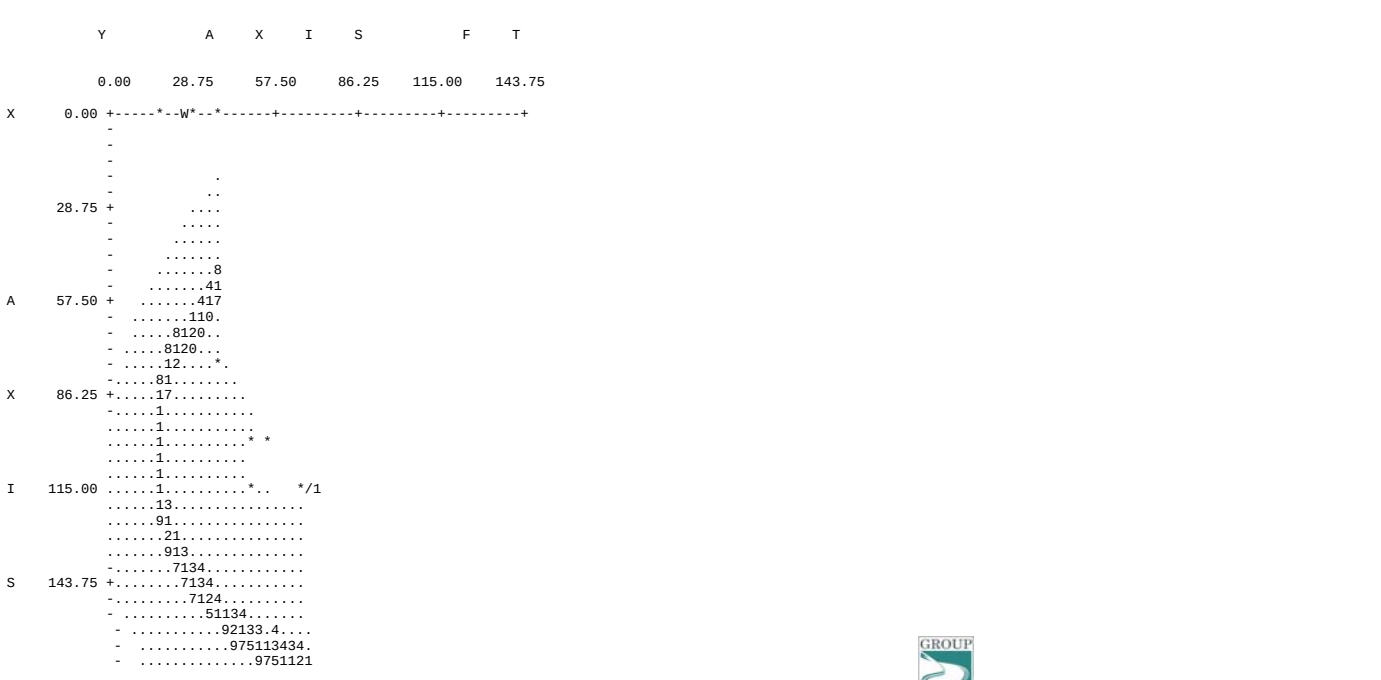

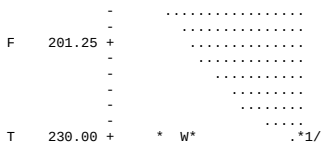

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I-436 SR-22 Bolsa Chica RD OC S. Abutment - Seismic

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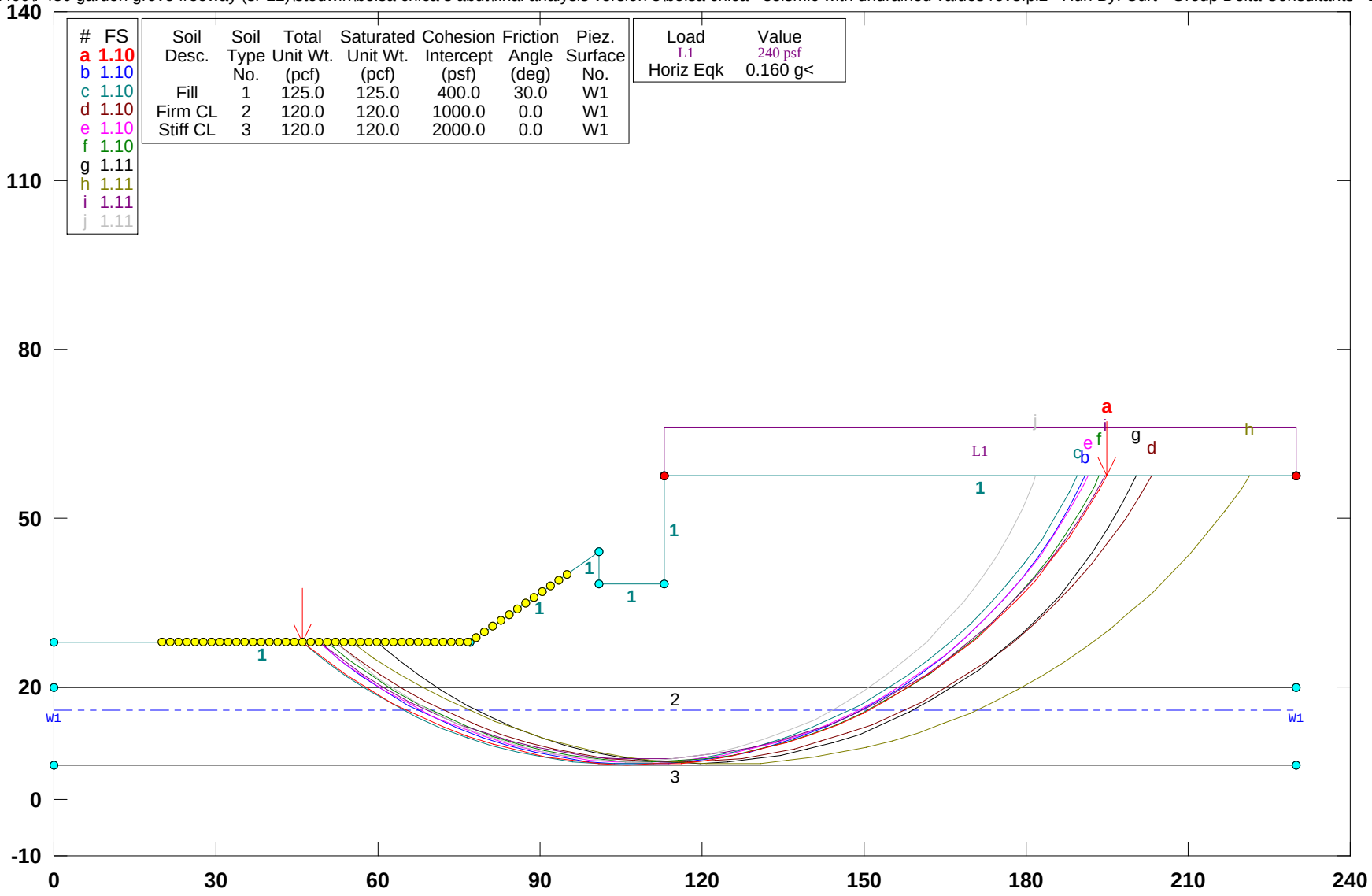

PCSTABL5M/si FSmin=1.10

Safety Factors Are Calculated By The Modified Bishop Method

STED

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/2009
Time of Run: 09:03AM
Run By: Curt - Group Delta Consultants
Input Data Filename: N:bolsa chica - seismic with undrained values rev3.in
Output Filename: N:bolsa chica - seismic with undrained values rev3.OUT
Unit: ENGLISH
Plotted Output Filename: N:bolsa chica - seismic with undrained values rev3.PLT

PROBLEM DESCRIPTION I-436 SR-22
Bolsa Chica RD OC S. Abutment - Seismic

BOUNDARY COORDINATES

6 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	38.00	77.00	38.00	1
2	77.00	38.00	101.00	54.00	1
3	101.00	54.00	101.01	48.30	1
4	101.01	48.30	113.00	48.30	1
5	113.00	48.30	113.01	67.50	1
6	113.01	67.50	230.00	67.50	1
7	0.00	30.00	230.00	30.00	2
8	0.00	16.00	230.00	16.00	3

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	400.0	30.0	0.00	0.0	1
2	120.0	120.0	1000.0	0.0	0.00	0.0	1
3	120.0	120.0	2000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	26.00
2	230.00	26.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	113.01	230.00	240.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Horizontal Earthquake Loading Coefficient
Of0.160 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 (psf)

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2500 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 20.00 ft.
and X = 95.00 ft.

Each Surface Terminates Between X = 113.01 ft.
and X = 230.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	46.02	38.00
2	50.00	34.97
3	54.12	32.15

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4	58.39	29.53
5	62.78	27.14
6	67.28	24.97
7	71.89	23.03
8	76.59	21.32
9	81.37	19.85
10	86.22	18.63
11	91.12	17.65
12	96.07	16.93
13	101.04	16.45
14	106.04	16.22
15	111.04	16.25
16	116.03	16.53
17	121.00	17.06
18	125.94	17.84
19	130.83	18.86
20	135.67	20.14
21	140.43	21.65
22	145.12	23.41
23	149.70	25.40
24	154.19	27.61
25	158.55	30.05
26	162.79	32.71
27	166.88	35.58
28	170.83	38.65
29	174.61	41.92
30	178.23	45.37
31	181.67	49.00
32	184.92	52.80
33	187.97	56.76
34	190.82	60.87
35	193.46	65.11
36	194.78	67.50

Circle Center At X = 108.0 ; Y = 115.2 and Radius, 99.0

*** 1.098 ***

Individual data on the 44 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.0	753.2	0.0	0.0	0.0	0.0	120.5	0.0	0.0
2	4.1	2290.7	0.0	0.0	0.0	0.0	366.5	0.0	0.0
3	3.5	3030.2	0.0	0.0	0.0	0.0	484.8	0.0	0.0
4	0.8	784.7	0.0	0.0	0.0	0.0	125.5	0.0	0.0
5	4.4	5266.3	0.0	0.0	0.0	0.0	842.6	0.0	0.0
6	2.4	3331.7	0.0	0.0	0.0	0.0	533.1	0.0	0.0
7	2.1	3306.7	0.0	76.7	0.0	0.0	529.1	0.0	0.0
8	4.6	7927.9	0.0	625.1	0.0	0.0	1268.5	0.0	0.0
9	4.7	9114.4	0.0	1193.9	0.0	0.0	1458.3	0.0	0.0
10	0.4	843.4	0.0	127.4	0.0	0.0	134.9	0.0	0.0
11	4.4	10131.1	0.0	1561.3	0.0	0.0	1621.0	0.0	0.0
12	4.8	13850.5	0.0	2108.2	0.0	0.0	2216.1	0.0	0.0
13	4.9	16648.9	0.0	2451.4	0.0	0.0	2663.8	0.0	0.0
14	4.9	19331.5	0.0	2717.5	0.0	0.0	3093.0	0.0	0.0
15	4.9	21664.9	0.0	2879.3	0.0	0.0	3466.4	0.0	0.0
16	0.0	42.7	0.0	6.0	0.0	0.0	6.8	0.0	0.0
17	0.0	133.2	0.0	20.4	0.0	0.0	21.3	0.0	0.0
18	5.0	19616.5	0.0	3015.5	0.0	0.0	3138.6	0.0	0.0
19	5.0	19696.4	0.0	3046.8	0.0	0.0	3151.4	0.0	0.0
20	2.0	7709.7	0.0	1188.6	0.0	0.0	1233.5	0.0	0.0
21	0.0	51.3	0.0	6.0	0.0	0.0	8.2	0.0	0.0
22	3.0	19076.7	0.0	1804.7	0.0	0.0	3052.3	0.0	725.1
23	5.0	31186.4	0.0	2873.2	0.0	0.0	4989.8	0.0	1193.2
24	4.9	30591.0	0.0	2668.9	0.0	0.0	4894.6	0.0	1185.3
25	4.9	29777.5	0.0	2386.9	0.0	0.0	4764.4	0.0	1174.4
26	4.8	28756.2	0.0	2027.8	0.0	0.0	4601.0	0.0	1160.4
27	4.8	27540.0	0.0	1592.6	0.0	0.0	4406.4	0.0	1143.5
28	4.7	26144.2	0.0	1082.5	0.0	0.0	4183.1	0.0	1123.7
29	4.6	24586.4	0.0	498.6	0.0	0.0	3933.8	0.0	1101.0
30	1.2	6351.9	0.0	25.7	0.0	0.0	1016.3	0.0	293.0
31	3.3	16534.8	0.0	0.0	0.0	0.0	2645.6	0.0	782.6
32	4.3	20615.5	0.0	0.0	0.0	0.0	3298.5	0.0	1024.2
33	0.1	451.2	0.0	0.0	0.0	0.0	72.2	0.0	23.1
34	4.2	19120.7	0.0	0.0	0.0	0.0	3059.3	0.0	1016.5
35	4.1	17076.6	0.0	0.0	0.0	0.0	2732.3	0.0	983.0
36	3.9	14987.1	0.0	0.0	0.0	0.0	2397.9	0.0	947.0
37	3.8	12880.1	0.0	0.0	0.0	0.0	2060.8	0.0	908.6
38	3.6	10784.6	0.0	0.0	0.0	0.0	1725.5	0.0	867.9
39	3.4	8729.5	0.0	0.0	0.0	0.0	1396.7	0.0	825.0
40	3.2	6743.8	0.0	0.0	0.0	0.0	1079.0	0.0	780.0
41	3.1	4856.5	0.0	0.0	0.0	0.0	777.0	0.0	733.0
42	2.9	3095.6	0.0	0.0	0.0	0.0	495.3	0.0	684.1
43	2.6	1488.3	0.0	0.0	0.0	0.0	238.1	0.0	633.5
44	1.3	197.3	0.0	0.0	0.0	0.0	31.6	0.0	317.3

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.08	38.00
2	52.99	34.88
3	57.06	31.97
4	61.28	29.29
5	65.64	26.85
6	70.13	24.64
7	74.73	22.68
8	79.43	20.98
9	84.21	19.53
10	89.07	18.34
11	93.98	17.42
12	98.94	16.76
13	103.93	16.38
14	108.92	16.27
15	113.92	16.42
16	118.90	16.85
17	123.85	17.55
18	128.76	18.52
19	133.61	19.75
20	138.38	21.25
21	143.06	23.00
22	147.64	25.00
23	152.11	27.24
24	156.45	29.73
25	160.64	32.45
26	164.69	35.39
27	168.56	38.55
28	172.26	41.91
29	175.78	45.47
30	179.09	49.21
31	182.20	53.13
32	185.09	57.21
33	187.75	61.44
34	190.18	65.81
35	191.00	67.50

Circle Center At X = 108.5 ; Y = 108.4 and Radius, 92.1

*** 1.098 ***

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Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	46.02	38.00

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2	49.94	34.90
3	54.03	32.02
4	58.26	29.35
5	62.63	26.92
6	67.12	24.72
7	71.72	22.77
8	76.42	21.06
9	81.20	19.61
10	86.06	18.41
11	90.97	17.47
12	95.93	16.80
13	100.91	16.40
14	105.91	16.25
15	110.91	16.38
16	115.89	16.77
17	120.85	17.43
18	125.76	18.35
19	130.62	19.54
20	135.41	20.98
21	140.11	22.67
22	144.72	24.61
23	149.22	26.80
24	153.59	29.22
25	157.83	31.87
26	161.92	34.75
27	165.85	37.83
28	169.61	41.13
29	173.19	44.62
30	176.58	48.29
31	179.77	52.14
32	182.75	56.16
33	185.51	60.33
34	188.05	64.64
35	189.53	67.50

Circle Center At X = 106.0 ; Y = 109.9 and Radius, 93.7

*** 1.102 ***

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.14	38.00
2	56.17	35.04
3	60.34	32.27
4	64.64	29.72
5	69.05	27.38
6	73.58	25.25
7	78.20	23.35
8	82.92	21.68
9	87.70	20.24
10	92.56	19.03
11	97.46	18.06
12	102.41	17.34
13	107.38	16.85
14	112.38	16.61
15	117.38	16.62
16	122.37	16.86
17	127.35	17.36
18	132.29	18.09
19	137.20	19.06
20	142.05	20.28
21	146.83	21.72
22	151.54	23.40
23	156.17	25.31
24	160.69	27.44
25	165.10	29.79
26	169.40	32.36
27	173.56	35.12
28	177.58	38.09
29	181.46	41.26
30	185.17	44.60
31	188.72	48.13
32	192.09	51.82
33	195.27	55.67
34	198.27	59.68
35	201.06	63.82
36	203.29	67.50

Circle Center At X = 114.8 ; Y = 118.9 and Radius, 102.3

*** 1.103 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.08	38.00
2	53.02	34.92
3	57.11	32.05
4	61.36	29.40
5	65.74	26.99
6	70.24	24.82
7	74.85	22.89
8	79.56	21.21
9	84.35	19.78
10	89.22	18.62
11	94.13	17.72
12	99.09	17.08
13	104.08	16.72
14	109.08	16.62
15	114.08	16.78
16	119.06	17.22
17	124.01	17.92
18	128.91	18.89
19	133.76	20.12
20	138.53	21.61
21	143.22	23.35
22	147.81	25.35
23	152.28	27.58
24	156.62	30.06
25	160.83	32.76
26	164.89	35.68
27	168.78	38.82
28	172.50	42.16
29	176.03	45.70
30	179.37	49.42
31	182.50	53.32
32	185.42	57.38
33	188.12	61.59
34	190.59	65.93
35	191.37	67.50

Circle Center At X = 108.4 ; Y = 109.7 and Radius, 93.1

*** 1.104 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.61	38.00

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2	54.56	34.93
3	58.67	32.08
4	62.92	29.44
5	67.30	27.04
6	71.81	24.88
7	76.43	22.96
8	81.14	21.28
9	85.93	19.86
10	90.79	18.70
11	95.71	17.80
12	100.67	17.16
13	105.66	16.79
14	110.66	16.68
15	115.65	16.84
16	120.64	17.27
17	125.59	17.96
18	130.50	18.91
19	135.35	20.12
20	140.13	21.59
21	144.82	23.32
22	149.42	25.29
23	153.90	27.50
24	158.26	29.94
25	162.48	32.62
26	166.56	35.52
27	170.47	38.63
28	174.22	41.94
29	177.78	45.45
30	181.15	49.15
31	184.32	53.01
32	187.27	57.05
33	190.01	61.23
34	192.52	65.55
35	193.52	67.50

Circle Center At X = 110.2 ; Y = 110.5 and Radius, 93.8

*** 1.104 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.80	38.00
2	63.70	34.88
3	67.77	31.98
4	72.00	29.30
5	76.36	26.86
6	80.85	24.66
7	85.46	22.72
8	90.16	21.02
9	94.95	19.59
10	99.82	18.43
11	104.73	17.53
12	109.70	16.90
13	114.68	16.55
14	119.68	16.47
15	124.68	16.66
16	129.66	17.13
17	134.60	17.87
18	139.50	18.88
19	144.33	20.16
20	149.09	21.70
21	153.75	23.50
22	158.31	25.55
23	162.75	27.85
24	167.06	30.39
25	171.22	33.16
26	175.23	36.15

27	179.06	39.36
28	182.71	42.78
29	186.17	46.39
30	189.43	50.18
31	192.47	54.15
32	195.29	58.28
33	197.88	62.56
34	200.23	66.97
35	200.48	67.50

Circle Center At X = 118.6 ; Y = 107.6 and Radius, 91.2

*** 1.109 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.20	38.00
2	59.35	35.20
3	63.61	32.59
4	67.98	30.15
5	72.44	27.90
6	76.99	25.84
7	81.63	23.97
8	86.34	22.30
9	91.12	20.82
10	95.96	19.55
11	100.84	18.49
12	105.77	17.63
13	110.73	16.98
14	115.71	16.53
15	120.70	16.30
16	125.70	16.28
17	130.70	16.47
18	135.68	16.86
19	140.65	17.47
20	145.58	18.29
21	150.47	19.31
22	155.32	20.53
23	160.11	21.96
24	164.84	23.59
25	169.49	25.42
26	174.07	27.44
27	178.55	29.65
28	182.94	32.05
29	187.22	34.63
30	191.39	37.39
31	195.44	40.32
32	199.37	43.42
33	203.16	46.68
34	206.81	50.09
35	210.31	53.66
36	213.66	57.37
37	216.85	61.22
38	219.88	65.20
39	221.48	67.50

Circle Center At X = 123.7 ; Y = 135.2 and Radius, 118.9

*** 1.111 ***

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Failure Surface Specified By 35 Coordinate Points

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	49.08	38.00
2	53.09	35.01
3	57.25	32.23
4	61.54	29.67
5	65.96	27.33
6	70.50	25.23
7	75.13	23.35
8	79.86	21.72
9	84.66	20.33
10	89.53	19.19
11	94.45	18.30
12	99.41	17.67
13	104.39	17.29
14	109.39	17.17
15	114.39	17.30
16	119.38	17.69
17	124.33	18.33
18	129.25	19.23
19	134.12	20.38
20	138.92	21.78
21	143.64	23.42
22	148.27	25.30
23	152.80	27.42
24	157.22	29.77
25	161.51	32.34
26	165.66	35.12
27	169.66	38.12
28	173.51	41.32
29	177.18	44.71
30	180.68	48.28
31	183.99	52.03
32	187.10	55.94
33	190.00	60.01
34	192.70	64.22
35	194.56	67.50

Circle Center At X = 109.3 ; Y = 114.6 and Radius, 97.4

*** 1.114 ***

Failure Surface Specified By 33 Coordinate Points

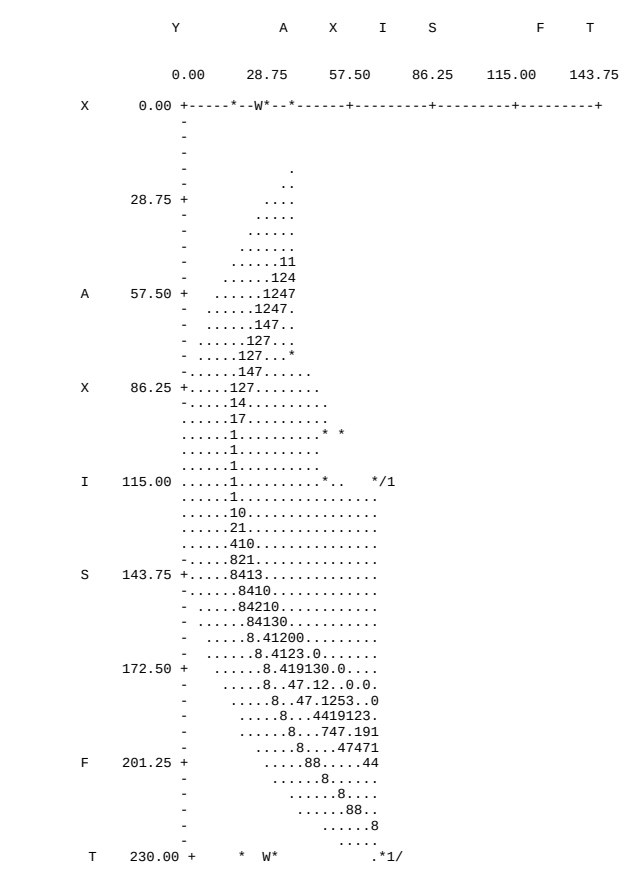
Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.14	38.00
2	55.94	34.74
3	59.92	31.73
4	64.09	28.96
5	68.42	26.46
6	72.89	24.23
7	77.50	22.28
8	82.21	20.61
9	87.02	19.24
10	91.91	18.18
11	96.85	17.41
12	101.83	16.95
13	106.82	16.80
14	111.82	16.96
15	116.80	17.42
16	121.74	18.20
17	126.62	19.27
18	131.43	20.65
19	136.14	22.32
20	140.74	24.28
21	145.21	26.51
22	149.54	29.02
23	153.70	31.79

24	157.68	34.82
25	161.47	38.08
26	165.05	41.57
27	168.41	45.28
28	171.53	49.18
29	174.41	53.27
30	177.02	57.53
31	179.37	61.95
32	181.44	66.50
33	181.83	67.50

Circle Center At X = 106.8 ; Y = 97.8 and Radius, 81.0

*** 1.114 ***

1



MATERIALS REPORT
WEST COUNTY CONNECTOR PROJECT
I-405 / SR-22 HOV CONNECTOR SEGMENT
12-ORA-405/22-PM 20.4/22.3 (405) R0.7/R2.9 (22)
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr., # 200
Irvine, CA 92612

Prepared by

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GDC Project No. I-436
October 24, 2008
Revised May 1, 2009

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

October 24, 2008
(Revised May 1, 2009)

Parsons Transportation Group, Inc.
2201 Dupont Dr., # 200
Irvine, CA 92612

Attention: Carlos Cadena

Subject: Materials Report
West County Connector Project
I-405 / SR-22 HOV Connector Segment
12-ORA-405/22-PM 20.4/22.3 (405) R0.7/R2.9 (22)
Orange County, California
GDC Project No. I-436

Dear Carlos:

Group Delta Consultants is pleased to submit our Materials Report for the SR-22 / I-405 improvements from Valley View Street to Seal Beach Boulevard. The purpose is to provide culvert materials, pavement, and corrosion recommendations for project design. The report has been prepared in accordance with the latest Caltrans design guidelines and specifications and is to be included as part of the final PS&E submittal.

We appreciate the opportunity to provide our services on this project and look forward to working with you during the design and construction of the project.

If you have any questions, please call.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing

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MATERIALS REPORT
WEST COUNTY CONNECTOR PROJECT
I-405 / SR-22 HOV CONNECTOR SEGMENT
12-ORA-405/22-PM 20.4/22.3 (405) R0.7/R2.9 (22)
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

1.1 General

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The proposed project has been divided into 2 segments, and the overall project name is "West County Connector Project." The easterly segment is named "I-405/SR-22 HOV Connector Segment," which extends from just east of Valley View Street to just east of Seal Beach Boulevard, and the westerly segment is named "I-405/I-605 HOV Connector Segment," which extends from just east of Seal Beach Boulevard to the I-605 interchange. This Materials Report covers the easterly segment of the project. A project vicinity map is shown in Figure 1.

The I-405/SR-22 HOV Connector Segment is a 2.1 mile east-west trending route that carries traffic between major north-south arterial corridors I-605, I-405, and east-west SR-22. The existing SR-22 also provides connections to I-5, SR-55, and SR-57.

1.2 Purpose and Scope of Work

The purpose of this Materials Report is to provide pavement and materials related recommendations to assist Parsons in preparing project Plans, Specifications, and Estimates (PS&E). This Materials Report is prepared in general accordance with Topic 114 of the Highway Design Manual (2006) and California Test Method 130 (2006). The scope of work for this project included the following tasks:

- Review of available topographic and improvement plans;
- Review of available reports and subsurface information, including materials report for Phase 1 of SR-22 between SR-55 and Valley View Street;
- Field exploration consisting of drilling exploratory soil borings and sampling and conducting Cone Penetration Tests (CPTs), see Appendix A;
- Performing laboratory testing on selected soil samples, see Appendix B;
- Performing engineering analyses and developing recommendations for selection of culvert and pavement materials; and
- Documenting the results of our findings, conclusions, and our recommendations in this report.

The Geotechnical Design Report (GDR) and Structure Foundation Reports (SFRs) required for this project are submitted separately by GDC.

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

2.1 Existing Facilities

The site layout plan is shown in Figures (Key Map and Line Index, and Layout Sheets L-1 through L-13). At the east end of project SR-22 consists of 3 westbound and 3 eastbound travel lanes plus eastbound HOV lane, left and right asphalt concrete (AC) shoulders and a paved AC median with concrete barrier. West of Valley View Street, westbound SR-22 merges with I-405, which has 6 travel lanes plus 1 HOV lane in each direction, left and right shoulders and a concrete median barrier. Travel and HOV Lanes are PCC, and shoulders are AC. The Route 22/405 Separation has 3 PCC lanes with outboard AC shoulders. South of the SR-22 interchange, I-405 has 4 PCC travel lanes plus 1 PCC paved HOV lane in each direction, and AC shoulders. All on-ramps / off-ramps have AC pavements.

Existing bridge structures in the segment include Bolsa Chica Road OC over SR-22, Bolsa Chica Road OC over I-405, and Route 22 / 405 Separation. Minor retaining walls and soundwalls are present.

The site area is fairly level with grades ranging from El. 20 feet to El. 30 feet on SR-22 and I-405. Elevated areas are approaches to bridge overcrossings with elevations as high as about El. 56 feet. Elevations in Seal Beach Naval Weapons Station south of the freeway at the west end of project are as low as El. 15 feet. Site drainage is generally by sheet flow to storm drains and v-ditches adjacent to the freeway. Regional drainage is toward the south in the direction of the Pacific Ocean. A south-flowing triple 12x10 box culvert (Bolsa Chica Channel) passes below the Route 22/405 Separation and discharges to a south-flowing open channel. Other buried culverts are present.

2.2 Proposed Improvements

The project key map and Layout Plans are shown in Figures 2 through 2-L13. The project covers both directions of I-405 and SR-22 between SR-22 Station "B" 285+80 and I-405 Station "SB405" 301+09 on the east near Valley View Street and I-405 Station "A" 395+50 on the west end of project. The project includes the following major elements:

- Widening of SR-22 and I-405 on the outside;
- Re-alignment of I-405 at the 405 / 22 interchange;
- Re-alignment of on-ramps and off-ramps (including NB & SB Valley View to WB SR-22 On-Ramps, EB SR-22 to Valley View / Garden Grove Blvd. Off-Ramp, and SB I-405 to Bolsa Chica Road Off-Ramp);
- New mainline, connector, shoulder, and on/off-ramp paving for I-405 and SR-22 (pavement areas are color coded in Figures 2 through 2-L13);
- New pavement and overlay on Valley View Street / Garden Grove Blvd. between I-405 and SR-22;
- Replacement of Route 22/405 Separation bridge and reconstruction of abutment approaches;
- Replacement and widening of Bolsa Chica Road OC over SR-22 (a.k.a. Valley View Street). No improvement to Bolsa Chica Road OC over I-405 is proposed;
- Construction of a new I-405/SR-22 HOV Connector bridge and approach embankments;
- Construction of MSE walls on approaches to 22/405 Separation and HOV Connector;
- Construction of standard retaining walls on the outboard sides of I-405; and
- Drainage, overhead signs, and other improvements.

3.0 GEOLOGY AND CLIMATIC CONDITIONS

3.1 Geology

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County flatlands of the southern portion of the Central Block of the Los Angeles Basin. The basin is infilled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of unconsolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Relatively thin man-placed fill is present locally overlying the alluvium. The thickest fills are at approaches to overcrossings where up to about 35 feet of fill is present. Groundwater is typically 10 to 15 feet below the freeway grades.

3.2 Geologic Hazards

The site is in a seismically active area of southern California. Regional seismicity and geologic and seismic hazards are discussed in the project GDR. Due to primarily clayey soils, only isolated layers are liquefiable, and settlements are estimated at less than 1 inch. Therefore, the liquefaction hazard is considered low, and liquefaction impacts to pavements and drainage facilities are considered minor.

3.3 Climatic Conditions

The project site is located in the Los Angeles Basin, in a semi-arid climate. The average monthly maximum and minimum temperature, and mean precipitation measured at the closest recording station to the project site for the years 1958 to 2007 are summarized in Table 1. No snowfall was recorded at the Long Beach WSCMO Station. Soil freeze-thaw conditions do not exist at the site.

4.0 FIELD INVESTIGATION AND LABORATORY TESTING

4.1 Field Investigation

Sixteen (16) exploratory hollow stem auger (A) and rotary wash (R) soil borings ranging in depth from 16.5 feet to 137 feet below ground surface (bgs), and thirty-two (32) CPTs ranging in depth between 20 and 164 feet bgs were performed from March to May 2008 by GDC to investigate the physical and engineering characteristics of subsurface soils for roadway, grading, pavement, drainage system, retaining system, and bridge structure design and construction. In addition, on October 8th, 2008, eight (8) hand auger borings were advanced to depths of 5 feet bgs to collect supplemental near-surface samples for R-Value and index tests for pavement design. Details of the investigation are included in Appendix A. The stations, offsets, elevations, and encountered groundwater elevations of explorations are summarized in Table A-1 of Appendix A. Boring locations are shown on the Layout plans in Figures 2 (Key Map and L-1 through L-13).

4.2 Laboratory Investigation

Laboratory testing of selected samples was performed in accordance with applicable Caltrans and ASTM standards. Details of the testing are presented in Appendix B. The following laboratory tests were conducted:

- Moisture content and dry density;
- Grain size distribution and percent passing No. 200 sieve;
- Atterberg Limits;
- Consolidation;
- Direct Shear;
- Soil Corrosivity (pH, Sulfate, Chloride, and Minimum Resistivity); and
- R-Value.

Moisture content, dry density, grain size distribution, percent passing No. 200 sieve, pocket penetrometer, and Atterberg limits laboratory test results are presented on

the boring logs in Appendix A. Soil corrosivity test results are summarized in Table 2. A summary of lab results for near surface material (including R-Value) is presented in Table 3. An overall description and summary of laboratory tests is included in Appendix B.

5.0 SUBSURFACE AND GROUNDWATER CONDITIONS

5.1 Subsurface Conditions

The characteristics of near-surface soils in the project area based on boring and CPT data are summarized in Table 3. The near surface materials are generally man-placed compacted fills and native alluvium. Native materials encountered in the upper 8 to 10 feet below freeway grade (above about El. 12 feet on the west and above El. 20 feet on the east) consist primarily of stiff to very stiff low plasticity lean clays, sandy lean clays, and sandy to clayey silts, with less frequent interbeds of medium dense sand (SP), silty sand (SM), and clayey sand (SC). Embankment fills in the area are similar materials. Unified Soil Classification System (USCS) classifications from borings and CPT soil behavior type, percent passing No. 200 sieve, Atterberg Limits, moisture content, dry density, and R-Value data of the near surface soils are summarized in Table 3. These properties are considered representative of materials likely to be exposed during project construction.

Below the surface layer is a 10 to 15 foot layer of locally soft but generally firm to stiff low plasticity lean clay with top elevations ranging from about El. 12 to 20 feet and bottom elevations ranging from El. 0 to 8 feet. The upper boundary of this layer is typically at or near the water table, and the material is moderately compressible and moderately weak. This layer is generally more than 10 feet below freeway grades and should not affect project pavements.

Below the bottom of the soft to stiff layer (below El. 0 to 8 feet) are interbedded stiff to hard clays and dense to very dense sands, silty sands, sandy silts, silts, and clayey silts extending to depths of at least 160 feet (El. -130 ft).

5.2 Groundwater Conditions

Based on California Geological Survey Seismic Hazard Evaluation of the Los Alamitos 7.5-Minute Quadrangle (2001) (see Figure 3), the highest historical groundwater at the subject site is between the 10 foot and 20 foot depth contours. Data from our investigation indicates groundwater is typically present at variable depths of 10 to 15 feet or more below freeway grades. Groundwater elevation is generally at or below El. 12 feet on the west end of project, and at or below El. 18 feet on the east end of the project, which appears consistent with high historical levels. Excavations exceeding about 10 feet in depth below freeway grades are likely

to encounter the permanent groundwater table. Shallower perched zones may be encountered locally. A summary of groundwater data from our investigation are included in Table A-1 of Appendix A.

6.0 CORROSION INVESTIGATION

6.1 Corrosion Testing

Corrosion tests were performed on eleven soil samples from both near-surface soils and subsurface soils near the water table from the project site in order to determine corrosion potential of site soils on buried concrete and metals. Corrosivity testing included soil pH (CTM 643), water-soluble chlorides (CTM 422), water-soluble sulfates (CTM 417), and minimum electrical resistivity (CTM 643). The sample locations, depths, elevations, and corrosivity test results are summarized in Table 2.

6.2 Corrosion Recommendations

6.2.1 General

Caltrans considers a site to be corrosive to foundation or other buried elements if one or more of the following conditions exist for the representative soil samples taken at the site:

- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- pH is 5.5 or less

Caltrans considers MSE Structure backfill to be corrosive to the metallic soil reinforcement and reinforced concrete retaining wall if one or more of the following requirements are met:

- Minimum Resistivity (CTM 643) is less than 1500 ohm-cm
- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- pH is 5.5 or less

Based on the laboratory results presented in Table 2, Minimum Resistivity (CTM 643) ranges from 2750 to less than 500 ohm-cm, soils are generally mildly alkaline with pH (CTM 643) ranging from 7.7 to 9.3, Soluble Sulfate (CTM 417) ranges from 62 to 4720 ppm, and Soluble Chlorides (CTM 422) range from 30 to 1330 ppm. Based on these data it is our conclusion that soils in the project area are corrosive to buried concrete and metallic elements due mainly to locally high chlorides and high sulfates. On-site near surface soils are corrosive and unsuitable for MSE structural

backfill. The culvert materials recommendations for existing soils in Table 4 are based on the results of the computer program "CULVERT4" (McTrans, 1998), the criteria provided in the Highway Design Manual (Caltrans, 2006) and related Caltrans standards.

6.2.2 Site Corrosion Recommendations

For design, we selected the most corrosive data from test results on the near surface site soils, which are summarized as follows:

- pH=7.7
- Resistivity = 500 ohm-cm
- Sulfate = 4720 ppm
- Chloride = 1330 ppm

Based on the analysis and output of CULVERT4 assuming maximum flow velocities of 5 feet per second and abrasive conditions, our recommendations for culverts are summarized in Table 4. The gauges of Corrugated Steel Pipe suitable for a 50 year design life at the site are summarized in the table. Corrugated Aluminum Pipe (CAP) and Corrugated Aluminized Steel Pipe (CASP) should not be used due to corrosive conditions. Due to high chlorides, standard Reinforced Concrete Pipe (RCP) is not suitable, and increased concrete cover of 2.5 inches and 7 sacks per cubic yard concrete with total mix water percentage by volume of 15% are required for 50 year design life. For sulfate resistance Type II Modified or Type V cement (7 sacks per cubic yard) with 25% mineral admixture replacement by weight and maximum water to cementitious ratio of 0.4 is required. Plastic pipe is approved for 50 year service life for corrosive conditions, abrasion must be evaluated and concrete headwalls and concrete or metal end treatment should be considered where high fire potential exists.

7.0 PAVEMENT STRUCTURAL SECTIONS

7.1 Existing Pavement Sections

Approximate pavement section measurements made at locations of explorations are summarized in Table 3. As-built pavement structural sections provided by Parsons based upon available plans are summarized in Table 5. Existing pavements are generally PCC for mainline and HOV lanes, and AC for shoulders and ramps. The designers should provide appropriate drainage and other details at the interface between new and existing pavements.

7.2 Proposed Pavement Sections

All pavements should be designed in accordance with the latest edition of Highway Design Manual, Standard Plans, and Standard Specifications.

7.2.1 Traffic Index

We understand that a 40 year design life is being used for mainline pavements. Traffic Indices (TIs) for the project were provided by Parsons. TIs for rigid and flexible pavement sections are presented in Tables 6A and 6B, respectively.

7.2.2 R-Value, PI, and Subgrade Type for Native Materials

A summary of soil subgrade type, index tests, and R-Value tests for existing subgrade materials is summarized in Table 3. Subgrade Type I, II, or III listed in the table is based on Table 623.1A of Highway Design Manual (2006), which is reproduced below:

Table 623.1A

Relationship Between Subgrade Type(1)

Subgrade Type(2)	California R-value (R)	Uniform Soil Classifications
I	R > 40	SC, SP, SM, SW, GC, GP, GM, GW
II	10 ≤ R ≤ 40	CH (PI ≤ 12), CL, MH, ML
III	R < 10	CH (PI >12)

Notes:

(1) See Topic 614 for further discussion on subgrade.

(2) Choose more conservative soil type (i.e., use lower row) if native soil can be classified by more than one row.

Legend

PI = Plasticity Index

The materials observed in the project area are generally low plasticity lean clays and lean sandy clays (CL), lean silty clays (CL-ML), sandy silts (ML), clayey silts (ML-CL), silty sands (SM), and clayey sands (SC); the native materials generally classify as Subgrade Type II (R-Value 10 to 40) in accordance with the above table. R-Value tests on selected samples indicate R-Value of 15 to 54 (average 31), which is also consistent with Type II subgrade.

Plasticity Index (PI) of on site soils generally ranges from non plastic to PI=20. For soils with plasticity, of the near surface soils tested PI ranged from 9 to 27 with an average of 13. Only 1 sample obtained from more than 5 feet below finished grade had PI of greater than 20. The vast majority of clayey project soils appear to have PI=12 to 20.

7.2.3 Overexcavation Requirements and Design R-Value

Caltrans District 12 practice considers soils with PI>12 to be potentially expansive. Expansion potential generally increases with higher PI. For PI<12, no special consideration is required. For PI>12, some overexcavation and replacement is typically done (example, Phase 1 of SR-22 project). Based on field and laboratory test results the soils in the project area generally have R-Value greater than 10 and PI of 12 to 20. The actual subgrade should be tested during construction to confirm the R-Value and PI. We recommend the following phased approach, similar to SR-22 Phase 1:

- **Native subgrade areas (R-Value > 10 and PI = 12 to 20)**: overexcavate and remove the native materials to the greater depth of 3 feet below finish pavement grade, or 2 feet below the structural section, and replace with compacted non-corrosive imported soils having R-Value > 40 and PI < 12;
- **Fill Areas:** Materials in the upper 4 feet below finished grade should be compacted non-corrosive imported soils having R-Value > 40 and PI < 12;
- **If testing during construction reveals areas with R-Value <10 and/or PI >20**: overexcavate and remove the native materials to 5 feet below finish pavement grade and replace with compacted non-corrosive imported soils having R-Value > 40 and PI < 12.

The majority of soils are expected to have PI=12 to 20 and R-Value greater than 10. Localized areas with lower R-Value or higher PI may be encountered in construction. For cost estimating purposes, it is recommended that a contingency be provided assuming that 20% to 30% of the pavement areas may require the deeper 5 ft overexcavation.

After the recommended overexcavations and replacement, the imported select R>40 material will be the subgrade of the structural section, and we recommend that the pavements be designed for R-Value of 41.

7.2.4 Pavement Type

The structural section recommendations herein follow the current Highway Design Manual (2006), which now refers to AC as HMA (Hot Mix Asphalt) and PCCP as

JPCP (Jointed Plain Concrete Pavement). The following pavement types are recommended for the new pavements:

- HMA for ramps
- JPCP for exit ramp termini
- JPCP for 405/22 HOV Connector (include shoulders)
- JPCP for 405 and 22 lanes
- HMA for 405 and 22 shoulders
- HMA for Valley View & Garden Grove

7.2.5 Recommended Rigid Pavement (JPCP) Sections

The rigid pavement design should follow the 2006 HDM, 2006 Standard Plans, and 2006 Standard Specifications, and other applicable Caltrans standards.

The site is located in the "South Coast" climate region in accordance with Figure 615.1 of Highway Design Manual (2006). Selection of rigid pavement sections should be based on Subgrade Type I (Table 623.1A of Highway Design Manual) and Table 623.1D (Type I subgrade for controlled import soil with R-Value>40). A summary of recommended rigid pavement sections is presented in Table 6A.

7.2.6 Recommended Flexible Pavement (HMA) Sections

The flexible pavement design should follow the 2006 HDM, 2006 Standard Plans, and 2006 Standard Specifications, and other applicable Caltrans standards.

7.2.6.1 Permanent HMA Sections

We performed design of flexible pavements using the Caltrans computer program CalFP Version 1.2 using the TI's provided by Parsons, and R-Value of 41 (for controlled import replacement soils). We recommend using HMA/AB, where HMA=Hot Mix Asphalt and AB=Class 2 Aggregate Base. A summary of recommended flexible pavements is presented in Table 6B.

We understand that the mandatory enhancements required based on Section 633.1 Item (3) of HDM for design life of more than 20 years only apply for mainline applications, and are not applicable to this project.

7.2.6.2 Temporary HMA Sections for Construction Detours

Temporary pavements are required for detour roads during construction. Parsons provided a TI of 8.0. We designed the sections using CalFP Version 1.1 using a

recommended R-Value of 15 (lowest of test results). The recommended HMA/AB and full-depth HMA sections are:

- 0.40 ft HMA / 1.25 ft Class 2 AB / Native Subgrade
- 0.95 ft HMA / Native Subgrade

8.0 AVAILABILTY OF MATERIALS

Materials sources were not evaluated in our study.

9.0 EARTHWORK

Earthwork shall conform to requirements of Section 19 of Caltrans Standard Specifications (2006). Detailed earthwork recommendations are addressed in the GDR.

10.0 RECOMMENDATIONS AND SPECIFICATIONS

10.1 Published Standards and Specifications

Special attention should be given to the following sections of the 2006 Standard Specifications:

SECTION 19: EARTHWORK
SECTION 25: AGGREGATE SUBBASES
SECTION 26: AGGREGATE BASES
SECTION 28: LEAN CONCRETE BASE
SECTION 29: TREATED PERMEABLE BASES
SECTION 39: ASPHALT CONCRETE
SECTION 40: PORTLAND CEMENT CONCRETE PAVEMENT
SECTION 68: SUBSURFACE DRAINS
SECTION 73: CONCRETE CURBS AND SIDEWALKS
SECTION 90: PORTLAND CEMENT CONCRETE
SECTION 92: ASPHALTS
SECTION 93: LIQUID ASPHALTS
SECTION 94: ASPHALTIC EMULSIONS
SECTION 95: EPOXY

Rigid and flexible pavements shall comply with the Standard Plans and requirements of Chapter 600, specifically Chapters 620 and 630 of the September 1, 2006 Highway Design Manual, respectively.

10.2 Additional Recommendations and Specifications

- If any drainage layer and edge drain are present in the existing pavement, then the new pavement should have a drainage layer to provide continuity for the water to drain;
- Any surface water due to runoffs shall be properly drained into the cross-culvert and inlets or catch basins. The impact of a new drainage system on existing drainage shall be considered;
- Special attention should be given to the mix design, compaction and temperature requirements for flexible pavement as stated in Caltrans Standard Specifications and project Standard Special Provisions. For all flexible pavements, special attention must be given to the mix design and compaction requirements. A copy of the approved mix design for Hot Mix Asphalt (HMA) shall be provided to the District Materials Engineer's office prior to paving operation. A summary of all field compaction records (RAC-G, HMA, HMA Base and Aggregate Subbase) shall be provided at the conclusion of the construction activities and during the project closeout. A copy of all field temperature measurements shall also be submitted at project closeout;
- Hot Mix Asphalt (HMA) shall be ¾-inch Type "A". HMA mix shall follow requirements in section 39 of Caltrans Quality Control and Quality Assurance specifications for Asphalt Concrete (when quantity of AC is over 10,000 Ton);
- HMA shall follow section 39 of Caltrans Standard Specifications May 2006;
- Aggregate Subbase (AS) shall be Class 2 and follow requirements in section 26 of Caltrans Standard Specifications May 2006;
- The join between the existing pavement and the new pavement shall be sealed. A layer of prime coat shall be applied between all bounded and unbounded layers. A layer of tack coat shall be applied to all vertical-cut faces and between subsequent AC lifts;
- Prior to placement of new pavement in native soil areas, the native subgrade soils shall be tested and verified to have PI less than or equal to 20 and R-Value greater than 10. For subgrade meeting this requirement the existing subgrade materials in the upper 3 feet below finish grade or 2 feet below the structural section shall be overexcavated, removed and replaced with imported borrow materials. For subgrade materials not meeting these requirements, the overexcavation and replacement shall be increased to 5 feet below finished grade;
- The imported borrow materials used in the upper 4 feet below finished grade for embankment or for overexcavation and replacement (top 3 feet from finished grade or 2 feet below structural section, whichever is deeper) shall have an R-Value of at least 40 and be non-corrosive (per Caltrans Corrosion Guidelines), low expansion (EI less than 50 or PI<12), and be free of other deleterious

properties that adversely affect all concrete/steel structures. The Imported borrow shall conform to Section 19-7.02 of Caltrans Standard Specifications (May 2006) and be tested prior to placement;

- Prior to placement of pavement sections, the subgrade soils shall be compacted in accordance with Section 19-5.03 of the 2006 Standard Specifications;
- All Standard Special Provisions (SSPs) to be included in the project shall be submitted to the Materials and Research Branch for review and approval.

11.0 LIMITATIONS

The report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report, or portions of this report, are provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report.

12.0 REFERENCES

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TABLES

TABLE 1:

Climatic Data

Average Monthly Maximum, Minimum Temperature and Average Monthly Precipitation

Period of Record: 4/1/1958 to 6/30/2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.9	67.3	68.3	71.7	73.6	77.1	82.5	83.9	82.3	78.0	72.1	67.2	74.2
Average Min. Temperature (F)	45.5	47.3	49.7	52.3	56.8	60.3	63.7	64.9	62.8	57.9	50.4	45.3	54.8
Average Total Precipitation (in.)	2.58	2.93	1.92	0.72	0.20	0.06	0.02	0.07	0.20	0.39	1.23	1.62	11.96
Average Total Snowfall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record: Max. Temp.: 100% Min. Temp.: 100% Precipitation: 100% Snowfall: 90% Snow Depth: 90.4%

TABLE 2:
Summary of Soil Corrosivity Test Results

Boring No.	Boring Elevation (ft)	Sample No.	Sample Depth (ft)	Sample Elevation (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-101	19.5	B-1	1-5	18.5-14.5	SC	2000	8.5	100	30
A-08-105	19.8	R-2	11-11.5	8.8-8.3	SC	NA	9.3	74	218
A-08-112	23	B-1	1.5-5	21.5-18	SC	<500	8.2	3900	626
A-08-116	22	S-3	10-11.5	12-10.5	CL	NA	8.3	4720	388
A-08-119	23	R-5	21-21.5	2-1.5	CL	NA	7.9	1140	96
A-08-122	32	B-1	1.2-5	30.8-27	SC	2750	8.3	132	163
R-08-004	31.5	B-1	1.5-3.5	30-28	CL	1350	9.1	465	604
R-08-011	29.5	S-3	15-16.5	14.5-13	CL	NA	8.2	189	1330
R-08-017	54	R-4	21-21.5	33-32.5	CL	NA	7.7	62	1311
R-08-017	54	S-7	35-36.5	19-17.5	ML	NA	8.8	576	255
R-08-019	53	S-7	35-36.5	18-16.5	SM	NA	8.5	538	336

TABLE 3:
Summary of Existing Pavements, Near Surface Soils, and Laboratory Results

Boring/CPT No.	Approximate Existing Pavement Section (ft)	Boring/CPT Elevation (ft)	Sample/CPT Depth (ft)		Sample/CPT Elevation (ft)		USCS Classification or CPT Soil Behavior Type	Moisture Content (%)	Dry Density (pcf)	Percent Passing No. 200 Seive	Atterberg Limits			Liquidity Index	Estimated Subgrade Soil Type per HDM Table	R Value
			from	to	from	to	from	to			Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI			
A-08-101	0.45 AC (outside shoulder)/0.6 AB	19.5	1	5	18.5	14.5	SC	14	110	37	31	20	11	-0.55	II	21
A-08-103	0.4 AC (outside shoulder)/0.4 AB	19.5	1	5	18.5	14.5	SC-SM	26	88.8	41	NM	NM	NM	NM	II	46
A-08-105	0.55 AC (outside shoulder)/0.7AB	19.8	1.2	5	18.6	14.8	SC	11	NM	27	28	14	14	-0.21	II	NM
A-08-112	0.45 AC (outside shoulder)/0.75 AB	23	1.2	5	21.8	18	SC	11	NM	45	NM	NM	NM	NM	II	NM
A-08-115	0.45 AC (outside shoulder)/0.7 AB	21.5	1.1	5	20.4	16.5	CL	24	NM	75	NM	NM	NM	NM	II	34
A-08-116	0.45 AC (outside shoulder)/0.55 AB	22	1	5	21	17	SP-SM	4	NM	8	NM	NM	NM	NM	I	NM
A-08-119	0.4 AC (outside shoulder)/0.4 AB	23	0.8	5	22.2	18	SC	15	NM	36	32	20	12	-0.42	II	NM
A-08-120	0.25 AC (outside shoulder)/0.75 AB	25	1	5	24	20	SM	9	NM	27	NM	NM	NM	NM	I	54
A-08-122	0.6 AC (outside shoulder)/0.6 AB	32	1.2	5	30.8	27	SC	7	NM	23	26	15	11	-0.73	II	NM
CPT-08-001	NM (AC outside shoulder)	24.5	1	5	23.5	19.5	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-002	0.75 PCC/0.35 LC	25	2	5	23	20	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-003	NM (AC outside shoulder)	27.9	2	5	25.9	22.9	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-006	0.7 AC (outside shoulder)	42	2	5	40	37	SM-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-007	0.7 PCC/0.6 LC	27	2	5	25	22	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-008	NM (AC outside shoulder)	49	2	5	47	44	SM-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-009	NM (AC outside shoulder)	29	2	5	27	24	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-013	NM (AC outside shoulder)	28.5	2	5	26.5	23.5	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA

TABLE 3:
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Boring/CPT No.	Approximate Existing Pavement Section (ft)	Boring/CPT Elevation (ft)	Sample/CPT Depth (ft)		Sample/CPT Elevation (ft)		USCS Classification or CPT Soil Behavior Type	Moisture Content (%)	Dry Density (pcf)	Percent Passing No. 200 Seive	Atterberg Limits			Liquidity Index	Estimated Subgrade Soil Type per HDM Table	R Value
			from	to	from	to	from	to			Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI			
CPT-08-014	0.7 PCC, 0.6 LC	28.5	1	5	27.5	23.5	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-014B	0.75 PCC, 0.6 LC	28.5	1	5	27.5	23.5	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-015	0.3 AC (outside shoulder)	29.5	2	5	27.5	24.5	CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-016	NM (AC outside shoulder)	26	1	5	25	21	CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-018	0.7 PCC/ 0.3 LC	43.5	1	5	42.5	38.5	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-020	NM (AC outside shoulder)	28	2	5	26	23	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-021	0.75 AC (shoulder)	26	1	5	25	21	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-022	NM (AC outside shoulder)	26	1	5	25	21	CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-102	NM (AC outside shoulder)	20	2	5	18	15	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-103	0.4 AC (outside shoulder)/0.4 AB	19.5	2	5	17.5	14.5	SM-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-104	NM (AC outside shoulder)	19.5	2	5	17.5	14.5	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-105	0.55 AC (outside shoulder)/0.7AB	19.8	2	5	17.8	14.8	SM-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-106	NM (AC outside shoulder)	20	2	5	18	15	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-107	NM (AC outside shoulder)	20.5	2	5	18.5	15.5	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-108	NM (AC outside shoulder)	21	2	5	19	16	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-109	NM (AC outside shoulder)	22	1	5	21	17	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-110	NM (AC outside shoulder)	23	1	5	22	18	CL-ML	NA	NA	NA	NA	NA	NA	NA	II	NA

TABLE 3:
Summary of Existing Pavements, Near Surface Soils, and Laboratory Results

Boring/CPT No.	Approximate Existing Pavement Section (ft)	Boring/CPT Elevation (ft)	Sample/CPT Depth (ft)		Sample/CPT Elevation (ft)		USCS Classification or CPT Soil Behavior Type	Moisture Content (%)	Dry Density (pcf)	Percent Passing No. 200 Seive	Atterberg Limits			Liquidity Index	Estimated Subgrade Soil Type per HDM Table	R Value
			from	to	from	to	from	to			Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI			
CPT-08-111	NM (AC outside shoulder)	23	2	5	21	18	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-113	NM (AC outside shoulder)	22.5	2	5	20.5	17.5	SM-ML	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-114	NM (AC outside shoulder)	21.5	1	5	20.5	16.5	SP-SM	NA	NA	NA	NA	NA	NA	NA	I	NA
CPT-08-117	NM (AC outside shoulder)	22	2	5	20	17	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-118	NM (AC outside shoulder)	24	2	5	22	19	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-119	0.4 AC (outside shoulder)/0.4 AB	23	2	5	21	18	CL	NA	NA	NA	NA	NA	NA	NA	II	NA
CPT-08-121	NM (AC outside shoulder)	28	2	5	26	23	ML-CL	NA	NA	NA	NA	NA	NA	NA	II	NA
R-08-004	0.7 PCC/ 0.4 LC/0.25 AB	31.5	1.3	3.5	30.2	28	CL	16	NM	66	29	18	11	-0.18	II	39
R-08-005	0.75 PCC/ 0.75 LC/0.5 AB	28	2	5	26	23	CL	16	NM	63	NM	NM	NM	NM	II	25
R-08-011	NM (AC outside shoulder)	29.5	5	6.5	24.5	23	SM	19	NM	47	NM	NM	NM	NM	II	NM
R-08-012	0.3 AC/0.7AB (outside shoulder)	25	5	6.5	20	18.5	CL	28	95.8	80	47	20	27	0.30	II	NM
R-08-017	0.6 AC/0.25AB (outside shoulder)	54	5	6.5	49	47.5	CL	NM	NM	NM	NM	NM	NM	NM	II	NM
R-08-019	0.2 AC/0.3AB (outside shoulder)	53	5	6.5	48	46.5	CL-ML	20	NM	59	34	20	14	0.00	II	NM
R-08-023	0.3 AC/0.8AB (Valley View St.)	47	5	6.5	42	40.5	CL	10	115.8	54	NM	NM	NM	NM	II	NM
HA-08-01	None (off shoulder)	26	0	5	26	21	CL	NM	NM	56	30	20	10	NM	II	35
HA-08-02	None (off shoulder)	27	0	5	27	22	CL	NM	NM	55	28	19	9	NM	II	29
HA-08-03	None (off shoulder)	28	0	5	28	23	CL	NM	NM	69	32	19	13	NM	II	17

TABLE 3:
Summary of Existing Pavements, Near Surface Soils, and Laboratory Results

Boring/CPT No.	Approximate Existing Pavement Section (ft)	Boring/CPT Elevation (ft)	Sample/CPT Depth (ft)		Sample/CPT Elevation (ft)		USCS Classification or CPT Soil Behavior Type	Moisture Content (%)	Dry Density (pcf)	Percent Passing No. 200 Seive	Atterberg Limits			Liquidity Index	Estimated Subgrade Soil Type per HDM Table	R Value
			from	to	from	to	from	to			Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI			
HA-08-04	None (off shoulder)	43	0.5	5	42.5	38	CL	NM	NM	57	30	21	9	NM	II	43
HA-08-05	None (off shoulder)	24.9	1	5	23.9	19.9	CL	NM	NM	56	30	17	13	NM	II	27
HA-08-06	None (off shoulder)	29	0.5	5	28.5	24	CL-SC	NM	NM	51	28	18	10	NM	II	15
HA-08-07	None (off shoulder)	28.5	0	5	28.5	23.5	SC	NM	NM	40	27	17	10	NM	II	29
HA-08-08	None (off shoulder)	20	0	5	20	15	CL	NM	NM	53	33	17	16	NM	II	23
									Max=	80	47	21	27	0.30	generally Type II	54
									Min=	8	26	14	9	-0.73		15
									Average=	49	31	18	13	-0.26		31

NM = Not Measured

NA = Not Available

A = Hollow Stem Auger boring

CPT = Cone Penetration Test

HA = Hand Auger Boring

R = Rotary Wash Boring

TABLE 4:
Culvert Materials Recommendations for Existing Soils
(Based on CULVERT4)

Culvert Materials	Pipe Types	Conditions for Use	Comments
Galvanized Steel	Corrugated Steel Pipe (CSP)	See Note 2	---
Aluminum	Corrugated Aluminum Pipe (CAP), Corrugated Aluminized Steel Pipe (CASP)	Not Suitable	Should not be used due to Corrosive Condition
Reinforced Concrete	Reinforced Concrete Pipe	See Note 3	Standard Reinforced Concrete pipe design is adversely affected by Chlorides
Other	Plastic Pipe	See Note 4	Meet structural and other material requirements. Refer to HDM Table 854.8 for maximum fill height (height of cover) over pipe

Notes:

1. The culvert design is based on flow velocity < 5 fps with abrasive condition by using following project site corrosion data:
   pH = 7.7, Resistivity = 500 ohm-cm, Chlorides = 1330 ppm, Sulfates = 4720 ppm.

2. The following CSP can be used for 50 years design Life;
   Gage 10 (0.138 in) Galvanized 2 oz or Galvanized & Bitumen Coated (water side)
   Gage 12 (0.109 in) Galvanized & Bitumen Coated & Paved Invert (Abrasion)
   Gage 14 (0.079 in) Galvanized & Bitumen Coated (soil side)
   Gage 16 (0.064 in) Galvanized & Polymer 90 deg Invert (Gage 18 not recommended due to abrasive condition)

   For Chloride resistant RCP, use Cement Content C = 7 sk/cy, Concrete Cover S = 2.5 in (Non-Standard), Total Mix Water, % by Vol. W = 15%

   For Sulfate Resistant Concrete and RCP, use Type II Modified Cement or Type V Cement 7 sk/cy with 25% Mineral Admixture Replacement (by weight) and a maximum water-to-cement ratio of 0.40

3. Plastic pipe is approved for 50 years service life for corrosive conditions. Abrasion must be evaluated. Also, consider concrete headwalls and concrete or metal end treatment where high fire potential exists.

4. The above recommendations are based on corrosion properties of site soils and assumed flow velocity for abrasive conditions. Actual flow velocity and overfill requirements should also be considered in selection of pipe

TABLE 5:
As-Built Pavement Structural Sections

Location	Existing Thickness (feet)			
I-405 Mainline				
Travel Lanes	0.75 PCC	0.25 CTB	0.25AB	0.75AS
Inside Shoulder	0.85 PCC	0.70 slurry		
Outside Shoulder	0.25 AC	0.50 AB	1.25 AS	
SR-22 Mainline				
Travel Lanes	0.75 PCC	0.33 RMCTB	.33' AB,	0.60 AS
Inside Shoulder	0.25 AC	0.50 AB	0.67 AS	
Outside Shoulder	0.25 AC	0.50 AB	0.67 AS	
Valley View/Bolsa Chica OC Ramps				
Traveled way	0.33 AC	0.67 RMCTB	0.33 AB	0.67 AS
Inside shoulder	0.33 AC	0.67 RMCTB	0.33 AB	0.67 AS
Outside shoulder/CHP	0.33 AC	0.50 AB	1.15 AS	
Valley View/Bolsa Chica Street				
Travel Lanes	0.35 AC	0.50 RMCTB	0.35 AB	0.85 AS
Inside Shoulder	0.35 AC	0.50 RMCTB	0.35 AB	0.85 AS
Outside Shoulder	0.25 AC	0.50 AB	1.25 AS	

Note: Based on As-Built data provided by Parsons.

Table 6A
Recommended Rigid Pavement Structural Sections

Location	Design Traffic Index (TI)[1]	Pavement Type	Subgrade Type[3]	Lateral Support	Rigid Pavement Section (ft)[2]
HOV Connector and Shoulder	11	Rigid	Type 1 Select Fill [R>40 subgrade (import)] over native subgrade Minimum select fill depth in new fill areas, or minimum overex and select fill replacement in native areas, greater of 3' below Finish Grade or 2' below Structural Section Overex / min. fill depth recommendation based on native subgrade with R>10 and PI=12 to 20 (see note 2)	Yes	0.75 JPCP 0.40 LCB
I-405 Traveled Way	14.5	Rigid		No	1.00 JPCP 0.50 LCB
SR-22 Traveled Way	12	Rigid		No	0.85 JPCP 0.40 LCB
Ramp Termini Traveled Way and Shoulder	12	Rigid		No	0.85 JPCP 0.40 LCB

Footnotes:

1. Traffic Indices were provided by Parsons.
2. Ref: Table 623.1D HDM (2006). We understand no existing treated permeable layers are required to be perpetuated.
3. R-Value / PI Testing should be done in construction. If R<10 or PI>20 subgrade encountered, increase overex / R>40 depth to 5 feet below finished grade. Allow contingency of 20% of areas possibly requiring additional overex.

Abbreviations:

JPCP = Jointed Plain Concrete Pavement
LCB = Lean Concrete Base
ATPB = Asphalt Treated Permeable Base
AB = Class 2 Aggregate Base
AS = Class 4 Aggregate Subbase

Table 6B
Recommended Flexible Pavement Structural Sections

Location	Design Traffic Index (TI) [1]	Pavement Type	Subgrade Type[2]	Flexible Pavement Sections
				Design R-Value =41
I-405 Shoulder	9.5	Flexible	Type 1 Select Fill [R>40 subgrade (import)] over native subgrade Minimum select fill depth in new fill areas, or minimum overex and select fill replacement in native areas, greater of 3' below Finish Grade or 2' below Structural Section Overex / min. fill depth recommendation based on native subgrade with R>10 and PI=12 to 20 (see note 2)	0.50 HMA 0.80 AB
SR-22 Shoulder	8	Flexible		0.40 HMA 0.65 AB
On-Ramps and Off-Ramps	12	Flexible		0.60 HMA 1.15 AB
Valley View Street/ Bolsa Chica Road	10	Flexible		0.50 HMA 0.90 AB
Garden Grove Blvd	10	Flexible		0.50 HMA 0.90 AB

Footnotes:

1. Traffic Indices were provided by Parsons.

2. Subgrade R-Value / PI Testing should be done in construction. If R<10 or PI>20 subgrade encountered, increase overex and replace or minimum select fill depth to 5 feet below finished grade. Allow contingency of 20% of areas possibly requiring additional overex.

Abbreviations:

HMA = Hot Mix Asphalt (Type A)

AB = Class 2 Aggregate Base

The base maps are from Microsoft's Virtual Earth

GROUP DELTA CONSULTANTS

GDC Project No. I-436

West County Connector Project
I-405/SR22 HOV Conn. Segment
Orange County, California

Vicinity Map

Figure 1

BLUE - NEW PAVEMENT
GREEN - GRIND AND CONSTRUCT PCC PAVEMENT
YELLOW - SALVAGE EXISTING PAVEMENT
BROWN - REMOVE PCC
PURPLE - COLD PLANE AND OVERLAY
ORANGE - REMOVE AC PAVEMENT
HATCH - NEW BRIDGE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

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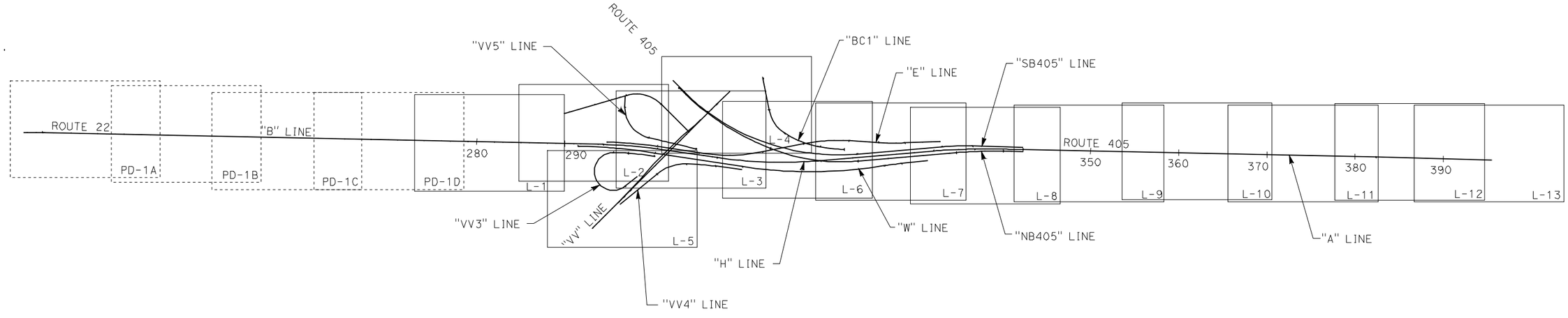

NO SCALE

LINE INDEX	DESCRIPTION
"A" LINE	I-405 CENTERLINE
"NB405" LINE	I-405 NB HOV EDGE OF TRAVELED WAY
"SB405" LINE	I-405 SB HOV EDGE OF TRAVELED WAY
"B" LINE	SR 22 CENTERLINE
"E" LINE	EB CONNECTOR STATIONLINE
"W" LINE	WB CONNECTOR STATIONLINE
"H" LINE	HOV CONNECTOR CENTERLINE
"GG" LINE	GARDEN GROVE BOULEVARD CENTERLINE
"VV" LINE	VALLEY VIEW STREET CENTERLINE
"VV1" LINE	SR-22 WB ON-RAMP FROM VALLEY VIEW STREET
"VV2" LINE	SR-22 WB OFF-RAMP TO VALLEY VIEW STREET
"VV3" LINE	SR-22 WB LOOP ON-RAMP FROM VALLEY VIEW STREET
"VV4" LINE	SR-22 WB ON-RAMP FROM VALLEY VIEW STREET
"VV5" LINE	SR-22 EB OFF-RAMP TO VALLEY VIEW STREET
"BC1" LINE	I-405 SB OFF-RAMP TO BOLSA CHICA ROAD

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

KEY MAP AND LINE INDEX LAYOUT

FIGURE 2

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LEVEL 1 - BLUE - NEW PAVEMENT
LEVEL 2 - GREEN - GRIND AND CONSTRUCT PCC PAVEMENT
LEVEL 3 - YELLOW - SALVAGE EXISTING PAVEMENT
LEVEL 4 - BROWN - REMOVE PCC
LEVEL 5 - PURPLE - COLD PLANE AND OVERLAY
LEVEL 6 - ORANGE - REMOVE AC PAVEMENT
LEVEL 7 - HATCH - NEW BRIDGE

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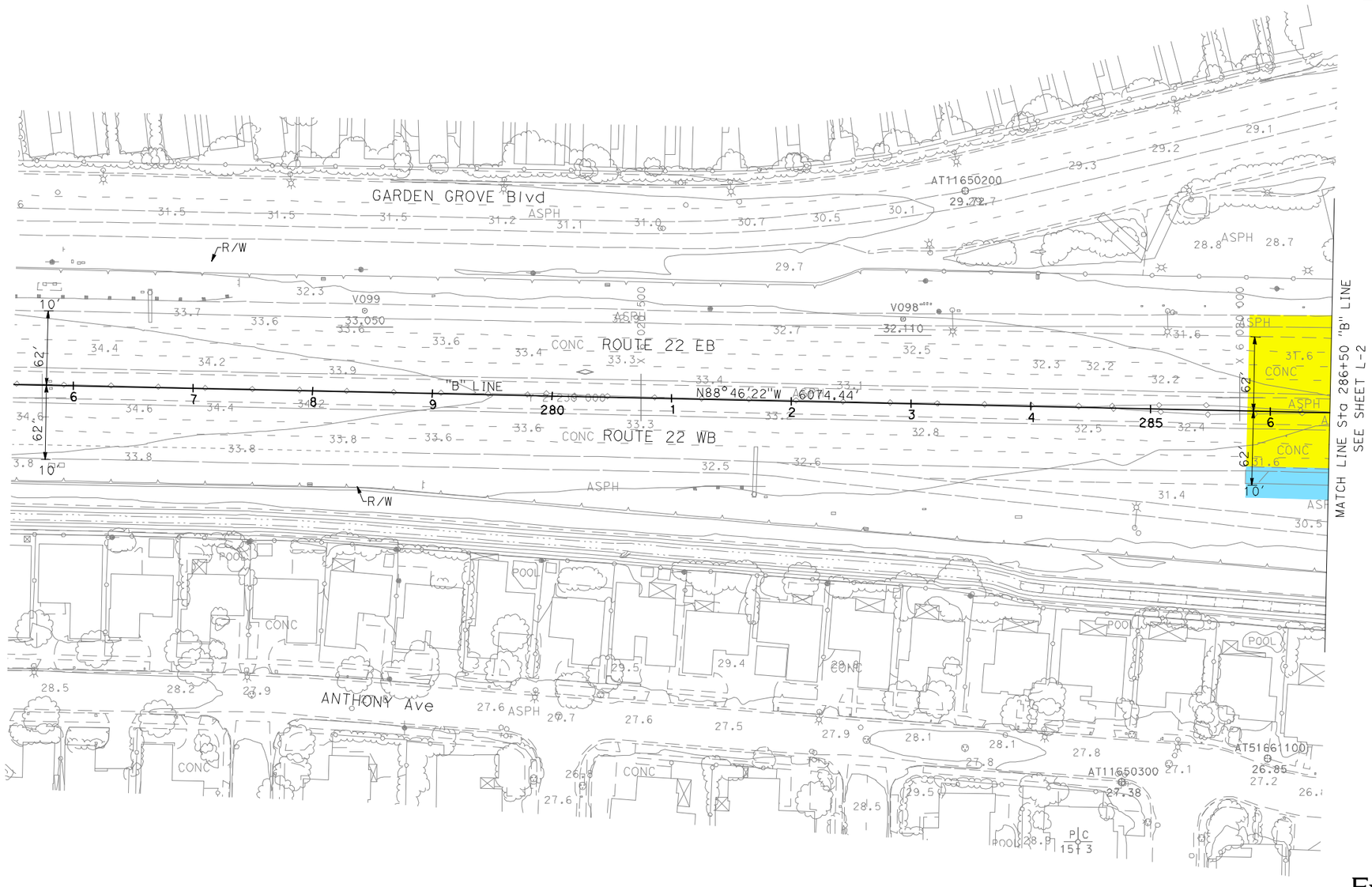

Exploration Location Plan

LAYOUT

SCALE 1" = 50'

FIGURE 2 L-1

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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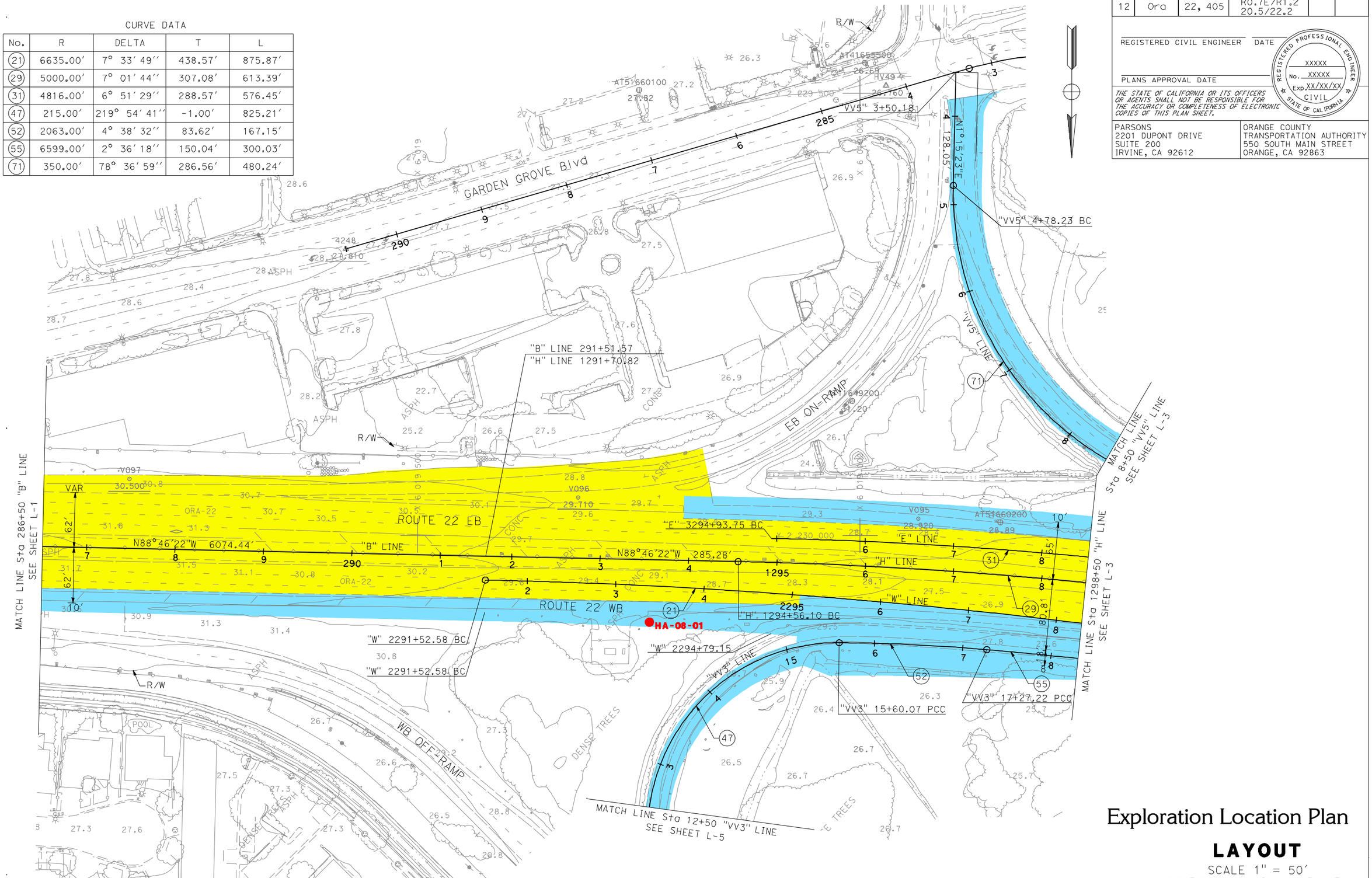
CURVE DATA

No.	R	DELTA	T	L
(21)	6635.00′	7° 33′ 49″	438.57′	875.87′
(29)	5000.00′	7° 01′ 44″	307.08′	613.39′
(31)	4816.00′	6° 51′ 29″	288.57′	576.45′
(47)	215.00′	219° 54′ 41″	-1.00′	825.21′
(52)	2063.00′	4° 38′ 32″	83.62′	167.15′
(55)	6599.00′	2° 36′ 18″	150.04′	300.03′
(71)	350.00′	78° 36′ 59″	286.56′	480.24′



RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

LAYOUT

SCALE 1" = 50′

FIGURE 2 L-2

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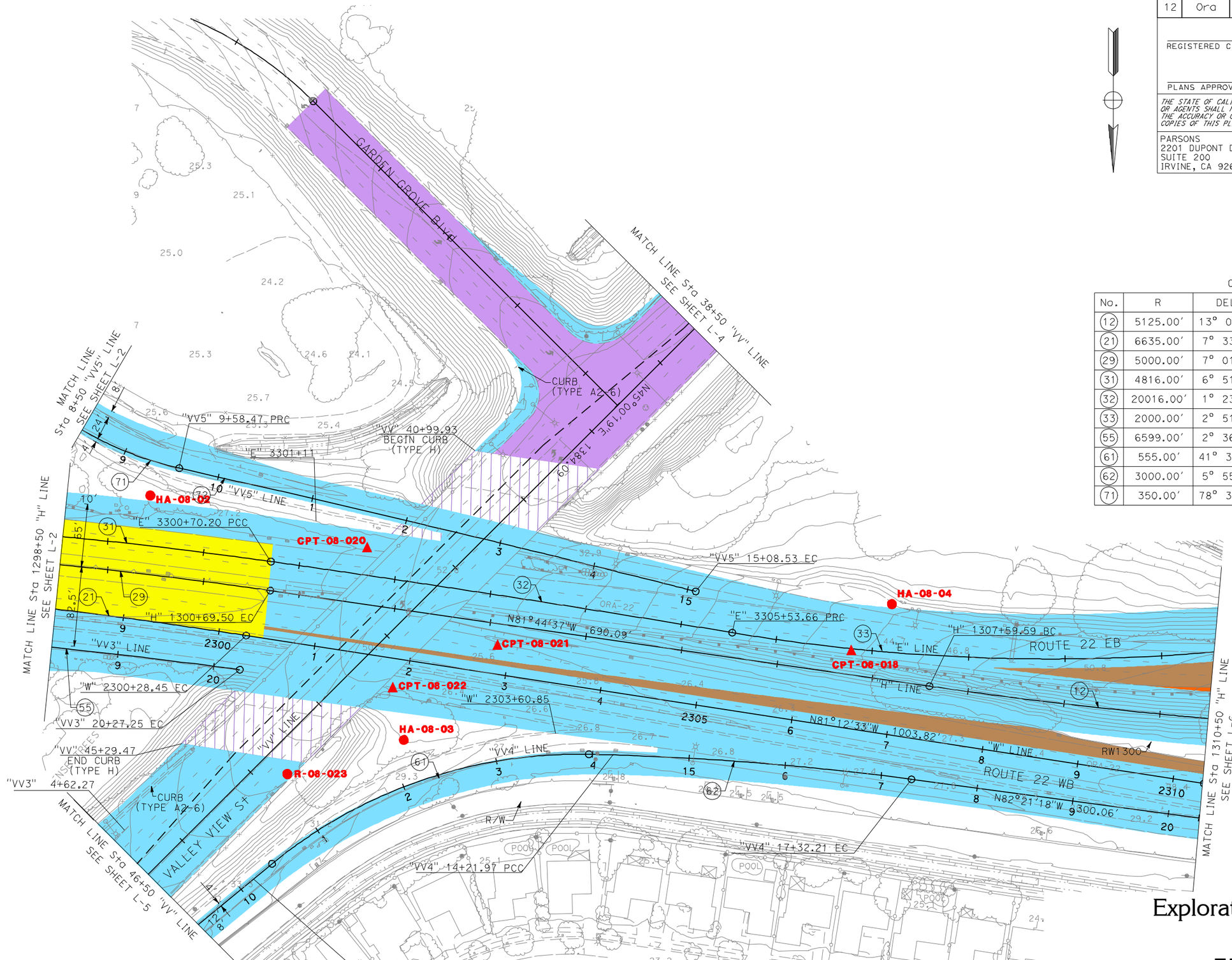
CURVE DATA

No.	R	DELTA	T	L
(12)	5125.00′	13° 08′ 50″	590.60′	1176.01′
(21)	6635.00′	7° 33′ 49″	438.57′	875.87′
(29)	5000.00′	7° 01′ 44″	307.08′	613.39′
(31)	4816.00′	6° 51′ 29″	288.57′	576.45′
(32)	20016.00′	1° 23′ 02″	241.74′	483.86′
(33)	2000.00′	2° 51′ 53″	366.14′	724.26′
(55)	6599.00′	2° 36′ 18″	150.04′	300.03′
(61)	555.00′	41° 35′ 12″	210.75′	402.83′
(62)	3000.00′	5° 55′ 30″	155.26′	310.24′
(71)	350.00′	78° 36′ 59″	286.56′	480.24′



RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan
LAYOUT
SCALE 1" = 50′

FIGURE 2 L-3

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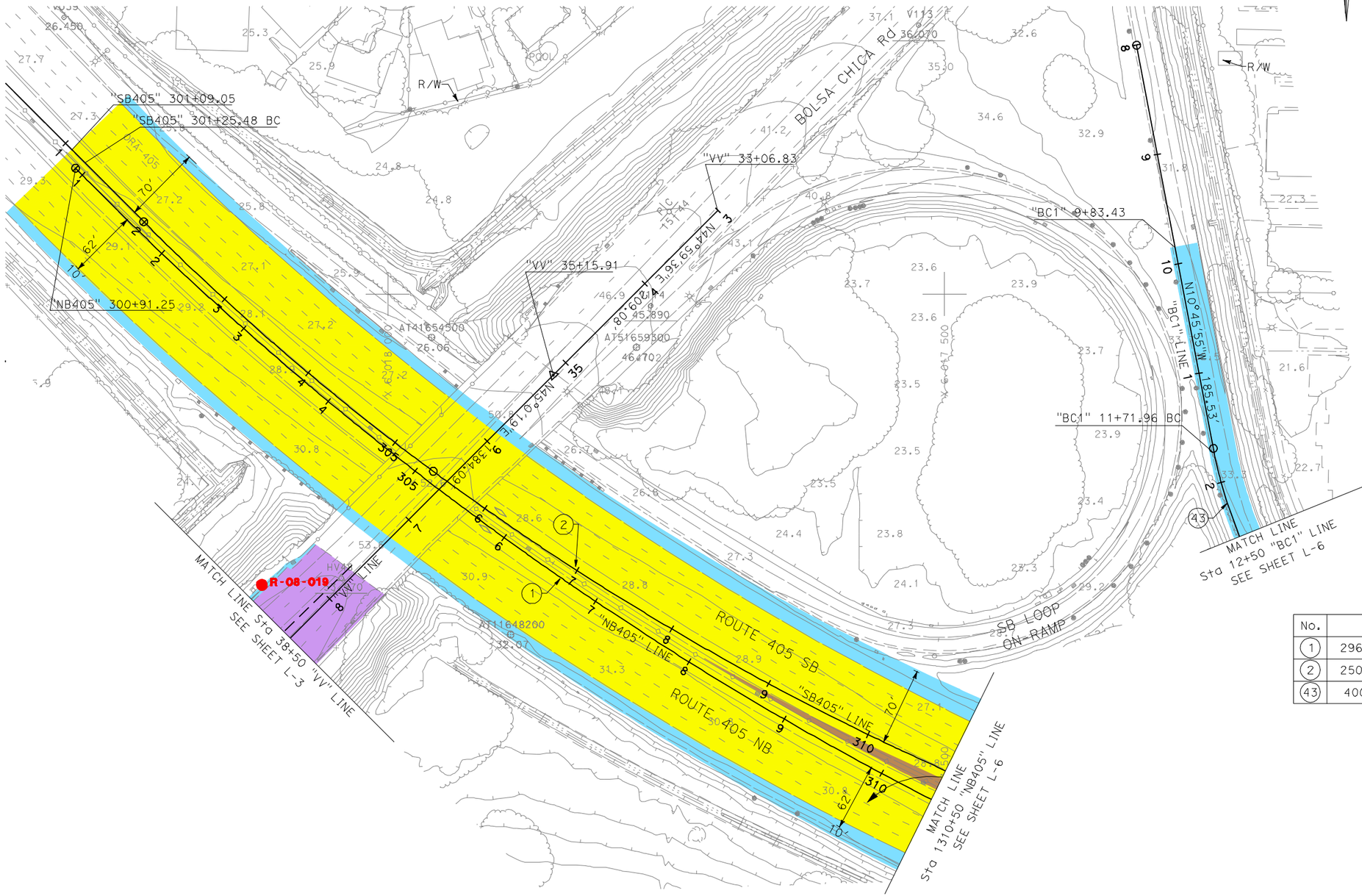

CURVE DATA

No.	R	DELTA	T	L
(1)	2960.00′	24° 16′ 57″	636.80′	1254.48′
(2)	2500.00′	50° 57′ 01″	1191.10′	2223.12′
(43)	400.00′	49° 40′ 20″	185.13′	346.78′

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

LAYOUT

SCALE 1" = 50′

FIGURE 2 L-4

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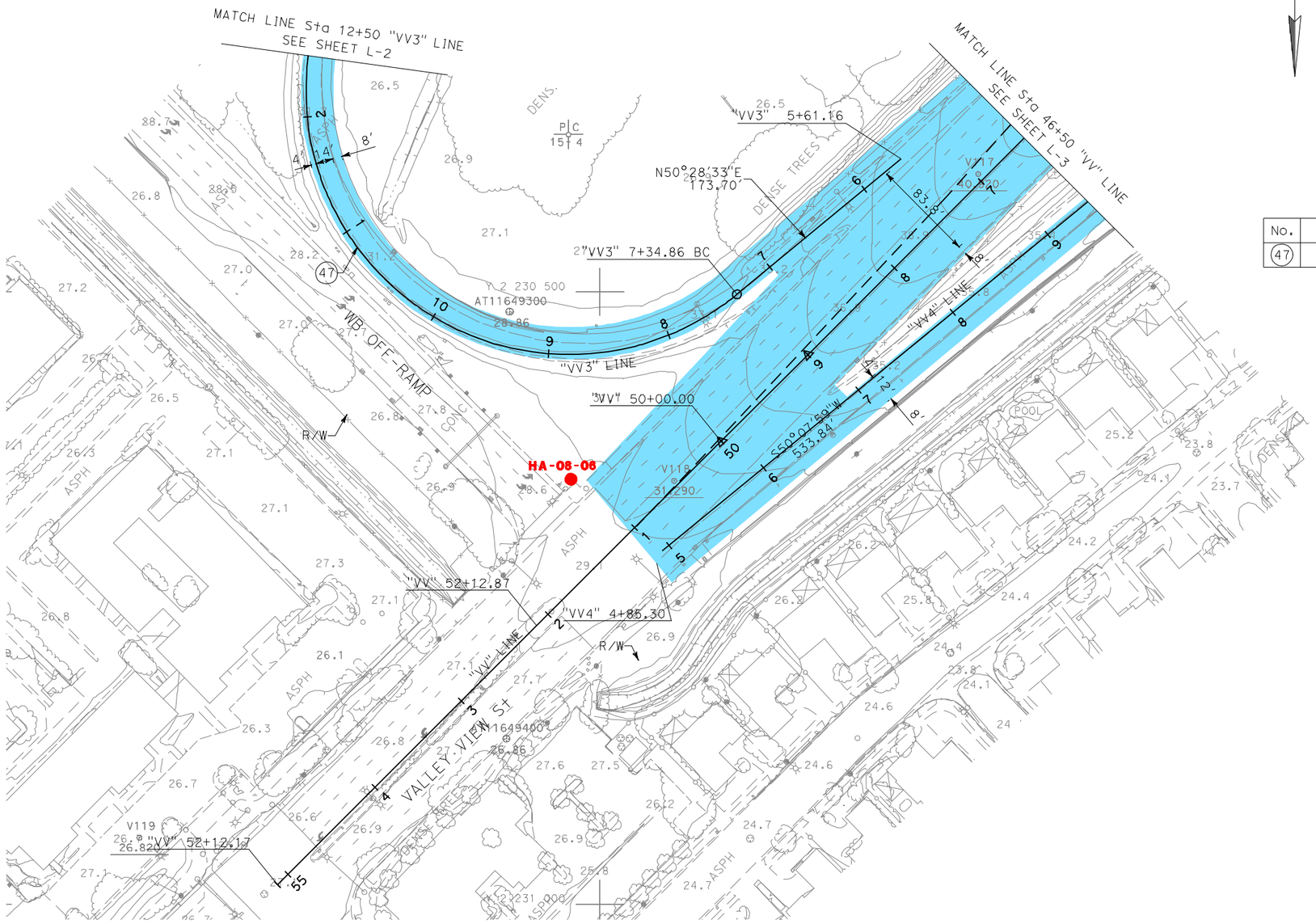

CURVE DATA

No.	R	DELTA	T	L
(47)	215.00'	219° 54' 41''	-1.00'	825.21'

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

LAYOUT

SCALE 1" = 50'

FIGURE 2 L-5

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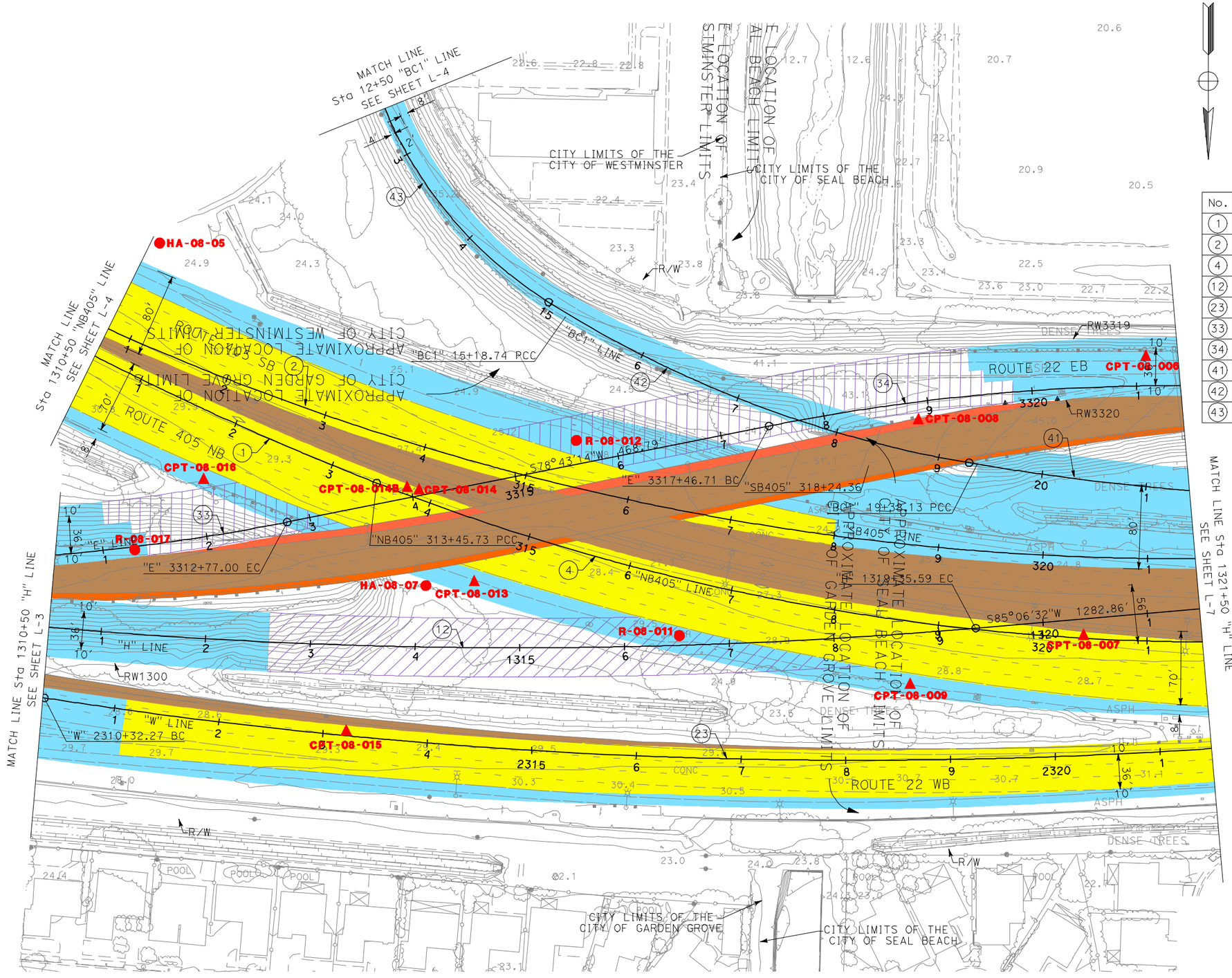
CURVE DATA

No.	R	DELTA	T	L
(1)	2960.00′	24° 16′ 57″	636.80′	1254.48′
(2)	2500.00′	50° 57′ 01″	1191.10′	2223.12′
(4)	2200.00′	26° 20′ 20″	514.77′	1011.34′
(12)	5125.00′	13° 08′ 50″	590.60′	1176.01′
(23)	5075.00′	18° 19′ 20″	818.44′	1622.90′
(33)	2000.00′	2° 51′ 53″	366.14′	724.26′
(34)	2000.00′	14° 53′ 17″	261.32′	519.70′
(41)	2440.00′	6° 21′ 41″	135.59′	270.90′
(42)	1200.00′	4° 46′ 29″	211.86′	419.40′
(43)	400.00′	49° 40′ 20″	185.13′	346.78′



RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

LAYOUT

SCALE 1" = 50′

FIGURE 2 L-6

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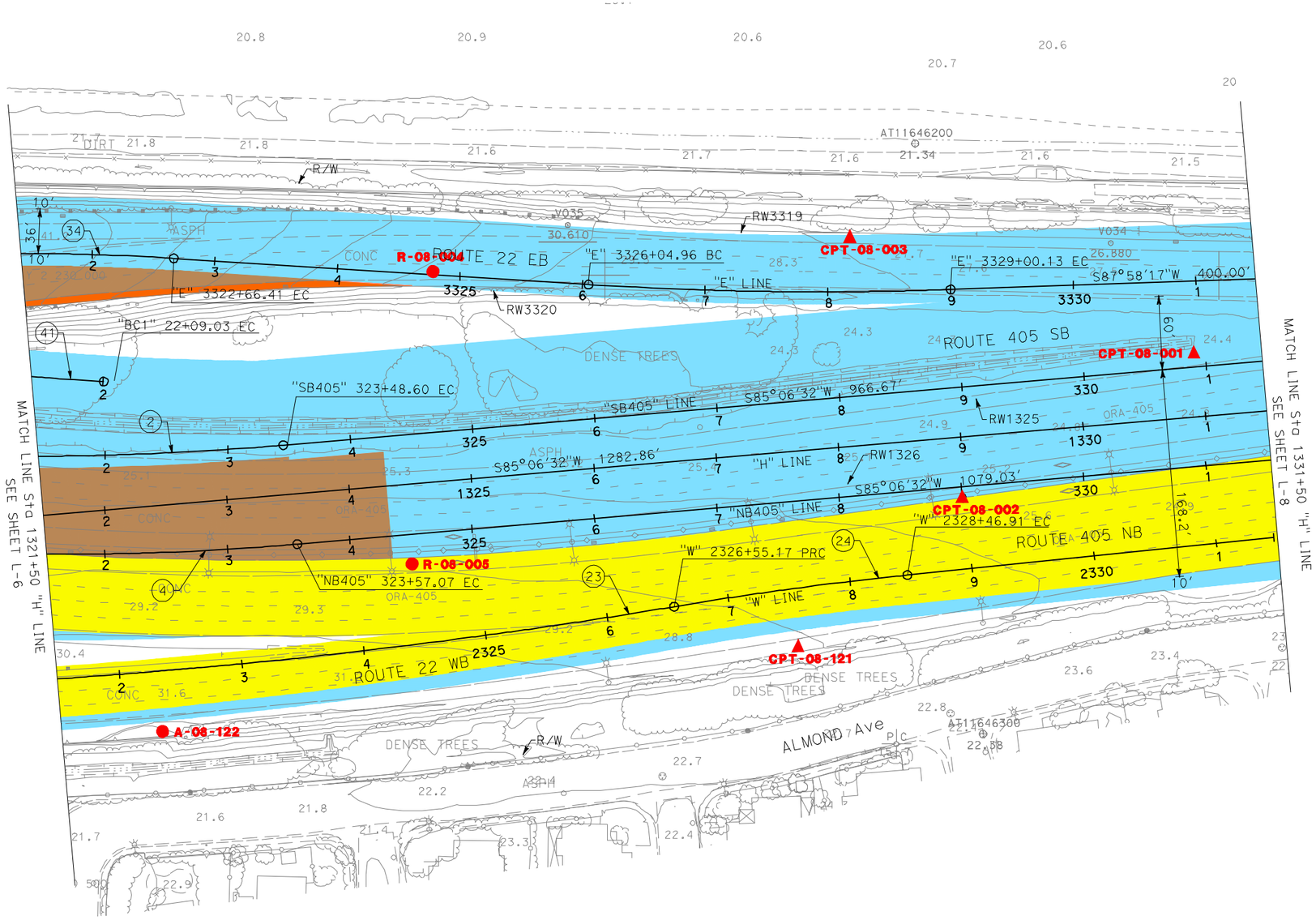

CURVE DATA

No.	R	DELTA	T	L
(2)	2500.00′	50° 57′ 01″	1191.10′	2223.12′
(4)	2200.00′	26° 20′ 20″	514.77′	1011.34′
(23)	5075.00′	18° 19′ 20″	818.44′	1622.90′
(24)	3000.00′	3° 39′ 43″	95.90′	191.74′
(34)	2000.00′	14° 53′ 17″	261.32′	519.70′
(41)	2440.00′	6° 21′ 41″	135.59′	270.90′

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

LAYOUT

SCALE 1" = 50′

FIGURE 2 L-7

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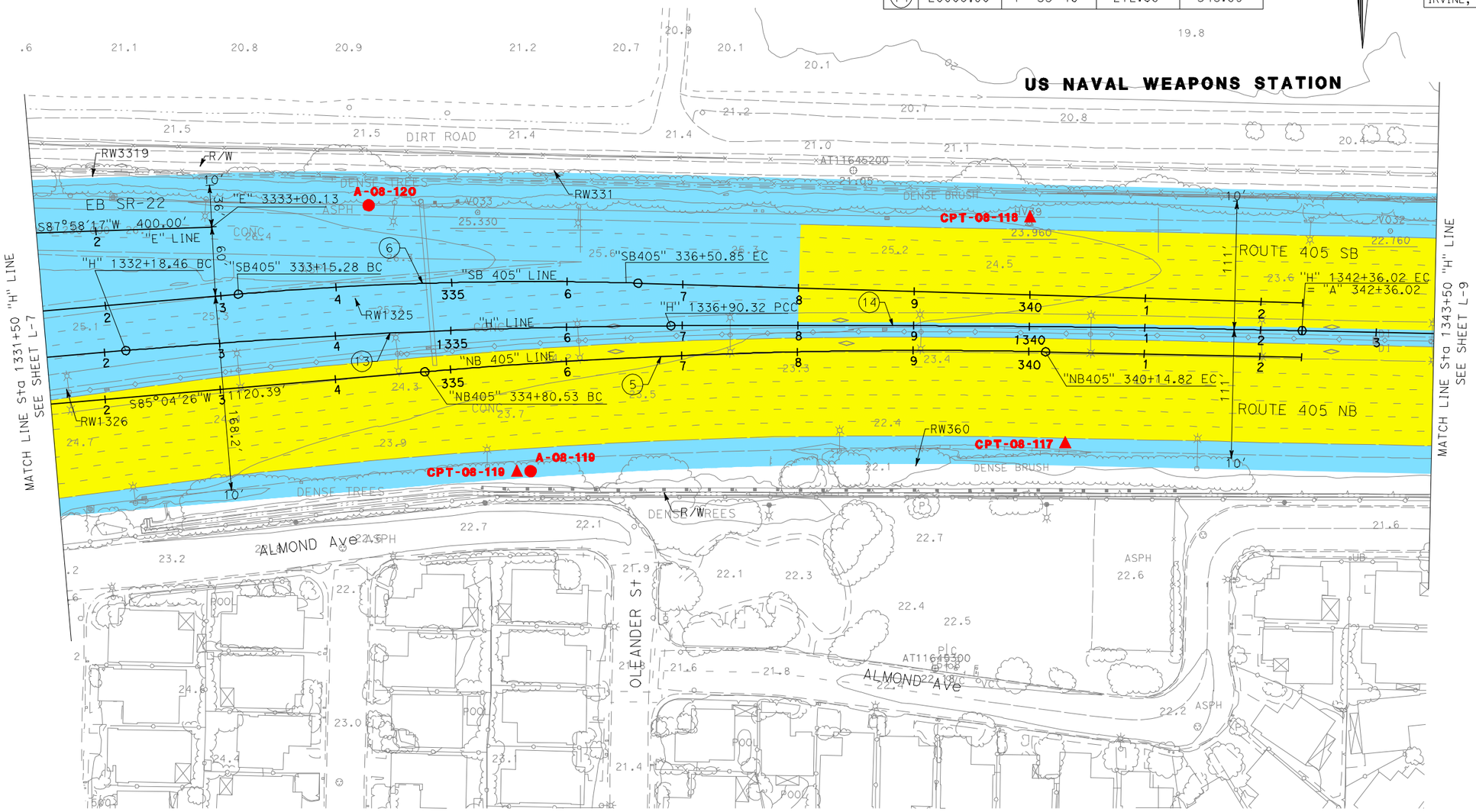
CURVE DATA

No.	R	DELTA	T	L
(5)	5000.00′	6° 09′ 27″	268.93′	537.35′
(6)	3000.00′	6° 24′ 32″	167.96′	335.57′
(13)	5930.00′	4° 33′ 33″	236.06′	471.87′
(14)	20000.00′	1° 33′ 48″	272.86′	545.69′



Exploration Location Plan

LAYOUT

SCALE 1" = 50′

FIGURE 2 L-8

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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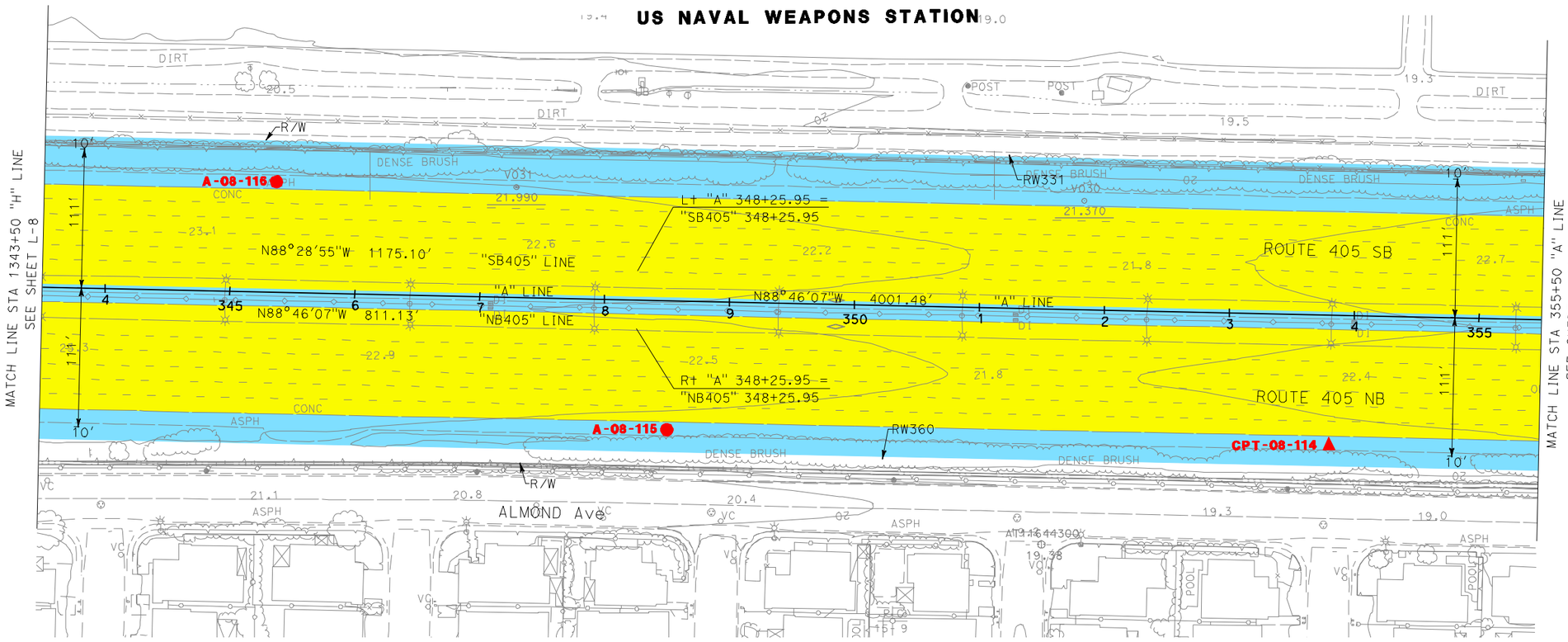

Exploration Location Plan

LAYOUT

SCALE 1" = 50'

FIGURE 2 L-9

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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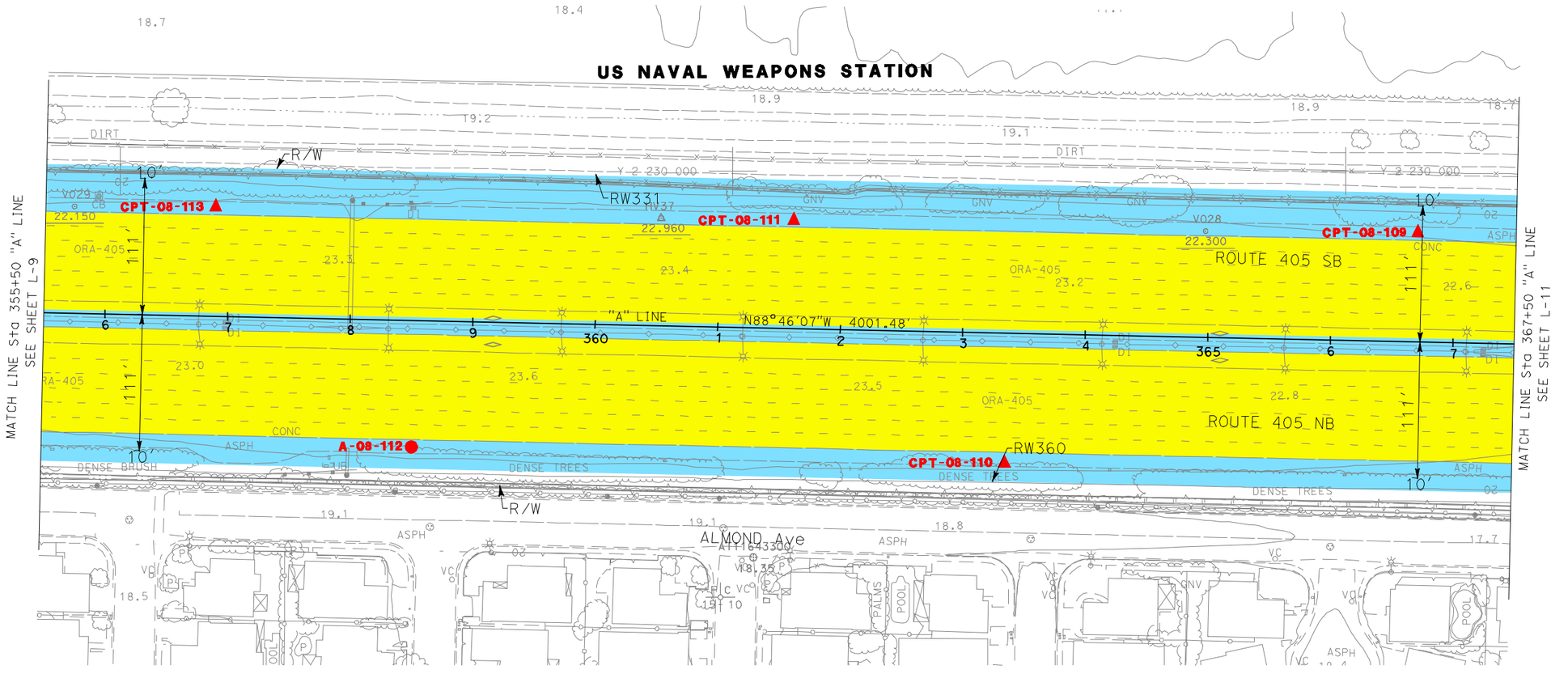

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Exploration Location Plan

LAYOUT

SCALE 1" = 50'

FIGURE 2 L-10

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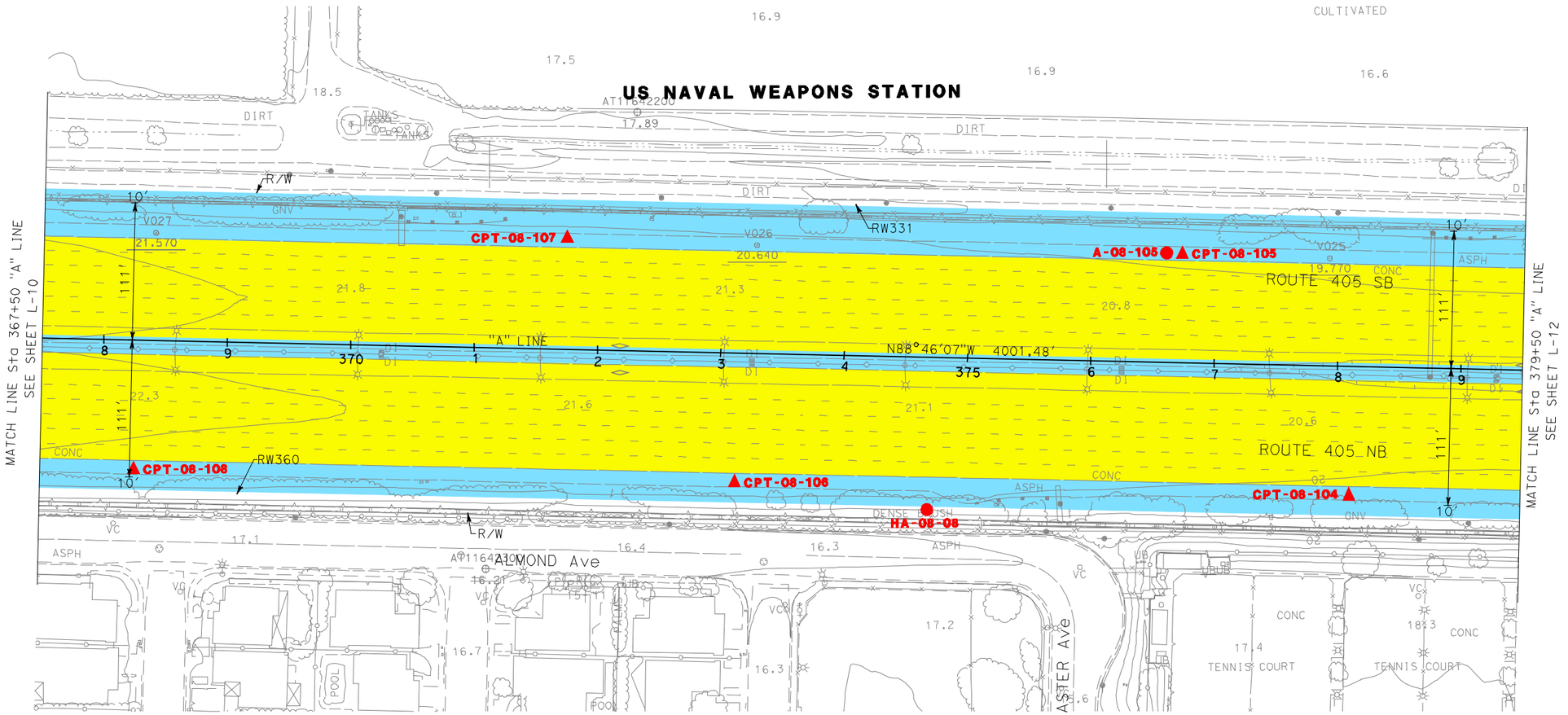

Exploration Location Plan

LAYOUT

SCALE 1" = 50'

FIGURE 2 L-11

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

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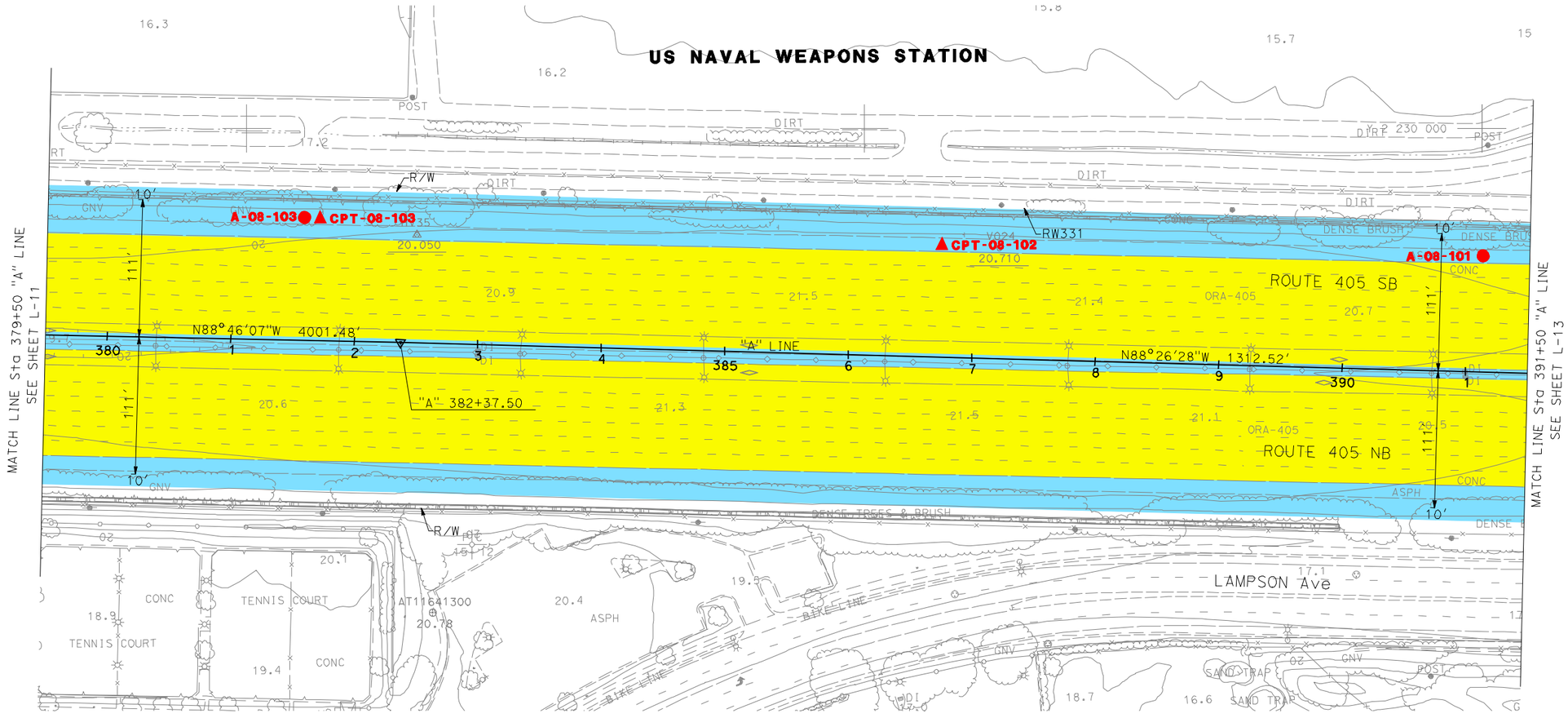

Exploration Location Plan

LAYOUT

SCALE 1" = 50'

FIGURE 2 L-12

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

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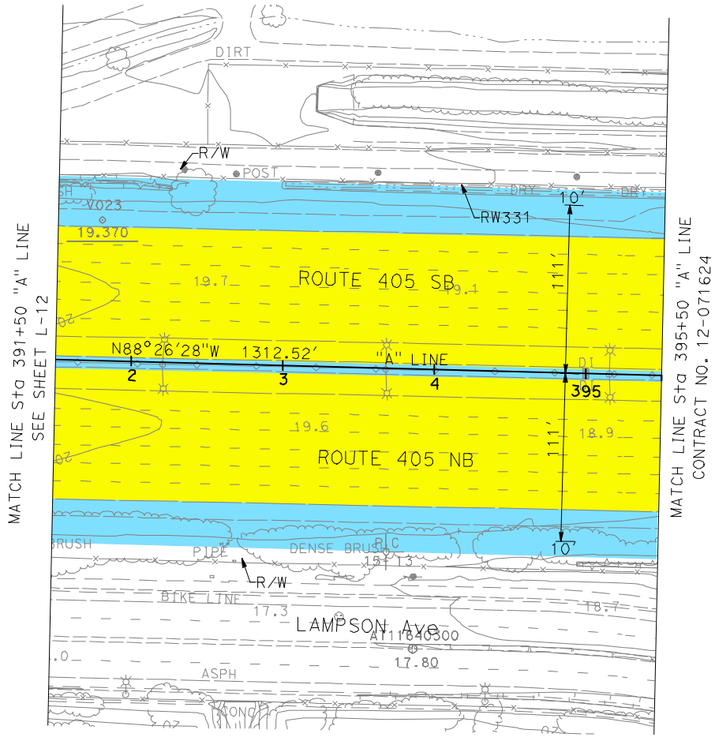
550 SOUTH MAIN STREET
ORANGE, CA 92863



RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

Exploration Location Plan

LAYOUT

SCALE 1" = 50'

FIGURE 2 L-13

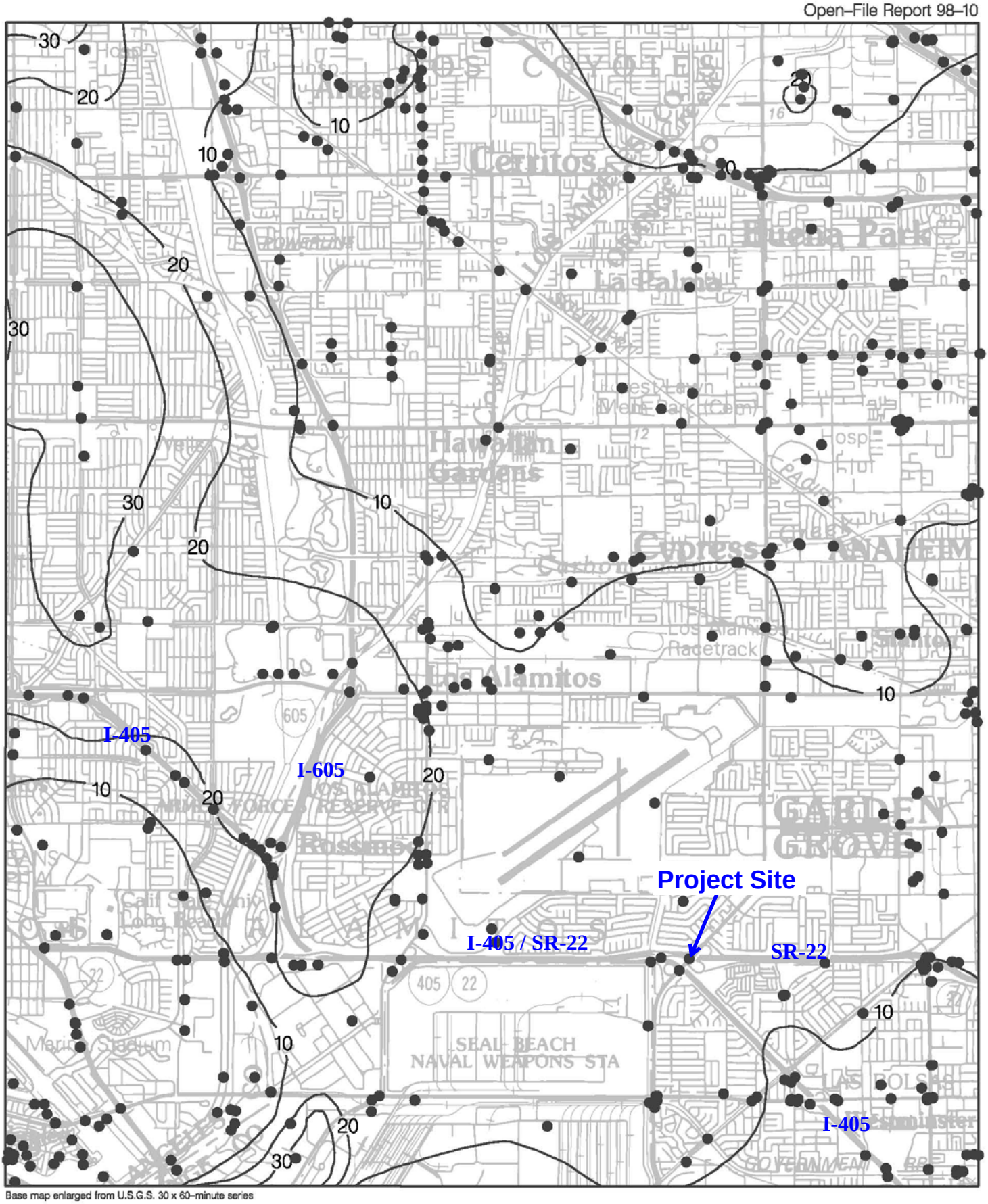
REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY

CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
DESIGN DIVISION



Base map enlarged from U.S.G.S. 30 x 60–minute series

Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

● Borehole Site

30 Depth to ground water in feet

Figure 3: Historically Highest Groundwater Map

ONE MILE

SCALE

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the project site were investigated by Group Delta Consultants, Inc. (GDC) by performing sixteen (16) soil borings (9 hollow-stem auger borings, and 7 rotary wash borings), and thirty-two (32) Cone Penetration Tests (CPTs) during the period of March 26 to May 9th, 2008. The borings were performed to depths of 16.5 feet to 137 feet below ground surface (bgs) and the CPTs were performed to depths of 20 to 164 feet bgs. In addition, on October 8th, 2008, eight (8) hand auger borings were advanced to depths of 5 feet bgs to collect supplemental near-surface samples for R-Value and index tests for pavement design. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at selected undercrossing, overcrossing, overhead sign, retaining wall, and new pavement locations. Locations of the borings and CPTs are presented in Figures 2 through 2-L13 of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1.

14 hollow stem auger and rotary wash borings and 32 CPTs were performed from the freeway lanes, connector ramps, and shoulders of SR-22/I-405. 8 hand auger borings were performed from the freeway shoulders of SR-22/I-405 in or adjacent to proposed pavement areas. 2 borings were performed from surface streets in the vicinity of the Bolsa Chica Rd. OC. All of the exploration locations were within the Caltrans Right-of-Way (ROW), with the exception of R-08-019, and R-08-023, which were located within the Cities of Westminster and Garden Grove ROWs respectively.

Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night. The exploration methods are described in the following sections.

A.2 Soil Drilling and Sampling

A total of sixteen (16) soil borings; seven (7) rotary wash (R-08-004, R-05-005, R-08-011, R-08-012, R-08-017, R-08-019, and R-08-023), and nine (9) hollow-stem auger borings (A-08-101, A-08-103, A-08-105, A-08-112, A-08-115, A-08-116, A-08-119, A-08-120 and A-08-122) were drilled and sampled during this project. C & L Drilling, Inc. of La Habra, California drilled and sampled the rotary wash

borings. R & C Drilling, Inc. of Van Nuys, California drilled and sampled the hollow stem auger borings. All drilling companies acted as subcontractors to GDC. All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS) and were assigned a group name and group symbol, as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The rotary wash and hollow stem auger boring logs are presented in Figures A-2 through A-17d.

The rotary wash borings were drilled using a Mayhew 1000 drill rig. The hollow-stem auger borings were drilled using a Mobile B-61 drill rig. All drill rigs were truck mounted. The Mayhew 1000 used a 4.875-inch drill bit in conjunction with bentonite slurry to drill to desired depths. The Mobile B-61 used an 8-inch auger to bore to desired depths.

Additionally, eight (8) hand auger borings (HA-08-01 through HA-08-08) were advanced by GDC personnel using a nominal 3-inch diameter hand auger. The hand auger boring logs are presented in Figures A-50 through A-57.

Bulk samples of the near-surface soils were collected along the project alignment. Drive samples were collected from the borings generally at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using either an automatic or downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample

blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured using a well sounder.

The hollow stem auger and hand auger borings were abandoned by backfilling the borehole with drill cuttings and cement grout mix as needed to the ground surface. The rotary wash borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with either asphalt patch or quickset cement.

Rotary wash borings drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California. for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of thirty-two (32) CPT soundings (CPT-08-001 through CPT-08-003, CPT-08-006 through CPT-08-009, CPT-08-013 through CPT-08-014B, CPT-08-015, CPT-08-016, CPT-08-018, CPT-08-020 through CPT-08-022, CPT-08-102 through CPT-08-111, CPT-08-113, CPT-08-114, CPT-08-117 through CPT-08-119, and CPT-08-121) were completed during the current project to depths ranging from 20 to 164 feet below ground surface. Kehoe Testing and Engineering, Inc. of Long Beach, California performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D3441 test standard using an electronic cone penetrometer. A 2.32-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly

continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in Appendix A on Figures A-18a through A-49b. Soil behavior type and other interpretations of the CPT data provided by Kehoe and are in our files.

At the completion of the sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned following each test by backfilling bentonite into the hole, to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1	Summary of Field Explorations

List of Figures

Figure A-1a	Key for Soil Classification
Figure A-1b	Boring Legend
Figures A-2 through A-17d	Hollow Stem and Rotary Wash Boring Logs
Figures A-18a through A-49b	Cone Penetration Test Results
Figure A-50 to A-57	Hand Auger Boring Logs

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
A-08-101	"A Line" 391+12 94 L	4/3/2008	A	19.5	21.5	L-12	15.5	4	
A-08-103	"A Line" 381+63 100 L	4/3/2008	A	19.5	31.5	L-12	13.2	6.3	
A-08-105	"A Line" 376+62 90 L	4/3/2008	A	19.8	41.5	L-11	18.3	1.5	
A-08-112	"A Line" 358+50 102 R	4/14/2008	A	23	41.5	L-10	Hole obstructed at 7.75 ft (dry)	NA	GW is below Elev. 15.3 feet
A-08-115	"A Line" 348+52 102 R	4/14/2008	A	21.5	16.5	L-9	Hole obstructed at 7.5 ft (dry)	NA	GW is below Elev. 14 feet
A-08-116	"A Line" 345+34 86 L	4/3/2008	A	22	16.5	L-9	11.4	10.6	
A-08-119	1335+66 105 R	4/14/2008	A	23	31.5	L-8	Hole obstructed at 5.7 ft (dry)	NA	GW is below Elev. 17 feet
A-08-120	1334+34 110 L	4/1/2008	A	25	51.5	L-8	12	13	
A-08-122	1322+30 180 R	4/14/2008	A	32	51.5	L-7	16.5	15.5	
CPT-08-001	1330+96 50 L	4/11/2008	CPT	24.5	163.5	L-7	Hole obstructed at 10' (dry)	NA	GW is below Elev. 14.5 feet
CPT-08-002	1328+98 50 R	3/26/2008	CPT	25	107.6	L-7	7	18	Inclination Refusal at 107.6'
CPT-08-003	1328+26 168 L	4/1/2008	CPT	27.9	150.0	L-7	Hole obstructed at 10' (dry)	NA	GW is below Elev. 17.9 feet
CPT-08-006	1321+24 263 L	3/31/2008	CPT	42	150.3	L-6	Hole obstructed at 20' (dry)	NA	GW is below Elev. 22 feet
CPT-08-007	1320+34 18 R	3/27/2008	CPT	27	105.5	L-6	Hole obstructed at 7' (dry)	NA	GW is below Elev. 20 feet
CPT-08-008	1319+00 230 L	4/1/2008	CPT	49	150.2	L-6	Hole obstructed at 34' (dry)	NA	GW is below Elev. 15 feet
CPT-08-009	1318+70 48 R	4/15/2008	CPT	29	130.3	L-6	Hole obstructed at 17' (dry)	NA	GW is below Elev. 12 feet
CPT-08-013	1314+56 64 L	4/15/2008	CPT	28.5	130.3	L-6	Hole obstructed at 16' (dry)	NA	GW is below Elev. 12.5 feet
CPT-08-014	1313+99 128 L	3/27/2008	CPT	28.5	61.0	L-6	Hole obstructed at 10' (dry)	NA	Inclination Refusal at 61 feet GW is below Elev. 12.5 feet
CPT-08-014B	1313+89 130 L	3/27/2008	CPT	28.5	79.9	L-6	Hole obstructed at 7' (dry)	NA	Inclination Refusal at 80 feet GW is below Elev. 21.5 feet
CPT-08-015	1313+28 170 R	3/31/2008	CPT	29.5	150.2	L-6	Hole obstructed at 12' (dry)	NA	GW is below EL. 17.5 feet
CPT-08-016	1311+89 153 L	4/15/2008	CPT	30	130.3	L-6	Hole obstructed at 15' (dry)	NA	GW is below Elev. 15 feet

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SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
CPT-08-018	"W Line" 2306+52 80 L	4/24/2008	CPT	43.5	80.1	L-3	Hole obstructed at 24' (dry)	NA	GW is below Elev. 19.5 feet
CPT-08-020	"W Line" 2301+40 112 L	4/1/2008	CPT	28	124.6	L-3	Hole obstructed at 12' (dry)	NA	GW is below Elev. 16 feet
CPT-08-021	"W Line" 2302+89 30 L	3/31/2008	CPT	26	150.2	L-3	Hole obstructed at 7' (dry)	NA	GW is below Elev. 19 feet
CPT-08-022	"W" Line" 2301+88 26 R	4/24/2008	CPT	26	118.5	L-3	Hole obstructed at 5' (dry)	NA	Tip Refusal to 118.5' GW is below Elev. 21 feet
CPT-08-102	"A Line" 386+73 94 L	4/3/2008	CPT	20	50.0	L-12	8	12	
CPT-08-103	"A Line" 381+73 100 L	4/3/2008	CPT	19.5	30.1	L-12	Hole obstructed at 9' (dry)	NA	GW is below Elev. 10.5 feet
CPT-08-104	"A Line" 378+20 108 R	4/14/2008	CPT	19.5	50.3	L-11	Hole obstructed at 7' (dry)	NA	GW is below Elev. 12.5 feet
CPT-08-105	"A Line" 376+72 90 L	4/3/2008	CPT	19.8	40.3	L-11	Hole obstructed at 8' (dry)	NA	GW observed at 18.3' (El. 1.5 ft) in nearby A-08-105
CPT-08-106	"A Line" 373+20 104 R	4/14/2008	CPT	20	40.4	L-11	Hole obstructed at 5' (dry)	NA	GW is below Elev. 15 feet
CPT-08-107	"A Line" 371+74 90 L	4/3/2008	CPT	20.5	50.1	L-11	Hole obstructed at 9' (dry)	NA	GW is below Elev. 11.5 feet
CPT-08-108	"A Line" 368+16 104 R	4/14/2008	CPT	21	30.2	L-11	Hole obstructed at 11' (dry)	NA	GW is below Elev. 10 feet
CPT-08-109	"A Line" 366+70 90 L	4/3/2008	CPT	22	30.1	L-10	Hole obstructed at 8' (dry)	NA	GW is below Elev. 12 feet
CPT-08-110	"A Line" 363+24 106 R	4/14/2008	CPT	23	50.2	L-10	Hole obstructed at 5' (dry)	NA	GW is below Elev. 18 feet
CPT-08-111	"A Line" 361+62 88 L	4/3/2008	CPT	23	40.4	L-10	Hole obstructed at 9' (dry)	NA	GW is below Elev. 14 feet
CPT-08-113	"A Line" 356+88 88 L	4/3/2008	CPT	22.5	40.1	L-10	Hole obstructed at 7' (dry)	NA	GW is below El. 15.5 feet
CPT-08-114	"A Line" 353+82 105 R	4/14/2008	CPT	21.5	30.2	L-9	Hole obstructed at 5' (dry)	NA	GW is below El. 16.5 feet
CPT-08-117	1340+34 100 L	4/14/2008	CPT	22	50.1	L-8	Hole obstructed at 7' (dry)	NA	GW is below Elev. 15 feet
CPT-08-118	1340+00 94 L	4/3/2008	CPT	24	20.1	L-8	Hole obstructed at 9' (dry)	NA	GW is below Elev. 15 feet
CPT-08-119	1335+56 105 R	4/14/2008	CPT	23	50.3	L-8	Hole obstructed at 6' (dry)	NA	GW is below Elev. 17 feet
CPT-08-121	1327+54 160 R	4/14/2008	CPT	28	30.1	L-7	Hole obstructed at 9' (dry)	NA	GW is below Elev. 19 feet
HA-08-01	"B" 293+60 95R	10/8/2008	HA	26	5.0	L-2	NE	NA	GW is below Elev. 21

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
HA-08-02	"E Line" 3299+42 51L	10/8/2008	HA	27	5.0	L-3	NE	NA	GW is below Elev. 22
HA-08-03	"W Line" 2302+04 84L	10/8/2008	HA	28	5.0	L-3	NE	NA	GW is below Elev. 23
HA-08-04	"E Line" 3307+28 74R	10/8/2008	HA	43	5.0	L-3	NE	NA	GW is below Elev. 38
HA-08-05	"NB 405" 1310+50 128R	10/8/2008	HA	24.9	5.0	L-6	NE	NA	GW is below Elev. -19.9
HA-08-06	"VV" 51+08 61L	10/8/2008	HA	29	5.0	L-5	NE	NA	GW is below Elev. 24
HA-08-07	"NB405" 314+20 90L	10/8/2008	HA	28.5	5.0	L-6	NE	NA	GW is below Elev. 23.5
HA-08-08	"W Line" 374+70 104L	10/8/2008	HA	20	5.0	L-11	NE	NA	GW is below Elev. 15
R-08-004	1324+85 170 L	4/24/2008	R	31.5	61.5	L-7	NA	NA	
R-08-005	1324+47 66 R	3/27/2008	R	28	137.0	L-7	NA	NA	
R-08-011	1316+52 16 L	4/15/2008	R	29.5	121.5	L-6	NA	NA	
R-08-012	1315+58 196 L	4/11/2008	R	25	101.5	L-6	9	16	
R-08-017	1311+26 68 L	4/1/2008	R	54	101.5	L-6	NA	NA	
R-08-019	"V V Line" 38+36 50 R	4/23/2008	R	53	86.5	L-4	NA	NA	
R-08-023	"V V Line" 44+70 54 L	5/8/2008	R	47	96.5	L-3	31	16	

Notes:

1. Stationing relative to SR-22 "H" line, except where noted otherwise. Right and left offsets defined by looking along station line in direction of increasing station.

2. Elevations based upon topographic contours in Figure 2 of main report.

NA = Not Available
NE = Not encountered

A = Auger Boring
CPT = Cone Penetration Test
HA = Hand Auger Boring
R = Rotary Wash Boring

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

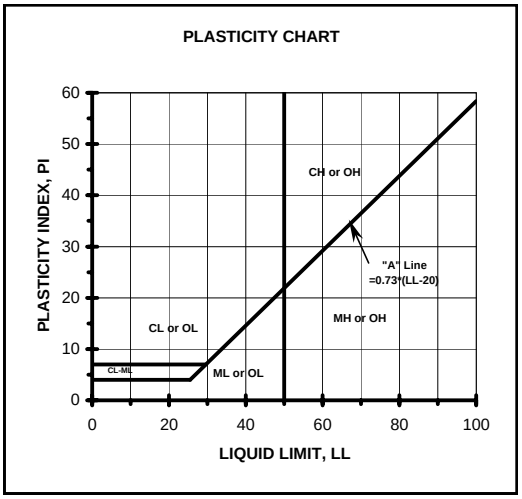
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375-inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **LEGEND**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 4/15/2008	**SHEET NO.** 1 of 1
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 25	**GROUND ELEV (ft)** VAR
DEPTH/*ELEV.* GROUND WATER (ft) ▼ 11.4 / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.		**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

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FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME		**PROJECT NUMBER**	**BORING**
SR-22 West Orange County Connectors		I-436	**A-08-101**
SITE LOCATION	**START**	**FINISH**	**SHEET NO.**
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 1

DRILLING COMPANY	**DRILLING METHOD**	**LOGGED BY**	**CHECKED BY**
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	**BORING DIA. (in)**	**TOTAL DEPTH (ft)**	**GROUND ELEV (ft)**	**DEPTH/*ELEV.* GROUND WATER (ft)**
Mobile B-61	8	21.5	19.5	▼ 15.5 / *4.0*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **7" Aggregate Base (AB)**
			B1			12	CR RV	37	31:11			**Clayey Sand (SC)** moist, brown, fine to medium grained with pea-sized to 1/2" gravel
			R2	12 20 23	110.3	15						medium dense
	15											
5			S3	13 9 10		24		86				**Lean Clay (CL)** very stiff, moist, brown, with fine to coarse grains and fine granite gravel
	10											
10			R4	7 10 18	91.3	29				2.0		
												Lean Clay with Sand (CL) stiff, olive-brown with trace of orange mottling, fine grained, with fine gravel of clay cemented sand
	5											
15			S5	5 6 6		28		72		1.25		▼
	0											
20			R6	12 12 16	93.5	28				1.25		stiff to very stiff, with some rounded fine quartz grains
	-5											*Boring terminated at 21.5 feet below ground surface (bgs).* *Groundwater encountered at 15.5 feet bgs.* *Borehole backfilled with soil cuttings and grout mix and patched with asphalt.*

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-2

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-103**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	31.5	19.5	▼ 13.2 / *6.3*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES:

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5" Asphalt Concrete (AC) **5" Aggregate Base (AB)** **Silty, Clayey Sand (SC)** moist, brown, fine to coarse grained, with subrounded granite gravel up to 3", dominantly fine-sized
			B1				RV					
5	15											
			R2	5 7 9	88.8	26						medium dense, interbedded Silty, Clayey Sand (SC-SM) and Silty Sand (SM)
												Silty Sand (SM) medium dense, moist, brown, fine grained, with trace of clay
												Lean Clay (CL) firm, moist, olive brown, some fine to medium grains
10	10		S3	2 3 3		31				0.5		
												Sandy Lean Clay (CL) stiff, moist, olive brown, fine grained
15	5		R4	12 13 18	96.1	28		65		1.5		stiff to very stiff
20	0		S5	7 7 7		24				1.25		
	-5											

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FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-103**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	31.5	19.5	▼ 13.2 / *6.3*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R6	12 20 20	101.7	24				2.75		**Sandy Lean Clay (CL)** very stiff, moist, olive brown, fine grained, with some silt
	-10											**Clayey Silt (ML)** very stiff, moist-wet, olive gray, fine grained
30			S7	12 14 14		29		45				**Silty Sand (SM)** medium dense, wet, gray, fine grained
												Boring terminated at 31.5 feet below ground surface (bgs). *Groundwater encountered at 13.2 feet bgs.* *Borehole backfilled with soil cuttings and grout mix and patched with asphalt.*
	-15											
35												
	-20											
40												
	-25											
45												
	-30											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-105**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	41.5	19.8	▼ 18.3 / *1.5*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												6.5" Asphalt Concrete **8" Aggregate Base**
												Clayey Sand (SC) moist, brown, fine to coarse grained, with gravel up to 1.5"
			B1			11		27	28:14			
5	15											
												Sandy Lean Clay (CL) stiff, moist, olive brown, fine grained
10	10		R2	8 12 15	99.2	23	CR	62		1.0		
15	5											
												very stiff, grading coarser to Clayey Sand (SC)
20	0		R3	12 14 19	105.4	22						**Clayey Sand (SC)** medium dense, moist, olive brown, fine grained, with some silt
	-5											

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FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-105**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	41.5	19.8	▼ 18.3 / *1.5*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
30	-10		R4	10 15 16	107.2	18						**Clayey Sand (SC)** medium dense, moist, olive brown, fine grained, with some silt
35	-15											**Silty Sand (SM)** medium dense, wet, gray, fine grained
40	-20		R5	19 25 50/5"	104.6	22		35	NP			very dense
45	-25											*Boring terminated at 41.5 feet below ground surface (bgs).* *Groundwater encountered at 18.3 feet bgs.* *Borehole backfilled with soil cuttings and grout mix and patched with asphalt.*
	-30											

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-112**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	41.5	23	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **9" Aggregate Base (AB)**
	20		B1			11	CR	45				**Clayey Sand (SC)** moist, brown, fine to medium grained, with pieces of hard clay up to 1/2"
5			S2	4 2 4		31						**Silty Clay (CL)** firm, moist, olive brown, scattered fine grains pocket penetrometer=0.75 tsf
	15											**Sandy Clayey Silt (ML)** firm to stiff, moist-wet, olive gray, fine grained
10			R3	5 7 8	88.8	33		62		1.0		
	10											**Silt with Sand (ML)** firm to stiff, moist-wet, olive gray, scattered fine grains
15			S4	5 5 5		32		77	NP	0.75		
	5											
20			R5	8 11 15	101.8	24				1.2		stiff to very stiff, scattered fine grains up to fine gravel
	0											

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FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-112**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	41.5	23	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S6	5 7 10		24				1.25-1.5		**Silt with Sand (ML)** stiff to very stiff, moist-wet, olive gray, scattered fine grains
	-5											
30			R7	10 15 20	93.8	26				2.0-3.0		**Silty Clay (CL)** stiff to very stiff, moist, olive gray, no grains visible
	-10											
35			S8	10 15 24		44						hard
	-15											
40			R9	20 30 50/6"	95.2	27				3.5		**Silt (ML)** dense/very stiff to hard, moist, olive gray, trace to no clay
	-20											*Boring terminated at 41.5 feet below ground surface (bgs).* *Borehole obstructed at 7.75 feet bgs after removal of auger, possible caving.* *No groundwater encountered to 7.75 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
45												
	-25											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-5 b

LOG OF TEST BORING

PROJECT NAME	SR-22 West Orange County Connectors	**PROJECT NUMBER**	I-436
BORING	**A-08-115**		
SITE LOCATION	Cities of Seal Beach, Westminster, and Garden Grove, California	**START**	4/15/2008
FINISH	4/15/2008	**SHEET NO.**	1 of 1
DRILLING COMPANY	R & C Drilling Inc.	**DRILLING METHOD**	Hollow Stem Auger
LOGGED BY	A. Tucker	**CHECKED BY**	C. Scheyhing
DRILLING EQUIPMENT	Mobile B-61	**BORING DIA. (in)**	8
TOTAL DEPTH (ft)	16.5	**GROUND ELEV (ft)**	21.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ N/A / *na*		
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **8" Aggregate Base (AB)**
	20											**Sandy Lean Clay/Clayey Sand (CL/SC)** moist, brown,fine to medium grained with scattered fine gravel
			B1			24	RV	75				**Lean Clay with Sand (CL)** stiff, moist, olive brown, trace of silt
5												
			R2	5 6 9	89.6	29		80		2.0		
	15											
10												firm to stiff, with some silt
			S3	3 3 4		29				1.25		
	10											**Interbedded Clayey Silt (ML) and Silty Sand (SM)** stiff to very stiff/medium dense, moist, olive gray
15												
			R4	7 12 12	94	27				1.7		
	5											**Silty Clay (CL)** stiff to very stiff, moist, olive gray
												Boring terminated at 16.5 feet below ground surface (bgs). *Borehole obstructed at 7.5 feet bgs after removal of auger, possible caving.* *No groundwater encountered to 7.5 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
20												
	0											

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FIGURE A-6

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-116**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/3/2008	4/3/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	16.5	22	▼ 11.4 / *10.6*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5.5" Asphalt Concrete (AC) **6.5" Aggregate Base (AB)**
	20											**Well Graded Sand with Silt (SW-SM)** loose, moist, yellow brown, fine to coarse grained with some fine gravel up to 3/4"
			B1			4	PA	8				
5												
			R2	6 7 7	99	23		86	37:17	2.0		**Lean Clay (CL)** stiff, moist, olive brown, with few scattered fine to coarse grains
	15											
10												brown gray
	10		S3	3 4 5		29	CR			1.0		
15												very stiff
			R4	6 9 15	96.7	27				2.1-2.6		
	5											**Silty Sand (SM)** medium dense, wet, brown, fine grained
												Boring terminated at 16.5 feet below ground surface (bgs). *Groundwater encountered at 11.4 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
20												
	0											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-7

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-119**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	31.5	23	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES:

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												5" Asphalt Concrete (AC) **5" Aggregate Base (AB)**
												Silty Clayey Sand (SC) moist, olive brown, fine grained
	20		B1			15		36	32:12			
5												
			S2	5 8 9								medium dense no sample recovery, Lean Clay with sand (CL) in sampler shoe
												Lean Clay with Sand (CL) stiff to very stiff, moist-wet, olive brown, with scattered fine to coarse grains and few fine gravel
	15											
10												
			R3	8 12 15	88.3	31				1.0		with some interbedded Silt (ML) and Silty Sand (SM)
	10											
15												
			S4	6 7 11		27		72		1.75-2.0		very stiff
	5											
20												
			R5	10 15 25	99.4	26	CR					
	0											**Silty Clay (CL)** stiff to very stiff, moist-wet, olive gray, with few scattered fine grains, no gravel

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-8 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-119**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	31.5	23	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES:

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S6	7 12 14		24				1.5-2.0		**Silty Clay (CL)** stiff to very stiff, moist-wet, olive gray, with few scattered fine grains, no gravel
	-5											
30			R7	30 50/6"	99.1	26				1.25		
	-10											**Silty Sand (SM)** very dense, olive brown, fine grained *Boring terminated at 31.5 feet below ground surface (bgs).* *Borehole obstructed at 5.67 feet bgs after removal of auger, possible caving.* *No groundwater encountered to 5.67 feet bgs.* *Borehole backfilled with soil cuttings and patched with asphalt.*
35												
	-15											
40												
	-20											
45												
	-25											

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FIGURE A-8 b

LOG OF TEST BORING

PROJECT NAME: SR-22 West Orange County Connectors	PROJECT NUMBER: I-436	BORING: **A-08-120**	
SITE LOCATION: Cities of Seal Beach, Westminster, and Garden Grove, California	START: 4/1/2008	FINISH: 4/1/2008	SHEET NO.: 1 of 3
DRILLING COMPANY: R & C Drilling Inc.	DRILLING METHOD: Hollow Stem Auger	LOGGED BY: S. Navaratnarajah	CHECKED BY: C. Scheyhing
DRILLING EQUIPMENT: Mobile B-61	BORING DIA. (in): 8	TOTAL DEPTH (ft): 51.5	GROUND ELEV (ft): 25
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)			DEPTH/*ELEV.* GROUND WATER (ft): ▼ 12.0 / *13.0*
			NOTES:

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												3" Asphalt Concrete (AC) **9" Aggregate Base (AB)**
												Sandy Lean Clay (CL) moist, dark brown-black
			B1			9	RV	27				**Silty Sand (SM)** moist, light brown, fine to medium grained, with lenses of clay
5	20		R2	4 6 11	103.7	11						medium dense
												Clayey Sand (SC) medium dense, moist-wet, dark brown, fine grained
10	15		S3	2 4 8		21						
												Lean Clay with Sand (CL) firm-stiff, wet, dark brown, with lenses of fine grained sand
15	10		R4	4 6 8		29	CN	72	36:17	0.5		
20	5		S5	9 8 15		26				2.0-2.25		**Silty Clay (CL)** very stiff, wet, dark brown
												Clayey Sand (SC) medium dense, wet, dark brown, fine grained

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FIGURE A-9 a

LOG OF TEST BORING

PROJECT NAME	SR-22 West Orange County Connectors	**PROJECT NUMBER**	I-436
BORING	**A-08-120**		
SITE LOCATION	Cities of Seal Beach, Westminster, and Garden Grove, California	**START**	4/1/2008
FINISH	4/1/2008	**SHEET NO.**	2 of 3
DRILLING COMPANY	R & C Drilling Inc.	**DRILLING METHOD**	Hollow Stem Auger
LOGGED BY	S. Navaratnarajah	**CHECKED BY**	C. Scheyhing
DRILLING EQUIPMENT	Mobile B-61	**BORING DIA. (in)**	8
TOTAL DEPTH (ft)	51.5	**GROUND ELEV (ft)**	25
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 12.0 / *13.0*		
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R6	7 13 13	99.2	25						**Clayey Sand (SC)** medium dense, wet, dark brown, fine grained
												Sandy Silt (ML) medium dense to dense, wet, dark brown, fine grained
30	-5		S7	6 17 23		24						
35	-10		R8	9 20 22	100.3	25		55	NP			
40	-15		S9	20 22 30		21						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
45	-20		R10	26 50/6"	97.1	27		19				

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FIGURE A-9 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **A-08-120**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/1/2008	**FINISH** 4/1/2008	**SHEET NO.** 3 of 3
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** S. Navaratnarajah	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 25
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)			**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ 12.0 / *13.0*
			NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S11	20 27 30		28						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
												Boring terminated at 51.5 feet below ground surface (bgs). *Groundwater encountered at 12 feet bgs.* *Borehole obstructed below 5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
55	-30											
60	-35											
65	-40											
70	-45											

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FIGURE A-9 c

LOG OF TEST BORING

PROJECT NAME: SR-22 West Orange County Connectors	PROJECT NUMBER: I-436	BORING: **A-08-122**	
SITE LOCATION: Cities of Seal Beach, Westminster, and Garden Grove, California	START: 4/14/2008	FINISH: 4/14/2008	SHEET NO.: 1 of 3
DRILLING COMPANY: R & C Drilling Inc.	DRILLING METHOD: Hollow Stem Auger	LOGGED BY: A. Tucker	CHECKED BY: C. Scheyhing
DRILLING EQUIPMENT: Mobile B-61	BORING DIA. (in): 8	TOTAL DEPTH (ft): 51.5	GROUND ELEV (ft): 32
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)			DEPTH/*ELEV.* GROUND WATER (ft): ▼ 16.5 / *15.5*
NOTES:			

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **7" Aggregate Base (AB)**
	30		B1			7	CR	23	26:11			**Clayey Sand (SC)** moist-dry, light brown, fine to coarse grained with pieces of hard brown clay up to 3/4"
5			R2	5 7 19	107.6	18	CN					medium dense, becomes brown, finer, with scattered gravel up to 1/2"
	25											
10			S3	5 11 14		13		40				with chunk of asphalt at 10 feet depth
	20											
15			R4	11 13 16	100	23		26				▼ **Silty Sand (SM)** medium dense, moist, olive gray, fine grained
	15											**Lean Clay (CL)** stiff, moist, olive brown
20			S5	3 4 8						1.0		
	10											**Poorly Graded Sand (SP)** medium dense, moist, orange brown
												Silty Clay with Sand (CL) stiff to very stiff, moist, olive gray

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FIGURE A-10 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	32	▼ 16.5 / *15.5*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R6	9 16 20	87.2	31		88		1.5-1.75		**Silty Clay (CL)** stiff to very stiff, moist, olive gray
	5											
30			S7	5 6 9		26						**Silty Sand (SM)** medium dense, moist, gray olive, fine grained
	0											
35			R8	11 20 35	96.8	28		26				dense, some clay
	-5											
												Silty to Clayey Sand (SC/SM) dense, wet, olive gray, fine grained
40			S9a	13 14		30						
			S9b	20						2.0-2.5		**Silty Clay (CL)** very stiff to hard, moist, olive gray
	-10											
												Clayey Silt (ML) very stiff to hard, moist, olive brown
45			R10	20 50/6"	86.4	35				2.0-2.75		**Silty Clay (CL)** very stiff to hard, wet-moist, olive gray
	-15											

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FIGURE A-10 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	32	▼ 16.5 / *15.5*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S11	20 30 30		27						**Silty Sand/Sandy Silt (SM/ML)** very dense/hard, wet-moist, olive gray, fine grained
	-20											*Boring terminated at 51.5 feet below ground surface (bgs).* *Groundwater encountered at 16.5 feet bgs.* *Borehole obstructed below 22.5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
55	-25											
60	-30											
65	-35											
70	-40											

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FIGURE A-10 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												8.25" Concrete Pavement (PCC) **4.75" Concrete Treated Base** **3" Aggregate Base (AB)**
	30											**9" Poorly Graded Sand (SP)** moist, red-yellow, fine grained
			B1			16	CR RV	66	29:12			**Sandy Lean Clay (CL)** firm, moist, dark brown, in chunks up to 1.5"
			R2	13 25 30	117.1	16	DS			4.5+		hard, dry, dark gray, fine grained
5												**Sandy Silt (ML)** dense/hard, dry-moist, brown, fine grained, trace of clay
	25											
10			S3	6 12 18		22		66		4.5+		
	20											**Lean Clay (CL)** stiff, moist, olive brown
15			R4	5 9 13	100.5	24		27				pocket penetrometer = 1.0-1.25
	15											**Silty Sand (SM)** medium dense, wet, light brown gray, fine grained with occasional coarse grains and few fine gravel, with clay
												Sandy Lean Clay (CL) firm to stiff, wet, olive light brown, very fine grains barely visible with some to trace of silt
20			S5	2 3 4		31		66		1.0		
	10											**Lean Clay (CL)** stiff, moist, gray olive brown

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FIGURE A-11 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	5		R6	5 7 12	91.1	31	DS			1.25-1.5		**Lean Clay (CL)** stiff, moist, gray olive brown, no visible sand grains, with fine to 3/4" angular light gray fine grained sandstone gravel in sampler shoe
30	0		S7	2 5 8		29		55				**Sandy Lean Clay (CL)** stiff, moist, olive gray, trace fine grains, with some silt
35	-5		R8	8 8 14	92.3	30				1.5-2.2		stiff to very stiff, less silt, occasional fine grain
40	-10		S9	2 7 14		32				2.0		
45	-15		R10	20 27 38	105.2	22		51		4.5		**Sandy Silt/Silty Sand (ML/SM)** very dense/hard, gray, trace of clay

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FIGURE A-11 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-20		S11	10 8 11		32		86				**Lean Clay with Sand (CL)** very stiff, wet, olive gray, little to no silt, rolls very good thread
												Silt (ML) dense/hard, wet, gray,with some fine grains and clay
55	-25		R12	12 23 25	109.6	19				4.5+		
												Sandy Silt (ML) dense, wet, gray olive, fine grains barely visible
60	-30		S13	9 13 20		26		56				*Boring terminated at 61.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
65	-35											
70	-40											

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FIGURE A-11 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	1 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	28	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.

NOTES:

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												8.5" Concrete Pavement (PCC) **8.5" Lean Concrete/slurry** **6" Aggregate Base (AB)**
	25		B1			16	RV	63	29:9			**Sandy Lean Clay (CL)** moist, gray, very fine grains and few coarse grains, rolls very good thread
5			R1	3 9 16	108.3	19	CN PA	53	32:13	4.5+		dark gray, very stiff to hard, with silt
	20											
10			S2	3 5 5		26	PA	18				**Silty Sand (SM)** loose to medium dense, moist-wet, gray brown, fine grained
	15											**Sandy Silty Clay (CL)** stiff, moist, brown gray, fine grained
15			R3	5 6 7	98	27	DS	65				
	10											
20			S4	3 3 4		29						**Silty Sand (SM)** loose, wet, gray brown, fine grained with scattered coarse grains
	5											**Silty Clay with Sand (CL)** stiff, moist, brown gray, fine grained

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FIGURE A-12 a

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 2 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 28	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.			**NOTES**

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	7 12 12	97.6	26		24				**Silty Sand (SM)** medium dense, wet, gray brown, fine grained with scattered coarse grains and fine gravel of clay cemented coarse sand
	0											**Lean Clay (CL)** stiff, wet-moist, gray brown
30			S6	3 4 8		41		97	46:20	1.25		
	-5											
35												
	-10											
40			S7	4 4 8		31			39:20	1.5		with very fine to coarse sand grains and some silt
	-15											**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay harder drilling
45												
	-20											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-12 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	3 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	28	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R8	18 28 23	103	23		85		4.5		**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay, slight to no plasticity
	-25											
55												**Lean Clay with Sand (CL)** hard, wet, scattered fine grains
	-30											
60												
	-35											
65												
	-40											
70			R9	30 50/6"		45		75	43:19	4.5		very stiff to hard Torvane = 3.6 to 4.0 ksf
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-12 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	4 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	28	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML), hard, **Sand (SP) and Silty Sand (SM),** dense to very dense
												hard, moist, gray
	-50											
80												
	-55											
85												
	-60											
90												
	-65											
95												
	-70											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-12 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	5 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	28	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
105	-75	⋈	R10	50/5"	82.4	39				2.5		**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)**, hard, **Sand (SP) and Silty Sand (SM)**, dense to very dense hard, moist, gray, drill chatter at 100'
110	-80											
115	-85											
120	-90											
	-95											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-12 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	6 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	28	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML), hard, **Sand (SP) and Silty Sand (SM),** dense to very dense hard, moist, gray
	-100											
130												drill chatter
	-105											
135			S11	12 17 32		27						
	-110											*Boring terminated at 137 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
140												
	-115											
145												
	-120											

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FIGURE A-12 f

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Asphalt Concrete (AC)
												Aggregate Base (AB)
												Clayey Sand (SC) medium dense, moist, olive brown, fine grained, with some silt
5	25		S1	7 12 13		19		47	33:14			
10	20		R2	7 12 20	96.9	19						
15	15		S3	2 2 4		31	CR			0.5		**Sandy Lean Clay (CL)** firm, wet, olive brown, fine grained, scattered few fine gravel, rolls very good thread
20	10		R4	4 8 11	94.6	24	CN	52	34:18	1.0		stiff, olive gray, with gravelly lense at 20' to 20.3' containing sunrounded to angular black and gray with orange limonite stained granite pieces 1/4" to 3/4"
	5											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-13 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	4 5 5		46						**Sandy Lean Clay (CL)** stiff, wet, olive brown, fine grained, with few fine gravel
	0											**Sandy Silt (ML)** stiff to very stiff, moist, gray, single black and white granodiorite cobble 2.5", with some clay and decomposed organic fibers
30			R6	5 13 18	93.2	30				1.5		
	-5											
35			S7	4 11 16		28		68		1.0		with fine angular gravel in thin lense at 35', little to no clay
	-10											**Silty Clay with Sand (CL)** hard, moist, gray, rolls very poor thread, with some gravel in lense at 40'
40			R8	11 15 32	97.9	25		80		4.0		
	-15											
45			S9	10 20 30		33						**Clayey Silt (ML)** hard, moist, gray, no gravel
	-20											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-13 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	14 24 36	83.9	35				3.5		**Clayey Silt (ML)** hard, moist, gray, no gravel **Silt (ML)** very dense, moist, gray, trace to no clay
55	-25											
												Well Graded Sand with Silt (SW-SM) very dense, wet, gray-red-black-brown, fine to medium grained
60	-30		S11	26 44 50/4"		15	PA	7				
65	-35											**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains
70	-40		R12	27 28 50/5"	114.8	17			31:16	3.5		
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-13 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay (CL) very stiff to hard, moist, light brown gray, scattered fine grains
												Clayey Sand (SC) very dense, dry-moist, light brown-gray-orange, fine grained
80	-50		S13	11 21 32		17		45				
												Silty Sand (SM) very dense, moist, gray, fine grains barely visible, trace to no clay
85	-55											
90	-60		R14	20 37 48	102.4	24		29				
95	-65											
												Silty Clay (CL) hard, moist, gray, some fine grains, rolls poor thread
	-70											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-13 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S15	11 22 48		40						**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-75											
105												**Silty Sand (SM)** very dense, moist, gray, fine grained
	-80											
110												
	-85											
115												
	-90											
120			R16	40 50/4"		24		27				*Boring terminated at 121.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-95											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-13 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	25	▼ 9.0 / *16.0*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												4" Asphalt Concrete (AC) **8" Aggregate Base (AB)**
												Lean Clay with Sand (CL) stiff to very stiff, moist-wet, dark brown, fine to medium grained, tiny flecks of mica
5	20		R1	4 5 9	95.8	28		80	47:27	2.4		
												Lean Clay (CL) firm, wet, dark brown
10	15		S2	1 1 2		39				0.75		
												Sandy Lean Clay (CL) stiff to very stiff, wet, fine to medium grained, tiny flecks of mica
15	10		R3	3 6 8	102.1	24	DS	58		2.75		
20	5		S4	2 2 3		27				1.1		with some fine gravel
												Silty Lean Clay with Sand (CL) very stiff, wet, dark brown, with fine gravel

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/22/08

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FIGURE A-14 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	25	▼ 9.0 / *16.0*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.

NOTES:

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	5 10 15	92.7	29		80	33:12	2.25		**Silty Lean Clay with Sand (CL)** very stiff, wet, dark brown, with fine gravel
												Lean Clay (CL) stiff to very stiff, wet, dark brown, with some silt
30	-5		S6	2 6 12		34				1.25-1.5		
												Silty Clay (CL) very stiff, wet, olive brown, fine grained
35	-10		R7	9 18 21	93.9	30				4.0		
												Sandy Silt (ML) hard/dense, wet, dark brown
40	-15		S8	7 24 26		28						
45	-20		R9	16 20 34	99	26		70	26:03			

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FIGURE A-14 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	25	▼ 9.0 / *16.0*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S10	7 11 15		38				3.3		**Silty Clay (CL)** very stiff, wet, olive gray, with scattered coarse grains
55	-30		R11	7 15 17	88.5	33		96		2.8		
60	-35		S12	6 11 16		29				3.75		color changes to yellow-gray, with some pieces of siltstone
												Sandy Lean Clay (CL) very stiff, wet, gray
65	-40		R13	10 15 20	107.1	21		61		3.0		with some white clay and some small pieces of claystone gravel
70	-45		S14	5 6 18		21				1.5		color changes to white-gray

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/22/08

GROUP DELTA CONSULTANTS, INC.
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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-14 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	25	▼ 9.0 / *16.0*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-55		R15	19 30 50/4"	97.9	31		57				**Sandy Lean Clay (CL)** hard, wet, dark brown-gray, fine grained, with up to 2" thick lenses of clay and silt
85	-60											
90	-65		S16	15 32 38								no recovery (no sand catcher in sampler)
			S17	15 32 35		31		89				**Clayey Silt/Silty Clay with Sand (ML/CL)** hard, wet, gray
95	-70											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/22/08

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FIGURE A-14 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	25	▼ 9.0 / *16.0*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R18	14 39 50/4"	134.9	18						**Clayey Sand (SC)** very dense, wet, dark gray, fine grained
												Boring terminated at 101.5 feet below ground surface (bgs). *Groundwater encountered at 9.0 feet bgs.* *Borehole backfilled with cement/bentonite grout mix and patched with asphalt.*
105	-80											
110	-85											
115	-90											
120	-95											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/22/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-14 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **3" Aggregate Base (AB)** **[FILL]** **Lean Clay with Sand/Clayey Sand (CL/SC)** very stiff/medium dense, dry, light brown, fine to medium grained
5	50		S1	7 10 10						3.0		
	45											**Lean Clay with Sand (CL)** very stiff, moist, dark brown with orange mottling, scattered fine grains
10			R2	6 10 22	89.3	32	DS	82	35:14	2.5		
	40											**Sandy Lean Clay (CL)** stiff to very stiff, light brown, fine to medium grained
15			S3	4 6 11		27		55	34:14	1.25		
	35											**Lean Clay with Sand (CL)** hard, moist, gray brown, fine grained 19' - 19.5' Drill chatter
20			R4	8 23 25	108.8	19	CR			4.5+		at 21' Drill chatter and broken asphalt in cuttings, old asphalt in sampler shoe
	30											**[NATIVE]** **Sandy Lean Clay (CL)** hard, moist, gray, fine grained with scattered coarse grains and few 1/2" claystone gravel

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-15 a

LOG OF TEST BORING

PROJECT NAME: SR-22 West Orange County Connectors	PROJECT NUMBER: I-436	BORING: **R-08-017**	
SITE LOCATION: Cities of Seal Beach, Westminster, and Garden Grove, California	START: 4/1/2008	FINISH: 4/1/2008	SHEET NO.: 2 of 5
DRILLING COMPANY: C & L Drilling	DRILLING METHOD: Rotary Wash	LOGGED BY: A. Tucker	CHECKED BY: C. Scheyhing
DRILLING EQUIPMENT: Mayhew 1000	BORING DIA. (in): 4.875	TOTAL DEPTH (ft): 101.5	GROUND ELEV (ft): 54
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.			DEPTH/*ELEV.* GROUND WATER (ft): ▼ N/A / *na*
NOTES:			

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	8 20 23		20		63		4.5+		**Sandy Lean Clay (CL)** hard, moist, gray, scattered coarse grains and few 1/2" claystone gravel
	25											
30			R6	5 13 24	109.3	15				4.0		very stiff to hard, with scattered fine grains and few 1/4" gravel of dark purple-gray slate Torvane = 8.0 tsf
	20											**Sandy Silt (ML)** medium dense, moist, olive brown, scattered coarse grains and few 3/4" pieces of slate, non-plastic
35			S7	5 5 8		34	CR	57				
	15											**Lean Clay (CL)** stiff to very stiff, moist, gray-brown, few fine grains and scattered pea-sized slate gravel
40			R8	8 10 15	96.2	28	CN		39:19			
	10											
45			S9	3 4 7		36				1.2		no gravel
	5											**Silt (ML)** medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-15 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	54	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	7 15 29	100.0	25				3.0		**Silt (ML)** medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity
												Lean Clay with Sand (CL) very stiff, moist-wet, gray-brown, scattered fine grains and pea-sized gray claystone gravel
	0											
55												
	-5											
60			S11	11 15 14		31		82		2.0		becomes gray, no gravel
	-10											
65												
	-15											**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic
70			R12	21 35 50/5"	96.7	27						
	-20											

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FIGURE A-15 c

LOG OF TEST BORING

PROJECT NAME		**PROJECT NUMBER**	**BORING**
SR-22 West Orange County Connectors		I-436	**R-08-017**
SITE LOCATION	**START**	**FINISH**	**SHEET NO.**
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	4 of 5

DRILLING COMPANY	**DRILLING METHOD**	**LOGGED BY**	**CHECKED BY**
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	**BORING DIA. (in)**	**TOTAL DEPTH (ft)**	**GROUND ELEV (ft)**	**DEPTH *ELEV.* GROUND WATER (ft)**
Mayhew 1000	4.875	101.5	54	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silt (ML) very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic 76' - 78' drillstem bounce on rock
	-25											**Silty Sand (SM)** very dense, moist, olive gray, fine grained, no gravel
80			S13	35 39 50/5.5"		19		22				
	-30											
85												**Well Graded Sand (SW)** very dense, wet, gray-black-white, fine to coarse grained, with scattered granite gravel up to pea-size, no clay
	-35											
90			R14	50/6" 50/3"	111.4	18						
	-40											**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
95												
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-15 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	54	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S15	6 9 17						1.5		**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
												Boring terminated at 101.5 feet below ground surface (bgs). *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-50											
105												
	-55											
110												
	-60											
115												
	-65											
120												
	-70											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-15 e

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **R-08-019**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/23/2008	**FINISH** 4/23/2008	**SHEET NO.** 1 of 4
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 86.5	**GROUND ELEV (ft)** 53	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.			**NOTES**

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												2" Asphalt Concrete (AC) **4" Aggregate Base (AB)** **[FILL]** **Sandy Lean Clay (CL)** very stiff to hard, moist, light brown olive to olive gray, fine to coarse grained with scattered fine gravel
	50											
5			S1	8 12 15		20		59	34:14	4.0		no gravel
	45											
10			R2	8 13 20	114.3	17	DS		39:19	4.5+		
	40											**Sandy Clayey Silt (ML)** hard, moist, olive brown, very fine grained
15			S3	9 13 20		27		57				
	35											**Sandy Lean Clay (CL)** hard, moist, olive gray, fine grained with scattered fine gravel, trace of silt
20			R4	13 24 36	110.8	15				4.5+		
	30											**Silty Sand/Sandy Silt (SM/ML)** dense/hard, moist, olive gray, fine grained

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-16 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-019**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	2 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	9 14 20		18						**Silty Sand/Sandy Silt (SM/ML)** dense/hard, moist, olive gray, fine grained
	25											
30			R6	13 17 28	107.6	19		71	33:12	4.5		**[NATIVE]** **Silty Clay with Sand (CL)** hard, dry-moist, olive gray, fine grained, with small roots and twigs
	20											**Sandy Lean Clay (CL)** stiff, moist, olive gray
35			S7	5 7 7		29	CR					**Silty Sand (SM)** medium dense, wet, olive brown, fine grained with few scattered fine gravel, trace to no clay
	15											**Sandy Lean Clay (CL)** stiff, moist, olive gray, fine grained
40			R8	5 9 13	103.8	23	DS			1.25		**Silty Sand (SM)** medium dense, moist, olive brown, fine grained with scattered coarse grains, trace to no clay
	10											**Sandy Lean Clay (CL)** stiff, moist, olive gray, fine grained
45												
	5											**Clayey Silt/Silty Clay (ML/CL)** very stiff, moist, olive gray

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FIGURE A-16 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-019
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/23/2008	**FINISH** 4/23/2008	**SHEET NO.** 3 of 4
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 86.5	**GROUND ELEV (ft)** 53
DEPTH/*ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.		**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S9	6 11 16				31				**Silty Sand (SM)** medium dense to dense, wet, olive brown, fine grained
	0											
55												
												Clayey Silt with Sand (ML) hard, moist, gray, fine grained
	-5											becomes harder, drill bounce
60			R10	14 40 30	100.2	24				4.5		
	-10											
65												
												Poorly Graded Sand with Silt (SP-SM) very dense, moist to wet, brown gray, fine grained, no gravel
	-15											
70			S11	20 27 30								no recovery (no catcher) SP in tip as described above
	-20											becomes harder, drill bounce

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-16 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-019**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	4 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Poorly Graded Sand with Silt (SP-SM) very dense, moist, olive gray
	-25		R12	17 44 50/4"	103.8	23						
80												
	-30											
85			R13	19 38 50/5.5"	94.4	29		12				
	-35											*Boring terminated at 86.5 feet below ground surface (bgs).* *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
90												
	-40											
95												
	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

GROUP DELTA CONSULTANTS, INC.
92 Argonaut, Suite 120
Aliso Viejo, CA 92656

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-16 d

LOG OF TEST BORING

PROJECT NAME	SR-22 West Orange County Connectors	**PROJECT NUMBER**	I-436
BORING	**R-08-023**		
SITE LOCATION	Cities of Seal Beach, Westminster, and Garden Grove, California	**START**	5/8/2008
FINISH	5/8/2008	**SHEET NO.**	1 of 4
DRILLING COMPANY	C & L Drilling	**DRILLING METHOD**	Rotary Wash
LOGGED BY	A. Tucker	**CHECKED BY**	C. Scheyhing
DRILLING EQUIPMENT	Mayhew 1000	**BORING DIA. (in)**	4.875
TOTAL DEPTH (ft)	96.5	**GROUND ELEV (ft)**	47
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 31.0 / *16.0*		
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in.	**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												4" Asphalt Concrete (AC) **10" Aggregate Base (AB)**
	45											**[FILL]** **Sandy Lean Clay (CL)** very stiff to hard, red-brown, dry, fine to coarse grained with scattered pieces of hard red clay and fine subrounded granite gravel
5			R-1	8 13 18	115.8	10		54	32:13	4.5+		light brown-yellow fine grained Clayey Sand (SC) in sampler shoe
	40											**Clayey Sand (SC)** medium dense, moist, brown-yellow, fine grained
10			S-2	6 12 16		23						
	35											**Sandy Clayey Silt (ML)** very stiff, moist, gray, with some fine grains and scattered fine gravel
15			R-3	8 24 34	113.8	15		55		4.5		**Sandy Lean Clay (CL)** hard, moist, brown-yellow, fine grained
	30											**Sandy Lean Clay (CL)** very stiff, moist, gray-brown, scattered fine grains and fine gravel, with some very thin bedding present, little silt, rolls excellent thread with pieces of broken asphalt in sampler shoe
20			S-4	5 11 17		22	CR	61		3.25		
	25											**[NATIVE]** **Sandy Lean Clay/Lean Clay with Sand (CL)** stiff, brown-yellow, moist, fine grained

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-17 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	2 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	47	▼ 31.0 / *16.0*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-5	3 7 10	88.7	31	DS			1.5		**[NATIVE]** **Sandy Lean Clay/Lean Clay with Sand (CL)** stiff, brown-yellow, moist, fine grained
	20											
												Lean Clay (CL) stiff, moist, gray-brown, scattered fine grains and fine gravel, with thin sand lense at 30.5', rolls excellent thread
30			S-6	3 4 6		34	CR					▼
	15											
35			R-7	6 12 13		28	DS			1-1.25		with some pieces of dry light brown-gray clay and red-orange color mottling
	10											
40			S-8	4 6 9		24		49	29:10	2.0		**Clayey Sand/Sandy Lean Clay (SC/CL)** medium dense/stiff to very stiff, moist, light brown-gray, with some fine grains and silt
	5											
45			R-9	21 41 50/5"	107.8	19	PA	11				**Poorly Graded Sand with Silt (SP-SM)** very dense, brown, wet, fine to medium grained
	0											
												Clayey Silt with Sand (ML) very stiff, moist, olive gray

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-17 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	3 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	47	▼ 31.0 / *16.0*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-5											**Clayey Silt with Sand (ML)** very stiff, moist, olive gray
55			R-10	9 17 35	98.8	26		84		2.0		
	-10											
60												
	-15											**Poorly Graded Sand with Silt/Silty Sand (SP-SM/SM)** dense, gray, wet, fine grained, long organic fibers present
65			S-11	15 14 13		40						**Lean Clay (CL)** very stiff, gray, moist, with some silt
	-20											**Poorly Graded Sand (SP)** very dense, light brown-gray, wet, fine to medium grained, little to no silt
70												
	-25											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-17 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	4 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	47	▼ 31.0 / *16.0*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-12	50/5"	106.8	21		2				**Poorly Graded Sand (SP)** very dense, light brown-gray, wet, fine to medium grained, little to no silt
	-30											drill chatter and fine to 1/2" gravel cuttings 77.5' to 78'
80			S-13	40 50/5"		25						with red staining of quartz grains
	-35											drill chatter and fine gravel cuttings
												Well Graded Sand with Silt (SW-SM) very dense, light brown-gray, wet, fine to coarse grained, with scattered fine gravel up to 1/2"
85			R-14	25 44 50/5"	108.1	19		8				with thin lenses of interbedded gray Silt (ML)
	-40											
90												**Poorly Graded Sand (SP)** very dense, gray-white-black-orange, moist, fine grained
	-45											
95			R-15	50/5" 10/1"	101.4	23		4				
	-50											*Boring terminated at 96.5 feet below ground surface (bgs).* *Groundwater measured at 31 feet bgs with tape after bailing hole.* *Borehole backfilled with grout mix and patched with asphalt.*

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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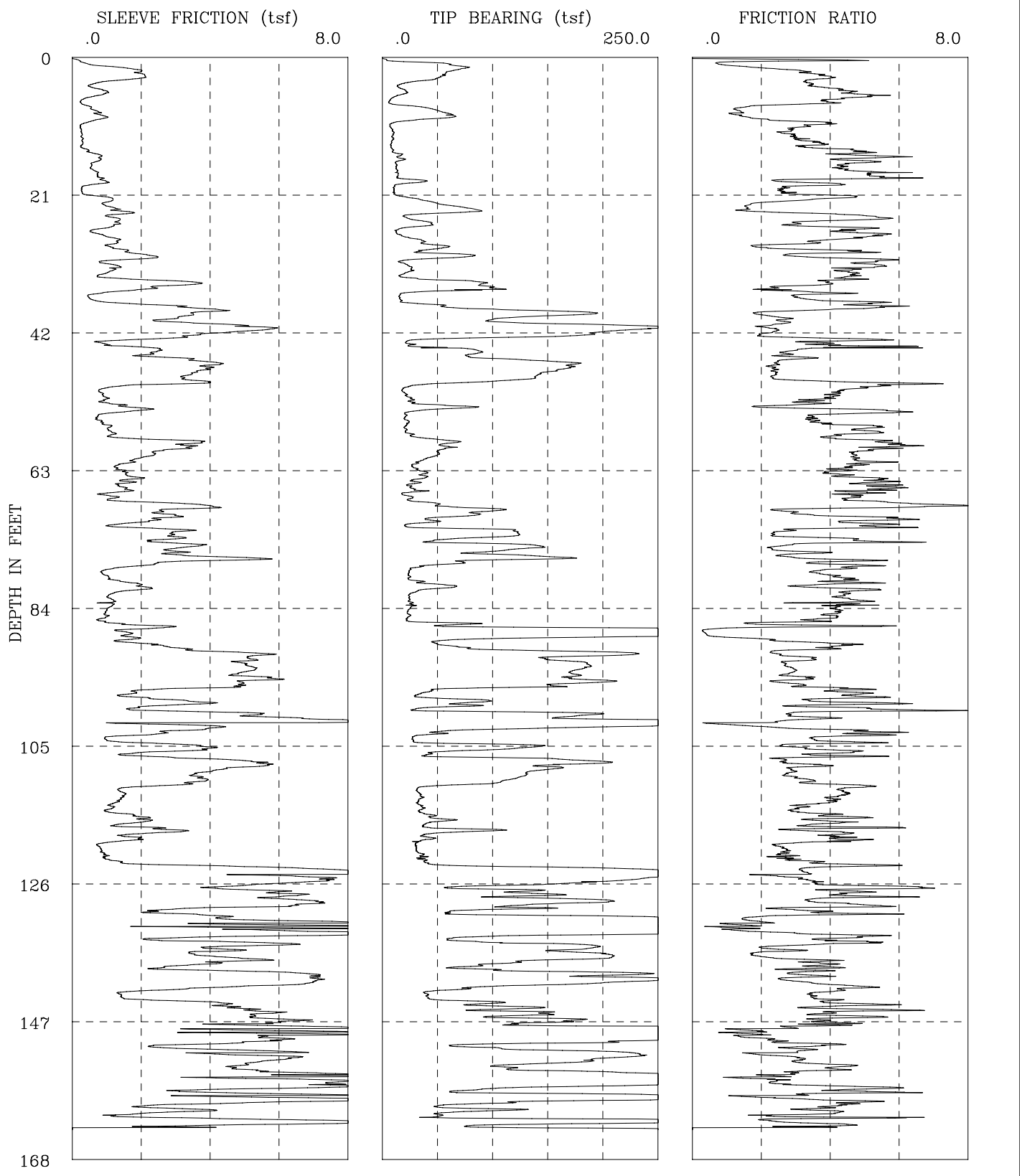
THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-17 d



CPT-08-001	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-18a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	23.76	0.23	0.98	0.03	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
0.60	2	70.09	1.38	1.97	0.09	silty sand to sandy silt	>90	>48	22	UNDEFINED
0.95	3	55.67	2.02	3.63	0.15	clayey silt to silty clay	UNDFND	UNDFD	27	3.7
1.25	4	30.61	1.05	3.43	0.22	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
1.55	5	16.82	0.69	4.07	0.28	silty clay to clay	UNDFND	UNDFD	11	1.1
1.85	6	16.90	0.81	4.80	0.33	clay	UNDFND	UNDFD	16	1.1
2.15	7	6.99	0.28	3.98	0.39	clay	UNDFND	UNDFD	7	.4
2.45	8	35.18	0.51	1.45	0.45	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
2.75	9	60.31	0.80	1.32	0.51	silty sand to sandy silt	60-70	40-42	19	UNDEFINED
3.05	10	29.62	0.66	2.22	0.57	sandy silt to clayey silt	UNDFND	UNDFD	11	1.9
3.35	11	7.61	0.24	3.20	0.61	clay	UNDFND	UNDFD	7	.4
3.65	12	9.66	0.27	2.79	0.64	silty clay to clay	UNDFND	UNDFD	6	.5
3.95	13	9.17	0.29	3.19	0.67	silty clay to clay	UNDFND	UNDFD	6	.5
4.25	14	8.03	0.29	3.61	0.69	clay	UNDFND	UNDFD	8	.4
4.55	15	12.89	0.61	4.71	0.72	clay	UNDFND	UNDFD	12	.8
4.85	16	15.75	0.78	4.98	0.75	clay	UNDFND	UNDFD	15	.9
5.15	17	12.55	0.55	4.40	0.78	clay	UNDFND	UNDFD	12	.7
5.45	18	13.48	0.69	5.10	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	23.21	0.84	3.60	0.84	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
6.05	20	17.10	0.59	3.47	0.86	silty clay to clay	UNDFND	UNDFD	11	1.0
6.40	21	10.89	0.31	2.89	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	31.02	1.07	3.46	0.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.9
7.00	23	61.58	1.01	1.64	0.95	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
7.35	24	60.46	1.37	2.27	0.98	sandy silt to clayey silt	UNDFND	UNDFD	23	3.9
7.65	25	29.05	1.28	4.39	1.02	silty clay to clay	UNDFND	UNDFD	19	1.8
7.95	26	34.53	1.17	3.38	1.04	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
8.25	27	13.57	0.66	4.84	1.07	clay	UNDFND	UNDFD	13	.7
8.55	28	28.88	1.22	4.21	1.10	silty clay to clay	UNDFND	UNDFD	18	1.8
8.85	29	48.40	1.15	2.37	1.13	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
9.15	30	46.72	1.67	3.58	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.45	31	52.32	1.94	3.71	1.19	clayey silt to silty clay	UNDFND	UNDFD	25	3.3
9.75	32	21.37	1.12	5.26	1.21	clay	UNDFND	UNDFD	20	1.2
10.05	33	24.45	1.10	4.51	1.24	clay	UNDFND	UNDFD	23	1.5
10.35	34	29.00	1.26	4.35	1.27	silty clay to clay	UNDFND	UNDFD	19	1.8
10.65	35	91.00	3.20	3.52	1.30	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
10.95	36	63.93	1.66	2.59	1.33	sandy silt to clayey silt	UNDFND	UNDFD	24	4.1
11.25	37	15.91	0.51	3.17	1.36	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	33.67	1.72	5.12	1.38	clay	UNDFND	UNDFD	32	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-18b

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	121.13	3.82	3.16	1.41	sandy silt to clayey silt	UNDFND	UNDFD	46	7.9
12.15	40	144.57	3.24	2.24	1.44	silty sand to sandy silt	70-80	40-42	46	UNDEFINED
12.45	41	141.02	3.52	2.50	1.47	silty sand to sandy silt	70-80	40-42	45	UNDEFINED
12.80	42	229.65	5.19	2.26	1.50	silty sand to sandy silt	80-90	42-44	>50	UNDEFINED
13.10	43	127.54	3.09	2.43	1.53	silty sand to sandy silt	60-70	40-42	41	UNDEFINED
13.40	44	23.79	0.99	4.18	1.56	silty clay to clay	UNDFND	UNDFD	15	1.4
13.75	45	75.82	2.38	3.14	1.59	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
14.05	46	91.79	2.70	2.95	1.62	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
14.35	47	167.68	3.99	2.38	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	158.43	3.79	2.39	1.68	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.95	49	138.54	3.28	2.37	1.70	silty sand to sandy silt	60-70	40-42	44	UNDEFINED
15.25	50	66.77	3.07	4.60	1.73	silty clay to clay	UNDFND	UNDFD	43	4.2
15.55	51	19.58	0.89	4.57	1.76	clay	UNDFND	UNDFD	19	1.1
15.85	52	22.88	0.93	4.07	1.79	silty clay to clay	UNDFND	UNDFD	15	1.3
16.15	53	32.38	1.06	3.27	1.82	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
16.45	54	56.17	1.84	3.27	1.85	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
16.75	55	21.04	0.86	4.08	1.87	silty clay to clay	UNDFND	UNDFD	13	1.1
17.05	56	22.57	0.82	3.65	1.90	silty clay to clay	UNDFND	UNDFD	14	1.2
17.35	57	20.99	1.08	5.14	1.93	clay	UNDFND	UNDFD	20	1.1
17.65	58	25.85	1.16	4.47	1.96	clay	UNDFND	UNDFD	25	1.4
17.95	59	57.41	3.08	5.36	1.99	clay	UNDFND	UNDFD	>50	3.5
18.25	60	55.25	3.20	5.79	2.02	clay	UNDFND	UNDFD	>50	3.4
18.55	61	49.82	2.33	4.68	2.04	silty clay to clay	UNDFND	UNDFD	32	3.0
18.85	62	36.09	1.79	4.96	2.07	clay	UNDFND	UNDFD	35	2.1
19.20	63	29.36	1.34	4.55	2.10	silty clay to clay	UNDFND	UNDFD	19	1.7
19.50	64	38.47	1.62	4.21	2.13	silty clay to clay	UNDFND	UNDFD	25	2.3
19.80	65	31.34	1.65	5.27	2.16	clay	UNDFND	UNDFD	30	1.8
20.15	66	28.11	1.50	5.35	2.19	clay	UNDFND	UNDFD	27	1.6
20.45	67	22.82	1.11	4.85	2.22	clay	UNDFND	UNDFD	22	1.2
20.75	68	34.59	1.95	5.63	2.25	clay	UNDFND	UNDFD	33	2.0
21.05	69	80.79	3.53	4.37	2.28	clayey silt to silty clay	UNDFND	UNDFD	39	5.1
21.35	70	80.36	2.80	3.48	2.31	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
21.65	71	41.92	2.17	5.17	2.34	clay	UNDFND	UNDFD	40	2.5
21.95	72	50.66	1.91	3.76	2.37	clayey silt to silty clay	UNDFND	UNDFD	24	3.0
22.25	73	121.34	2.96	2.44	2.39	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
22.55	74	59.23	2.71	4.58	2.42	silty clay to clay	UNDFND	UNDFD	38	3.6
22.85	75	132.79	3.35	2.52	2.45	silty sand to sandy silt	60-70	38-40	42	UNDEFINED
23.15	76	103.02	2.99	2.90	2.48	sandy silt to clayey silt	UNDFND	UNDFD	39	6.5
23.45	77	120.24	4.37	3.64	2.51	sandy silt to clayey silt	UNDFND	UNDFD	46	7.7
23.75	78	43.59	1.86	4.27	2.54	silty clay to clay	UNDFND	UNDFD	28	2.5
24.05	79	24.18	0.89	3.69	2.56	silty clay to clay	UNDFND	UNDFD	15	1.2
24.35	80	27.45	1.17	4.25	2.59	silty clay to clay	UNDFND	UNDFD	18	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-18c

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	53.30	1.98	3.72	2.62	clayey silt to silty clay	UNDFND	UNDFD	26	3.2
24.95	82	31.15	1.49	4.79	2.65	clay	UNDFND	UNDFD	30	1.7
25.25	83	24.27	1.10	4.54	2.68	clay	UNDFND	UNDFD	23	1.2
25.60	84	25.74	1.09	4.23	2.71	silty clay to clay	UNDFND	UNDFD	16	1.3
25.90	85	23.57	0.97	4.10	2.74	silty clay to clay	UNDFND	UNDFD	15	1.2
26.20	86	23.16	0.90	3.91	2.77	silty clay to clay	UNDFND	UNDFD	15	1.2
26.55	87	122.93	2.02	1.64	2.80	sand to silty sand	50-60	36-38	29	UNDEFINED
26.85	88	422.67	1.51	0.36	2.83	gravelly sand to sand	>90	42-44	>50	UNDEFINED
27.15	89	114.10	1.60	1.40	2.86	sand to silty sand	50-60	36-38	27	UNDEFINED
27.45	90	60.32	2.53	4.20	2.88	clayey silt to silty clay	UNDFND	UNDFD	29	3.6
27.75	91	179.66	4.58	2.55	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.05	92	161.47	5.13	3.18	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	186.46	5.06	2.71	2.97	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.65	94	174.18	5.06	2.91	3.00	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.95	95	179.71	5.40	3.00	3.03	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.25	96	169.41	4.89	2.89	3.05	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.55	97	48.71	2.24	4.59	3.08	silty clay to clay	UNDFND	UNDFD	31	2.8
29.85	98	48.37	1.99	4.11	3.11	clayey silt to silty clay	UNDFND	UNDFD	23	2.8
30.15	99	81.26	3.27	4.03	3.14	clayey silt to silty clay	UNDFND	UNDFD	39	5.0
30.45	100	69.91	2.77	3.97	3.17	clayey silt to silty clay	UNDFND	UNDFD	33	4.2
30.75	101	181.80	5.91	3.25	3.20	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.7
31.05	102	305.75	5.58	1.83	3.22	sand to silty sand	80-90	40-42	>50	UNDEFINED
31.35	103	108.82	3.55	3.26	3.25	sandy silt to clayey silt	UNDFND	UNDFD	42	6.8
31.65	104	36.31	1.64	4.53	3.28	silty clay to clay	UNDFND	UNDFD	23	2.0
32.00	105	71.87	2.24	3.12	3.31	sandy silt to clayey silt	UNDFND	UNDFD	28	4.3
32.30	106	89.69	3.35	3.73	3.34	clayey silt to silty clay	UNDFND	UNDFD	43	5.5
32.60	107	78.77	2.48	3.15	3.37	sandy silt to clayey silt	UNDFND	UNDFD	30	4.8
32.95	108	175.05	5.42	3.09	3.40	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.2
33.25	109	144.13	4.11	2.85	3.43	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
33.55	110	124.86	3.67	2.94	3.46	sandy silt to clayey silt	UNDFND	UNDFD	48	7.8
33.85	111	88.12	3.30	3.74	3.49	clayey silt to silty clay	UNDFND	UNDFD	42	5.4
34.15	112	32.09	1.44	4.49	3.52	silty clay to clay	UNDFND	UNDFD	20	1.6
34.45	113	34.81	1.48	4.25	3.55	silty clay to clay	UNDFND	UNDFD	22	1.8
34.75	114	33.04	1.23	3.71	3.57	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
35.05	115	35.14	1.08	3.07	3.60	clayey silt to silty clay	UNDFND	UNDFD	17	1.8
35.35	116	43.18	1.80	4.17	3.63	silty clay to clay	UNDFND	UNDFD	28	2.4
35.65	117	49.14	1.84	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	24	2.8
35.95	118	67.87	2.38	3.51	3.69	clayey silt to silty clay	UNDFND	UNDFD	33	4.0
36.25	119	44.43	1.89	4.25	3.72	silty clay to clay	UNDFND	UNDFD	28	2.4
36.55	120	35.62	1.35	3.79	3.74	clayey silt to silty clay	UNDFND	UNDFD	17	1.8
36.85	121	30.52	0.80	2.62	3.77	sandy silt to clayey silt	UNDFND	UNDFD	12	1.5
37.15	122	35.28	0.92	2.60	3.80	sandy silt to clayey silt	UNDFND	UNDFD	14	1.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure 18d

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	36.96	1.21	3.29	3.83	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
37.75	124	150.61	5.46	3.63	3.86	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
38.05	125	270.44	8.08	2.99	3.89	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	205.07	6.96	3.39	3.92	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
38.70	127	97.89	4.71	4.81	3.95	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.00	128	130.35	6.23	4.78	3.97	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.35	129	175.35	6.62	3.78	4.01	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
39.65	130	109.82	4.12	3.75	4.04	sandy silt to clayey silt	UNDFND	UNDFD	42	6.8
39.95	131	129.69	3.49	2.69	4.06	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
40.25	132	366.81	5.92	1.61	4.09	sand to silty sand	80-90	40-42	>50	UNDEFINED
40.55	133	473.19	6.06	1.28	4.12	sand	>90	40-42	>50	UNDEFINED
40.85	134	255.01	7.59	2.98	4.15	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
41.15	135	76.82	3.57	4.65	4.18	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
41.45	136	186.41	4.87	2.61	4.21	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
41.75	137	187.40	3.81	2.03	4.23	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.05	138	162.63	4.87	2.99	4.26	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.2
42.35	139	83.37	3.06	3.67	4.29	clayey silt to silty clay	UNDFND	UNDFD	40	5.0
42.65	140	184.30	5.91	3.20	4.32	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.7
42.95	141	240.31	7.08	2.95	4.35	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
43.25	142	130.74	5.43	4.16	4.38	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	47.20	1.86	3.94	4.40	clayey silt to silty clay	UNDFND	UNDFD	23	2.5
43.85	144	51.48	1.93	3.76	4.43	clayey silt to silty clay	UNDFND	UNDFD	25	2.8
44.15	145	107.78	4.44	4.12	4.46	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.45	146	125.67	5.45	4.33	4.49	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.80	147	144.19	5.78	4.01	4.52	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
45.10	148	193.49	6.58	3.40	4.55	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
45.40	149	392.69	5.95	1.51	4.58	sand to silty sand	80-90	40-42	>50	UNDEFINED
45.75	150	304.00	5.69	1.87	4.61	sand to silty sand	70-80	38-40	>50	UNDEFINED
46.05	151	93.69	3.11	3.32	4.64	sandy silt to clayey silt	UNDFND	UNDFD	36	5.6
46.35	152	201.95	4.94	2.44	4.67	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
46.65	153	203.37	6.12	3.01	4.70	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
46.95	154	125.92	4.89	3.89	4.73	sandy silt to clayey silt	UNDFND	UNDFD	48	7.7
47.25	155	196.18	6.34	3.23	4.75	sandy silt to clayey silt	UNDFND	UNDFD	>50	12.4
47.55	156	324.05	7.05	2.18	4.78	sand to silty sand	70-80	38-40	>50	UNDEFINED
47.85	157	253.66	7.80	3.07	4.81	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
48.15	158	96.21	4.37	4.55	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
48.45	159	273.04	7.06	2.58	4.87	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
48.75	160	85.04	3.99	4.70	4.90	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
49.05	161	83.24	3.12	3.74	4.92	clayey silt to silty clay	UNDFND	UNDFD	40	4.9
49.35	162	103.25	2.75	2.67	4.95	sandy silt to clayey silt	UNDFND	UNDFD	40	6.2
49.65	163	218.69	6.58	3.01	4.98	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemente

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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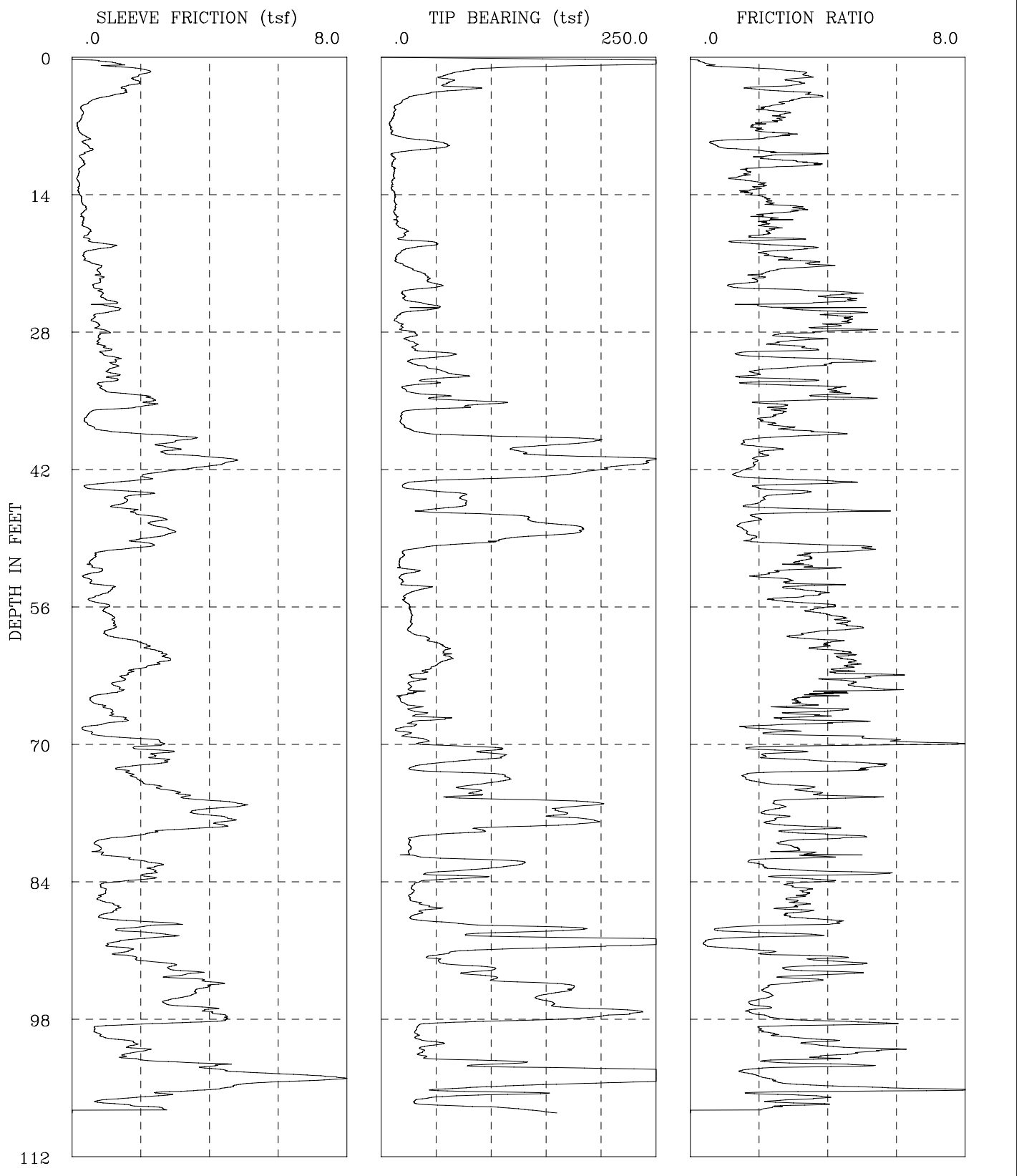
Figure A-18e



CPT−08−002	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-19a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-002
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :03/27/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	231.31	0.96	0.42	0.03	sand	>90	>48	44	UNDEFINED
0.60	2	69.54	2.07	2.98	0.09	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
0.95	3	64.39	1.75	2.71	0.15	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.25	4	45.22	1.32	2.91	0.22	sandy silt to clayey silt	UNDFND	UNDFD	17	3.0
1.55	5	16.76	0.45	2.67	0.28	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
1.85	6	11.81	0.30	2.53	0.33	clayey silt to silty clay	UNDFND	UNDFD	6	.7
2.15	7	8.57	0.19	2.23	0.39	silty clay to clay	UNDFND	UNDFD	5	.5
2.45	8	10.44	0.25	2.38	0.45	silty clay to clay	UNDFND	UNDFD	7	.6
2.75	9	46.68	0.42	0.90	0.51	silty sand to sandy silt	50-60	40-42	15	UNDEFINED
3.05	10	26.63	0.43	1.63	0.57	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
3.35	11	10.94	0.31	2.86	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	11.63	0.21	1.79	0.64	clayey silt to silty clay	UNDFND	UNDFD	6	.7
3.95	13	10.59	0.18	1.66	0.67	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.25	14	10.68	0.19	1.79	0.69	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.55	15	12.42	0.28	2.23	0.72	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.85	16	12.42	0.36	2.91	0.75	silty clay to clay	UNDFND	UNDFD	8	.7
5.15	17	14.15	0.31	2.22	0.78	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.45	18	19.31	0.44	2.30	0.81	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
5.75	19	26.81	0.48	1.79	0.84	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
6.05	20	30.90	0.85	2.75	0.86	sandy silt to clayey silt	UNDFND	UNDFD	12	1.9
6.40	21	14.37	0.41	2.83	0.89	clayey silt to silty clay	UNDFND	UNDFD	7	.8
6.70	22	28.43	0.79	2.78	0.93	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
7.00	23	42.74	0.81	1.90	0.95	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
7.35	24	35.12	0.75	2.13	0.98	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
7.65	25	26.22	1.05	3.99	1.02	silty clay to clay	UNDFND	UNDFD	17	1.6
7.95	26	39.16	1.14	2.92	1.04	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
8.25	27	14.42	0.64	4.46	1.07	clay	UNDFND	UNDFD	14	.8
8.55	28	21.73	0.87	4.01	1.10	silty clay to clay	UNDFND	UNDFD	14	1.3
8.85	29	27.31	0.78	2.85	1.13	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
9.15	30	34.04	0.92	2.72	1.16	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
9.45	31	45.67	1.16	2.54	1.19	sandy silt to clayey silt	UNDFND	UNDFD	17	2.9
9.75	32	42.09	1.15	2.74	1.21	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.05	33	57.64	1.22	2.11	1.24	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
10.35	34	29.58	0.84	2.84	1.27	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
10.65	35	48.52	1.96	4.04	1.30	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
10.95	36	77.30	1.84	2.38	1.33	sandy silt to clayey silt	UNDFND	UNDFD	30	5.0
11.25	37	18.72	0.45	2.40	1.36	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
11.55	38	20.65	0.53	2.55	1.38	clayey silt to silty clay	UNDFND	UNDFD	10	1.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-19b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	91.54	2.45	2.68	1.41	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
12.15	40	159.48	2.82	1.77	1.44	sand to silty sand	70-80	40-42	38	UNDEFINED
12.45	41	161.83	3.30	2.04	1.47	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
12.80	42	225.22	4.12	1.83	1.50	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.10	43	149.98	2.29	1.53	1.53	sand to silty sand	70-80	40-42	36	UNDEFINED
13.40	44	25.63	0.82	3.20	1.56	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
13.75	45	67.71	1.74	2.57	1.59	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
14.05	46	66.77	1.48	2.21	1.62	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
14.35	47	101.54	2.22	2.19	1.65	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.65	48	164.51	2.49	1.51	1.68	sand to silty sand	70-80	40-42	39	UNDEFINED
14.95	49	152.04	2.63	1.73	1.70	sand to silty sand	70-80	40-42	36	UNDEFINED
15.25	50	69.46	2.04	2.94	1.73	sandy silt to clayey silt	UNDFND	UNDFD	27	4.4
15.55	51	20.03	0.77	3.86	1.76	silty clay to clay	UNDFND	UNDFD	13	1.1
15.85	52	16.37	0.56	3.40	1.79	silty clay to clay	UNDFND	UNDFD	10	.8
16.15	53	24.11	0.59	2.45	1.82	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
16.45	54	24.86	0.74	3.00	1.85	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.75	55	27.84	0.96	3.45	1.87	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
17.05	56	23.07	0.77	3.32	1.90	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
17.35	57	26.92	1.02	3.77	1.93	silty clay to clay	UNDFND	UNDFD	17	1.5
17.65	58	27.28	1.22	4.46	1.96	silty clay to clay	UNDFND	UNDFD	17	1.5
17.95	59	27.34	1.06	3.87	1.99	silty clay to clay	UNDFND	UNDFD	17	1.5
18.25	60	47.30	1.78	3.76	2.02	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
18.55	61	58.08	2.45	4.22	2.04	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
18.85	62	57.96	2.67	4.60	2.07	silty clay to clay	UNDFND	UNDFD	37	3.6
19.20	63	38.89	1.81	4.65	2.10	silty clay to clay	UNDFND	UNDFD	25	2.3
19.50	64	29.78	1.36	4.55	2.13	silty clay to clay	UNDFND	UNDFD	19	1.7
19.80	65	26.42	1.23	4.64	2.16	clay	UNDFND	UNDFD	25	1.5
20.15	66	20.99	0.66	3.12	2.19	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
20.45	67	31.74	1.13	3.55	2.22	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
20.75	68	38.61	1.23	3.19	2.25	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
21.05	69	19.40	0.48	2.46	2.28	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
21.35	70	37.11	2.24	6.05	2.31	clay	UNDFND	UNDFD	36	2.1
21.65	71	99.90	2.31	2.31	2.34	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
21.95	72	79.22	2.53	3.20	2.37	sandy silt to clayey silt	UNDFND	UNDFD	30	4.9
22.25	73	48.77	1.57	3.22	2.39	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
22.55	74	109.19	1.92	1.76	2.42	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
22.85	75	80.46	2.73	3.40	2.45	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
23.15	76	121.99	3.79	3.11	2.48	sandy silt to clayey silt	UNDFND	UNDFD	47	7.8
23.45	77	171.79	4.17	2.43	2.51	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
23.75	78	177.61	4.33	2.44	2.54	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.05	79	118.99	3.60	3.03	2.56	sandy silt to clayey silt	UNDFND	UNDFD	46	7.6
24.35	80	36.24	1.39	3.84	2.59	clayey silt to silty clay	UNDFND	UNDFD	17	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

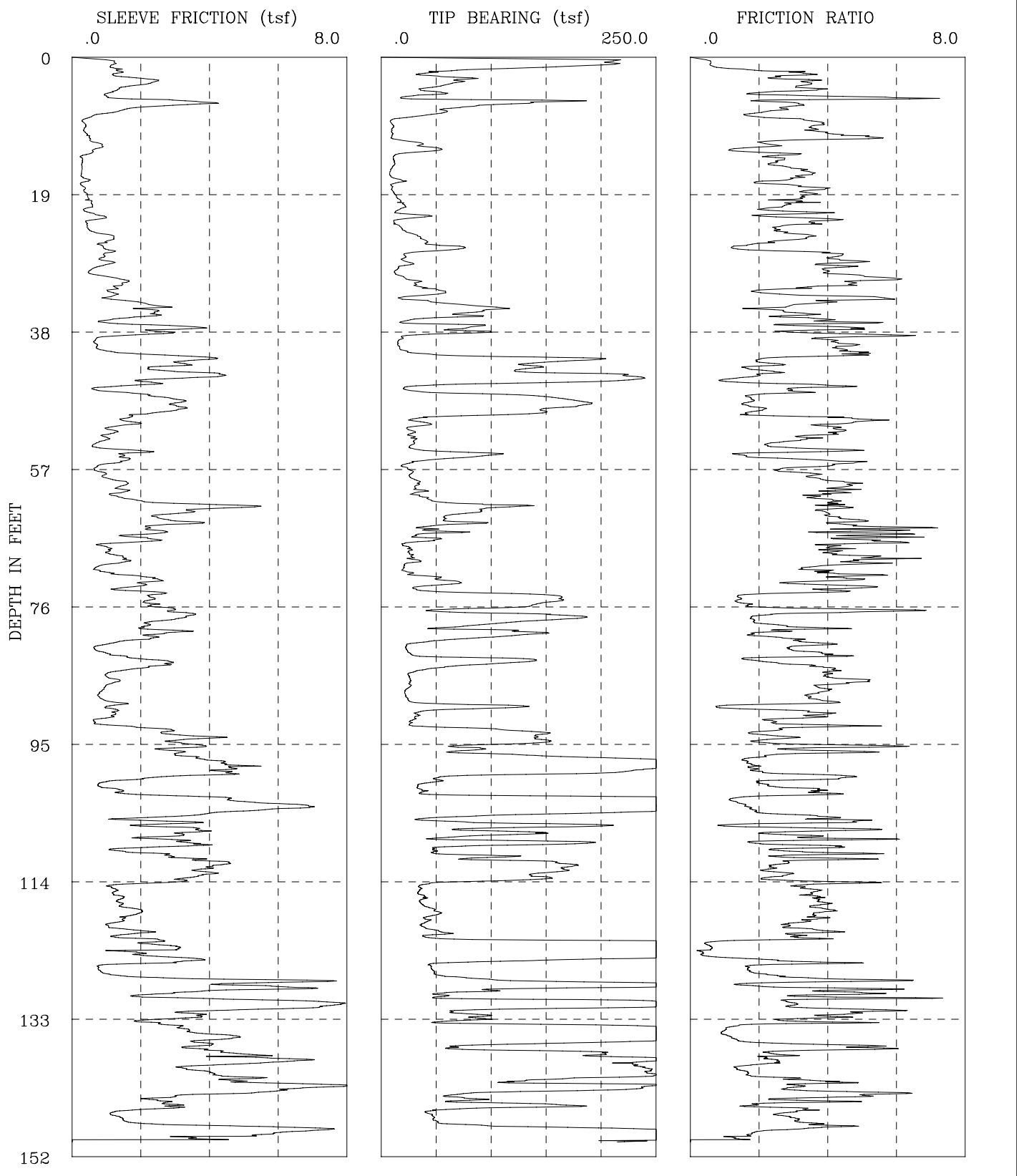
Figure A-19c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	25.95	0.75	2.91	2.62	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
24.95	82	55.24	1.38	2.50	2.65	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
25.25	83	108.52	2.42	2.23	2.68	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
25.60	84	56.21	2.06	3.67	2.71	clayey silt to silty clay	UNDFND	UNDFD	27	3.4
25.90	85	28.97	0.91	3.13	2.74	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
26.20	86	26.68	0.84	3.15	2.77	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
26.55	87	40.87	1.25	3.05	2.80	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
26.85	88	34.62	1.24	3.57	2.83	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
27.15	89	137.54	2.00	1.45	2.86	sand to silty sand	60-70	36-38	33	UNDEFINED
27.45	90	184.69	2.24	1.21	2.88	sand to silty sand	60-70	38-40	44	UNDEFINED
27.75	91	179.26	1.36	0.76	2.91	sand	60-70	38-40	34	UNDEFINED
28.05	92	51.73	1.67	3.23	2.94	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
28.35	93	82.15	2.86	3.48	2.97	sandy silt to clayey silt	UNDFND	UNDFD	31	5.1
28.65	94	92.36	3.38	3.65	3.00	sandy silt to clayey silt	UNDFND	UNDFD	35	5.7
28.95	95	160.64	3.96	2.46	3.03	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
29.25	96	150.37	3.35	2.23	3.05	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
29.55	97	165.04	3.19	1.93	3.08	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
29.85	98	211.39	4.25	2.01	3.11	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.15	99	59.70	2.26	3.79	3.14	clayey silt to silty clay	UNDFND	UNDFD	29	3.5
30.45	100	31.52	0.78	2.48	3.17	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
30.75	101	44.12	1.69	3.83	3.20	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
31.05	102	37.28	1.77	4.76	3.22	silty clay to clay	UNDFND	UNDFD	24	2.0
31.35	103	95.97	3.26	3.39	3.25	sandy silt to clayey silt	UNDFND	UNDFD	37	5.9
31.65	104	317.74	5.55	1.75	3.28	sand to silty sand	80-90	40-42	>50	UNDEFINED
32.00	105	207.20	5.86	2.83	3.31	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
32.30	106	81.40	2.84	3.49	3.34	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
32.60	107	49.13	1.37	2.80	3.37	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-19d



CPT-08-003	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-20a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-003
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	194.33	1.07	0.55	0.03	sand	>90	>48	37	UNDEFINED
0.60	2	113.82	1.27	1.11	0.09	sand to silty sand	>90	>48	27	UNDEFINED
0.95	3	56.03	1.63	2.91	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	61.88	2.07	3.34	0.22	sandy silt to clayey silt	UNDFND	UNDFD	24	4.1
1.55	5	46.25	1.21	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.85	6	67.11	1.84	2.74	0.33	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
2.15	7	97.86	2.93	3.00	0.39	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.45	8	52.21	1.11	2.12	0.45	sandy silt to clayey silt	UNDFND	UNDFD	20	3.4
2.75	9	14.50	0.39	2.69	0.51	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.05	10	10.33	0.38	3.63	0.57	clay	UNDFND	UNDFD	10	.6
3.35	11	9.85	0.42	4.30	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	23.30	0.62	2.64	0.64	clayey silt to silty clay	UNDFND	UNDFD	11	1.5
3.95	13	45.75	0.75	1.65	0.67	silty sand to sandy silt	50-60	38-40	15	UNDEFINED
4.25	14	16.32	0.39	2.42	0.69	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
4.55	15	11.85	0.29	2.48	0.72	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.85	16	9.10	0.29	3.14	0.75	silty clay to clay	UNDFND	UNDFD	6	.5
5.15	17	10.43	0.33	3.14	0.78	silty clay to clay	UNDFND	UNDFD	7	.6
5.45	18	13.44	0.33	2.43	0.81	clayey silt to silty clay	UNDFND	UNDFD	6	.8
5.75	19	10.57	0.38	3.60	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	15.08	0.48	3.15	0.86	silty clay to clay	UNDFND	UNDFD	10	.9
6.40	21	19.81	0.53	2.66	0.89	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
6.70	22	24.65	0.60	2.44	0.93	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
7.00	23	17.45	0.62	3.57	0.95	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	18.51	0.48	2.60	0.98	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
7.65	25	32.58	1.08	3.31	1.02	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
7.95	26	46.32	0.94	2.02	1.04	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
8.25	27	54.56	1.04	1.91	1.07	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
8.55	28	20.67	0.88	4.27	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	22.71	0.99	4.35	1.13	clay	UNDFND	UNDFD	22	1.4
9.15	30	13.39	0.54	4.05	1.16	clay	UNDFND	UNDFD	13	.7
9.45	31	24.92	1.31	5.25	1.19	clay	UNDFND	UNDFD	24	1.5
9.75	32	35.11	1.37	3.91	1.21	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
10.05	33	50.18	1.17	2.33	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
10.35	34	32.32	1.44	4.45	1.27	silty clay to clay	UNDFND	UNDFD	21	2.0
10.65	35	95.00	2.33	2.45	1.30	silty sand to sandy silt	60-70	38-40	30	UNDEFINED
10.95	36	79.01	2.32	2.94	1.33	sandy silt to clayey silt	UNDFND	UNDFD	30	5.1
11.25	37	32.63	1.17	3.57	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	81.49	3.02	3.70	1.38	clayey silt to silty clay	UNDFND	UNDFD	39	5.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-20b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	40.60	1.68	4.13	1.41	silty clay to clay	UNDFND	UNDFD	26	2.5
12.15	40	15.50	0.68	4.39	1.44	clay	UNDFND	UNDFD	15	.8
12.45	41	20.46	0.93	4.55	1.47	clay	UNDFND	UNDFD	20	1.2
12.80	42	130.77	3.33	2.55	1.50	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
13.10	43	138.62	2.87	2.07	1.53	silty sand to sandy silt	60-70	40-42	44	UNDEFINED
13.40	44	161.68	3.47	2.14	1.56	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
13.75	45	199.32	2.77	1.39	1.59	sand to silty sand	70-80	40-42	48	UNDEFINED
14.05	46	29.23	1.06	3.62	1.62	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.35	47	109.13	2.12	1.94	1.65	silty sand to sandy silt	60-70	38-40	35	UNDEFINED
14.65	48	181.84	3.07	1.69	1.68	sand to silty sand	70-80	40-42	44	UNDEFINED
14.95	49	156.24	3.03	1.94	1.70	silty sand to sandy silt	70-80	40-42	50	UNDEFINED
15.25	50	75.12	1.78	2.37	1.73	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
15.55	51	36.79	1.63	4.43	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	26.68	1.15	4.30	1.79	silty clay to clay	UNDFND	UNDFD	17	1.5
16.15	53	28.65	0.98	3.42	1.82	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
16.45	54	27.87	0.68	2.45	1.85	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
16.75	55	68.67	1.68	2.45	1.87	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
17.05	56	58.30	1.53	2.63	1.90	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
17.35	57	22.31	0.82	3.68	1.93	silty clay to clay	UNDFND	UNDFD	14	1.2
17.65	58	27.15	0.86	3.16	1.96	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
17.95	59	31.09	1.29	4.15	1.99	silty clay to clay	UNDFND	UNDFD	20	1.8
18.25	60	33.00	1.47	4.45	2.02	silty clay to clay	UNDFND	UNDFD	21	1.9
18.55	61	34.39	1.32	3.85	2.04	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
18.85	62	59.32	2.49	4.20	2.07	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
19.20	63	100.08	4.10	4.09	2.10	clayey silt to silty clay	UNDFND	UNDFD	48	6.4
19.50	64	60.03	2.58	4.30	2.13	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
19.80	65	62.52	2.93	4.69	2.16	silty clay to clay	UNDFND	UNDFD	40	3.9
20.15	66	45.80	2.27	4.96	2.19	silty clay to clay	UNDFND	UNDFD	29	2.7
20.45	67	39.51	2.08	5.25	2.22	clay	UNDFND	UNDFD	38	2.3
20.75	68	23.35	0.97	4.15	2.25	silty clay to clay	UNDFND	UNDFD	15	1.2
21.05	69	26.37	1.19	4.52	2.28	clay	UNDFND	UNDFD	25	1.4
21.35	70	29.19	1.47	5.02	2.31	clay	UNDFND	UNDFD	28	1.6
21.65	71	20.43	0.75	3.65	2.34	silty clay to clay	UNDFND	UNDFD	13	1.0
21.95	72	37.47	1.67	4.46	2.37	silty clay to clay	UNDFND	UNDFD	24	2.2
22.25	73	61.04	2.26	3.70	2.39	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
22.55	74	40.74	1.78	4.36	2.42	silty clay to clay	UNDFND	UNDFD	26	2.4
22.85	75	153.95	2.38	1.55	2.45	sand to silty sand	60-70	38-40	37	UNDEFINED
23.15	76	145.43	2.26	1.55	2.48	sand to silty sand	60-70	38-40	35	UNDEFINED
23.45	77	79.79	3.08	3.86	2.51	clayey silt to silty clay	UNDFND	UNDFD	38	5.0
23.75	78	166.37	3.12	1.87	2.54	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.05	79	86.63	2.13	2.46	2.56	sandy silt to clayey silt	UNDFND	UNDFD	33	5.4
24.35	80	121.85	2.70	2.22	2.59	silty sand to sandy silt	50-60	36-38	39	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-20c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	70.56	1.96	2.77	2.62	sandy silt to clayey silt	UNDFND	UNDFD	27	4.3
24.95	82	23.48	0.79	3.36	2.65	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
25.25	83	27.90	1.08	3.87	2.68	silty clay to clay	UNDFND	UNDFD	18	1.5
25.60	84	116.37	2.50	2.15	2.71	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
25.90	85	45.45	1.79	3.94	2.74	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.20	86	25.31	1.05	4.16	2.77	silty clay to clay	UNDFND	UNDFD	16	1.3
26.55	87	26.18	1.15	4.37	2.80	silty clay to clay	UNDFND	UNDFD	17	1.3
26.85	88	22.08	0.84	3.82	2.83	silty clay to clay	UNDFND	UNDFD	14	1.1
27.15	89	23.95	0.88	3.68	2.86	silty clay to clay	UNDFND	UNDFD	15	1.2
27.45	90	91.50	1.23	1.35	2.88	sand to silty sand	40-50	34-36	22	UNDEFINED
27.75	91	36.80	1.25	3.38	2.91	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
28.05	92	28.62	0.79	2.77	2.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
28.35	93	63.32	1.89	2.99	2.97	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
28.65	94	143.01	3.21	2.24	3.00	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
28.95	95	139.64	3.26	2.33	3.03	silty sand to sandy silt	60-70	36-38	45	UNDEFINED
29.25	96	77.29	3.22	4.16	3.05	clayey silt to silty clay	UNDFND	UNDFD	37	4.7
29.55	97	144.11	3.30	2.29	3.08	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
29.85	98	260.92	4.43	1.70	3.11	sand to silty sand	70-80	40-42	>50	UNDEFINED
30.15	99	239.29	4.51	1.89	3.14	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.45	100	76.41	2.91	3.81	3.17	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
30.75	101	39.98	0.85	2.13	3.20	sandy silt to clayey silt	UNDFND	UNDFD	15	2.2
31.05	102	36.80	1.41	3.83	3.22	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
31.35	103	302.36	4.13	1.37	3.25	sand	80-90	40-42	>50	UNDEFINED
31.65	104	401.48	6.37	1.59	3.28	sand to silty sand	80-90	40-42	>50	UNDEFINED
32.00	105	187.48	4.19	2.24	3.31	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
32.30	106	69.33	2.47	3.56	3.34	clayey silt to silty clay	UNDFND	UNDFD	33	4.2
32.60	107	131.64	3.09	2.35	3.37	silty sand to sandy silt	50-60	36-38	42	UNDEFINED
32.95	108	94.61	2.82	2.98	3.40	sandy silt to clayey silt	UNDFND	UNDFD	36	5.8
33.25	109	138.97	3.40	2.45	3.43	silty sand to sandy silt	50-60	36-38	44	UNDEFINED
33.55	110	48.16	1.68	3.48	3.46	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
33.85	111	96.45	3.23	3.35	3.49	sandy silt to clayey silt	UNDFND	UNDFD	37	5.9
34.15	112	167.98	4.29	2.56	3.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	154.78	3.87	2.50	3.55	silty sand to sandy silt	60-70	36-38	49	UNDEFINED
34.75	114	125.68	3.30	2.63	3.57	silty sand to sandy silt	50-60	34-36	40	UNDEFINED
35.05	115	37.68	1.39	3.70	3.60	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.35	116	35.49	1.27	3.57	3.63	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
35.65	117	37.17	1.41	3.78	3.66	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.95	118	43.23	1.66	3.84	3.69	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
36.25	119	48.24	1.79	3.72	3.72	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
36.55	120	40.35	1.31	3.23	3.74	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
36.85	121	44.49	1.56	3.52	3.77	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
37.15	122	49.84	1.64	3.29	3.80	clayey silt to silty clay	UNDFND	UNDFD	24	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-20d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	405.25	2.48	0.61	3.83	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
37.75	124	522.17	2.37	0.45	3.86	gravelly sand to sand	>90	42-44	>50	UNDEFINED
38.05	125	366.03	2.89	0.79	3.89	sand	80-90	40-42	>50	UNDEFINED
38.40	126	56.03	1.57	2.80	3.92	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
38.70	127	49.16	0.98	1.99	3.95	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
39.00	128	128.27	4.85	3.78	3.97	sandy silt to clayey silt	UNDFND	UNDFD	49	8.0
39.35	129	207.98	5.28	2.54	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.65	130	54.46	2.58	4.74	4.04	silty clay to clay	UNDFND	UNDFD	35	3.1
39.95	131	236.15	6.99	2.96	4.06	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.25	132	135.01	5.24	3.88	4.09	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
40.55	133	89.44	3.39	3.79	4.12	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
40.85	134	133.31	2.54	1.91	4.15	silty sand to sandy silt	50-60	34-36	43	UNDEFINED
41.15	135	356.55	3.44	0.97	4.18	sand	80-90	40-42	>50	UNDEFINED
41.45	136	364.45	4.41	1.21	4.21	sand	80-90	40-42	>50	UNDEFINED
41.75	137	111.47	3.66	3.28	4.23	sandy silt to clayey silt	UNDFND	UNDFD	43	6.8
42.05	138	163.59	4.57	2.80	4.26	silty sand to sandy silt	50-60	36-38	>50	UNDEFINED
42.35	139	249.43	5.82	2.33	4.29	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
42.65	140	236.17	3.79	1.60	4.32	sand to silty sand	70-80	38-40	>50	UNDEFINED
42.95	141	244.78	4.13	1.69	4.35	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.25	142	151.12	5.28	3.49	4.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
43.55	143	230.25	6.98	3.03	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	77.11	3.85	4.99	4.43	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.15	145	106.06	2.68	2.53	4.46	silty sand to sandy silt	40-50	32-34	34	UNDEFINED
44.45	146	89.20	2.17	2.44	4.49	silty sand to sandy silt	40-50	30-32	28	UNDEFINED
44.80	147	46.72	1.33	2.85	4.52	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
45.10	148	90.27	3.53	3.91	4.55	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
45.40	149	304.28	6.52	2.14	4.58	sand to silty sand	70-80	38-40	>50	UNDEFINED

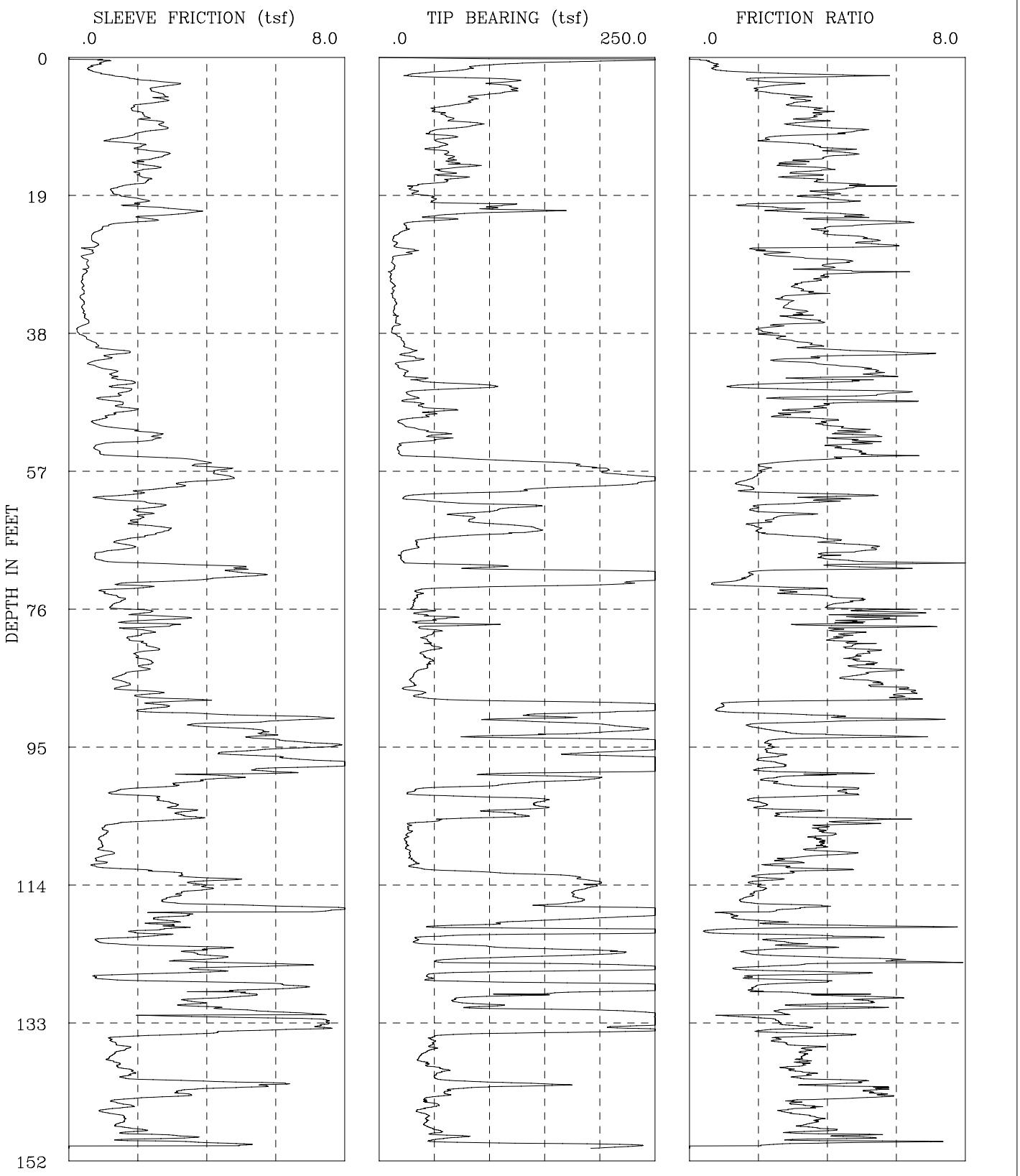
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-20d



I-436 SR-22 Phase 2	CPT-08-006
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-21a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-006
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 23.95013

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	162.45	0.77	0.48	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	76.38	0.63	0.82	0.09	sand to silty sand	>90	>48	18	UNDEFINED
0.95	3	63.52	1.49	2.35	0.15	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
1.25	4	113.90	2.86	2.51	0.22	silty sand to sandy silt	>90	46-48	36	UNDEFINED
1.55	5	115.30	2.51	2.17	0.28	silty sand to sandy silt	80-90	46-48	37	UNDEFINED
1.85	6	84.43	2.76	3.27	0.33	sandy silt to clayey silt	UNDFND	UNDFD	32	5.6
2.15	7	63.54	2.01	3.17	0.39	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
2.45	8	54.73	2.06	3.76	0.45	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
2.75	9	70.87	2.42	3.42	0.51	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
3.05	10	73.38	2.72	3.70	0.57	clayey silt to silty clay	UNDFND	UNDFD	35	4.8
3.35	11	54.98	1.90	3.46	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	56.38	1.52	2.69	0.69	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
3.95	13	53.42	2.17	4.07	0.75	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
4.25	14	63.43	2.72	4.28	0.81	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
4.55	15	73.86	2.10	2.84	0.87	sandy silt to clayey silt	UNDFND	UNDFD	28	4.8
4.85	16	62.42	2.22	3.56	0.93	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
5.15	17	65.35	2.18	3.34	0.98	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
5.45	18	42.04	1.86	4.43	1.04	silty clay to clay	UNDFND	UNDFD	27	2.7
5.75	19	31.71	1.28	4.04	1.10	silty clay to clay	UNDFND	UNDFD	20	2.0
6.05	20	48.78	1.96	4.01	1.16	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
6.40	21	104.43	2.40	2.30	1.23	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
6.70	22	79.82	3.00	3.76	1.29	clayey silt to silty clay	UNDFND	UNDFD	38	5.2
7.00	23	42.95	2.00	4.65	1.35	silty clay to clay	UNDFND	UNDFD	27	2.7
7.35	24	23.52	0.94	3.99	1.41	silty clay to clay	UNDFND	UNDFD	15	1.4
7.65	25	14.30	0.67	4.67	1.46	clay	UNDFND	UNDFD	14	.8
7.95	26	14.61	0.79	5.38	1.48	clay	UNDFND	UNDFD	14	.8
8.25	27	28.39	0.61	2.15	1.51	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
8.55	28	13.67	0.46	3.40	1.54	silty clay to clay	UNDFND	UNDFD	9	.8
8.85	29	13.23	0.54	4.12	1.57	clay	UNDFND	UNDFD	13	.7
9.15	30	10.79	0.47	4.38	1.60	clay	UNDFND	UNDFD	10	.6
9.45	31	10.52	0.39	3.68	1.63	clay	UNDFND	UNDFD	10	.5
9.75	32	13.07	0.41	3.11	1.65	silty clay to clay	UNDFND	UNDFD	8	.7
10.05	33	12.31	0.40	3.24	1.68	silty clay to clay	UNDFND	UNDFD	8	.6
10.35	34	14.68	0.41	2.81	1.71	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.65	35	13.72	0.40	2.95	1.74	silty clay to clay	UNDFND	UNDFD	9	.7
10.95	36	14.96	0.45	3.03	1.77	silty clay to clay	UNDFND	UNDFD	10	.8
11.25	37	16.01	0.53	3.31	1.80	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	11.83	0.26	2.20	1.82	clayey silt to silty clay	UNDFND	UNDFD	6	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.63	0.45	2.55	1.85	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	22.52	0.77	3.43	1.88	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	27.99	1.43	5.13	1.91	clay	UNDFND	UNDFD	27	1.7
12.80	42	29.48	0.96	3.27	1.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	17.73	0.83	4.67	1.97	clay	UNDFND	UNDFD	17	1.0
13.40	44	24.24	1.32	5.42	2.00	clay	UNDFND	UNDFD	23	1.4
13.75	45	55.41	1.62	2.93	2.03	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.05	46	64.79	1.58	2.43	2.06	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
14.35	47	29.69	1.21	4.07	2.09	silty clay to clay	UNDFND	UNDFD	19	1.7
14.65	48	32.38	1.44	4.44	2.12	silty clay to clay	UNDFND	UNDFD	21	1.9
14.95	49	52.70	1.67	3.17	2.14	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
15.25	50	32.61	1.01	3.10	2.17	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
15.55	51	22.71	0.93	4.11	2.20	silty clay to clay	UNDFND	UNDFD	15	1.3
15.85	52	47.86	2.26	4.73	2.23	silty clay to clay	UNDFND	UNDFD	31	2.9
16.15	53	47.63	2.28	4.79	2.26	silty clay to clay	UNDFND	UNDFD	30	2.9
16.45	54	18.02	0.82	4.52	2.29	clay	UNDFND	UNDFD	17	.9
16.75	55	21.24	1.11	5.21	2.31	clay	UNDFND	UNDFD	20	1.1
17.05	56	120.80	3.63	3.01	2.34	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8
17.35	57	195.95	4.16	2.12	2.37	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
17.65	58	227.67	4.46	1.96	2.40	sand to silty sand	70-80	40-42	>50	UNDEFINED
17.95	59	242.58	3.71	1.53	2.43	sand to silty sand	70-80	40-42	>50	UNDEFINED
18.25	60	144.72	2.54	1.75	2.46	sand to silty sand	60-70	38-40	35	UNDEFINED
18.55	61	32.52	1.34	4.12	2.48	silty clay to clay	UNDFND	UNDFD	21	1.9
18.85	62	92.90	2.38	2.56	2.51	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
19.20	63	94.62	2.15	2.27	2.54	silty sand to sandy silt	50-60	36-38	30	UNDEFINED
19.50	64	82.54	2.00	2.42	2.57	sandy silt to clayey silt	UNDFND	UNDFD	32	5.2
19.80	65	126.10	2.42	1.92	2.60	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.15	66	104.68	2.48	2.37	2.63	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.45	67	35.75	1.52	4.24	2.66	silty clay to clay	UNDFND	UNDFD	23	2.1
20.75	68	29.61	1.56	5.27	2.69	clay	UNDFND	UNDFD	28	1.7
21.05	69	19.51	0.76	3.91	2.72	silty clay to clay	UNDFND	UNDFD	12	1.0
21.35	70	51.59	2.44	4.73	2.75	silty clay to clay	UNDFND	UNDFD	33	3.1
21.65	71	183.98	4.92	2.67	2.78	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	284.59	4.66	1.64	2.81	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.25	73	178.65	2.05	1.15	2.83	sand to silty sand	60-70	38-40	43	UNDEFINED
22.55	74	37.16	1.16	3.11	2.86	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
22.85	75	32.94	1.51	4.59	2.89	silty clay to clay	UNDFND	UNDFD	21	1.8
23.15	76	30.33	1.31	4.33	2.92	silty clay to clay	UNDFND	UNDFD	19	1.7
23.45	77	40.64	2.27	5.57	2.95	clay	UNDFND	UNDFD	39	2.4
23.75	78	49.14	2.50	5.08	2.98	clay	UNDFND	UNDFD	47	2.9
24.05	79	58.91	2.43	4.12	3.00	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
24.35	80	46.35	2.11	4.55	3.03	silty clay to clay	UNDFND	UNDFD	30	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	43.88	2.01	4.57	3.06	silty clay to clay	UNDFND	UNDFD	28	2.6
24.95	82	49.09	2.41	4.90	3.09	silty clay to clay	UNDFND	UNDFD	31	2.9
25.25	83	41.14	2.00	4.87	3.12	silty clay to clay	UNDFND	UNDFD	26	2.4
25.60	84	45.40	2.28	5.01	3.15	clay	UNDFND	UNDFD	43	2.6
25.90	85	35.27	1.95	5.52	3.18	clay	UNDFND	UNDFD	34	2.0
26.20	86	29.36	1.41	4.82	3.21	clay	UNDFND	UNDFD	28	1.6
26.55	87	27.94	1.59	5.70	3.24	clay	UNDFND	UNDFD	27	1.5
26.85	88	36.55	2.29	6.28	3.27	clay	UNDFND	UNDFD	35	2.0
27.15	89	144.06	2.95	2.05	3.30	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
27.45	90	276.73	2.43	0.88	3.32	sand	70-80	40-42	>50	UNDEFINED
27.75	91	155.74	5.46	3.51	3.35	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.0
28.05	92	162.70	4.92	3.03	3.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	224.38	5.18	2.31	3.41	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
28.65	94	156.75	5.65	3.60	3.44	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
28.95	95	316.45	7.30	2.31	3.47	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
29.25	96	221.44	5.16	2.33	3.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
29.55	97	292.69	6.53	2.23	3.52	sand to silty sand	70-80	40-42	>50	UNDEFINED
29.85	98	304.81	7.81	2.56	3.55	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
30.15	99	185.34	5.18	2.80	3.58	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	172.86	4.09	2.37	3.61	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.75	101	72.03	2.46	3.42	3.64	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
31.05	102	45.82	1.71	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
31.35	103	145.21	2.81	1.93	3.69	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
31.65	104	129.56	3.25	2.51	3.72	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
32.00	105	106.14	3.35	3.16	3.75	sandy silt to clayey silt	UNDFND	UNDFD	41	6.6
32.30	106	33.99	1.49	4.39	3.78	silty clay to clay	UNDFND	UNDFD	22	1.8
32.60	107	27.13	1.05	3.88	3.81	silty clay to clay	UNDFND	UNDFD	17	1.3
32.95	108	24.39	0.93	3.79	3.84	silty clay to clay	UNDFND	UNDFD	16	1.1
33.25	109	24.87	0.93	3.75	3.87	silty clay to clay	UNDFND	UNDFD	16	1.2
33.55	110	27.90	1.14	4.09	3.90	silty clay to clay	UNDFND	UNDFD	18	1.4
33.85	111	31.44	0.89	2.82	3.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
34.15	112	40.50	1.37	3.38	3.96	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
34.45	113	149.32	3.39	2.27	3.99	silty sand to sandy silt	50-60	36-38	48	UNDEFINED
34.75	114	195.25	4.02	2.06	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	184.39	3.78	2.05	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.35	116	178.86	3.01	1.68	4.07	sand to silty sand	60-70	36-38	43	UNDEFINED
35.65	117	166.93	4.09	2.45	4.10	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	293.52	6.35	2.16	4.13	sand to silty sand	70-80	38-40	>50	UNDEFINED
36.25	119	203.09	2.92	1.44	4.16	sand to silty sand	60-70	36-38	49	UNDEFINED
36.55	120	89.66	2.95	3.29	4.18	sandy silt to clayey silt	UNDFND	UNDFD	34	5.5
36.85	121	284.22	2.34	0.82	4.21	sand	70-80	38-40	>50	UNDEFINED
37.15	122	36.08	1.23	3.42	4.24	clayey silt to silty clay	UNDFND	UNDFD	17	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	101.45	3.10	3.05	4.27	sandy silt to clayey silt	UNDFND	UNDFD	39	6.2
37.75	124	194.66	3.85	1.98	4.30	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.05	125	83.68	4.24	5.07	4.33	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	220.43	4.73	2.14	4.36	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.70	127	46.37	1.29	2.78	4.39	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
39.00	128	205.41	4.99	2.43	4.42	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.35	129	242.22	5.49	2.27	4.45	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
39.65	130	78.54	4.06	5.17	4.48	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	98.93	3.91	3.96	4.50	clayey silt to silty clay	UNDFND	UNDFD	47	6.0
40.25	132	241.09	5.40	2.24	4.53	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
40.55	133	283.46	6.92	2.44	4.56	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.85	134	243.92	6.92	2.84	4.59	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
41.15	135	99.59	2.95	2.96	4.62	sandy silt to clayey silt	UNDFND	UNDFD	38	6.1
41.45	136	48.78	1.29	2.65	4.65	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
41.75	137	46.78	1.61	3.44	4.67	clayey silt to silty clay	UNDFND	UNDFD	22	2.5
42.05	138	37.42	1.22	3.27	4.70	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
42.35	139	41.42	1.36	3.29	4.73	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
42.65	140	56.91	1.74	3.07	4.76	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2
42.95	141	53.32	1.97	3.70	4.79	clayey silt to silty clay	UNDFND	UNDFD	26	2.9
43.25	142	121.91	5.49	4.51	4.82	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	62.84	3.38	5.37	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.85	144	44.82	1.97	4.39	4.87	silty clay to clay	UNDFND	UNDFD	29	2.4
44.15	145	47.98	1.57	3.26	4.90	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
44.45	146	39.48	1.21	3.06	4.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.0
44.80	147	42.47	1.55	3.65	4.96	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
45.10	148	49.22	1.82	3.70	4.99	clayey silt to silty clay	UNDFND	UNDFD	24	2.6
45.40	149	61.08	2.67	4.37	5.02	clayey silt to silty clay	UNDFND	UNDFD	29	3.4
45.75	150	144.76	2.88	1.99	5.05	silty sand to sandy silt	50-60	34-36	46	UNDEFINED

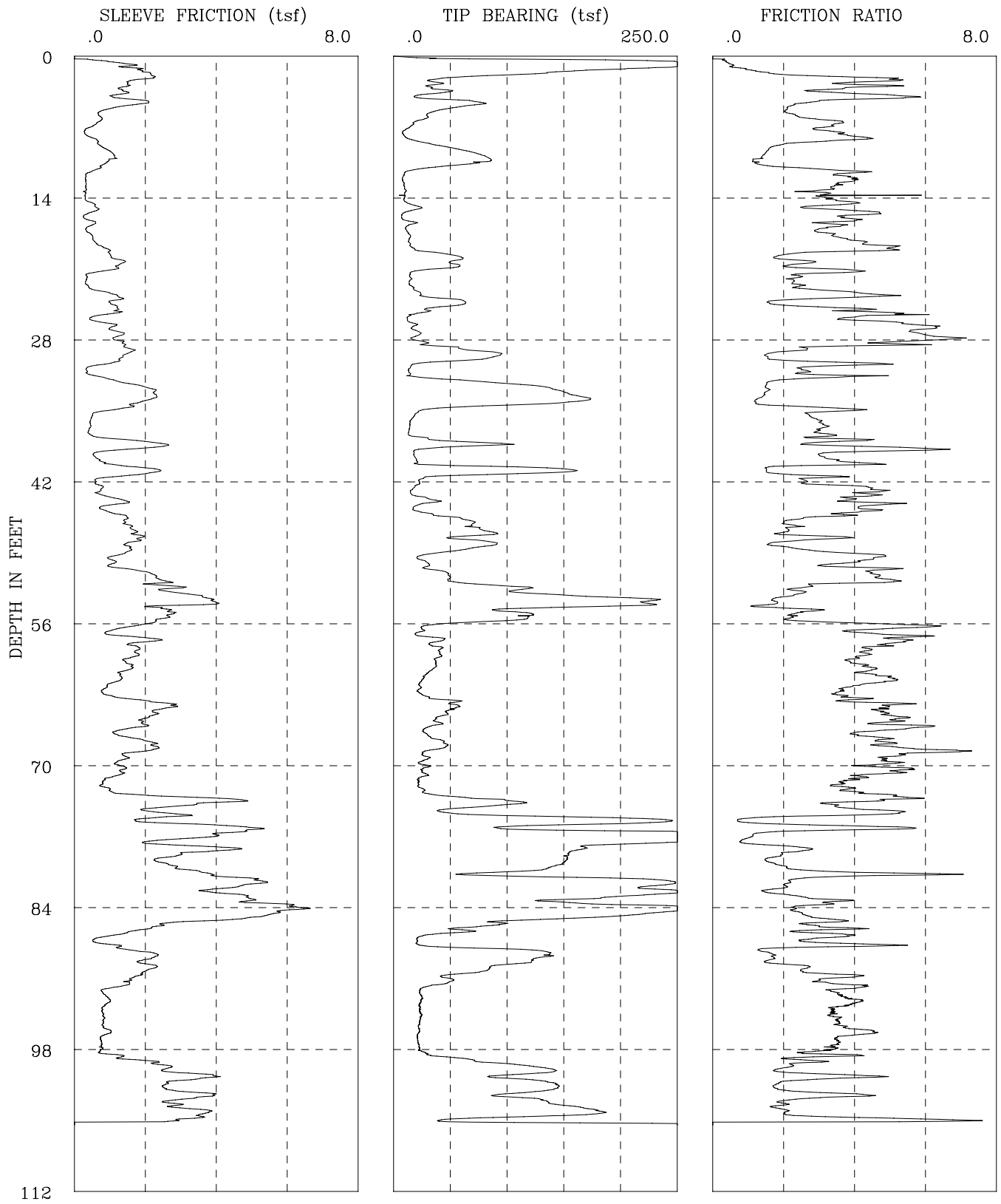
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-21e



CPT-08-007	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-22a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-007
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :03/28/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	216.40	0.96	0.45	0.03	sand	>90	>48	41	UNDEFINED
0.60	2	148.05	1.98	1.34	0.09	sand to silty sand	>90	>48	35	UNDEFINED
0.95	3	36.63	1.61	4.41	0.15	silty clay to clay	UNDFND	UNDFD	23	2.4
1.25	4	33.72	1.28	3.79	0.22	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
1.55	5	64.49	1.68	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.85	6	33.60	0.75	2.22	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.15	7	18.31	0.61	3.34	0.39	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
2.45	8	9.44	0.34	3.64	0.45	clay	UNDFND	UNDFD	9	.5
2.75	9	31.55	0.69	2.20	0.51	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
3.05	10	72.20	1.06	1.46	0.57	silty sand to sandy silt	60-70	42-44	23	UNDEFINED
3.35	11	64.99	0.86	1.32	0.61	silty sand to sandy silt	60-70	40-42	21	UNDEFINED
3.65	12	11.54	0.42	3.62	0.64	clay	UNDFND	UNDFD	11	.7
3.95	13	8.86	0.32	3.62	0.67	clay	UNDFND	UNDFD	8	.5
4.25	14	10.13	0.32	3.12	0.69	silty clay to clay	UNDFND	UNDFD	6	.6
4.55	15	15.04	0.48	3.21	0.72	silty clay to clay	UNDFND	UNDFD	10	.9
4.85	16	11.13	0.43	3.88	0.75	clay	UNDFND	UNDFD	11	.6
5.15	17	13.23	0.46	3.47	0.78	silty clay to clay	UNDFND	UNDFD	8	.8
5.45	18	13.02	0.42	3.24	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	14.38	0.64	4.45	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	39.97	1.00	2.49	0.86	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
6.40	21	52.08	1.27	2.44	0.89	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
6.70	22	15.80	0.47	2.97	0.93	clayey silt to silty clay	UNDFND	UNDFD	8	.9
7.00	23	15.40	0.37	2.40	0.95	clayey silt to silty clay	UNDFND	UNDFD	7	.9
7.35	24	33.74	1.09	3.22	0.98	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
7.65	25	46.17	1.13	2.44	1.02	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
7.95	26	16.16	0.72	4.48	1.04	clay	UNDFND	UNDFD	15	.9
8.25	27	17.66	1.02	5.79	1.07	clay	UNDFND	UNDFD	17	1.0
8.55	28	20.56	1.25	6.08	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	45.96	1.48	3.22	1.13	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.15	30	84.14	1.39	1.65	1.16	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
9.45	31	18.11	0.61	3.39	1.19	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
9.75	32	28.07	0.69	2.46	1.21	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
10.05	33	121.53	1.87	1.54	1.24	sand to silty sand	60-70	40-42	29	UNDEFINED
10.35	34	162.61	2.22	1.37	1.27	sand to silty sand	70-80	42-44	39	UNDEFINED
10.65	35	82.46	1.50	1.82	1.30	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
10.95	36	18.02	0.51	2.83	1.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
11.25	37	14.18	0.44	3.09	1.36	silty clay to clay	UNDFND	UNDFD	9	.7
11.55	38	22.16	0.78	3.51	1.38	clayey silt to silty clay	UNDFND	UNDFD	11	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-22b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.90	2.08	3.59	1.41	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
12.15	40	18.74	0.61	3.27	1.44	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
12.45	41	82.92	1.54	1.86	1.47	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
12.80	42	60.95	1.26	2.07	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	18.19	0.72	3.96	1.53	silty clay to clay	UNDFND	UNDFD	12	1.0
13.40	44	27.22	1.09	4.01	1.56	silty clay to clay	UNDFND	UNDFD	17	1.6
13.75	45	22.13	0.96	4.33	1.59	clay	UNDFND	UNDFD	21	1.2
14.05	46	58.74	1.44	2.45	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.35	47	77.98	1.64	2.11	1.65	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
14.65	48	72.15	1.76	2.43	1.68	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
14.95	49	62.49	1.51	2.42	1.70	sandy silt to clayey silt	UNDFND	UNDFD	24	3.9
15.25	50	25.22	1.09	4.32	1.73	silty clay to clay	UNDFND	UNDFD	16	1.4
15.55	51	36.25	1.53	4.22	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	51.84	2.38	4.59	1.79	silty clay to clay	UNDFND	UNDFD	33	3.2
16.15	53	107.86	2.72	2.52	1.82	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
16.45	54	202.76	3.78	1.87	1.85	sand to silty sand	70-80	40-42	49	UNDEFINED
16.75	55	138.33	2.65	1.92	1.87	silty sand to sandy silt	60-70	38-40	44	UNDEFINED
17.05	56	100.37	2.43	2.42	1.90	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
17.35	57	25.59	1.26	4.94	1.93	clay	UNDFND	UNDFD	25	1.4
17.65	58	34.30	1.82	5.31	1.96	clay	UNDFND	UNDFD	33	2.0
17.95	59	39.10	1.73	4.42	1.99	silty clay to clay	UNDFND	UNDFD	25	2.3
18.25	60	38.65	1.56	4.03	2.02	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
18.55	61	34.27	1.50	4.37	2.04	silty clay to clay	UNDFND	UNDFD	22	2.0
18.85	62	25.51	1.25	4.89	2.07	clay	UNDFND	UNDFD	24	1.4
19.20	63	23.04	0.85	3.71	2.10	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	44.90	1.96	4.37	2.13	silty clay to clay	UNDFND	UNDFD	29	2.7
19.80	65	50.87	2.44	4.79	2.16	silty clay to clay	UNDFND	UNDFD	32	3.1
20.15	66	37.85	1.98	5.22	2.19	clay	UNDFND	UNDFD	36	2.2
20.45	67	28.16	1.29	4.58	2.22	clay	UNDFND	UNDFD	27	1.6
20.75	68	42.73	2.05	4.80	2.25	silty clay to clay	UNDFND	UNDFD	27	2.5
21.05	69	31.04	1.80	5.81	2.28	clay	UNDFND	UNDFD	30	1.7
21.35	70	27.73	1.31	4.73	2.31	clay	UNDFND	UNDFD	27	1.5
21.65	71	26.57	1.33	4.99	2.34	clay	UNDFND	UNDFD	25	1.4
21.95	72	21.70	0.81	3.75	2.37	silty clay to clay	UNDFND	UNDFD	14	1.1
22.25	73	30.80	1.36	4.41	2.39	silty clay to clay	UNDFND	UNDFD	20	1.7
22.55	74	95.42	3.88	4.06	2.42	clayey silt to silty clay	UNDFND	UNDFD	46	6.0
22.85	75	63.37	2.47	3.90	2.45	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
23.15	76	196.07	2.70	1.38	2.48	sand to silty sand	70-80	40-42	47	UNDEFINED
23.45	77	239.29	4.55	1.90	2.51	sand to silty sand	70-80	40-42	>50	UNDEFINED
23.75	78	255.20	2.71	1.06	2.54	sand	80-90	40-42	49	UNDEFINED
24.05	79	158.51	3.65	2.30	2.56	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	149.73	2.50	1.67	2.59	sand to silty sand	60-70	38-40	36	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-22c

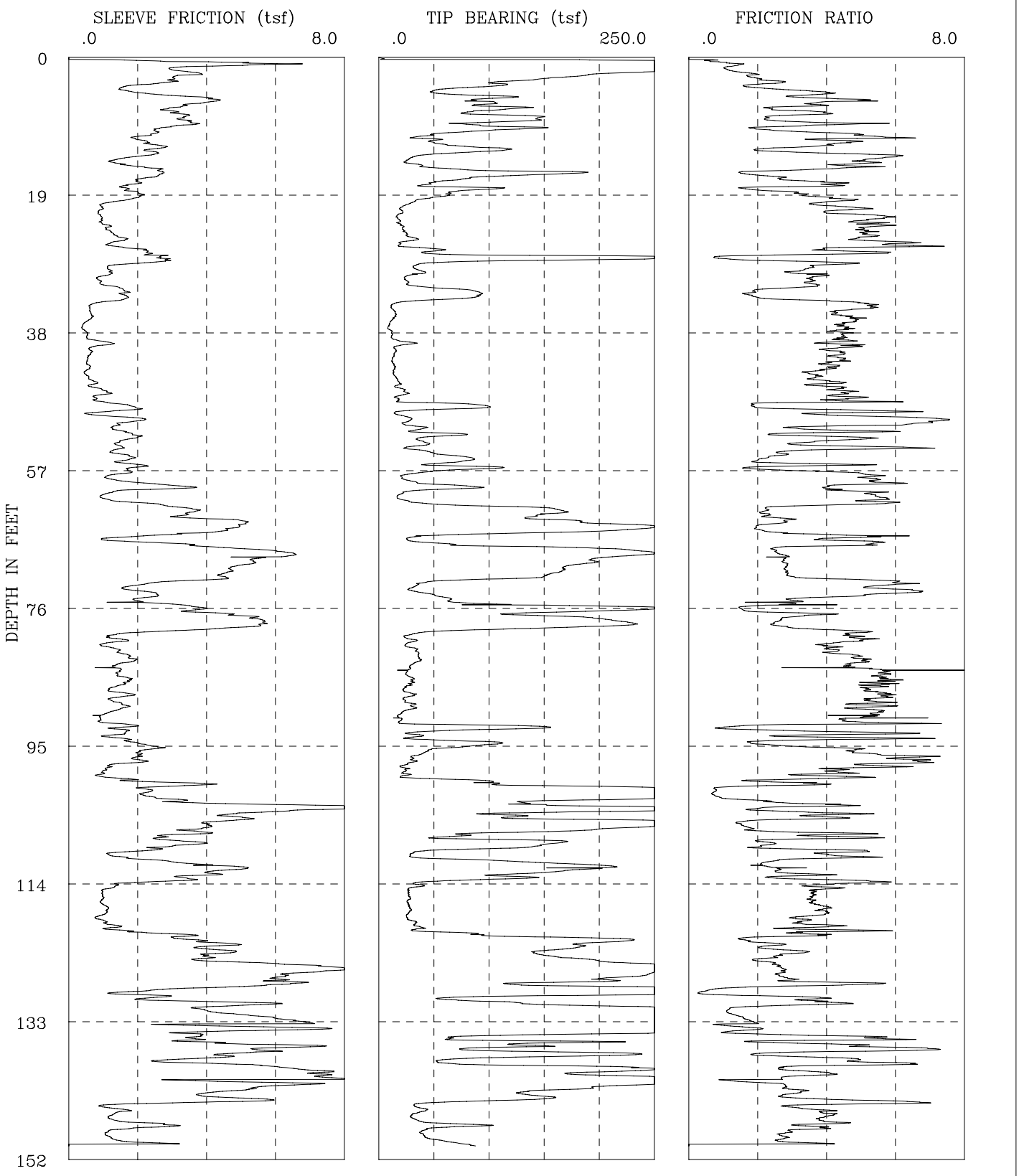
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	103.90	3.48	3.35	2.62	sandy silt to clayey silt	UNDFND	UNDFD	40	6.6
24.95	82	226.47	5.02	2.22	2.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
25.25	83	233.29	4.22	1.81	2.68	sand to silty sand	70-80	40-42	>50	UNDEFINED
25.60	84	190.99	5.45	2.86	2.71	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
25.90	85	225.64	5.62	2.49	2.74	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
26.20	86	93.86	3.01	3.20	2.77	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
26.55	87	40.37	1.25	3.11	2.80	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
26.85	88	41.22	0.99	2.41	2.83	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
27.15	89	133.06	2.15	1.62	2.86	sand to silty sand	50-60	36-38	32	UNDEFINED
27.45	90	100.53	2.07	2.06	2.88	silty sand to sandy silt	50-60	34-36	32	UNDEFINED
27.75	91	57.92	1.80	3.11	2.91	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
28.05	92	37.83	1.33	3.52	2.94	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
28.35	93	23.96	0.86	3.60	2.97	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
28.65	94	23.41	0.89	3.79	3.00	silty clay to clay	UNDFND	UNDFD	15	1.1
28.95	95	23.63	0.81	3.44	3.03	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
29.25	96	22.55	0.82	3.64	3.05	silty clay to clay	UNDFND	UNDFD	14	1.1
29.55	97	21.59	0.88	4.06	3.08	silty clay to clay	UNDFND	UNDFD	14	1.0
29.85	98	22.18	0.77	3.45	3.11	clayey silt to silty clay	UNDFND	UNDFD	11	1.0
30.15	99	37.59	1.04	2.77	3.14	sandy silt to clayey silt	UNDFND	UNDFD	14	2.1
30.45	100	106.00	2.43	2.29	3.17	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
30.75	101	114.31	3.36	2.94	3.20	sandy silt to clayey silt	UNDFND	UNDFD	44	7.2
31.05	102	139.99	2.63	1.88	3.22	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.35	103	112.41	3.46	3.08	3.25	sandy silt to clayey silt	UNDFND	UNDFD	43	7.0
31.65	104	148.84	2.83	1.90	3.28	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
32.00	105	128.25	3.49	2.72	3.31	silty sand to sandy silt	50-60	36-38	41	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-22d



I-436 Sr-22 Phase 2	CPT-08-008
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-23a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-008
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 30.83989

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	317.32	3.23	1.02	0.03	sand	>90	UNDFD	>50	UNDEFINED
0.60	2	284.69	3.39	1.19	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	174.65	3.27	1.87	0.15	sand to silty sand	>90	>48	42	UNDEFINED
1.25	4	106.28	2.30	2.16	0.22	silty sand to sandy silt	>90	46-48	34	UNDEFINED
1.55	5	55.47	1.86	3.36	0.28	clayey silt to silty clay	UNDFND	UNDFD	27	3.6
1.85	6	102.04	3.91	3.83	0.33	clayey silt to silty clay	UNDFND	UNDFD	49	6.7
2.15	7	109.15	3.36	3.08	0.39	sandy silt to clayey silt	UNDFND	UNDFD	42	7.2
2.45	8	97.11	3.13	3.22	0.45	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.75	9	129.81	3.40	2.62	0.51	silty sand to sandy silt	80-90	44-46	41	UNDEFINED
3.05	10	111.34	2.96	2.66	0.57	sandy silt to clayey silt	UNDFND	UNDFD	43	7.3
3.35	11	55.24	2.33	4.22	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	49.76	2.17	4.35	0.69	silty clay to clay	UNDFND	UNDFD	32	3.2
3.95	13	96.84	2.55	2.63	0.75	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
4.25	14	43.32	2.14	4.94	0.81	clay	UNDFND	UNDFD	41	2.8
4.55	15	29.77	1.42	4.78	0.87	clay	UNDFND	UNDFD	29	1.9
4.85	16	103.20	2.55	2.47	0.93	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.15	17	104.66	2.36	2.26	0.98	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.45	18	50.64	1.80	3.55	1.04	clayey silt to silty clay	UNDFND	UNDFD	24	3.3
5.75	19	79.14	1.87	2.36	1.10	sandy silt to clayey silt	UNDFND	UNDFD	30	5.2
6.05	20	45.48	1.82	4.00	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.40	21	23.42	0.99	4.22	1.23	silty clay to clay	UNDFND	UNDFD	15	1.4
6.70	22	19.08	0.89	4.66	1.29	clay	UNDFND	UNDFD	18	1.1
7.00	23	18.32	0.95	5.20	1.35	clay	UNDFND	UNDFD	18	1.1
7.35	24	22.28	1.16	5.19	1.41	clay	UNDFND	UNDFD	21	1.3
7.65	25	29.23	1.46	5.01	1.48	clay	UNDFND	UNDFD	28	1.8
7.95	26	21.33	1.29	6.07	1.54	clay	UNDFND	UNDFD	20	1.3
8.25	27	47.64	2.14	4.50	1.59	silty clay to clay	UNDFND	UNDFD	30	3.0
8.55	28	221.16	2.65	1.20	1.65	sand	80-90	42-44	42	UNDEFINED
8.85	29	39.56	1.59	4.02	1.71	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.15	30	35.53	1.19	3.36	1.77	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
9.45	31	24.82	0.88	3.55	1.83	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
9.75	32	42.57	1.26	2.95	1.87	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.05	33	90.03	1.63	1.81	1.90	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
10.35	34	42.78	1.27	2.96	1.93	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.65	35	12.07	0.61	5.04	1.95	clay	UNDFND	UNDFD	12	.6
10.95	36	14.80	0.66	4.43	1.98	clay	UNDFND	UNDFD	14	.8
11.25	37	10.69	0.50	4.69	2.01	clay	UNDFND	UNDFD	10	.5
11.55	38	9.83	0.44	4.44	2.04	clay	UNDFND	UNDFD	9	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-23b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	12.25	0.54	4.44	2.07	clay	UNDFND	UNDFD	12	.6
12.15	40	22.75	1.01	4.45	2.10	clay	UNDFND	UNDFD	22	1.3
12.45	41	14.68	0.63	4.27	2.12	clay	UNDFND	UNDFD	14	.8
12.80	42	12.86	0.56	4.32	2.15	clay	UNDFND	UNDFD	12	.6
13.10	43	14.12	0.58	4.09	2.19	clay	UNDFND	UNDFD	14	.7
13.40	44	13.63	0.50	3.65	2.21	silty clay to clay	UNDFND	UNDFD	9	.7
13.75	45	17.72	0.69	3.89	2.24	silty clay to clay	UNDFND	UNDFD	11	1.0
14.05	46	19.72	0.86	4.35	2.27	clay	UNDFND	UNDFD	19	1.1
14.35	47	20.11	0.91	4.52	2.30	clay	UNDFND	UNDFD	19	1.1
14.65	48	55.24	1.26	2.28	2.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.4
14.95	49	48.93	1.49	3.04	2.36	sandy silt to clayey silt	UNDFND	UNDFD	19	3.0
15.25	50	24.62	1.53	6.20	2.39	clay	UNDFND	UNDFD	24	1.4
15.55	51	28.65	1.48	5.15	2.42	clay	UNDFND	UNDFD	27	1.7
15.85	52	46.69	1.58	3.39	2.44	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
16.15	53	42.68	1.80	4.21	2.47	silty clay to clay	UNDFND	UNDFD	27	2.6
16.45	54	35.11	1.46	4.17	2.50	silty clay to clay	UNDFND	UNDFD	22	2.1
16.75	55	51.15	1.43	2.79	2.53	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
17.05	56	77.09	1.67	2.16	2.56	silty sand to sandy silt	40-50	34-36	25	UNDEFINED
17.35	57	75.95	1.93	2.54	2.59	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
17.65	58	29.92	1.41	4.70	2.61	clay	UNDFND	UNDFD	29	1.7
17.95	59	33.00	1.79	5.42	2.64	clay	UNDFND	UNDFD	32	1.9
18.25	60	62.66	2.61	4.16	2.67	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
18.55	61	18.58	1.01	5.45	2.70	clay	UNDFND	UNDFD	18	.9
18.85	62	45.21	2.05	4.54	2.73	silty clay to clay	UNDFND	UNDFD	29	2.7
19.20	63	158.20	3.51	2.22	2.76	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
19.50	64	152.38	4.01	2.63	2.79	silty sand to sandy silt	60-70	38-40	49	UNDEFINED
19.80	65	229.45	4.96	2.16	2.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
20.15	66	126.43	3.42	2.71	2.85	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.45	67	37.10	1.83	4.94	2.88	clay	UNDFND	UNDFD	36	2.2
20.75	68	171.97	4.77	2.77	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.05	69	229.56	6.06	2.64	2.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
21.35	70	188.98	5.27	2.79	2.96	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.65	71	166.90	4.70	2.81	2.99	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	136.64	4.43	3.25	3.02	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
22.25	73	39.86	2.33	5.84	3.05	clay	UNDFND	UNDFD	38	2.3
22.55	74	34.00	2.05	6.03	3.08	clay	UNDFND	UNDFD	33	1.9
22.85	75	59.66	2.21	3.71	3.11	clayey silt to silty clay	UNDFND	UNDFD	29	3.6
23.15	76	160.88	3.05	1.89	3.13	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.45	77	169.77	4.07	2.40	3.16	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.75	78	203.90	5.53	2.71	3.19	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
24.05	79	181.16	5.03	2.77	3.22	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	36.69	1.77	4.82	3.25	clay	UNDFND	UNDFD	35	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-23c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	28.63	1.36	4.73	3.28	clay	UNDFND	UNDFD	27	1.5
24.95	82	29.79	1.24	4.16	3.30	silty clay to clay	UNDFND	UNDFD	19	1.6
25.25	83	36.03	1.65	4.58	3.33	silty clay to clay	UNDFND	UNDFD	23	2.0
25.60	84	32.99	1.63	4.93	3.36	clay	UNDFND	UNDFD	32	1.8
25.90	85	26.08	1.38	5.31	3.39	clay	UNDFND	UNDFD	25	1.4
26.20	86	28.70	1.63	5.66	3.42	clay	UNDFND	UNDFD	27	1.5
26.55	87	26.79	1.45	5.41	3.45	clay	UNDFND	UNDFD	26	1.4
26.85	88	27.43	1.55	5.64	3.48	clay	UNDFND	UNDFD	26	1.4
27.15	89	24.58	1.33	5.41	3.51	clay	UNDFND	UNDFD	24	1.2
27.45	90	30.17	1.56	5.19	3.54	clay	UNDFND	UNDFD	29	1.6
27.75	91	19.23	1.02	5.32	3.57	clay	UNDFND	UNDFD	18	.9
28.05	92	29.02	1.14	3.94	3.60	silty clay to clay	UNDFND	UNDFD	19	1.5
28.35	93	105.53	1.62	1.54	3.62	sand to silty sand	40-50	34-36	25	UNDEFINED
28.65	94	30.76	1.39	4.51	3.65	silty clay to clay	UNDFND	UNDFD	20	1.6
28.95	95	91.03	2.02	2.22	3.68	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
29.25	96	49.59	2.27	4.58	3.71	silty clay to clay	UNDFND	UNDFD	32	2.9
29.55	97	32.21	2.01	6.24	3.74	clay	UNDFND	UNDFD	31	1.7
29.85	98	25.46	1.50	5.87	3.77	clay	UNDFND	UNDFD	24	1.3
30.15	99	24.99	1.00	3.98	3.79	silty clay to clay	UNDFND	UNDFD	16	1.2
30.45	100	57.94	1.52	2.63	3.82	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
30.75	101	182.64	3.08	1.69	3.85	sand to silty sand	60-70	36-38	44	UNDEFINED
31.05	102	304.83	2.25	0.74	3.88	sand	70-80	38-40	>50	UNDEFINED
31.35	103	191.91	3.15	1.64	3.91	sand to silty sand	60-70	36-38	46	UNDEFINED
31.65	104	309.81	7.76	2.51	3.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
32.00	105	132.49	5.06	3.82	3.97	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
32.30	106	261.51	4.25	1.63	4.00	sand to silty sand	70-80	38-40	>50	UNDEFINED
32.60	107	180.06	3.81	2.11	4.03	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
32.95	108	92.84	2.93	3.15	4.06	sandy silt to clayey silt	UNDFND	UNDFD	36	5.7
33.25	109	143.35	3.24	2.26	4.09	silty sand to sandy silt	50-60	34-36	46	UNDEFINED
33.55	110	37.99	1.65	4.34	4.12	silty clay to clay	UNDFND	UNDFD	24	2.0
33.85	111	84.92	2.33	2.75	4.14	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
34.15	112	195.34	4.57	2.34	4.17	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	134.08	3.88	2.90	4.20	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
34.75	114	68.75	2.67	3.89	4.23	clayey silt to silty clay	UNDFND	UNDFD	33	4.1
35.05	115	31.48	1.18	3.75	4.26	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
35.35	116	27.43	0.99	3.61	4.29	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.65	117	26.74	0.97	3.62	4.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.95	118	28.14	1.12	3.98	4.34	silty clay to clay	UNDFND	UNDFD	18	1.4
36.25	119	25.84	0.90	3.47	4.37	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
36.55	120	33.59	1.22	3.65	4.40	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
36.85	121	53.41	1.86	3.48	4.43	clayey silt to silty clay	UNDFND	UNDFD	26	3.0
37.15	122	177.85	3.50	1.97	4.46	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-23d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	184.03	4.24	2.31	4.48	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.75	124	147.66	4.37	2.96	4.51	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.3
38.05	125	188.81	4.20	2.22	4.54	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.40	126	279.50	7.41	2.65	4.57	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
38.70	127	236.16	6.36	2.69	4.60	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.00	128	165.57	6.23	3.76	4.63	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
39.35	129	372.47	2.81	0.75	4.66	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
39.65	130	109.59	2.43	2.22	4.69	silty sand to sandy silt	40-50	32-34	35	UNDEFINED
39.95	131	181.83	4.81	2.64	4.72	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
40.25	132	367.72	4.34	1.18	4.75	sand	80-90	38-40	>50	UNDEFINED
40.55	133	372.43	6.20	1.66	4.78	sand to silty sand	80-90	38-40	>50	UNDEFINED
40.85	134	356.93	5.62	1.58	4.80	sand to silty sand	80-90	38-40	>50	UNDEFINED
41.15	135	235.11	4.02	1.71	4.83	sand to silty sand	60-70	36-38	>50	UNDEFINED
41.45	136	115.16	3.79	3.29	4.86	sandy silt to clayey silt	UNDFND	UNDFD	44	7.1
41.75	137	106.79	6.18	5.79	4.89	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	181.15	4.74	2.61	4.92	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.35	139	65.23	3.56	5.45	4.95	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.65	140	225.04	6.72	2.99	4.97	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.95	141	235.00	7.51	3.20	5.00	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
43.25	142	267.68	5.61	2.10	5.03	sand to silty sand	70-80	36-38	>50	UNDEFINED
43.55	143	155.70	4.77	3.06	5.06	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.8
43.85	144	140.77	4.76	3.38	5.09	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
44.15	145	41.24	2.02	4.89	5.12	clay	UNDFND	UNDFD	40	2.1
44.45	146	37.43	1.46	3.90	5.14	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
44.80	147	36.25	1.47	4.06	5.18	silty clay to clay	UNDFND	UNDFD	23	1.8
45.10	148	65.19	2.24	3.44	5.21	clayey silt to silty clay	UNDFND	UNDFD	31	3.7
45.40	149	40.22	1.12	2.78	5.23	sandy silt to clayey silt	UNDFND	UNDFD	15	2.0
45.75	150	66.48	1.28	1.93	5.27	silty sand to sandy silt	<40	<30	21	UNDEFINED

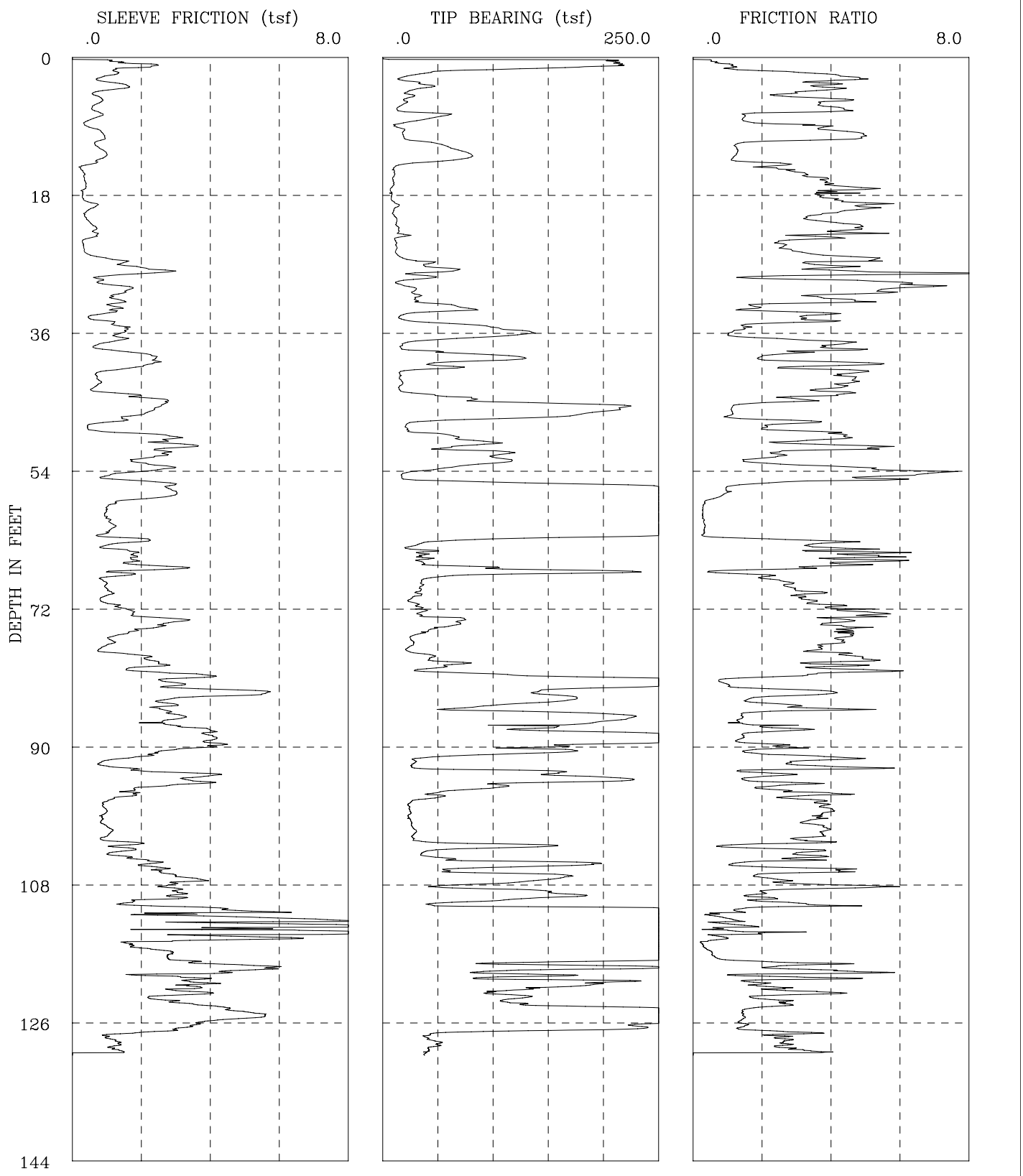
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-23e



CPT-08-009	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-24a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-009
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	176.67	1.34	0.76	0.03	sand	>90	>48	34	UNDEFINED
0.60	2	110.06	1.54	1.40	0.09	sand to silty sand	>90	>48	26	UNDEFINED
0.95	3	22.26	0.92	4.15	0.15	silty clay to clay	UNDFND	UNDFD	14	1.4
1.25	4	38.08	1.47	3.86	0.22	clayey silt to silty clay	UNDFND	UNDFD	18	2.5
1.55	5	24.56	0.72	2.93	0.28	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
1.85	6	20.87	0.82	3.92	0.33	silty clay to clay	UNDFND	UNDFD	13	1.3
2.15	7	14.98	0.61	4.09	0.39	clay	UNDFND	UNDFD	14	.9
2.45	8	49.86	0.76	1.53	0.45	silty sand to sandy silt	50-60	40-42	16	UNDEFINED
2.75	9	18.88	0.39	2.08	0.51	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
3.05	10	18.26	0.78	4.29	0.57	clay	UNDFND	UNDFD	17	1.1
3.35	11	23.79	0.87	3.67	0.61	silty clay to clay	UNDFND	UNDFD	15	1.5
3.65	12	56.98	0.72	1.26	0.64	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.95	13	77.32	0.97	1.25	0.67	silty sand to sandy silt	60-70	40-42	25	UNDEFINED
4.25	14	49.19	0.71	1.44	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.70	0.27	2.52	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	9.98	0.34	3.45	0.75	clay	UNDFND	UNDFD	10	.6
5.15	17	9.53	0.38	4.04	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.31	0.31	4.30	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	8.33	0.34	4.09	0.84	clay	UNDFND	UNDFD	8	.4
6.05	20	12.40	0.63	5.05	0.86	clay	UNDFND	UNDFD	12	.7
6.40	21	10.39	0.38	3.68	0.89	clay	UNDFND	UNDFD	10	.6
6.70	22	12.52	0.52	4.17	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	14.35	0.67	4.70	0.95	clay	UNDFND	UNDFD	14	.8
7.35	24	14.78	0.48	3.25	0.98	silty clay to clay	UNDFND	UNDFD	9	.8
7.65	25	12.39	0.33	2.65	1.02	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.95	26	13.31	0.52	3.90	1.04	clay	UNDFND	UNDFD	13	.7
8.25	27	34.75	1.37	3.94	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
8.55	28	53.92	2.35	4.35	1.10	silty clay to clay	UNDFND	UNDFD	34	3.4
8.85	29	33.92	1.08	3.17	1.13	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.15	30	18.05	1.14	6.32	1.16	clay	UNDFND	UNDFD	17	1.0
9.45	31	29.51	1.48	5.02	1.19	clay	UNDFND	UNDFD	28	1.8
9.75	32	31.42	1.31	4.16	1.21	silty clay to clay	UNDFND	UNDFD	20	1.9
10.05	33	70.50	1.19	1.69	1.24	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
10.35	34	24.79	0.79	3.20	1.27	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
10.65	35	44.75	1.01	2.26	1.30	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.95	36	116.99	1.53	1.30	1.33	sand to silty sand	60-70	40-42	28	UNDEFINED
11.25	37	87.31	1.36	1.56	1.36	silty sand to sandy silt	50-60	38-40	28	UNDEFINED
11.55	38	19.08	0.79	4.16	1.38	silty clay to clay	UNDFND	UNDFD	12	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-24a

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	60.44	1.67	2.76	1.41	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
12.15	40	99.25	2.42	2.44	1.44	silty sand to sandy silt	60-70	38-40	32	UNDEFINED
12.45	41	47.95	1.73	3.61	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	15.69	0.72	4.57	1.50	clay	UNDFND	UNDFD	15	.8
13.10	43	16.90	0.76	4.48	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	22.82	0.95	4.16	1.56	silty clay to clay	UNDFND	UNDFD	15	1.3
13.75	45	88.21	2.42	2.74	1.59	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
14.05	46	212.87	2.47	1.16	1.62	sand	80-90	42-44	41	UNDEFINED
14.35	47	166.63	1.83	1.10	1.65	sand to silty sand	70-80	40-42	40	UNDEFINED
14.65	48	35.55	0.96	2.71	1.68	sandy silt to clayey silt	UNDFND	UNDFD	14	2.1
14.95	49	27.45	0.85	3.11	1.70	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
15.25	50	69.66	2.81	4.03	1.73	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
15.55	51	78.70	3.02	3.84	1.76	clayey silt to silty clay	UNDFND	UNDFD	38	5.0
15.85	52	99.36	2.61	2.63	1.79	sandy silt to clayey silt	UNDFND	UNDFD	38	6.4
16.15	53	107.93	1.96	1.82	1.82	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
16.45	54	57.10	2.58	4.52	1.85	silty clay to clay	UNDFND	UNDFD	36	3.5
16.75	55	18.35	1.12	6.10	1.87	clay	UNDFND	UNDFD	18	1.0
17.05	56	142.23	2.50	1.76	1.90	silty sand to sandy silt	60-70	38-40	45	UNDEFINED
17.35	57	302.62	2.91	0.96	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	359.93	2.22	0.62	1.96	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.95	59	357.37	1.09	0.31	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	345.25	0.96	0.28	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	350.09	1.07	0.31	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	348.41	1.16	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	205.38	1.35	0.66	2.10	sand	70-80	40-42	39	UNDEFINED
19.50	64	31.89	1.24	3.88	2.13	silty clay to clay	UNDFND	UNDFD	20	1.8
19.80	65	36.97	1.68	4.55	2.16	silty clay to clay	UNDFND	UNDFD	24	2.2
20.15	66	36.07	1.72	4.78	2.19	clay	UNDFND	UNDFD	35	2.1
20.45	67	129.77	2.38	1.83	2.22	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
20.75	68	86.11	1.28	1.49	2.25	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.05	69	35.09	0.95	2.71	2.28	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0
21.35	70	33.27	1.08	3.24	2.31	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
21.65	71	27.00	0.87	3.21	2.34	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
21.95	72	32.72	1.31	4.01	2.37	silty clay to clay	UNDFND	UNDFD	21	1.8
22.25	73	35.45	1.81	5.09	2.39	clay	UNDFND	UNDFD	34	2.0
22.55	74	70.72	2.93	4.14	2.42	clayey silt to silty clay	UNDFND	UNDFD	34	4.4
22.85	75	47.99	2.14	4.45	2.45	silty clay to clay	UNDFND	UNDFD	31	2.9
23.15	76	28.22	1.25	4.43	2.48	silty clay to clay	UNDFND	UNDFD	18	1.5
23.45	77	26.78	1.07	4.00	2.51	silty clay to clay	UNDFND	UNDFD	17	1.4
23.75	78	27.32	1.08	3.95	2.54	silty clay to clay	UNDFND	UNDFD	17	1.5
24.05	79	48.32	2.26	4.68	2.56	silty clay to clay	UNDFND	UNDFD	31	2.9
24.35	80	54.32	2.17	3.99	2.59	clayey silt to silty clay	UNDFND	UNDFD	26	3.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-24c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	103.75	3.23	3.11	2.62	sandy silt to clayey silt	UNDFND	UNDFD	40	6.5
24.95	82	326.66	2.89	0.88	2.65	sand	80-90	40-42	>50	UNDEFINED
25.25	83	182.41	4.15	2.28	2.68	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
25.60	84	163.72	3.76	2.30	2.71	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
25.90	85	100.74	2.70	2.68	2.74	sandy silt to clayey silt	UNDFND	UNDFD	39	6.3
26.20	86	166.32	2.91	1.75	2.77	sand to silty sand	60-70	38-40	40	UNDEFINED
26.55	87	200.53	2.78	1.38	2.80	sand to silty sand	70-80	38-40	48	UNDEFINED
26.85	88	160.88	3.75	2.33	2.83	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.15	89	286.40	4.04	1.41	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.45	90	206.49	4.04	1.95	2.88	sand to silty sand	70-80	38-40	49	UNDEFINED
27.75	91	139.13	2.57	1.85	2.91	silty sand to sandy silt	60-70	36-38	44	UNDEFINED
28.05	92	34.29	1.29	3.75	2.94	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
28.35	93	45.98	1.29	2.81	2.97	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
28.65	94	170.87	3.51	2.05	3.00	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.95	95	163.46	3.43	2.10	3.03	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.25	96	77.60	1.86	2.39	3.05	sandy silt to clayey silt	UNDFND	UNDFD	30	4.7
29.55	97	43.32	1.43	3.29	3.08	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
29.85	98	24.11	0.91	3.76	3.11	silty clay to clay	UNDFND	UNDFD	15	1.2
30.15	99	24.52	0.95	3.87	3.14	silty clay to clay	UNDFND	UNDFD	16	1.2
30.45	100	24.94	0.85	3.42	3.17	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
30.75	101	27.60	1.05	3.81	3.20	silty clay to clay	UNDFND	UNDFD	18	1.4
31.05	102	28.23	1.01	3.58	3.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
31.35	103	75.49	1.43	1.90	3.25	silty sand to sandy silt	40-50	32-34	24	UNDEFINED
31.65	104	67.26	1.44	2.14	3.28	silty sand to sandy silt	<40	30-32	21	UNDEFINED
32.00	105	69.78	1.79	2.56	3.31	sandy silt to clayey silt	UNDFND	UNDFD	27	4.2
32.30	106	131.75	2.34	1.77	3.34	silty sand to sandy silt	50-60	36-38	42	UNDEFINED
32.60	107	121.84	2.82	2.32	3.37	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
32.95	108	114.00	3.24	2.84	3.40	sandy silt to clayey silt	UNDFND	UNDFD	44	7.1
33.25	109	118.33	3.01	2.55	3.43	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
33.55	110	143.40	2.65	1.85	3.46	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
33.85	111	120.94	2.56	2.12	3.49	silty sand to sandy silt	50-60	34-36	39	UNDEFINED
34.15	112	459.01	4.06	0.88	3.52	gravelly sand to sand	>90	42-44	>50	UNDEFINED
34.45	113	625.38	6.09	0.97	3.55	gravelly sand to sand	>90	42-44	>50	UNDEFINED
34.75	114	651.22	7.45	1.14	3.57	sand	>90	42-44	>50	UNDEFINED
35.05	115	611.68	7.34	1.20	3.60	sand	>90	42-44	>50	UNDEFINED
35.35	116	636.71	2.30	0.36	3.63	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.65	117	550.17	2.55	0.46	3.66	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.95	118	370.38	2.95	0.80	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	185.88	4.99	2.69	3.72	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
36.55	120	121.64	3.70	3.04	3.74	sandy silt to clayey silt	UNDFND	UNDFD	47	7.6
36.85	121	163.10	3.63	2.23	3.77	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.15	122	139.79	3.30	2.36	3.80	silty sand to sandy silt	50-60	36-38	45	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

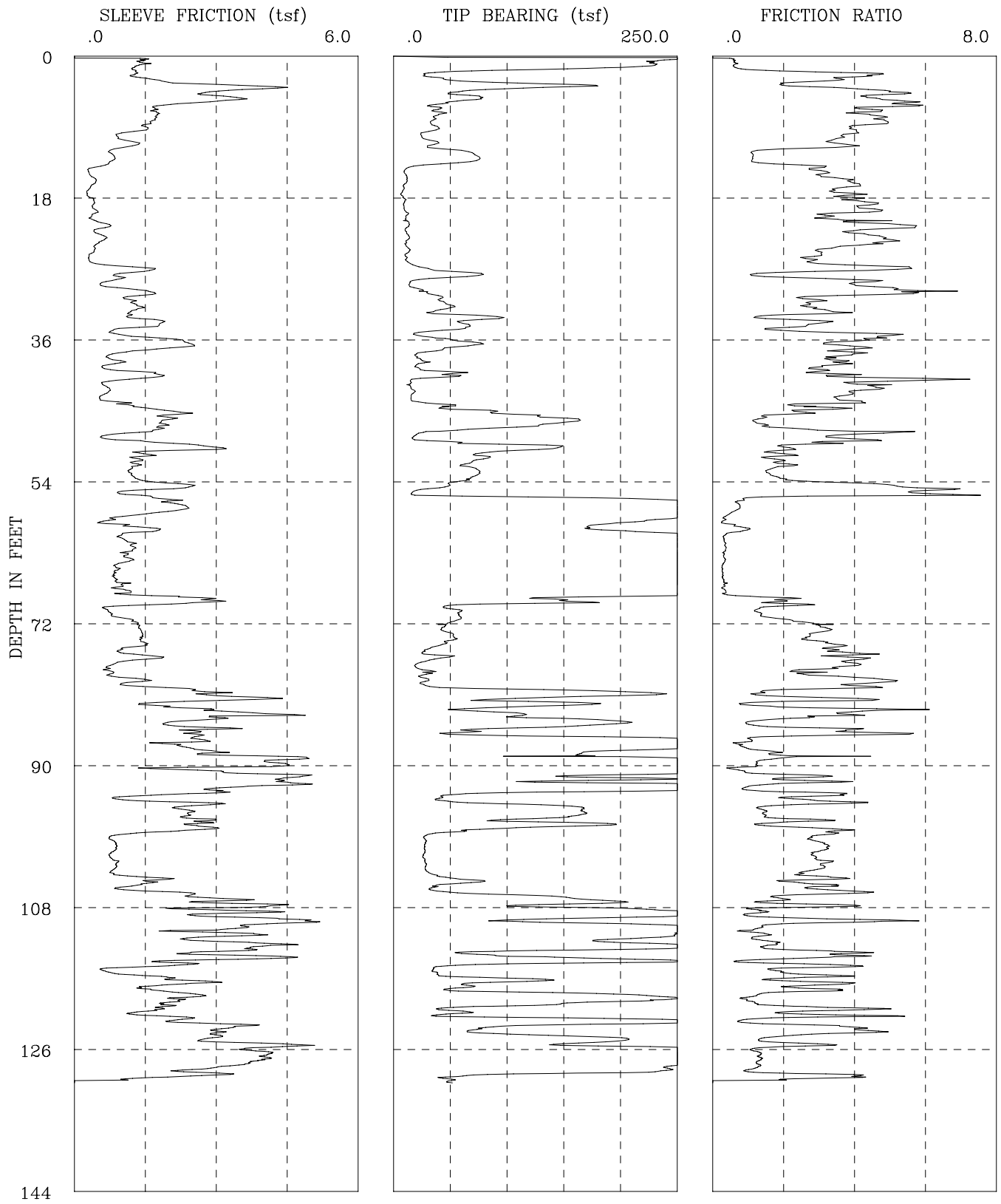
Figure A-24d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	116.43	2.94	2.52	3.83	silty sand to sandy silt	50-60	34-36	37	UNDEFINED
37.75	124	130.60	3.39	2.60	3.86	silty sand to sandy silt	50-60	34-36	42	UNDEFINED
38.05	125	327.37	4.90	1.50	3.89	sand to silty sand	80-90	40-42	>50	UNDEFINED
38.40	126	325.27	4.64	1.43	3.92	sand	80-90	40-42	>50	UNDEFINED
38.70	127	217.86	3.28	1.51	3.95	sand to silty sand	60-70	38-40	>50	UNDEFINED
39.00	128	49.93	1.36	2.73	3.97	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
39.35	129	47.90	1.27	2.65	4.01	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
39.65	130	39.94	0.87	2.19	4.04	sandy silt to clayey silt	UNDFND	UNDFD	15	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-24e



CPT-08-013	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-25a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-013
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	221.69	1.21	0.54	0.03	sand	>90	>48	42	UNDEFINED
0.60	2	152.50	1.28	0.84	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	37.31	1.44	3.86	0.15	clayey silt to silty clay	UNDFND	UNDFD	18	2.4
1.25	4	131.37	3.31	2.52	0.22	silty sand to sandy silt	>90	>48	42	UNDEFINED
1.55	5	62.35	2.98	4.78	0.28	silty clay to clay	UNDFND	UNDFD	40	4.1
1.85	6	60.18	3.00	4.98	0.33	silty clay to clay	UNDFND	UNDFD	38	3.9
2.15	7	36.81	1.72	4.67	0.39	silty clay to clay	UNDFND	UNDFD	24	2.4
2.45	8	38.49	1.74	4.51	0.45	silty clay to clay	UNDFND	UNDFD	25	2.5
2.75	9	34.86	1.55	4.44	0.51	silty clay to clay	UNDFND	UNDFD	22	2.2
3.05	10	30.49	1.20	3.93	0.57	silty clay to clay	UNDFND	UNDFD	19	1.9
3.35	11	32.88	1.11	3.38	0.61	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
3.65	12	39.30	0.98	2.48	0.64	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
3.95	13	73.07	0.83	1.13	0.67	silty sand to sandy silt	60-70	40-42	23	UNDEFINED
4.25	14	51.62	0.72	1.39	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.53	0.32	3.02	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	11.70	0.41	3.51	0.75	silty clay to clay	UNDFND	UNDFD	7	.7
5.15	17	9.41	0.36	3.84	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.53	0.28	3.69	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	9.60	0.41	4.24	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	10.03	0.43	4.30	0.86	clay	UNDFND	UNDFD	10	.5
6.40	21	11.42	0.39	3.41	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	12.43	0.64	5.13	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	12.24	0.53	4.32	0.95	clay	UNDFND	UNDFD	12	.7
7.35	24	11.49	0.53	4.62	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	13.00	0.40	3.09	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	11.21	0.31	2.79	1.04	silty clay to clay	UNDFND	UNDFD	7	.6
8.25	27	22.68	1.08	4.78	1.07	clay	UNDFND	UNDFD	22	1.4
8.55	28	63.75	1.09	1.71	1.10	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
8.85	29	18.14	0.71	3.90	1.13	silty clay to clay	UNDFND	UNDFD	12	1.0
9.15	30	23.23	1.25	5.37	1.16	clay	UNDFND	UNDFD	22	1.4
9.45	31	39.65	1.28	3.22	1.19	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.75	32	48.68	1.32	2.71	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	49.00	1.19	2.43	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.35	34	72.45	1.65	2.28	1.27	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
10.65	35	54.74	1.20	2.19	1.30	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
10.95	36	29.90	1.37	4.59	1.33	silty clay to clay	UNDFND	UNDFD	19	1.8
11.25	37	65.90	2.40	3.64	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.2
11.55	38	31.44	1.21	3.86	1.38	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-25b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	24.01	0.84	3.48	1.41	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
12.15	40	22.03	0.70	3.20	1.44	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	47.99	1.67	3.49	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	14.78	0.73	4.92	1.50	clay	UNDFND	UNDFD	14	.8
13.10	43	17.07	0.70	4.10	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	18.06	0.70	3.86	1.56	silty clay to clay	UNDFND	UNDFD	12	1.0
13.75	45	58.87	1.54	2.62	1.59	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.05	46	128.95	2.08	1.61	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	135.90	1.84	1.36	1.65	sand to silty sand	60-70	40-42	33	UNDEFINED
14.65	48	40.11	1.35	3.36	1.68	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.95	49	30.92	1.08	3.50	1.70	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
15.25	50	126.49	2.68	2.12	1.73	silty sand to sandy silt	60-70	38-40	40	UNDEFINED
15.55	51	79.67	1.40	1.76	1.76	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
15.85	52	66.65	1.33	2.00	1.79	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
16.15	53	74.04	1.18	1.60	1.82	silty sand to sandy silt	40-50	36-38	24	UNDEFINED
16.45	54	65.99	1.35	2.05	1.85	silty sand to sandy silt	40-50	34-36	21	UNDEFINED
16.75	55	42.30	2.20	5.20	1.87	clay	UNDFND	UNDFD	41	2.6
17.05	56	42.41	1.22	2.88	1.90	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
17.35	57	270.93	2.05	0.76	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	322.94	2.17	0.67	1.96	sand	>90	42-44	>50	UNDEFINED
17.95	59	271.44	1.00	0.37	1.99	gravelly sand to sand	80-90	42-44	43	UNDEFINED
18.25	60	184.07	1.06	0.57	2.02	sand	70-80	40-42	35	UNDEFINED
18.55	61	240.92	1.31	0.54	2.04	sand	80-90	40-42	46	UNDEFINED
18.85	62	335.61	1.11	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	343.25	1.19	0.35	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	347.37	1.14	0.33	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	325.24	0.93	0.29	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	308.74	0.85	0.27	2.19	gravelly sand to sand	80-90	42-44	49	UNDEFINED
20.45	67	294.69	0.94	0.32	2.22	gravelly sand to sand	80-90	42-44	47	UNDEFINED
20.75	68	312.45	1.05	0.33	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	193.92	2.23	1.15	2.28	sand	70-80	40-42	37	UNDEFINED
21.35	70	85.13	1.54	1.81	2.31	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.65	71	57.93	0.75	1.30	2.34	silty sand to sandy silt	<40	32-34	18	UNDEFINED
21.95	72	54.08	1.20	2.22	2.37	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
22.25	73	43.96	1.39	3.15	2.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.6
22.55	74	53.03	1.43	2.69	2.42	sandy silt to clayey silt	UNDFND	UNDFD	20	3.2
22.85	75	42.52	1.42	3.33	2.45	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
23.15	76	29.27	1.07	3.65	2.48	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
23.45	77	36.28	1.39	3.83	2.51	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
23.75	78	22.25	0.73	3.27	2.54	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
24.05	79	28.59	0.88	3.07	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	27.66	1.25	4.53	2.59	clay	UNDFND	UNDFD	26	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-25c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	151.28	2.53	1.67	2.62	sand to silty sand	60-70	38-40	36	UNDEFINED
24.95	82	135.12	3.32	2.46	2.65	silty sand to sandy silt	60-70	36-38	43	UNDEFINED
25.25	83	122.70	1.99	1.62	2.68	sand to silty sand	50-60	36-38	29	UNDEFINED
25.60	84	105.54	3.53	3.34	2.71	sandy silt to clayey silt	UNDFND	UNDFD	40	6.7
25.90	85	187.58	2.18	1.16	2.74	sand	70-80	38-40	36	UNDEFINED
26.20	86	73.92	2.71	3.66	2.77	clayey silt to silty clay	UNDFND	UNDFD	35	4.5
26.55	87	216.57	2.51	1.16	2.80	sand	70-80	38-40	41	UNDEFINED
26.85	88	253.25	2.43	0.96	2.83	sand	70-80	40-42	49	UNDEFINED
27.15	89	193.09	3.70	1.91	2.86	sand to silty sand	70-80	38-40	46	UNDEFINED
27.45	90	336.49	4.31	1.28	2.88	sand	80-90	40-42	>50	UNDEFINED
27.75	91	329.36	2.78	0.84	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	176.66	4.55	2.57	2.94	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.35	93	316.67	3.81	1.20	2.97	sand	80-90	40-42	>50	UNDEFINED
28.65	94	98.30	2.18	2.22	3.00	silty sand to sandy silt	50-60	34-36	31	UNDEFINED
28.95	95	68.39	1.98	2.90	3.03	sandy silt to clayey silt	UNDFND	UNDFD	26	4.1
29.25	96	165.82	2.33	1.41	3.05	sand to silty sand	60-70	38-40	40	UNDEFINED
29.55	97	135.73	2.55	1.88	3.08	silty sand to sandy silt	50-60	36-38	43	UNDEFINED
29.85	98	150.63	2.73	1.81	3.11	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
30.15	99	46.04	1.57	3.41	3.14	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
30.45	100	27.76	0.81	2.91	3.17	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
30.75	101	27.47	0.87	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.05	102	26.69	0.76	2.86	3.22	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
31.35	103	28.13	0.89	3.16	3.25	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.65	104	30.83	0.82	2.65	3.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.00	105	58.65	1.60	2.72	3.31	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
32.30	106	36.49	1.23	3.38	3.34	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
32.60	107	124.23	2.74	2.21	3.37	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.95	108	165.71	3.35	2.02	3.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
33.25	109	266.87	3.17	1.19	3.43	sand	70-80	38-40	>50	UNDEFINED
33.55	110	150.47	4.47	2.97	3.46	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
33.85	111	260.23	3.10	1.19	3.49	sand	70-80	38-40	50	UNDEFINED
34.15	112	231.12	3.09	1.34	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	233.85	3.79	1.62	3.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.75	114	119.93	3.08	2.57	3.57	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
35.05	115	193.54	3.19	1.65	3.60	sand to silty sand	60-70	36-38	46	UNDEFINED
35.35	116	48.11	1.36	2.82	3.63	sandy silt to clayey silt	UNDFND	UNDFD	18	2.7
35.65	117	46.39	1.00	2.17	3.66	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
35.95	118	92.32	2.29	2.48	3.69	sandy silt to clayey silt	UNDFND	UNDFD	35	5.6
36.25	119	91.47	1.84	2.02	3.72	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
36.55	120	229.01	2.35	1.03	3.74	sand	70-80	38-40	44	UNDEFINED
36.85	121	95.88	1.88	1.96	3.77	silty sand to sandy silt	40-50	32-34	31	UNDEFINED
37.15	122	56.55	1.58	2.80	3.80	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-25d

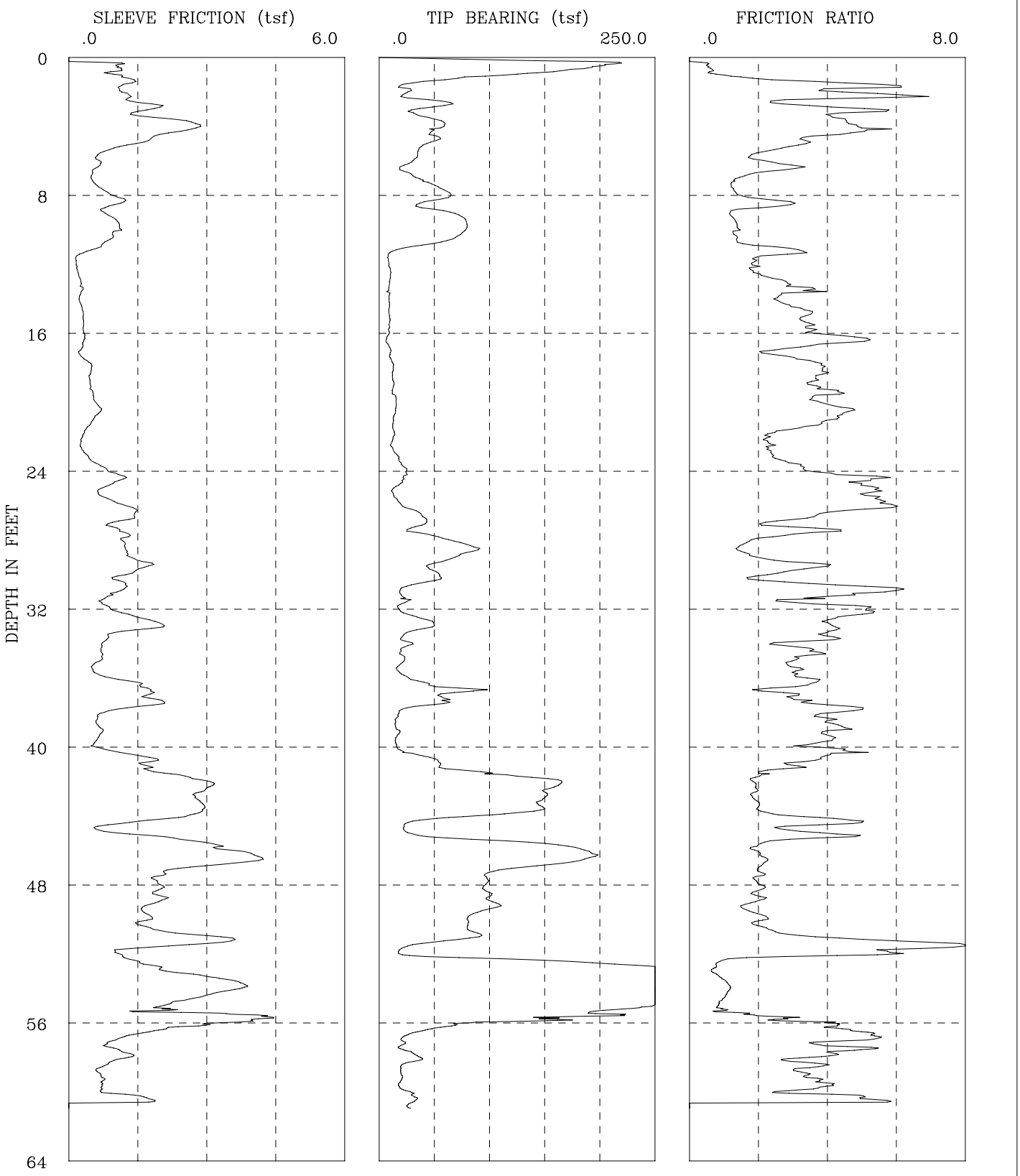
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.82	2.62	1.17	3.83	sand	70-80	38-40	43	UNDEFINED
37.75	124	76.88	3.16	4.11	3.86	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
38.05	125	168.18	2.89	1.72	3.89	sand to silty sand	60-70	36-38	40	UNDEFINED
38.40	126	217.42	3.96	1.82	3.92	sand to silty sand	60-70	38-40	>50	UNDEFINED
38.70	127	313.08	4.04	1.29	3.95	sand	70-80	40-42	>50	UNDEFINED
39.00	128	290.48	3.81	1.31	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	216.19	2.80	1.29	4.01	sand	60-70	38-40	41	UNDEFINED
39.65	130	52.30	1.29	2.48	4.04	sandy silt to clayey silt	UNDFND	UNDFD	20	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-25d



I-436 SR-22 Phase 2	CPT-08-014
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-26a

Engineer : Nava
On Site Loc: CPT-08-014
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/27/2008
Cone Used : 30 ton
Water table (feet) : 9.8

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	168.58	0.88	0.52	0.03	sand	>90	>48	32	UNDEFINED
0.60	2	39.05	1.22	3.14	0.09	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
0.95	3	39.86	1.55	3.89	0.15	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
1.25	4	49.74	2.29	4.61	0.22	silty clay to clay	UNDFND	UNDFD	32	3.3
1.55	5	47.93	1.83	3.81	0.28	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
1.85	6	33.76	0.73	2.16	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.15	7	26.57	0.55	2.06	0.39	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
2.45	8	55.85	0.74	1.33	0.45	silty sand to sandy silt	60-70	40-42	18	UNDEFINED
2.75	9	48.65	0.95	1.95	0.51	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
3.05	10	77.93	1.05	1.35	0.57	silty sand to sandy silt	60-70	42-44	25	UNDEFINED
3.35	11	57.59	0.85	1.47	0.61	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.65	12	9.78	0.25	2.51	0.64	silty clay to clay	UNDFND	UNDFD	6	.6
3.95	13	9.94	0.21	2.13	0.67	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.25	14	8.85	0.26	2.98	0.69	silty clay to clay	UNDFND	UNDFD	6	.5
4.55	15	9.10	0.28	3.09	0.72	silty clay to clay	UNDFND	UNDFD	6	.5
4.85	16	9.33	0.32	3.39	0.75	clay	UNDFND	UNDFD	9	.5
5.15	17	7.99	0.32	3.96	0.78	clay	UNDFND	UNDFD	8	.4
5.45	18	11.10	0.35	3.13	0.81	silty clay to clay	UNDFND	UNDFD	7	.6
5.75	19	12.49	0.47	3.73	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	13.37	0.51	3.82	0.86	silty clay to clay	UNDFND	UNDFD	9	.8
6.40	21	14.44	0.62	4.31	0.89	clay	UNDFND	UNDFD	14	.8
6.70	22	12.95	0.38	2.96	0.93	silty clay to clay	UNDFND	UNDFD	8	.7
7.00	23	12.37	0.29	2.32	0.95	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.35	24	21.10	0.67	3.19	0.98	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
7.65	25	18.30	0.95	5.19	1.02	clay	UNDFND	UNDFD	18	1.1
7.95	26	16.94	0.95	5.60	1.04	clay	UNDFND	UNDFD	16	1.0
8.25	27	38.95	1.27	3.26	1.07	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
8.55	28	44.30	1.16	2.61	1.10	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
8.85	29	78.74	1.27	1.61	1.13	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
9.15	30	50.70	1.53	3.01	1.16	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
9.45	31	33.78	1.13	3.35	1.19	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.75	32	21.10	0.82	3.89	1.21	silty clay to clay	UNDFND	UNDFD	13	1.2
10.05	33	37.77	1.63	4.30	1.24	silty clay to clay	UNDFND	UNDFD	24	2.3
10.35	34	26.68	1.01	3.79	1.27	silty clay to clay	UNDFND	UNDFD	17	1.6
10.65	35	21.80	0.71	3.28	1.30	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
10.95	36	19.61	0.60	3.04	1.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
11.25	37	55.37	1.58	2.85	1.36	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
11.55	38	45.02	1.59	3.53	1.38	clayey silt to silty clay	UNDFND	UNDFD	22	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

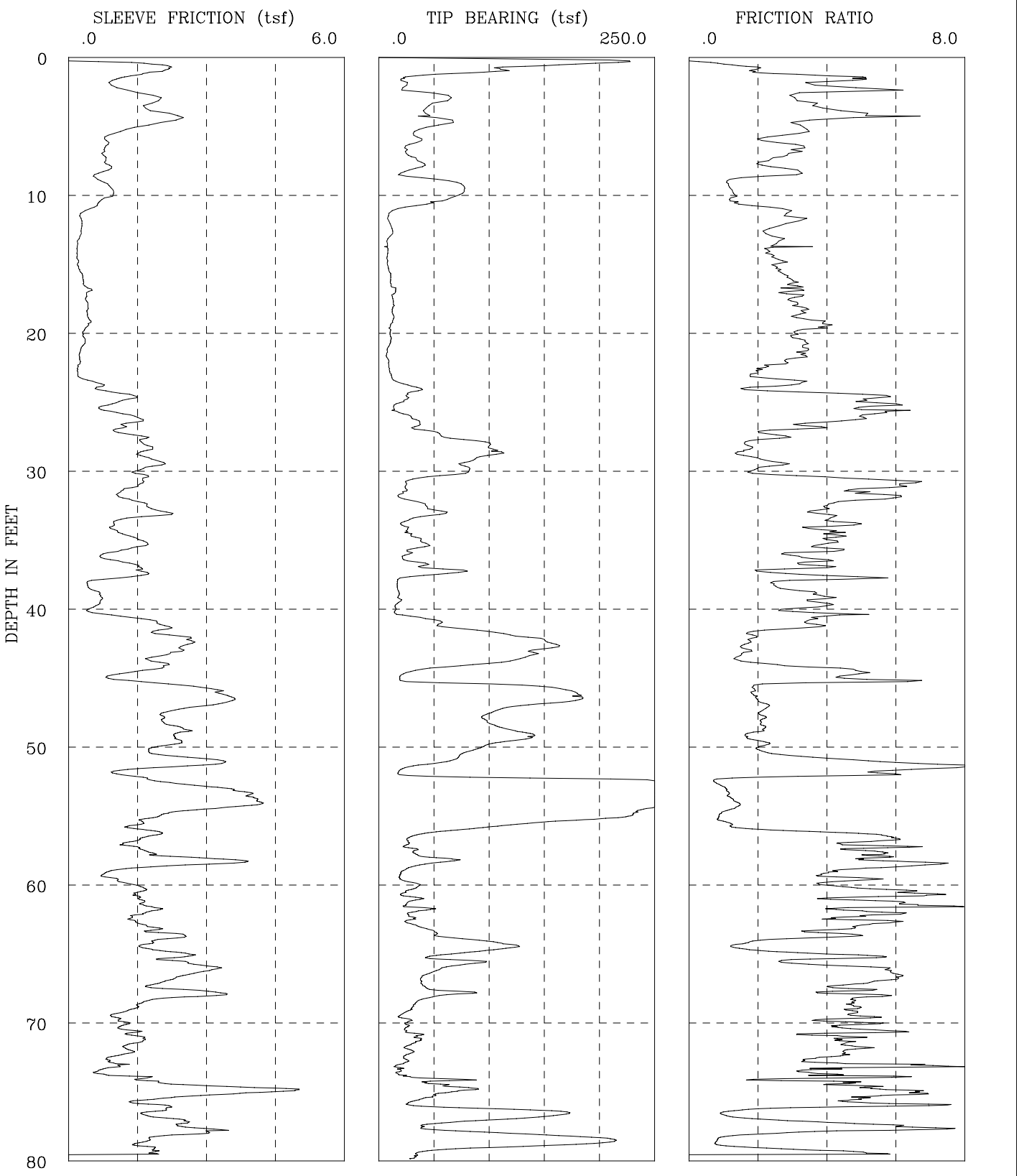
Figure A-26b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	15.69	0.64	4.06	1.41	clay	UNDFND	UNDFD	15	.8
12.15	40	16.39	0.64	3.89	1.44	silty clay to clay	UNDFND	UNDFD	10	.9
12.45	41	35.12	1.34	3.81	1.47	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
12.80	42	104.33	2.21	2.12	1.50	silty sand to sandy silt	60-70	38-40	33	UNDEFINED
13.10	43	153.81	2.91	1.89	1.53	silty sand to sandy silt	70-80	40-42	49	UNDEFINED
13.40	44	133.88	2.85	2.13	1.56	silty sand to sandy silt	60-70	40-42	43	UNDEFINED
13.75	45	30.33	1.23	4.07	1.59	silty clay to clay	UNDFND	UNDFD	19	1.8
14.05	46	146.99	3.11	2.12	1.62	silty sand to sandy silt	70-80	40-42	47	UNDEFINED
14.35	47	164.16	3.49	2.12	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	97.53	1.97	2.02	1.68	silty sand to sandy silt	50-60	38-40	31	UNDEFINED
14.95	49	99.74	1.96	1.96	1.70	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
15.25	50	90.96	1.68	1.85	1.73	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
15.55	51	84.34	2.16	2.56	1.76	sandy silt to clayey silt	UNDFND	UNDFD	32	5.4
15.85	52	32.48	2.10	6.47	1.79	clay	UNDFND	UNDFD	31	1.9
16.15	53	204.31	1.67	0.82	1.82	sand	70-80	40-42	39	UNDEFINED
16.45	54	338.84	3.41	1.01	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	276.06	2.74	0.99	1.87	sand	80-90	42-44	>50	UNDEFINED
17.05	56	177.37	3.19	1.80	1.90	sand to silty sand	70-80	40-42	42	UNDEFINED
17.35	57	39.62	1.84	4.63	1.93	silty clay to clay	UNDFND	UNDFD	25	2.4
17.65	58	24.92	1.06	4.25	1.96	silty clay to clay	UNDFND	UNDFD	16	1.4
17.95	59	24.87	0.80	3.24	1.99	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
18.25	60	19.78	0.72	3.65	2.02	silty clay to clay	UNDFND	UNDFD	13	1.0
18.55	61	29.80	0.97	3.26	2.04	clayey silt to silty clay	UNDFND	UNDFD	14	1.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-26c



I-436 SR-22 Phase 2	CPT-08-014B
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-27a

Engineer : Nava
On Site Loc: CPT-08-014B
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/28/2008
Cone Used : 30 ton
Water table (feet) : 9.84

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	155.39	1.55	1.00	0.03	sand to silty sand	>90	>48	37	UNDEFINED
0.60	2	33.76	1.16	3.44	0.09	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
0.95	3	46.10	1.58	3.44	0.15	clayey silt to silty clay	UNDFND	UNDFD	22	3.0
1.25	4	50.25	1.84	3.66	0.22	clayey silt to silty clay	UNDFND	UNDFD	24	3.3
1.55	5	53.80	2.02	3.76	0.28	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
1.85	6	35.02	0.94	2.69	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
2.15	7	26.02	0.79	3.05	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.7
2.45	8	36.27	0.85	2.33	0.45	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
2.75	9	37.98	0.67	1.77	0.51	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
3.05	10	75.88	0.94	1.23	0.57	silty sand to sandy silt	60-70	42-44	24	UNDEFINED
3.35	11	42.76	0.64	1.49	0.61	silty sand to sandy silt	40-50	38-40	14	UNDEFINED
3.65	12	9.33	0.28	3.01	0.64	silty clay to clay	UNDFND	UNDFD	6	.5
3.95	13	11.77	0.28	2.38	0.67	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.25	14	9.14	0.19	2.09	0.69	silty clay to clay	UNDFND	UNDFD	6	.5
4.55	15	7.77	0.19	2.51	0.72	silty clay to clay	UNDFND	UNDFD	5	.4
4.85	16	9.62	0.26	2.67	0.75	silty clay to clay	UNDFND	UNDFD	6	.5
5.15	17	12.33	0.37	3.03	0.78	silty clay to clay	UNDFND	UNDFD	8	.7
5.45	18	13.04	0.39	3.01	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	12.89	0.42	3.23	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	11.24	0.41	3.66	0.86	clay	UNDFND	UNDFD	11	.6
6.40	21	10.24	0.33	3.21	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	7.75	0.25	3.18	0.93	clay	UNDFND	UNDFD	7	.4
7.00	23	9.58	0.21	2.17	0.95	clayey silt to silty clay	UNDFND	UNDFD	5	.5
7.35	24	23.17	0.53	2.31	0.98	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
7.65	25	24.10	1.20	4.98	1.02	clay	UNDFND	UNDFD	23	1.5
7.95	26	19.25	1.02	5.30	1.04	clay	UNDFND	UNDFD	18	1.1
8.25	27	36.49	1.27	3.48	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
8.55	28	75.00	1.53	2.03	1.10	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
8.85	29	100.38	1.69	1.68	1.13	silty sand to sandy silt	60-70	40-42	32	UNDEFINED
9.15	30	80.43	1.79	2.22	1.16	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
9.45	31	39.41	1.60	4.07	1.19	silty clay to clay	UNDFND	UNDFD	25	2.5
9.75	32	21.67	1.19	5.49	1.21	clay	UNDFND	UNDFD	21	1.3
10.05	33	45.22	1.77	3.92	1.24	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
10.35	34	31.07	1.31	4.23	1.27	silty clay to clay	UNDFND	UNDFD	20	1.9
10.65	35	29.44	1.20	4.08	1.30	silty clay to clay	UNDFND	UNDFD	19	1.8
10.95	36	35.68	1.38	3.85	1.33	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
11.25	37	30.67	1.08	3.52	1.36	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
11.55	38	45.87	1.36	2.96	1.38	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-27b

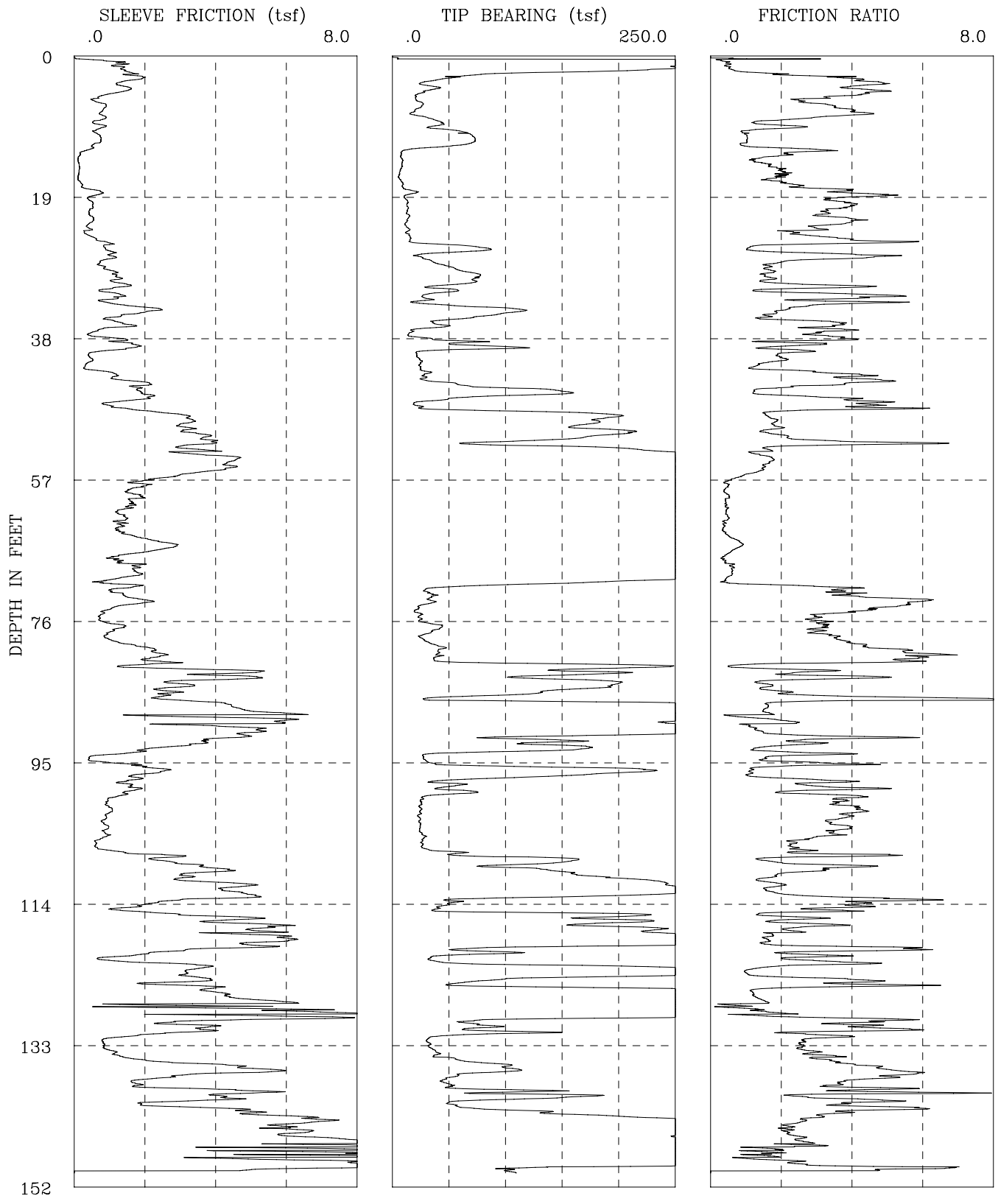
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.32	0.50	2.91	1.41	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	17.33	0.66	3.82	1.44	silty clay to clay	UNDFND	UNDFD	11	.9
12.45	41	28.89	1.04	3.62	1.47	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
12.80	42	87.66	2.10	2.39	1.50	silty sand to sandy silt	50-60	38-40	28	UNDEFINED
13.10	43	152.52	2.57	1.68	1.53	sand to silty sand	70-80	40-42	37	UNDEFINED
13.40	44	124.83	1.99	1.59	1.56	sand to silty sand	60-70	40-42	30	UNDEFINED
13.75	45	32.74	1.38	4.23	1.59	silty clay to clay	UNDFND	UNDFD	21	2.0
14.05	46	135.20	2.73	2.02	1.62	silty sand to sandy silt	60-70	40-42	43	UNDEFINED
14.35	47	161.62	3.33	2.06	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	100.03	2.12	2.12	1.68	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.95	49	116.57	2.35	2.02	1.70	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
15.25	50	114.64	2.24	1.96	1.73	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
15.55	51	74.27	2.38	3.20	1.76	sandy silt to clayey silt	UNDFND	UNDFD	28	4.7
15.85	52	26.95	1.84	6.81	1.79	clay	UNDFND	UNDFD	26	1.5
16.15	53	247.11	2.35	0.95	1.82	sand	80-90	42-44	47	UNDEFINED
16.45	54	329.94	3.97	1.20	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	246.35	2.93	1.19	1.87	sand	80-90	42-44	47	UNDEFINED
17.05	56	141.72	1.55	1.09	1.90	sand to silty sand	60-70	38-40	34	UNDEFINED
17.35	57	34.72	1.67	4.82	1.93	clay	UNDFND	UNDFD	33	2.0
17.65	58	31.05	1.67	5.37	1.96	clay	UNDFND	UNDFD	30	1.8
17.95	59	44.78	2.60	5.81	1.99	clay	UNDFND	UNDFD	43	2.7
18.25	60	22.70	0.96	4.22	2.02	silty clay to clay	UNDFND	UNDFD	14	1.2
18.55	61	28.73	1.55	5.40	2.04	clay	UNDFND	UNDFD	28	1.6
18.85	62	33.50	1.72	5.13	2.07	clay	UNDFND	UNDFD	32	1.9
19.20	63	29.57	1.51	5.11	2.10	clay	UNDFND	UNDFD	28	1.7
19.50	64	58.38	2.13	3.65	2.13	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
19.80	65	104.00	1.91	1.84	2.16	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.15	66	65.66	2.70	4.11	2.19	clayey silt to silty clay	UNDFND	UNDFD	31	4.1
20.45	67	41.47	2.41	5.81	2.22	clay	UNDFND	UNDFD	40	2.4
20.75	68	55.50	2.59	4.67	2.25	silty clay to clay	UNDFND	UNDFD	35	3.4
21.05	69	33.18	1.58	4.77	2.28	clay	UNDFND	UNDFD	32	1.9
21.35	70	23.43	1.11	4.72	2.31	clay	UNDFND	UNDFD	22	1.2
21.65	71	28.95	1.33	4.60	2.34	clay	UNDFND	UNDFD	28	1.6
21.95	72	30.22	1.40	4.63	2.37	clay	UNDFND	UNDFD	29	1.7
22.25	73	24.36	1.05	4.31	2.39	silty clay to clay	UNDFND	UNDFD	16	1.3
22.55	74	21.57	0.98	4.54	2.42	clay	UNDFND	UNDFD	21	1.1
22.85	75	70.00	3.22	4.60	2.45	silty clay to clay	UNDFND	UNDFD	45	4.3
23.15	76	38.26	2.22	5.80	2.48	clay	UNDFND	UNDFD	37	2.2
23.45	77	134.52	1.96	1.45	2.51	sand to silty sand	60-70	36-38	32	UNDEFINED
23.75	78	61.55	2.77	4.50	2.54	silty clay to clay	UNDFND	UNDFD	39	3.7
24.05	79	182.21	1.80	0.99	2.56	sand	70-80	38-40	35	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-27c



CPT-08-015	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-28a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-015
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :04/01/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	188.91	0.68	0.36	0.03	sand	>90	>48	36	UNDEFINED
0.60	2	245.14	1.33	0.54	0.09	sand	>90	>48	47	UNDEFINED
0.95	3	80.00	1.73	2.16	0.15	silty sand to sandy silt	80-90	46-48	26	UNDEFINED
1.25	4	30.23	1.34	4.43	0.22	silty clay to clay	UNDFND	UNDFD	19	2.0
1.55	5	31.90	1.39	4.35	0.28	silty clay to clay	UNDFND	UNDFD	20	2.1
1.85	6	20.96	0.64	3.07	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
2.15	7	25.59	0.84	3.29	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
2.45	8	19.04	0.78	4.09	0.45	silty clay to clay	UNDFND	UNDFD	12	1.2
2.75	9	37.50	0.71	1.89	0.51	sandy silt to clayey silt	UNDFND	UNDFD	14	2.4
3.05	10	42.04	0.75	1.78	0.57	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
3.35	11	68.39	0.67	0.99	0.61	sand to silty sand	60-70	40-42	16	UNDEFINED
3.65	12	69.52	0.68	0.97	0.64	sand to silty sand	60-70	40-42	17	UNDEFINED
3.95	13	21.50	0.39	1.83	0.67	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
4.25	14	7.98	0.13	1.66	0.69	clayey silt to silty clay	UNDFND	UNDFD	4	.4
4.55	15	8.56	0.13	1.52	0.72	clayey silt to silty clay	UNDFND	UNDFD	4	.5
4.85	16	6.84	0.14	2.04	0.75	silty clay to clay	UNDFND	UNDFD	4	.3
5.15	17	6.58	0.12	1.84	0.78	silty clay to clay	UNDFND	UNDFD	4	.3
5.45	18	9.47	0.25	2.64	0.81	silty clay to clay	UNDFND	UNDFD	6	.5
5.75	19	16.34	0.67	4.13	0.84	clay	UNDFND	UNDFD	16	1.0
6.05	20	12.53	0.46	3.65	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	13.31	0.48	3.61	0.89	silty clay to clay	UNDFND	UNDFD	9	.8
6.70	22	13.93	0.49	3.49	0.93	silty clay to clay	UNDFND	UNDFD	9	.8
7.00	23	12.17	0.43	3.53	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
7.35	24	14.05	0.37	2.67	0.98	clayey silt to silty clay	UNDFND	UNDFD	7	.8
7.65	25	16.25	0.70	4.28	1.02	clay	UNDFND	UNDFD	16	.9
7.95	26	70.30	0.91	1.30	1.04	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
8.25	27	36.15	1.09	3.00	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
8.55	28	35.95	0.79	2.20	1.10	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
8.85	29	57.12	0.96	1.68	1.13	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
9.15	30	74.57	1.22	1.63	1.16	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
9.45	31	57.77	1.32	2.29	1.19	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
9.75	32	45.23	0.98	2.17	1.21	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.05	33	27.73	1.11	3.99	1.24	silty clay to clay	UNDFND	UNDFD	18	1.7
10.35	34	60.12	1.61	2.68	1.27	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
10.65	35	101.12	1.84	1.82	1.30	silty sand to sandy silt	60-70	38-40	32	UNDEFINED
10.95	36	49.06	1.12	2.28	1.33	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
11.25	37	33.56	1.14	3.41	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	18.57	0.62	3.32	1.38	clayey silt to silty clay	UNDFND	UNDFD	9	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-28b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.41	1.51	2.63	1.41	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
12.15	40	64.46	1.18	1.84	1.44	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
12.45	41	22.56	0.45	2.01	1.47	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
12.80	42	24.89	0.35	1.40	1.50	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
13.10	43	28.76	0.97	3.37	1.53	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
13.40	44	35.14	1.50	4.27	1.56	silty clay to clay	UNDFND	UNDFD	22	2.1
13.75	45	104.77	1.87	1.78	1.59	silty sand to sandy silt	60-70	38-40	33	UNDEFINED
14.05	46	99.53	2.07	2.08	1.62	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.35	47	25.19	1.11	4.40	1.65	silty clay to clay	UNDFND	UNDFD	16	1.4
14.65	48	96.06	1.98	2.06	1.68	silty sand to sandy silt	50-60	38-40	31	UNDEFINED
14.95	49	190.00	3.26	1.72	1.70	sand to silty sand	70-80	40-42	45	UNDEFINED
15.25	50	169.05	3.14	1.86	1.73	sand to silty sand	70-80	40-42	40	UNDEFINED
15.55	51	200.67	3.40	1.69	1.76	sand to silty sand	70-80	40-42	48	UNDEFINED
15.85	52	127.34	3.82	3.00	1.79	sandy silt to clayey silt	UNDFND	UNDFD	49	8.2
16.15	53	163.46	3.32	2.03	1.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
16.45	54	262.62	3.75	1.43	1.85	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.75	55	265.52	4.41	1.66	1.87	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.05	56	287.07	4.15	1.45	1.90	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.35	57	328.80	2.71	0.83	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	402.74	1.90	0.47	1.96	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.95	59	382.21	1.58	0.41	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	368.25	1.75	0.47	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	357.14	1.59	0.45	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	286.20	1.29	0.45	2.07	gravelly sand to sand	80-90	42-44	46	UNDEFINED
19.20	63	318.32	1.35	0.43	2.10	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
19.50	64	344.13	1.28	0.37	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	319.72	1.72	0.54	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	317.79	2.67	0.84	2.19	sand	80-90	42-44	>50	UNDEFINED
20.45	67	345.99	1.91	0.55	2.22	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.75	68	311.68	1.17	0.38	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	290.11	1.74	0.60	2.28	sand	80-90	42-44	>50	UNDEFINED
21.35	70	299.59	1.72	0.57	2.31	sand	80-90	42-44	>50	UNDEFINED
21.65	71	194.12	1.06	0.54	2.34	sand	70-80	40-42	37	UNDEFINED
21.95	72	39.99	1.33	3.34	2.37	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
22.25	73	33.88	1.53	4.51	2.39	silty clay to clay	UNDFND	UNDFD	22	1.9
22.55	74	30.84	1.76	5.71	2.42	clay	UNDFND	UNDFD	30	1.7
22.85	75	22.20	0.91	4.10	2.45	silty clay to clay	UNDFND	UNDFD	14	1.1
23.15	76	24.14	0.72	2.98	2.48	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
23.45	77	38.80	1.22	3.15	2.51	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
23.75	78	31.52	0.99	3.14	2.54	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
24.05	79	28.49	1.07	3.76	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	41.83	2.01	4.80	2.59	silty clay to clay	UNDFND	UNDFD	27	2.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-28c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	40.15	2.37	5.91	2.62	clay	UNDFND	UNDFD	38	2.3
24.95	82	96.28	2.21	2.29	2.65	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
25.25	83	192.03	3.50	1.82	2.68	sand to silty sand	70-80	38-40	46	UNDEFINED
25.60	84	150.60	4.23	2.81	2.71	silty sand to sandy silt	60-70	38-40	48	UNDEFINED
25.90	85	192.89	2.94	1.52	2.74	sand to silty sand	70-80	38-40	46	UNDEFINED
26.20	86	124.28	2.62	2.11	2.77	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
26.55	87	127.55	3.23	2.53	2.80	silty sand to sandy silt	50-60	36-38	41	UNDEFINED
26.85	88	302.79	4.70	1.55	2.83	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.15	89	377.33	4.52	1.20	2.86	sand	80-90	42-44	>50	UNDEFINED
27.45	90	288.73	5.02	1.74	2.88	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.75	91	373.10	5.08	1.36	2.91	sand	80-90	42-44	>50	UNDEFINED
28.05	92	141.71	4.30	3.03	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.0
28.35	93	149.17	3.11	2.08	2.97	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
28.65	94	82.90	1.51	1.82	3.00	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
28.95	95	29.29	0.57	1.95	3.03	sandy silt to clayey silt	UNDFND	UNDFD	11	1.5
29.25	96	138.01	2.12	1.54	3.05	sand to silty sand	50-60	36-38	33	UNDEFINED
29.55	97	171.93	1.99	1.16	3.08	sand to silty sand	60-70	38-40	41	UNDEFINED
29.85	98	53.36	1.55	2.90	3.11	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
30.15	99	54.62	1.64	3.00	3.14	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
30.45	100	36.76	1.22	3.31	3.17	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
30.75	101	25.05	0.93	3.70	3.20	silty clay to clay	UNDFND	UNDFD	16	1.2
31.05	102	24.96	1.03	4.12	3.22	silty clay to clay	UNDFND	UNDFD	16	1.2
31.35	103	23.64	0.86	3.65	3.25	silty clay to clay	UNDFND	UNDFD	15	1.1
31.65	104	24.51	0.91	3.72	3.28	silty clay to clay	UNDFND	UNDFD	16	1.2
32.00	105	26.15	0.89	3.40	3.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
32.30	106	26.36	0.65	2.46	3.34	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
32.60	107	34.79	0.85	2.44	3.37	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.95	108	106.57	2.39	2.24	3.40	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
33.25	109	116.40	3.31	2.84	3.43	sandy silt to clayey silt	UNDFND	UNDFD	45	7.3
33.55	110	150.02	3.75	2.50	3.46	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
33.85	111	213.65	3.32	1.55	3.49	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.15	112	256.62	4.60	1.79	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	223.71	4.88	2.18	3.55	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
34.75	114	56.36	2.74	4.87	3.57	silty clay to clay	UNDFND	UNDFD	36	3.3
35.05	115	42.68	1.52	3.56	3.60	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
35.35	116	191.27	3.91	2.04	3.63	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.65	117	194.66	4.81	2.47	3.66	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	234.83	5.22	2.22	3.69	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.25	119	363.67	5.96	1.64	3.72	sand to silty sand	80-90	40-42	>50	UNDEFINED
36.55	120	223.36	4.94	2.21	3.74	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.85	121	73.36	2.36	3.22	3.77	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
37.15	122	37.67	1.21	3.22	3.80	clayey silt to silty clay	UNDFND	UNDFD	18	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-28d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.69	3.52	1.57	3.83	sand to silty sand	70-80	38-40	>50	UNDEFINED
37.75	124	259.10	3.23	1.25	3.86	sand	70-80	38-40	50	UNDEFINED
38.05	125	70.69	3.06	4.33	3.89	clayey silt to silty clay	UNDFND	UNDFD	34	4.2
38.40	126	262.06	3.92	1.50	3.92	sand to silty sand	70-80	38-40	>50	UNDEFINED
38.70	127	353.82	4.72	1.33	3.95	sand	80-90	40-42	>50	UNDEFINED
39.00	128	421.27	3.74	0.89	3.97	sand	80-90	40-42	>50	UNDEFINED
39.35	129	417.08	6.27	1.50	4.01	sand	80-90	40-42	>50	UNDEFINED
39.65	130	99.45	4.22	4.24	4.04	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	82.31	3.78	4.59	4.06	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
40.25	132	67.03	1.77	2.64	4.09	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
40.55	133	31.70	0.83	2.60	4.12	sandy silt to clayey silt	UNDFND	UNDFD	12	1.5
40.85	134	37.19	1.02	2.73	4.15	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
41.15	135	47.45	1.54	3.24	4.18	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
41.45	136	93.02	3.97	4.27	4.21	clayey silt to silty clay	UNDFND	UNDFD	45	5.6
41.75	137	86.19	4.64	5.38	4.23	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	47.31	2.08	4.40	4.26	silty clay to clay	UNDFND	UNDFD	30	2.6
42.35	139	62.94	2.61	4.15	4.29	clayey silt to silty clay	UNDFND	UNDFD	30	3.6
42.65	140	137.47	4.63	3.37	4.32	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.6
42.95	141	73.51	3.05	4.15	4.35	clayey silt to silty clay	UNDFND	UNDFD	35	4.3
43.25	142	89.26	4.07	4.56	4.38	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	198.93	5.95	2.99	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	268.30	6.43	2.40	4.43	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.15	145	285.73	6.27	2.19	4.46	sand to silty sand	70-80	38-40	>50	UNDEFINED
44.45	146	287.74	7.20	2.50	4.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.80	147	347.89	7.60	2.18	4.52	sand to silty sand	80-90	38-40	>50	UNDEFINED
45.10	148	492.38	7.21	1.47	4.55	sand	>90	40-42	>50	UNDEFINED
45.40	149	363.36	7.15	1.97	4.58	sand to silty sand	80-90	40-42	>50	UNDEFINED
45.75	150	140.86	5.16	3.66	4.61	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.7

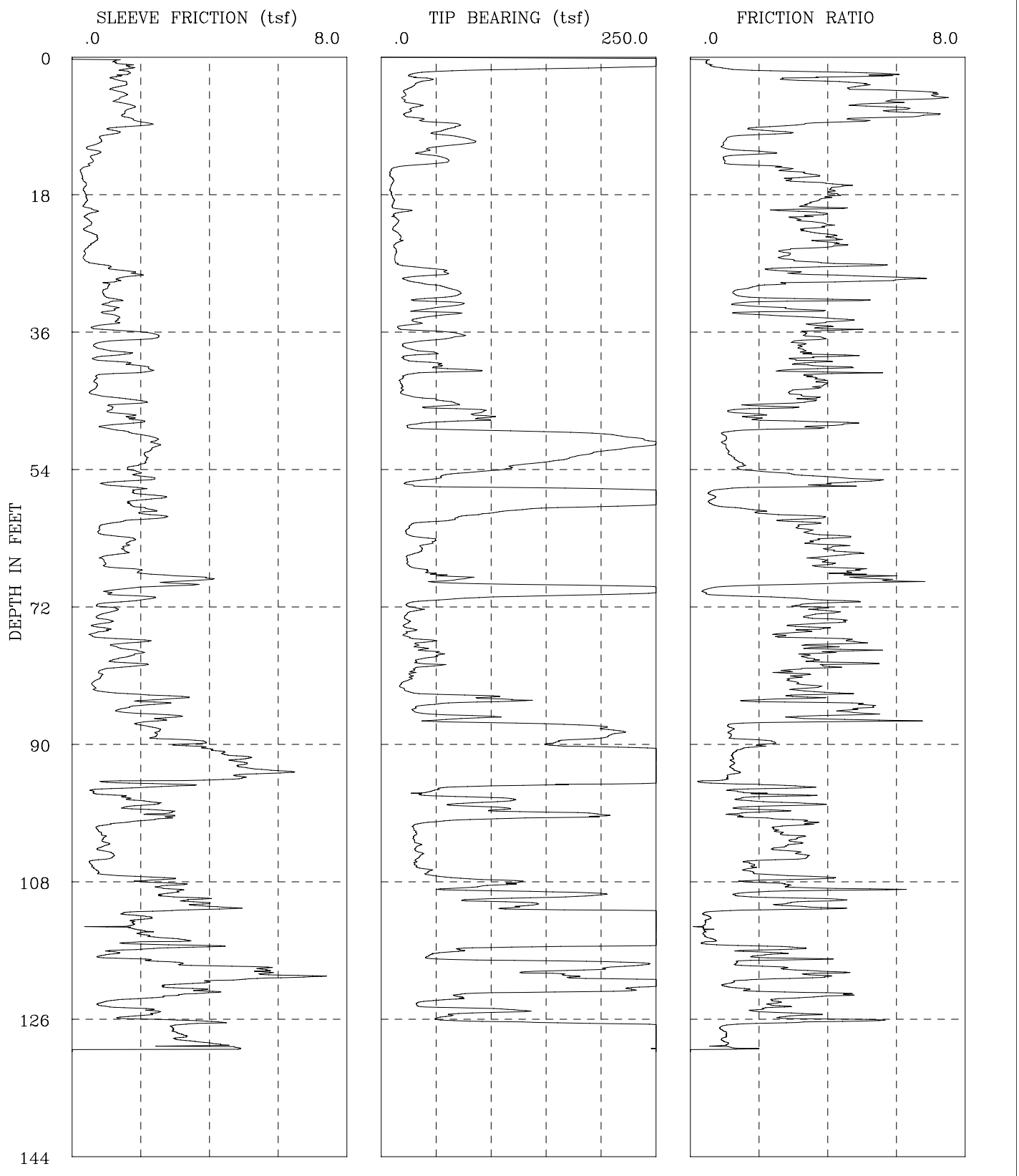
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-28d



CPT-08-016	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-29a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-016
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	268.07	1.16	0.43	0.03	gravelly sand to sand	>90	>48	43	UNDEFINED
0.60	2	140.01	1.61	1.15	0.09	sand to silty sand	>90	>48	34	UNDEFINED
0.95	3	34.32	1.38	4.02	0.15	silty clay to clay	UNDFND	UNDFD	22	2.2
1.25	4	29.35	1.43	4.86	0.22	clay	UNDFND	UNDFD	28	1.9
1.55	5	21.46	1.44	6.71	0.28	clay	UNDFND	UNDFD	21	1.4
1.85	6	22.21	1.37	6.18	0.33	clay	UNDFND	UNDFD	21	1.4
2.15	7	30.38	1.70	5.59	0.39	clay	UNDFND	UNDFD	29	1.9
2.45	8	25.84	1.56	6.03	0.45	clay	UNDFND	UNDFD	25	1.6
2.75	9	56.30	2.02	3.59	0.51	clayey silt to silty clay	UNDFND	UNDFD	27	3.7
3.05	10	55.57	1.23	2.21	0.57	sandy silt to clayey silt	UNDFND	UNDFD	21	3.6
3.35	11	74.39	0.86	1.16	0.61	silty sand to sandy silt	60-70	40-42	24	UNDEFINED
3.65	12	61.72	0.59	0.96	0.64	silty sand to sandy silt	50-60	40-42	20	UNDEFINED
3.95	13	41.31	0.69	1.67	0.67	silty sand to sandy silt	40-50	38-40	13	UNDEFINED
4.25	14	57.07	0.57	0.99	0.69	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
4.55	15	14.78	0.34	2.31	0.72	clayey silt to silty clay	UNDFND	UNDFD	7	.9
4.85	16	8.66	0.29	3.34	0.75	clay	UNDFND	UNDFD	8	.5
5.15	17	10.19	0.38	3.72	0.78	clay	UNDFND	UNDFD	10	.6
5.45	18	8.59	0.35	4.13	0.81	clay	UNDFND	UNDFD	8	.5
5.75	19	10.80	0.42	3.92	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	11.29	0.40	3.58	0.86	clay	UNDFND	UNDFD	11	.6
6.40	21	16.38	0.52	3.19	0.89	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
6.70	22	14.72	0.52	3.56	0.93	silty clay to clay	UNDFND	UNDFD	9	.8
7.00	23	11.95	0.42	3.54	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
7.35	24	17.40	0.70	4.05	0.98	silty clay to clay	UNDFND	UNDFD	11	1.0
7.65	25	12.64	0.50	3.95	1.02	clay	UNDFND	UNDFD	12	.7
7.95	26	13.30	0.37	2.76	1.04	clayey silt to silty clay	UNDFND	UNDFD	6	.7
8.25	27	12.92	0.44	3.41	1.07	silty clay to clay	UNDFND	UNDFD	8	.7
8.55	28	41.29	1.24	3.01	1.10	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
8.85	29	40.18	1.68	4.19	1.13	silty clay to clay	UNDFND	UNDFD	26	2.5
9.15	30	38.44	1.13	2.94	1.16	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
9.45	31	67.90	0.94	1.38	1.19	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
9.75	32	49.57	1.13	2.29	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	61.13	1.13	1.84	1.24	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.35	34	50.48	1.12	2.22	1.27	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
10.65	35	32.23	1.30	4.03	1.30	silty clay to clay	UNDFND	UNDFD	21	2.0
10.95	36	26.54	0.99	3.74	1.33	silty clay to clay	UNDFND	UNDFD	17	1.6
11.25	37	67.53	2.39	3.54	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
11.55	38	26.43	0.84	3.17	1.38	clayey silt to silty clay	UNDFND	UNDFD	13	1.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-29b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	36.52	1.22	3.35	1.41	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
12.15	40	23.90	0.90	3.78	1.44	silty clay to clay	UNDFND	UNDFD	15	1.4
12.45	41	54.71	1.98	3.62	1.47	clayey silt to silty clay	UNDFND	UNDFD	26	3.4
12.80	42	40.77	1.36	3.35	1.50	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
13.10	43	17.86	0.69	3.85	1.53	silty clay to clay	UNDFND	UNDFD	11	1.0
13.40	44	18.77	0.61	3.25	1.56	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
13.75	45	39.64	1.37	3.45	1.59	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.05	46	60.90	1.33	2.19	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
14.35	47	92.02	1.40	1.52	1.65	silty sand to sandy silt	50-60	38-40	29	UNDEFINED
14.65	48	67.04	1.81	2.69	1.68	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
14.95	49	63.22	1.16	1.83	1.70	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
15.25	50	217.30	2.18	1.00	1.73	sand	80-90	40-42	42	UNDEFINED
15.55	51	246.28	2.44	0.99	1.76	sand	80-90	42-44	47	UNDEFINED
15.85	52	203.65	2.22	1.09	1.79	sand	70-80	40-42	39	UNDEFINED
16.15	53	167.29	2.16	1.29	1.82	sand to silty sand	70-80	40-42	40	UNDEFINED
16.45	54	122.91	1.82	1.48	1.85	sand to silty sand	60-70	38-40	29	UNDEFINED
16.75	55	71.67	1.94	2.71	1.87	sandy silt to clayey silt	UNDFND	UNDFD	27	4.5
17.05	56	33.58	1.60	4.76	1.90	clay	UNDFND	UNDFD	32	2.0
17.35	57	178.75	1.73	0.97	1.93	sand	70-80	40-42	34	UNDEFINED
17.65	58	363.94	2.33	0.64	1.96	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.95	59	268.92	1.73	0.64	1.99	sand	80-90	42-44	>50	UNDEFINED
18.25	60	114.69	2.18	1.90	2.02	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
18.55	61	63.74	2.14	3.36	2.04	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
18.85	62	26.20	0.87	3.34	2.07	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
19.20	63	27.83	1.10	3.94	2.10	silty clay to clay	UNDFND	UNDFD	18	1.6
19.50	64	44.62	1.68	3.76	2.13	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
19.80	65	35.51	1.52	4.29	2.16	silty clay to clay	UNDFND	UNDFD	23	2.1
20.15	66	24.16	0.96	3.98	2.19	silty clay to clay	UNDFND	UNDFD	15	1.3
20.45	67	28.98	1.24	4.27	2.22	silty clay to clay	UNDFND	UNDFD	19	1.6
20.75	68	52.56	2.54	4.82	2.25	silty clay to clay	UNDFND	UNDFD	34	3.2
21.05	69	75.59	3.47	4.59	2.28	undefined	UNDFND	UNDFD	UDF	UNDEFINED
21.35	70	268.94	1.68	0.62	2.31	sand	80-90	40-42	>50	UNDEFINED
21.65	71	137.56	1.82	1.32	2.34	sand to silty sand	60-70	38-40	33	UNDEFINED
21.95	72	27.54	1.08	3.93	2.37	silty clay to clay	UNDFND	UNDFD	18	1.5
22.25	73	29.23	1.12	3.84	2.39	silty clay to clay	UNDFND	UNDFD	19	1.6
22.55	74	23.17	0.92	3.98	2.42	silty clay to clay	UNDFND	UNDFD	15	1.2
22.85	75	24.06	0.83	3.44	2.45	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
23.15	76	23.87	0.69	2.88	2.48	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
23.45	77	37.20	1.65	4.45	2.51	silty clay to clay	UNDFND	UNDFD	24	2.1
23.75	78	39.23	1.61	4.12	2.54	silty clay to clay	UNDFND	UNDFD	25	2.3
24.05	79	46.04	1.59	3.46	2.56	clayey silt to silty clay	UNDFND	UNDFD	22	2.7
24.35	80	39.52	1.64	4.15	2.59	silty clay to clay	UNDFND	UNDFD	25	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-29c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	28.57	0.86	3.01	2.62	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.95	82	24.97	0.74	2.98	2.65	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
25.25	83	18.73	0.63	3.34	2.68	clayey silt to silty clay	UNDFND	UNDFD	9	.9
25.60	84	63.24	2.11	3.33	2.71	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
25.90	85	75.66	2.26	2.99	2.74	sandy silt to clayey silt	UNDFND	UNDFD	29	4.7
26.20	86	31.91	1.55	4.87	2.77	clay	UNDFND	UNDFD	31	1.7
26.55	87	72.12	2.64	3.66	2.80	clayey silt to silty clay	UNDFND	UNDFD	35	4.4
26.85	88	188.87	2.23	1.18	2.83	sand	60-70	38-40	36	UNDEFINED
27.15	89	212.18	2.45	1.15	2.86	sand	70-80	38-40	41	UNDEFINED
27.45	90	164.34	3.36	2.04	2.88	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.75	91	268.49	4.04	1.51	2.91	sand to silty sand	70-80	40-42	>50	UNDEFINED
28.05	92	391.31	4.79	1.22	2.94	sand	>90	42-44	>50	UNDEFINED
28.35	93	405.58	4.93	1.22	2.97	sand	>90	42-44	>50	UNDEFINED
28.65	94	436.44	5.63	1.29	3.00	sand	>90	42-44	>50	UNDEFINED
28.95	95	416.18	3.46	0.83	3.03	gravelly sand to sand	>90	42-44	>50	UNDEFINED
29.25	96	106.27	2.09	1.97	3.05	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
29.55	97	52.39	1.03	1.96	3.08	silty sand to sandy silt	<40	30-32	17	UNDEFINED
29.85	98	95.32	2.13	2.23	3.11	silty sand to sandy silt	40-50	34-36	30	UNDEFINED
30.15	99	115.47	2.20	1.90	3.14	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
30.45	100	154.23	2.63	1.70	3.17	sand to silty sand	60-70	36-38	37	UNDEFINED
30.75	101	36.10	1.15	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
31.05	102	31.02	0.80	2.58	3.22	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
31.35	103	29.88	0.93	3.11	3.25	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
31.65	104	32.72	0.89	2.72	3.28	sandy silt to clayey silt	UNDFND	UNDFD	13	1.7
32.00	105	34.93	1.14	3.25	3.31	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
32.30	106	30.98	0.56	1.81	3.34	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.60	107	40.82	0.72	1.76	3.37	sandy silt to clayey silt	UNDFND	UNDFD	16	2.2
32.95	108	86.19	2.20	2.55	3.40	sandy silt to clayey silt	UNDFND	UNDFD	33	5.3
33.25	109	85.19	2.90	3.40	3.43	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
33.55	110	173.65	2.94	1.69	3.46	sand to silty sand	60-70	36-38	42	UNDEFINED
33.85	111	113.37	3.65	3.22	3.49	sandy silt to clayey silt	UNDFND	UNDFD	43	7.1
34.15	112	209.04	3.33	1.60	3.52	sand to silty sand	60-70	38-40	>50	UNDEFINED
34.45	113	393.52	1.93	0.49	3.55	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
34.75	114	423.53	1.62	0.38	3.57	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
35.05	115	511.27	2.03	0.40	3.60	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.35	116	478.89	2.65	0.55	3.63	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.65	117	189.30	2.67	1.41	3.66	sand to silty sand	60-70	36-38	45	UNDEFINED
35.95	118	49.08	1.04	2.12	3.69	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
36.25	119	179.02	2.77	1.54	3.72	sand to silty sand	60-70	36-38	43	UNDEFINED
36.55	120	176.85	5.54	3.13	3.74	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.3
36.85	121	201.63	5.74	2.84	3.77	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.15	122	284.33	3.20	1.13	3.80	sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

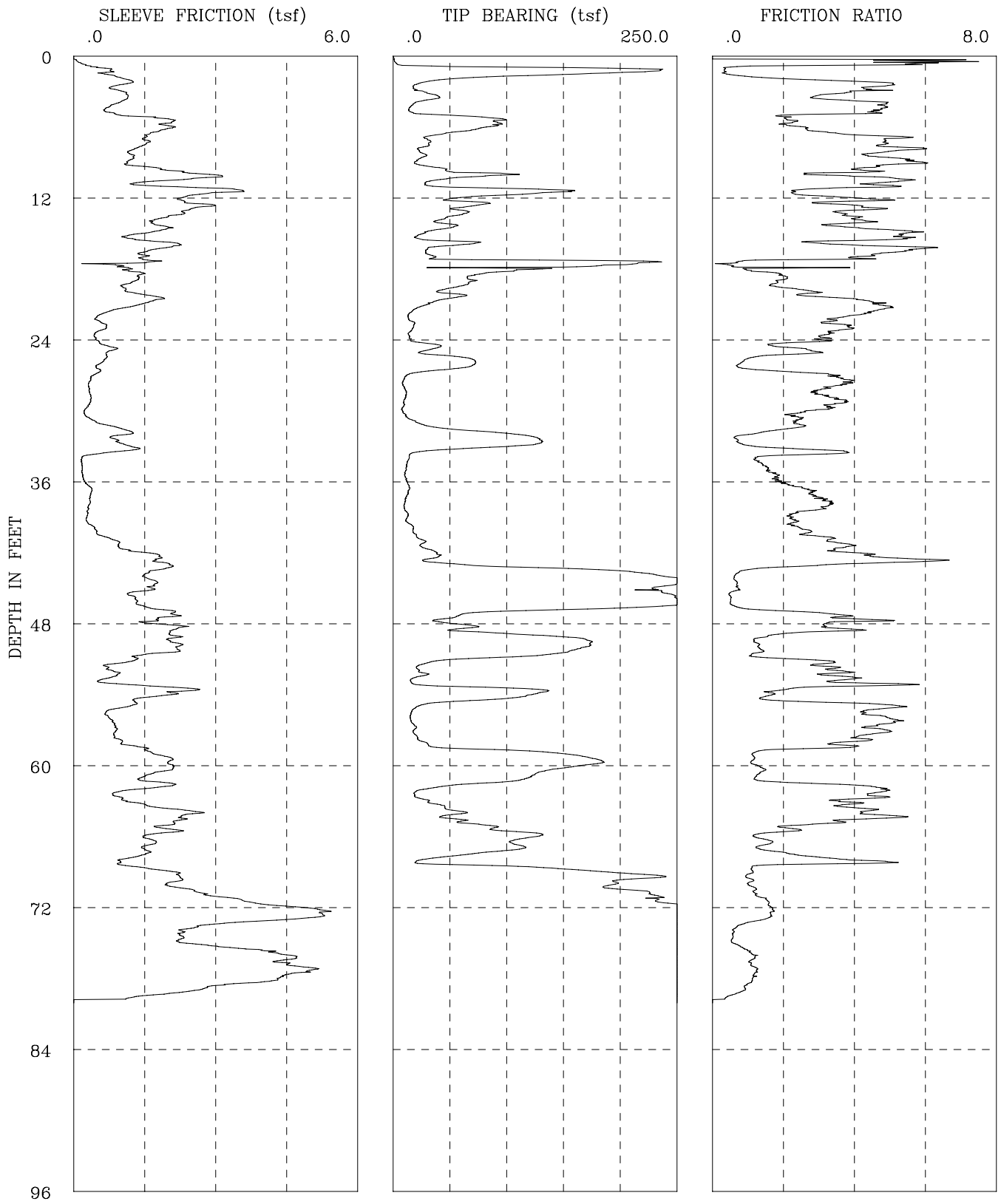
Figure A-29d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	148.01	3.67	2.48	3.83	silty sand to sandy silt	50-60	36-38	47	UNDEFINED
37.75	124	55.27	1.60	2.90	3.86	sandy silt to clayey silt	UNDFND	UNDFD	21	3.1
38.05	125	68.78	1.45	2.11	3.89	silty sand to sandy silt	<40	30-32	22	UNDEFINED
38.40	126	71.46	2.05	2.87	3.92	sandy silt to clayey silt	UNDFND	UNDFD	27	4.2
38.70	127	197.59	3.52	1.78	3.95	sand to silty sand	60-70	36-38	47	UNDEFINED
39.00	128	312.85	3.01	0.96	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	337.88	3.37	1.00	4.01	sand	80-90	40-42	>50	UNDEFINED
39.65	130	390.21	3.83	0.98	4.04	sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-29e



CPT-08-018	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-30a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-018
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 24.93438

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	34.20	0.21	0.60	0.03	silty sand to sandy silt	80-90	>48	11	UNDEFINED
0.60	2	143.63	0.87	0.60	0.09	sand	>90	>48	28	UNDEFINED
0.95	3	23.57	1.01	4.29	0.15	silty clay to clay	UNDFND	UNDFD	15	1.5
1.25	4	29.47	1.03	3.50	0.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
1.55	5	27.04	0.84	3.10	0.28	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
1.85	6	90.35	2.00	2.21	0.33	silty sand to sandy silt	70-80	44-46	29	UNDEFINED
2.15	7	43.26	1.62	3.75	0.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.8
2.45	8	27.60	1.40	5.08	0.45	clay	UNDFND	UNDFD	26	1.8
2.75	9	24.03	1.20	5.01	0.51	clay	UNDFND	UNDFD	23	1.5
3.05	10	53.84	1.98	3.67	0.57	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
3.35	11	41.97	2.01	4.79	0.63	silty clay to clay	UNDFND	UNDFD	27	2.7
3.65	12	107.15	2.89	2.70	0.69	sandy silt to clayey silt	UNDFND	UNDFD	41	7.0
3.95	13	64.06	2.54	3.96	0.75	clayey silt to silty clay	UNDFND	UNDFD	31	4.2
4.25	14	52.47	2.01	3.82	0.81	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
4.55	15	42.78	1.78	4.17	0.87	silty clay to clay	UNDFND	UNDFD	27	2.7
4.85	16	40.48	1.54	3.81	0.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
5.15	17	32.34	1.67	5.16	0.98	clay	UNDFND	UNDFD	31	2.0
5.45	18	131.32	1.15	0.88	1.04	sand to silty sand	70-80	40-42	31	UNDEFINED
5.75	19	82.62	1.32	1.60	1.10	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
6.05	20	56.77	1.12	1.97	1.16	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
6.40	21	45.10	1.58	3.51	1.23	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.70	22	17.45	0.80	4.59	1.29	clay	UNDFND	UNDFD	17	1.0
7.00	23	16.61	0.59	3.56	1.35	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	15.17	0.49	3.22	1.41	silty clay to clay	UNDFND	UNDFD	10	.9
7.65	25	32.55	0.73	2.23	1.48	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
7.95	26	63.89	0.63	0.99	1.51	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
8.25	27	34.16	0.48	1.41	1.54	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
8.55	28	9.16	0.33	3.60	1.57	clay	UNDFND	UNDFD	9	.5
8.85	29	10.94	0.35	3.16	1.60	silty clay to clay	UNDFND	UNDFD	7	.6
9.15	30	8.79	0.29	3.28	1.63	clay	UNDFND	UNDFD	8	.4
9.45	31	14.47	0.34	2.35	1.66	clayey silt to silty clay	UNDFND	UNDFD	7	.8
9.75	32	63.14	1.01	1.60	1.68	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.05	33	123.84	0.96	0.77	1.71	sand to silty sand	60-70	38-40	30	UNDEFINED
10.35	34	29.30	0.72	2.46	1.74	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
10.65	35	12.23	0.17	1.39	1.77	clayey silt to silty clay	UNDFND	UNDFD	6	.6
10.95	36	10.97	0.19	1.78	1.80	clayey silt to silty clay	UNDFND	UNDFD	5	.5
11.25	37	13.57	0.34	2.48	1.83	clayey silt to silty clay	UNDFND	UNDFD	7	.7
11.55	38	11.15	0.34	3.06	1.85	silty clay to clay	UNDFND	UNDFD	7	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

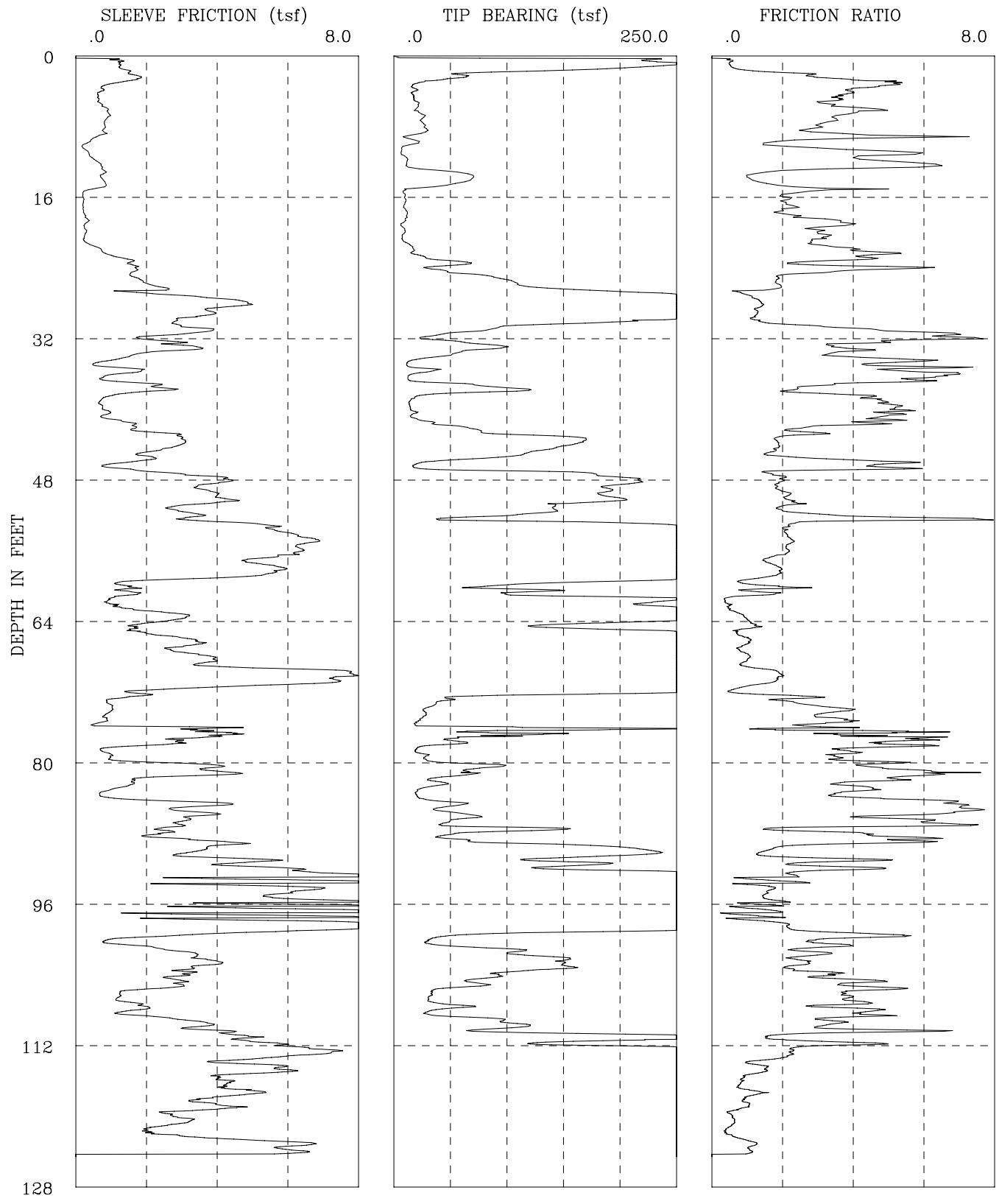
Figure A-30b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	11.41	0.30	2.59	1.88	silty clay to clay	UNDFND	UNDFD	7	.6
12.15	40	14.09	0.32	2.30	1.91	clayey silt to silty clay	UNDFND	UNDFD	7	.7
12.45	41	19.93	0.58	2.93	1.94	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
12.80	42	29.89	1.08	3.61	1.97	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	39.71	1.84	4.62	2.00	silty clay to clay	UNDFND	UNDFD	25	2.4
13.40	44	184.43	1.72	0.93	2.03	sand	70-80	40-42	35	UNDEFINED
13.75	45	246.32	1.67	0.68	2.06	sand	80-90	40-42	47	UNDEFINED
14.05	46	248.95	1.27	0.51	2.09	sand	80-90	40-42	48	UNDEFINED
14.35	47	179.26	1.70	0.95	2.12	sand	70-80	40-42	34	UNDEFINED
14.65	48	50.24	1.86	3.70	2.15	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
14.95	49	86.89	2.16	2.48	2.18	sandy silt to clayey silt	UNDFND	UNDFD	33	5.5
15.25	50	170.53	2.13	1.25	2.20	sand to silty sand	70-80	38-40	41	UNDEFINED
15.55	51	120.37	1.66	1.38	2.23	sand to silty sand	60-70	38-40	29	UNDEFINED
15.85	52	25.18	0.84	3.33	2.26	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.15	53	20.83	0.75	3.59	2.29	silty clay to clay	UNDFND	UNDFD	13	1.1
16.45	54	98.30	2.05	2.09	2.32	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
16.75	55	64.17	1.36	2.12	2.35	silty sand to sandy silt	40-50	32-34	20	UNDEFINED
17.05	56	16.41	0.75	4.58	2.37	clay	UNDFND	UNDFD	16	.8
17.35	57	17.88	0.86	4.79	2.40	clay	UNDFND	UNDFD	17	.9
17.65	58	20.50	0.90	4.41	2.43	clay	UNDFND	UNDFD	20	1.1
17.95	59	68.80	1.37	1.99	2.46	silty sand to sandy silt	40-50	34-36	22	UNDEFINED
18.25	60	174.08	1.98	1.14	2.49	sand to silty sand	60-70	38-40	42	UNDEFINED
18.55	61	137.10	1.86	1.36	2.52	sand to silty sand	60-70	38-40	33	UNDEFINED
18.85	62	81.50	1.74	2.13	2.54	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
19.20	63	23.19	1.01	4.34	2.57	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	47.92	1.98	4.12	2.61	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
19.80	65	56.83	2.24	3.93	2.63	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
20.15	66	108.78	1.79	1.64	2.66	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
20.45	67	108.99	1.60	1.46	2.69	sand to silty sand	50-60	36-38	26	UNDEFINED
20.75	68	51.06	1.30	2.55	2.72	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
21.05	69	123.78	1.54	1.24	2.75	sand to silty sand	50-60	36-38	30	UNDEFINED
21.35	70	211.00	2.16	1.02	2.78	sand	70-80	38-40	40	UNDEFINED
21.65	71	212.96	2.55	1.20	2.81	sand	70-80	38-40	41	UNDEFINED
21.95	72	251.25	3.99	1.59	2.84	sand to silty sand	70-80	40-42	>50	UNDEFINED
22.25	73	315.52	5.12	1.62	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.55	74	367.51	2.81	0.77	2.89	sand	80-90	42-44	>50	UNDEFINED
22.85	75	401.60	2.25	0.56	2.92	gravelly sand to sand	>90	42-44	>50	UNDEFINED
23.15	76	395.11	3.65	0.92	2.95	sand	>90	42-44	>50	UNDEFINED
23.45	77	408.09	4.54	1.11	2.98	sand	>90	42-44	>50	UNDEFINED
23.75	78	393.78	4.74	1.20	3.01	sand	>90	42-44	>50	UNDEFINED
24.05	79	337.28	3.40	1.01	3.03	sand	80-90	40-42	>50	UNDEFINED
24.35	80	309.14	1.42	0.46	3.06	gravelly sand to sand	80-90	40-42	49	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-30c



CPT-08-020	I-436 Garden Grove Freeway (SR-22)
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-31a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-020
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :04/01/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	199.33	1.02	0.51	0.03	sand	>90	>48	38	UNDEFINED
0.60	2	152.07	1.39	0.91	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	43.99	1.55	3.53	0.15	clayey silt to silty clay	UNDFND	UNDFD	21	2.9
1.25	4	17.70	0.75	4.25	0.22	clay	UNDFND	UNDFD	17	1.1
1.55	5	17.64	0.63	3.58	0.28	silty clay to clay	UNDFND	UNDFD	11	1.1
1.85	6	21.00	0.79	3.74	0.33	silty clay to clay	UNDFND	UNDFD	13	1.3
2.15	7	24.78	0.92	3.73	0.39	silty clay to clay	UNDFND	UNDFD	16	1.6
2.45	8	25.47	0.83	3.26	0.45	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
2.75	9	22.65	0.79	3.50	0.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
3.05	10	17.51	0.38	2.17	0.57	clayey silt to silty clay	UNDFND	UNDFD	8	1.1
3.35	11	5.71	0.26	4.53	0.61	clay	UNDFND	UNDFD	5	.3
3.65	12	11.00	0.50	4.57	0.64	clay	UNDFND	UNDFD	11	.6
3.95	13	18.99	0.80	4.21	0.67	clay	UNDFND	UNDFD	18	1.2
4.25	14	81.63	0.73	0.90	0.69	sand to silty sand	60-70	40-42	20	UNDEFINED
4.55	15	39.08	1.00	2.55	0.72	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
4.85	16	10.46	0.21	2.00	0.75	clayey silt to silty clay	UNDFND	UNDFD	5	.6
5.15	17	8.28	0.18	2.17	0.78	silty clay to clay	UNDFND	UNDFD	5	.4
5.45	18	14.27	0.21	1.50	0.81	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.75	19	6.91	0.28	4.04	0.84	clay	UNDFND	UNDFD	7	.3
6.05	20	10.73	0.32	3.00	0.86	silty clay to clay	UNDFND	UNDFD	7	.6
6.40	21	5.72	0.20	3.56	0.89	clay	UNDFND	UNDFD	5	.2
6.70	22	15.50	0.54	3.49	0.93	silty clay to clay	UNDFND	UNDFD	10	.9
7.00	23	22.70	1.04	4.56	0.95	clay	UNDFND	UNDFD	22	1.4
7.35	24	47.71	1.63	3.41	0.98	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
7.65	25	68.39	1.62	2.37	1.02	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
7.95	26	107.67	2.01	1.87	1.04	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
8.25	27	201.56	2.23	1.11	1.07	sand	80-90	42-44	39	UNDEFINED
8.55	28	335.71	4.39	1.31	1.10	sand	>90	44-46	>50	UNDEFINED
8.85	29	306.91	4.05	1.32	1.13	sand	>90	44-46	>50	UNDEFINED
9.15	30	265.86	3.26	1.23	1.16	sand	>90	44-46	>50	UNDEFINED
9.45	31	114.78	3.22	2.80	1.19	sandy silt to clayey silt	UNDFND	UNDFD	44	7.5
9.75	32	41.01	2.63	6.42	1.21	clay	UNDFND	UNDFD	39	2.6
10.05	33	73.89	2.93	3.96	1.24	clayey silt to silty clay	UNDFND	UNDFD	35	4.7
10.35	34	60.49	2.29	3.78	1.27	clayey silt to silty clay	UNDFND	UNDFD	29	3.8
10.65	35	17.59	0.88	5.00	1.30	clay	UNDFND	UNDFD	17	1.0
10.95	36	25.60	1.46	5.70	1.33	clay	UNDFND	UNDFD	25	1.5
11.25	37	15.36	0.92	5.98	1.36	clay	UNDFND	UNDFD	15	.8
11.55	38	92.89	2.41	2.59	1.38	sandy silt to clayey silt	UNDFND	UNDFD	36	6.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-31b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	32.31	1.08	3.33	1.41	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
12.15	40	13.96	0.71	5.08	1.44	clay	UNDFND	UNDFD	13	.7
12.45	41	16.61	0.84	5.09	1.47	clay	UNDFND	UNDFD	16	.9
12.80	42	36.77	1.42	3.85	1.50	clayey silt to silty clay	UNDFND	UNDFD	18	2.2
13.10	43	89.90	2.22	2.47	1.53	sandy silt to clayey silt	UNDFND	UNDFD	34	5.8
13.40	44	165.21	3.05	1.84	1.56	sand to silty sand	70-80	40-42	40	UNDEFINED
13.75	45	130.84	2.29	1.75	1.59	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
14.05	46	59.30	1.85	3.12	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.35	47	55.58	1.37	2.47	1.65	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.65	48	198.10	3.82	1.93	1.68	sand to silty sand	70-80	40-42	47	UNDEFINED
14.95	49	197.80	3.66	1.85	1.70	sand to silty sand	70-80	40-42	47	UNDEFINED
15.25	50	188.92	3.98	2.11	1.73	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
15.55	51	165.77	3.71	2.24	1.76	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
15.85	52	129.33	3.11	2.40	1.79	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
16.15	53	118.85	3.85	3.24	1.82	sandy silt to clayey silt	UNDFND	UNDFD	46	7.7
16.45	54	272.51	5.68	2.08	1.85	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.75	55	297.00	6.58	2.21	1.87	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.05	56	296.56	6.36	2.15	1.90	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.35	57	313.26	5.80	1.85	1.93	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.65	58	311.48	5.27	1.69	1.96	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.95	59	292.43	5.50	1.88	1.99	sand to silty sand	80-90	42-44	>50	UNDEFINED
18.25	60	190.58	2.02	1.06	2.02	sand	70-80	40-42	37	UNDEFINED
18.55	61	102.88	1.55	1.51	2.04	sand to silty sand	50-60	36-38	25	UNDEFINED
18.85	62	215.27	1.05	0.49	2.07	sand	70-80	40-42	41	UNDEFINED
19.20	63	290.20	1.58	0.55	2.10	sand	80-90	42-44	>50	UNDEFINED
19.50	64	313.36	2.94	0.94	2.13	sand	80-90	42-44	>50	UNDEFINED
19.80	65	160.82	1.73	1.07	2.16	sand to silty sand	60-70	38-40	39	UNDEFINED
20.15	66	293.35	2.57	0.88	2.19	sand	80-90	42-44	>50	UNDEFINED
20.45	67	349.50	3.14	0.90	2.22	sand	>90	42-44	>50	UNDEFINED
20.75	68	347.39	3.34	0.96	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	407.69	3.74	0.92	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	412.50	7.07	1.71	2.31	sand to silty sand	>90	42-44	>50	UNDEFINED
21.65	71	410.21	7.27	1.77	2.34	sand to silty sand	>90	42-44	>50	UNDEFINED
21.95	72	394.85	3.06	0.78	2.37	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.25	73	79.24	1.42	1.80	2.39	silty sand to sandy silt	40-50	34-36	25	UNDEFINED
22.55	74	32.55	0.99	3.04	2.42	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
22.85	75	26.83	0.87	3.24	2.45	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
23.15	76	35.50	1.23	3.47	2.48	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
23.45	77	137.53	3.92	2.85	2.51	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
23.75	78	53.48	2.95	5.52	2.54	clay	UNDFND	UNDFD	>50	3.2
24.05	79	21.43	0.95	4.43	2.56	clay	UNDFND	UNDFD	21	1.1
24.35	80	30.01	1.17	3.90	2.59	silty clay to clay	UNDFND	UNDFD	19	1.6

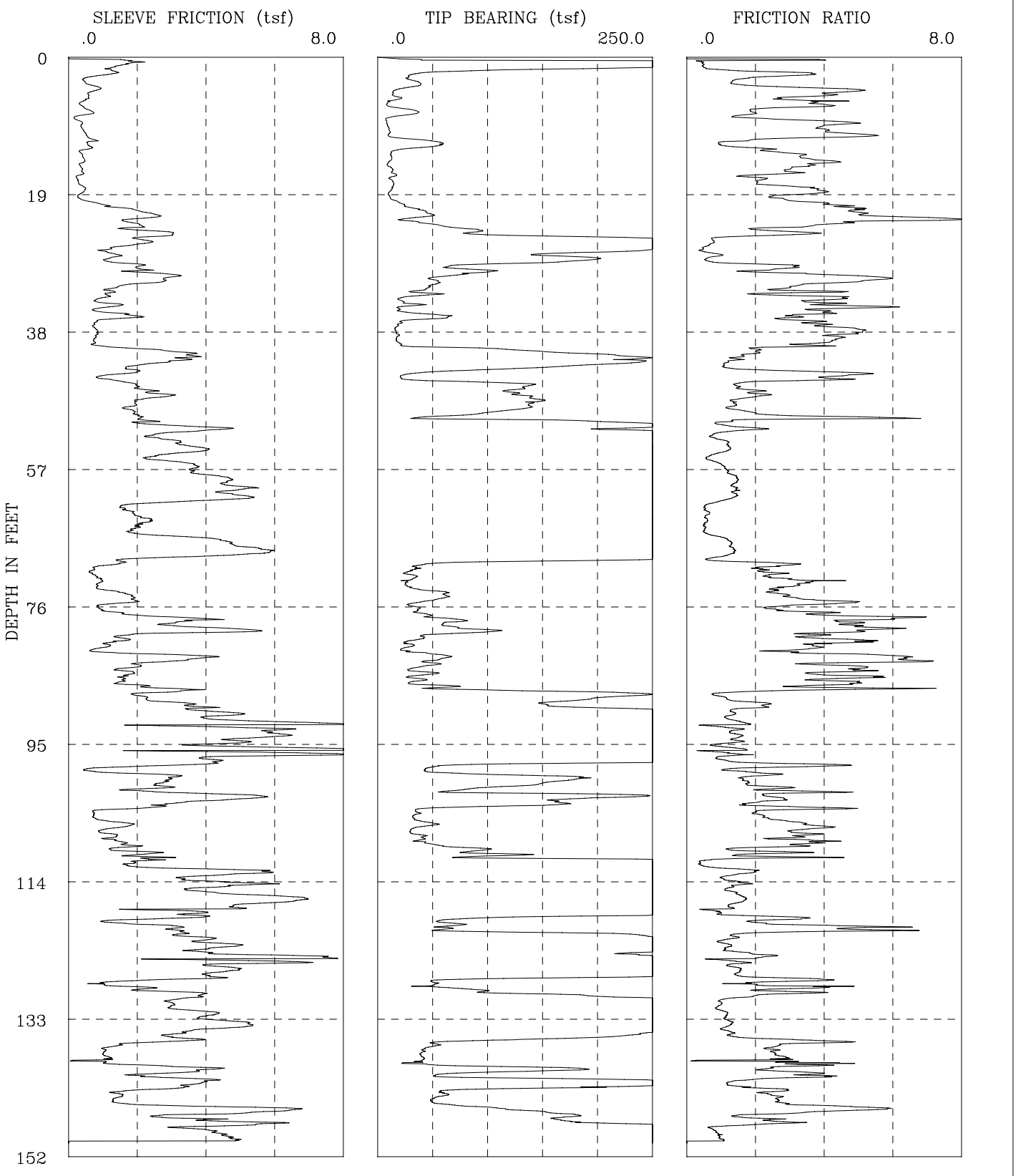
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-31c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	76.99	3.73	4.84	2.62	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.95	82	53.27	3.17	5.95	2.65	clay	UNDFND	UNDFD	>50	3.2
25.25	83	37.16	1.49	4.01	2.68	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
25.60	84	20.61	0.82	3.98	2.71	silty clay to clay	UNDFND	UNDFD	13	1.0
25.90	85	49.09	3.37	6.87	2.74	clay	UNDFND	UNDFD	47	2.9
26.20	86	51.52	3.33	6.46	2.77	clay	UNDFND	UNDFD	49	3.0
26.55	87	53.38	3.04	5.69	2.80	clay	UNDFND	UNDFD	>50	3.2
26.85	88	99.07	2.47	2.49	2.83	silty sand to sandy silt	50-60	34-36	32	UNDEFINED
27.15	89	61.05	3.29	5.39	2.86	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
27.45	90	204.30	3.74	1.83	2.88	sand to silty sand	70-80	38-40	49	UNDEFINED
27.75	91	170.34	3.96	2.32	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.05	92	157.54	5.06	3.21	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.1
28.35	93	338.39	6.95	2.05	2.97	sand to silty sand	80-90	40-42	>50	UNDEFINED
28.65	94	385.38	6.04	1.57	3.00	sand to silty sand	80-90	42-44	>50	UNDEFINED
28.95	95	387.61	6.21	1.60	3.03	sand to silty sand	80-90	42-44	>50	UNDEFINED
29.25	96	424.41	6.37	1.50	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	509.78	7.39	1.45	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	477.86	5.43	1.14	3.11	sand	>90	42-44	>50	UNDEFINED
30.15	99	377.17	8.13	2.16	3.14	sand to silty sand	80-90	40-42	>50	UNDEFINED
30.45	100	80.00	3.14	3.92	3.17	clayey silt to silty clay	UNDFND	UNDFD	38	4.9
30.75	101	41.29	1.34	3.25	3.20	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
31.05	102	112.26	3.10	2.76	3.22	sandy silt to clayey silt	UNDFND	UNDFD	43	7.0
31.35	103	151.08	3.82	2.53	3.25	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
31.65	104	125.95	3.17	2.52	3.28	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.00	105	78.72	2.89	3.67	3.31	clayey silt to silty clay	UNDFND	UNDFD	38	4.8
32.30	106	49.94	2.14	4.29	3.34	silty clay to clay	UNDFND	UNDFD	32	2.9
32.60	107	31.49	1.22	3.86	3.37	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
32.95	108	47.01	1.79	3.82	3.40	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
33.25	109	58.32	2.09	3.59	3.43	clayey silt to silty clay	UNDFND	UNDFD	28	3.4
33.55	110	105.60	3.53	3.34	3.46	sandy silt to clayey silt	UNDFND	UNDFD	40	6.6
33.85	111	191.60	4.50	2.35	3.49	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
34.15	112	184.55	5.29	2.87	3.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	307.66	6.95	2.26	3.55	sand to silty sand	80-90	40-42	>50	UNDEFINED
34.75	114	331.14	4.82	1.46	3.57	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.05	115	393.12	5.85	1.49	3.60	sand	80-90	40-42	>50	UNDEFINED
35.35	116	451.96	4.24	0.94	3.63	sand	>90	40-42	>50	UNDEFINED
35.65	117	535.15	4.35	0.81	3.66	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.95	118	392.58	4.63	1.18	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	391.03	3.89	0.99	3.72	sand	80-90	40-42	>50	UNDEFINED
36.55	120	511.97	3.08	0.60	3.74	gravelly sand to sand	>90	42-44	>50	UNDEFINED
36.85	121	497.06	3.08	0.62	3.77	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.15	122	499.91	2.14	0.43	3.80	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.45	123	515.30	4.07	0.79	3.83	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.75	124	548.07	6.19	1.13	3.86	sand	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 u: Nk= 15
(*) overconsolidated or cemented



I-436 SR-22 Phase 2	CPT-08-021
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-32a

Engineer : Nava
On Site Loc: CPT-08-021
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 9.84

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	312.43	1.49	0.48	0.03	gravelly sand to sand	>90	UNDFD	50	UNDEFINED
0.60	2	188.74	1.30	0.69	0.09	sand	>90	>48	36	UNDEFINED
0.95	3	30.90	0.83	2.70	0.15	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
1.25	4	36.20	0.61	1.68	0.22	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
1.55	5	16.48	0.74	4.47	0.28	clay	UNDFND	UNDFD	16	1.0
1.85	6	16.43	0.53	3.24	0.33	silty clay to clay	UNDFND	UNDFD	10	1.0
2.15	7	11.70	0.39	3.30	0.39	silty clay to clay	UNDFND	UNDFD	7	.7
2.45	8	32.16	0.60	1.85	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	2.1
2.75	9	9.17	0.26	2.83	0.51	silty clay to clay	UNDFND	UNDFD	6	.5
3.05	10	9.44	0.39	4.10	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	10.59	0.50	4.73	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	44.22	0.63	1.42	0.64	silty sand to sandy silt	40-50	38-40	14	UNDEFINED
3.95	13	34.87	0.54	1.55	0.67	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
4.25	14	12.36	0.40	3.22	0.69	silty clay to clay	UNDFND	UNDFD	8	.7
4.55	15	10.37	0.41	3.93	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	12.67	0.39	3.07	0.75	silty clay to clay	UNDFND	UNDFD	8	.7
5.15	17	13.77	0.30	2.17	0.78	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.45	18	14.07	0.33	2.35	0.81	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.75	19	11.59	0.44	3.82	0.84	clay	UNDFND	UNDFD	11	.6
6.05	20	12.37	0.34	2.78	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	26.20	1.19	4.53	0.89	clay	UNDFND	UNDFD	25	1.6
6.70	22	46.14	2.36	5.11	0.93	clay	UNDFND	UNDFD	44	2.9
7.00	23	31.89	1.89	5.94	0.95	clay	UNDFND	UNDFD	31	2.0
7.35	24	75.65	2.11	2.78	0.98	sandy silt to clayey silt	UNDFND	UNDFD	29	4.9
7.65	25	159.69	2.58	1.62	1.02	sand to silty sand	70-80	42-44	38	UNDEFINED
7.95	26	294.45	2.12	0.72	1.04	sand	>90	44-46	>50	UNDEFINED
8.25	27	233.07	1.16	0.50	1.07	sand	80-90	44-46	45	UNDEFINED
8.55	28	176.59	1.28	0.72	1.10	sand	80-90	42-44	34	UNDEFINED
8.85	29	105.96	1.77	1.67	1.13	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
9.15	30	88.45	2.28	2.58	1.16	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
9.45	31	54.22	2.92	5.38	1.19	clay	UNDFND	UNDFD	>50	3.4
9.75	32	49.47	1.67	3.37	1.21	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
10.05	33	41.59	1.17	2.81	1.24	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.35	34	22.05	0.92	4.16	1.27	silty clay to clay	UNDFND	UNDFD	14	1.3
10.65	35	25.65	1.13	4.42	1.30	silty clay to clay	UNDFND	UNDFD	16	1.5
10.95	36	45.23	1.57	3.47	1.33	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
11.25	37	29.83	0.95	3.19	1.36	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
11.55	38	16.84	0.78	4.62	1.38	clay	UNDFND	UNDFD	16	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.76	0.81	4.56	1.41	clay	UNDFND	UNDFD	17	1.0
12.15	40	19.31	0.75	3.87	1.44	silty clay to clay	UNDFND	UNDFD	12	1.1
12.45	41	116.15	2.44	2.10	1.47	silty sand to sandy silt	60-70	40-42	37	UNDEFINED
12.80	42	229.00	3.44	1.50	1.50	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.10	43	188.22	2.11	1.12	1.53	sand	70-80	40-42	36	UNDEFINED
13.40	44	53.23	1.70	3.20	1.56	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
13.75	45	57.04	1.31	2.30	1.59	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
14.05	46	130.58	2.12	1.62	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	130.24	2.64	2.03	1.65	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
14.65	48	143.42	1.99	1.38	1.68	sand to silty sand	60-70	40-42	34	UNDEFINED
14.95	49	125.21	1.79	1.43	1.70	sand to silty sand	60-70	38-40	30	UNDEFINED
15.25	50	67.85	2.03	2.99	1.73	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
15.55	51	235.05	2.59	1.10	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	263.32	3.81	1.45	1.79	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.15	53	316.90	2.61	0.83	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	281.50	3.42	1.22	1.85	sand	80-90	42-44	>50	UNDEFINED
16.75	55	341.06	3.51	1.03	1.87	sand	>90	42-44	>50	UNDEFINED
17.05	56	389.51	2.60	0.67	1.90	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.35	57	345.43	3.65	1.06	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	301.63	3.83	1.27	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	318.01	4.64	1.46	1.99	sand to silty sand	80-90	42-44	>50	UNDEFINED
18.25	60	354.11	4.97	1.40	2.02	sand	>90	42-44	>50	UNDEFINED
18.55	61	348.02	4.85	1.39	2.04	sand	>90	42-44	>50	UNDEFINED
18.85	62	348.19	3.28	0.94	2.07	sand	>90	42-44	>50	UNDEFINED
19.20	63	297.97	1.68	0.56	2.10	sand	80-90	42-44	>50	UNDEFINED
19.50	64	372.75	2.14	0.57	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	398.39	2.13	0.53	2.16	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.15	66	351.22	2.01	0.57	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	365.15	4.25	1.16	2.22	sand	>90	42-44	>50	UNDEFINED
20.75	68	393.56	5.19	1.32	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	402.02	5.04	1.25	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	171.99	1.64	0.96	2.31	sand	70-80	38-40	33	UNDEFINED
21.65	71	33.65	0.80	2.39	2.34	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
21.95	72	30.67	0.76	2.49	2.37	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
22.25	73	26.22	0.91	3.47	2.39	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
22.55	74	42.04	1.08	2.57	2.42	sandy silt to clayey silt	UNDFND	UNDFD	16	2.5
22.85	75	59.91	1.82	3.04	2.45	sandy silt to clayey silt	UNDFND	UNDFD	23	3.6
23.15	76	34.82	1.37	3.92	2.48	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
23.45	77	37.49	1.17	3.13	2.51	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
23.75	78	61.16	3.25	5.31	2.54	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.05	79	64.33	3.29	5.11	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	82.11	3.87	4.71	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	34.89	1.49	4.27	2.62	silty clay to clay	UNDFND	UNDFD	22	2.0
24.95	82	27.43	1.01	3.70	2.65	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
25.25	83	45.86	2.22	4.84	2.68	silty clay to clay	UNDFND	UNDFD	29	2.7
25.60	84	52.77	2.90	5.50	2.71	clay	UNDFND	UNDFD	>50	3.1
25.90	85	35.33	1.75	4.94	2.74	clay	UNDFND	UNDFD	34	2.0
26.20	86	39.81	1.68	4.21	2.77	silty clay to clay	UNDFND	UNDFD	25	2.3
26.55	87	45.07	1.79	3.98	2.80	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.85	88	160.38	2.83	1.76	2.83	sand to silty sand	60-70	38-40	38	UNDEFINED
27.15	89	196.87	2.31	1.18	2.86	sand	70-80	38-40	38	UNDEFINED
27.45	90	172.96	3.65	2.11	2.88	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.75	91	338.22	4.45	1.32	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	370.89	5.11	1.38	2.94	sand	80-90	42-44	>50	UNDEFINED
28.35	93	427.10	5.31	1.24	2.97	sand	>90	42-44	>50	UNDEFINED
28.65	94	421.84	6.02	1.43	3.00	sand	>90	42-44	>50	UNDEFINED
28.95	95	372.56	4.73	1.27	3.03	sand	80-90	40-42	>50	UNDEFINED
29.25	96	512.32	6.18	1.21	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	492.28	5.81	1.18	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	232.44	3.93	1.69	3.11	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.15	99	47.49	0.88	1.85	3.14	silty sand to sandy silt	<40	30-32	15	UNDEFINED
30.45	100	156.58	2.93	1.87	3.17	silty sand to sandy silt	60-70	36-38	50	UNDEFINED
30.75	101	141.39	2.75	1.95	3.20	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.05	102	99.35	2.76	2.78	3.22	sandy silt to clayey silt	UNDFND	UNDFD	38	6.2
31.35	103	197.21	4.98	2.53	3.25	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
31.65	104	122.94	2.71	2.21	3.28	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
32.00	105	34.69	0.79	2.26	3.31	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.30	106	40.75	1.21	2.97	3.34	sandy silt to clayey silt	UNDFND	UNDFD	16	2.2
32.60	107	36.99	1.35	3.66	3.37	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
32.95	108	37.99	1.21	3.17	3.40	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
33.25	109	46.90	1.67	3.55	3.43	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
33.55	110	90.11	1.78	1.98	3.46	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
33.85	111	198.07	2.17	1.10	3.49	sand	60-70	38-40	38	UNDEFINED
34.15	112	414.33	1.91	0.46	3.52	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
34.45	113	294.89	5.09	1.72	3.55	sand to silty sand	70-80	40-42	>50	UNDEFINED
34.75	114	310.52	3.67	1.18	3.57	sand	80-90	40-42	>50	UNDEFINED
35.05	115	324.42	4.55	1.40	3.60	sand	80-90	40-42	>50	UNDEFINED
35.35	116	327.31	4.68	1.43	3.63	sand	80-90	40-42	>50	UNDEFINED
35.65	117	399.38	6.50	1.63	3.66	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.95	118	394.07	4.01	1.02	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	293.94	3.78	1.29	3.72	sand	70-80	40-42	>50	UNDEFINED
36.55	120	66.96	1.70	2.54	3.74	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
36.85	121	65.44	3.17	4.84	3.77	silty clay to clay	UNDFND	UNDFD	42	3.8
37.15	122	253.08	3.60	1.42	3.80	sand to silty sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32d

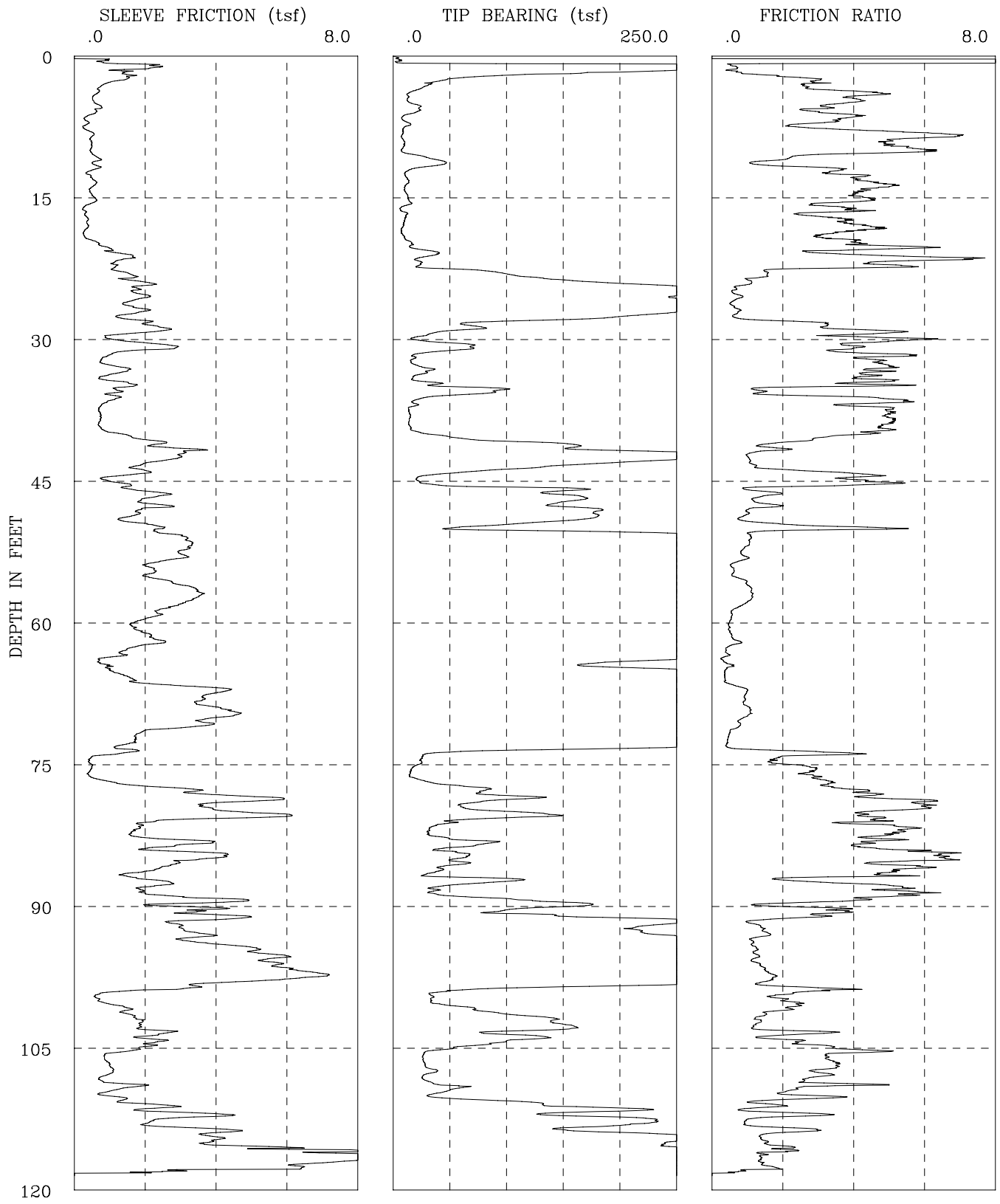
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	394.19	4.35	1.10	3.83	sand	80-90	40-42	>50	UNDEFINED
37.75	124	312.38	3.95	1.27	3.86	sand	70-80	40-42	>50	UNDEFINED
38.05	125	329.85	5.51	1.67	3.89	sand to silty sand	80-90	40-42	>50	UNDEFINED
38.40	126	354.67	5.16	1.45	3.92	sand	80-90	40-42	>50	UNDEFINED
38.70	127	289.77	4.34	1.50	3.95	sand to silty sand	70-80	38-40	>50	UNDEFINED
39.00	128	104.71	2.71	2.59	3.97	sandy silt to clayey silt	UNDFND	UNDFD	40	6.4
39.35	129	67.34	1.81	2.70	4.01	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
39.65	130	177.74	3.76	2.12	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.95	131	303.67	3.00	0.99	4.06	sand	70-80	38-40	>50	UNDEFINED
40.25	132	353.19	3.45	0.98	4.09	sand	80-90	40-42	>50	UNDEFINED
40.55	133	354.61	4.05	1.14	4.12	sand	80-90	40-42	>50	UNDEFINED
40.85	134	407.71	5.12	1.26	4.15	sand	80-90	40-42	>50	UNDEFINED
41.15	135	320.69	3.69	1.15	4.18	sand	70-80	38-40	>50	UNDEFINED
41.45	136	170.86	3.25	1.90	4.21	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
41.75	137	50.29	1.55	3.09	4.23	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
42.05	138	40.50	1.03	2.55	4.26	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.35	139	40.71	0.96	2.35	4.29	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.65	140	110.08	2.94	2.67	4.32	sandy silt to clayey silt	UNDFND	UNDFD	42	6.7
42.95	141	86.15	2.75	3.20	4.35	sandy silt to clayey silt	UNDFND	UNDFD	33	5.1
43.25	142	248.25	3.82	1.54	4.38	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.55	143	167.67	2.88	1.72	4.40	sand to silty sand	60-70	36-38	40	UNDEFINED
43.85	144	58.78	1.45	2.47	4.43	sandy silt to clayey silt	UNDFND	UNDFD	23	3.3
44.15	145	53.77	1.54	2.87	4.46	sandy silt to clayey silt	UNDFND	UNDFD	21	3.0
44.45	146	119.04	5.71	4.79	4.49	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.80	147	169.89	3.53	2.08	4.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
45.10	148	301.47	4.84	1.60	4.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
45.40	149	491.97	4.18	0.85	4.58	gravelly sand to sand	>90	40-42	>50	UNDEFINED
45.75	150	470.75	3.43	0.73	4.61	gravelly sand to sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-32e



CPT-08-022	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-33a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-022
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	109.32	1.03	0.94	0.03	sand to silty sand	>90	>48	26	UNDEFINED
0.60	2	232.57	1.67	0.72	0.09	sand	>90	>48	45	UNDEFINED
0.95	3	46.61	1.18	2.53	0.15	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.25	4	18.71	0.66	3.54	0.22	silty clay to clay	UNDFND	UNDFD	12	1.2
1.55	5	14.24	0.55	3.86	0.28	silty clay to clay	UNDFND	UNDFD	9	.9
1.85	6	21.85	0.66	3.00	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.4
2.15	7	9.76	0.36	3.64	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	10.65	0.34	3.18	0.45	silty clay to clay	UNDFND	UNDFD	7	.6
2.75	9	8.31	0.49	5.91	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	8.94	0.48	5.36	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	24.24	0.61	2.50	0.61	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
3.65	12	34.31	0.60	1.75	0.64	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
3.95	13	11.27	0.43	3.81	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	12.04	0.56	4.66	0.69	clay	UNDFND	UNDFD	12	.7
4.55	15	11.67	0.48	4.11	0.72	clay	UNDFND	UNDFD	11	.7
4.85	16	13.16	0.49	3.69	0.75	silty clay to clay	UNDFND	UNDFD	8	.8
5.15	17	9.30	0.29	3.10	0.78	silty clay to clay	UNDFND	UNDFD	6	.5
5.45	18	9.84	0.37	3.81	0.81	clay	UNDFND	UNDFD	9	.5
5.75	19	7.72	0.31	4.00	0.84	clay	UNDFND	UNDFD	7	.4
6.05	20	12.55	0.47	3.77	0.86	clay	UNDFND	UNDFD	12	.7
6.40	21	27.26	1.06	3.87	0.89	silty clay to clay	UNDFND	UNDFD	17	1.7
6.70	22	24.27	1.35	5.57	0.93	clay	UNDFND	UNDFD	23	1.5
7.00	23	56.94	1.23	2.16	0.95	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
7.35	24	148.98	1.79	1.20	0.98	sand to silty sand	70-80	42-44	36	UNDEFINED
7.65	25	271.53	1.76	0.65	1.02	sand	>90	44-46	>50	UNDEFINED
7.95	26	260.22	1.81	0.70	1.04	sand	>90	44-46	50	UNDEFINED
8.25	27	262.27	1.76	0.67	1.07	sand	>90	44-46	>50	UNDEFINED
8.55	28	181.16	1.56	0.86	1.10	sand	80-90	42-44	35	UNDEFINED
8.85	29	67.04	2.34	3.49	1.13	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
9.15	30	26.50	1.27	4.81	1.16	clay	UNDFND	UNDFD	25	1.6
9.45	31	59.54	2.41	4.05	1.19	clayey silt to silty clay	UNDFND	UNDFD	29	3.8
9.75	32	26.32	1.08	4.09	1.21	silty clay to clay	UNDFND	UNDFD	17	1.6
10.05	33	19.48	0.97	4.95	1.24	clay	UNDFND	UNDFD	19	1.1
10.35	34	26.69	1.19	4.46	1.27	silty clay to clay	UNDFND	UNDFD	17	1.6
10.65	35	29.75	1.32	4.44	1.30	silty clay to clay	UNDFND	UNDFD	19	1.8
10.95	36	80.35	1.14	1.42	1.33	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
11.25	37	21.57	1.01	4.68	1.36	clay	UNDFND	UNDFD	21	1.2
11.55	38	14.50	0.71	4.88	1.38	clay	UNDFND	UNDFD	14	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-33b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	14.40	0.73	5.04	1.41	clay	UNDFND	UNDFD	14	.8
12.15	40	17.41	0.83	4.76	1.44	clay	UNDFND	UNDFD	17	1.0
12.45	41	66.93	1.88	2.81	1.47	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
12.80	42	188.85	2.83	1.50	1.50	sand to silty sand	70-80	40-42	45	UNDEFINED
13.10	43	263.77	2.72	1.03	1.53	sand	80-90	42-44	>50	UNDEFINED
13.40	44	120.80	1.87	1.55	1.56	sand to silty sand	60-70	38-40	29	UNDEFINED
13.75	45	28.42	1.21	4.26	1.59	silty clay to clay	UNDFND	UNDFD	18	1.7
14.05	46	106.26	1.65	1.56	1.62	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
14.35	47	157.73	2.24	1.42	1.65	sand to silty sand	70-80	40-42	38	UNDEFINED
14.65	48	158.03	2.20	1.40	1.68	sand to silty sand	70-80	40-42	38	UNDEFINED
14.95	49	176.04	1.58	0.90	1.70	sand	70-80	40-42	34	UNDEFINED
15.25	50	91.65	2.08	2.27	1.73	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
15.55	51	237.16	2.76	1.16	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	320.29	3.26	1.02	1.79	sand	>90	42-44	>50	UNDEFINED
16.15	53	355.17	3.07	0.87	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	338.21	2.37	0.70	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	365.14	2.17	0.60	1.87	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.05	56	291.92	2.58	0.88	1.90	sand	80-90	42-44	>50	UNDEFINED
17.35	57	311.80	3.46	1.11	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	310.82	3.32	1.07	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	386.25	2.56	0.66	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	387.99	2.10	0.54	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	352.17	1.69	0.48	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	379.90	2.19	0.58	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	350.92	1.85	0.53	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	282.08	1.05	0.37	2.13	gravelly sand to sand	80-90	42-44	45	UNDEFINED
19.80	65	200.71	0.88	0.44	2.16	sand	70-80	40-42	38	UNDEFINED
20.15	66	393.79	1.44	0.37	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	449.43	3.18	0.71	2.22	gravelly sand to sand	>90	44-46	>50	UNDEFINED
20.75	68	402.06	3.79	0.94	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	386.43	3.72	0.96	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	429.27	4.40	1.02	2.31	sand	>90	42-44	>50	UNDEFINED
21.65	71	467.40	3.60	0.77	2.34	gravelly sand to sand	>90	44-46	>50	UNDEFINED
21.95	72	377.27	1.95	0.52	2.37	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.25	73	367.80	1.58	0.43	2.39	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.55	74	102.48	1.32	1.29	2.42	sand to silty sand	50-60	36-38	25	UNDEFINED
22.85	75	24.58	0.45	1.82	2.45	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
23.15	76	16.24	0.45	2.76	2.48	clayey silt to silty clay	UNDFND	UNDFD	8	.7
23.45	77	23.09	0.74	3.19	2.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
23.75	78	72.10	2.71	3.76	2.54	clayey silt to silty clay	UNDFND	UNDFD	35	4.4
24.05	79	98.77	4.94	5.01	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	68.14	3.83	5.61	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-33c

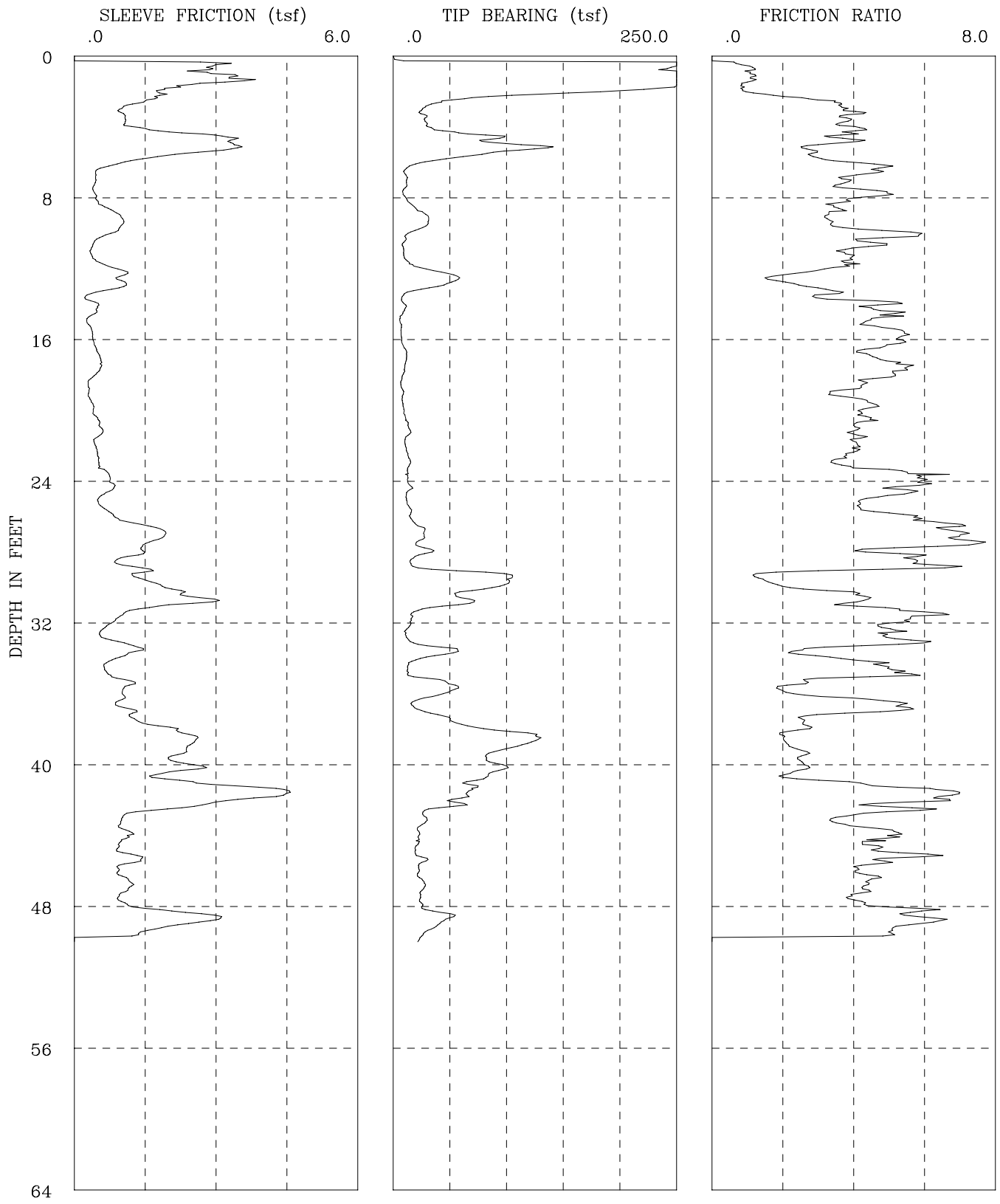
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	108.28	4.76	4.39	2.62	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.95	82	39.42	1.88	4.76	2.65	silty clay to clay	UNDFND	UNDFD	25	2.3
25.25	83	36.80	1.79	4.86	2.68	clay	UNDFND	UNDFD	35	2.1
25.60	84	66.12	2.95	4.47	2.71	clayey silt to silty clay	UNDFND	UNDFD	32	4.0
25.90	85	60.15	3.88	6.44	2.74	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
26.20	86	51.83	2.71	5.23	2.77	clay	UNDFND	UNDFD	50	3.1
26.55	87	51.63	1.76	3.40	2.80	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
26.85	88	62.88	2.37	3.76	2.83	clayey silt to silty clay	UNDFND	UNDFD	30	3.8
27.15	89	47.90	2.38	4.97	2.86	silty clay to clay	UNDFND	UNDFD	31	2.8
27.45	90	145.93	3.67	2.51	2.88	silty sand to sandy silt	60-70	36-38	47	UNDEFINED
27.75	91	113.42	3.84	3.38	2.91	sandy silt to clayey silt	UNDFND	UNDFD	43	7.2
28.05	92	244.50	3.38	1.38	2.94	sand to silty sand	70-80	40-42	>50	UNDEFINED
28.35	93	220.00	3.32	1.51	2.97	sand to silty sand	70-80	38-40	>50	UNDEFINED
28.65	94	294.49	3.45	1.17	3.00	sand	80-90	40-42	>50	UNDEFINED
28.95	95	416.11	5.06	1.21	3.03	sand	>90	42-44	>50	UNDEFINED
29.25	96	461.20	5.67	1.23	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	415.19	6.07	1.46	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	370.94	6.30	1.70	3.11	sand to silty sand	80-90	40-42	>50	UNDEFINED
30.15	99	160.48	3.05	1.90	3.14	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	34.31	0.70	2.03	3.17	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
30.75	101	52.27	1.21	2.31	3.20	sandy silt to clayey silt	UNDFND	UNDFD	20	3.0
31.05	102	110.03	1.56	1.41	3.22	sand to silty sand	50-60	34-36	26	UNDEFINED
31.35	103	150.02	1.87	1.25	3.25	sand to silty sand	60-70	36-38	36	UNDEFINED
31.65	104	113.92	2.28	2.00	3.28	silty sand to sandy silt	50-60	34-36	36	UNDEFINED
32.00	105	85.44	2.18	2.55	3.31	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
32.30	106	29.97	1.15	3.84	3.34	silty clay to clay	UNDFND	UNDFD	19	1.5
32.60	107	27.45	0.95	3.46	3.37	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
32.95	108	31.66	0.98	3.08	3.40	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
33.25	109	40.06	1.26	3.14	3.43	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
33.55	110	42.39	0.99	2.33	3.46	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
33.85	111	99.21	1.72	1.73	3.49	silty sand to sandy silt	40-50	34-36	32	UNDEFINED
34.15	112	176.22	2.89	1.64	3.52	sand to silty sand	60-70	36-38	42	UNDEFINED
34.45	113	215.92	2.57	1.19	3.55	sand	70-80	38-40	41	UNDEFINED
34.75	114	176.88	3.64	2.06	3.57	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	273.72	3.89	1.42	3.60	sand to silty sand	70-80	38-40	>50	UNDEFINED
35.35	116	308.96	6.18	2.00	3.63	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.65	117	635.31	8.78	1.38	3.66	sand	>90	42-44	>50	UNDEFINED
35.95	118	389.55	5.88	1.51	3.69	sand to silty sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-33d



CPT-08-102	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-34a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-102
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	253.16	2.29	0.90	0.03	sand	>90	>48	48	UNDEFINED
0.60	2	270.91	2.70	1.00	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	55.69	1.38	2.47	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	29.62	1.15	3.89	0.22	silty clay to clay	UNDFND	UNDFD	19	1.9
1.55	5	88.66	3.05	3.44	0.28	sandy silt to clayey silt	UNDFND	UNDFD	34	5.8
1.85	6	65.93	1.95	2.96	0.33	sandy silt to clayey silt	UNDFND	UNDFD	25	4.3
2.15	7	11.59	0.50	4.29	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	10.34	0.43	4.13	0.45	clay	UNDFND	UNDFD	10	.6
2.75	9	21.20	0.73	3.43	0.51	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
3.05	10	25.09	0.96	3.81	0.57	silty clay to clay	UNDFND	UNDFD	16	1.6
3.35	11	9.62	0.43	4.46	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	14.62	0.54	3.67	0.64	silty clay to clay	UNDFND	UNDFD	9	.9
3.95	13	49.15	1.04	2.11	0.67	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
4.25	14	12.76	0.45	3.55	0.69	silty clay to clay	UNDFND	UNDFD	8	.7
4.55	15	8.48	0.40	4.66	0.72	clay	UNDFND	UNDFD	8	.5
4.85	16	7.06	0.36	5.05	0.75	clay	UNDFND	UNDFD	7	.4
5.15	17	9.93	0.46	4.64	0.78	clay	UNDFND	UNDFD	10	.5
5.45	18	10.49	0.54	5.18	0.81	clay	UNDFND	UNDFD	10	.6
5.75	19	7.52	0.33	4.33	0.84	clay	UNDFND	UNDFD	7	.4
6.05	20	8.46	0.35	4.12	0.86	clay	UNDFND	UNDFD	8	.4
6.40	21	11.52	0.48	4.20	0.89	clay	UNDFND	UNDFD	11	.6
6.70	22	12.11	0.49	4.07	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	13.35	0.50	3.72	0.95	silty clay to clay	UNDFND	UNDFD	9	.8
7.35	24	12.80	0.69	5.42	0.98	clay	UNDFND	UNDFD	12	.7
7.65	25	13.12	0.66	5.05	1.02	clay	UNDFND	UNDFD	13	.7
7.95	26	14.64	0.71	4.84	1.04	clay	UNDFND	UNDFD	14	.8
8.25	27	24.06	1.63	6.79	1.07	clay	UNDFND	UNDFD	23	1.4
8.55	28	26.47	1.54	5.82	1.10	clay	UNDFND	UNDFD	25	1.6
8.85	29	23.38	1.17	5.00	1.13	clay	UNDFND	UNDFD	22	1.4
9.15	30	97.86	1.57	1.60	1.16	silty sand to sandy silt	60-70	40-42	31	UNDEFINED
9.45	31	61.41	2.45	3.98	1.19	clayey silt to silty clay	UNDFND	UNDFD	29	3.9
9.75	32	18.83	1.04	5.53	1.21	clay	UNDFND	UNDFD	18	1.1
10.05	33	12.30	0.63	5.11	1.24	clay	UNDFND	UNDFD	12	.6
10.35	34	38.79	1.18	3.04	1.27	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
10.65	35	13.92	0.69	4.94	1.30	clay	UNDFND	UNDFD	13	.7
10.95	36	47.15	1.08	2.28	1.33	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
11.25	37	23.33	1.03	4.41	1.36	clay	UNDFND	UNDFD	22	1.4
11.55	38	52.16	1.45	2.77	1.38	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-34b

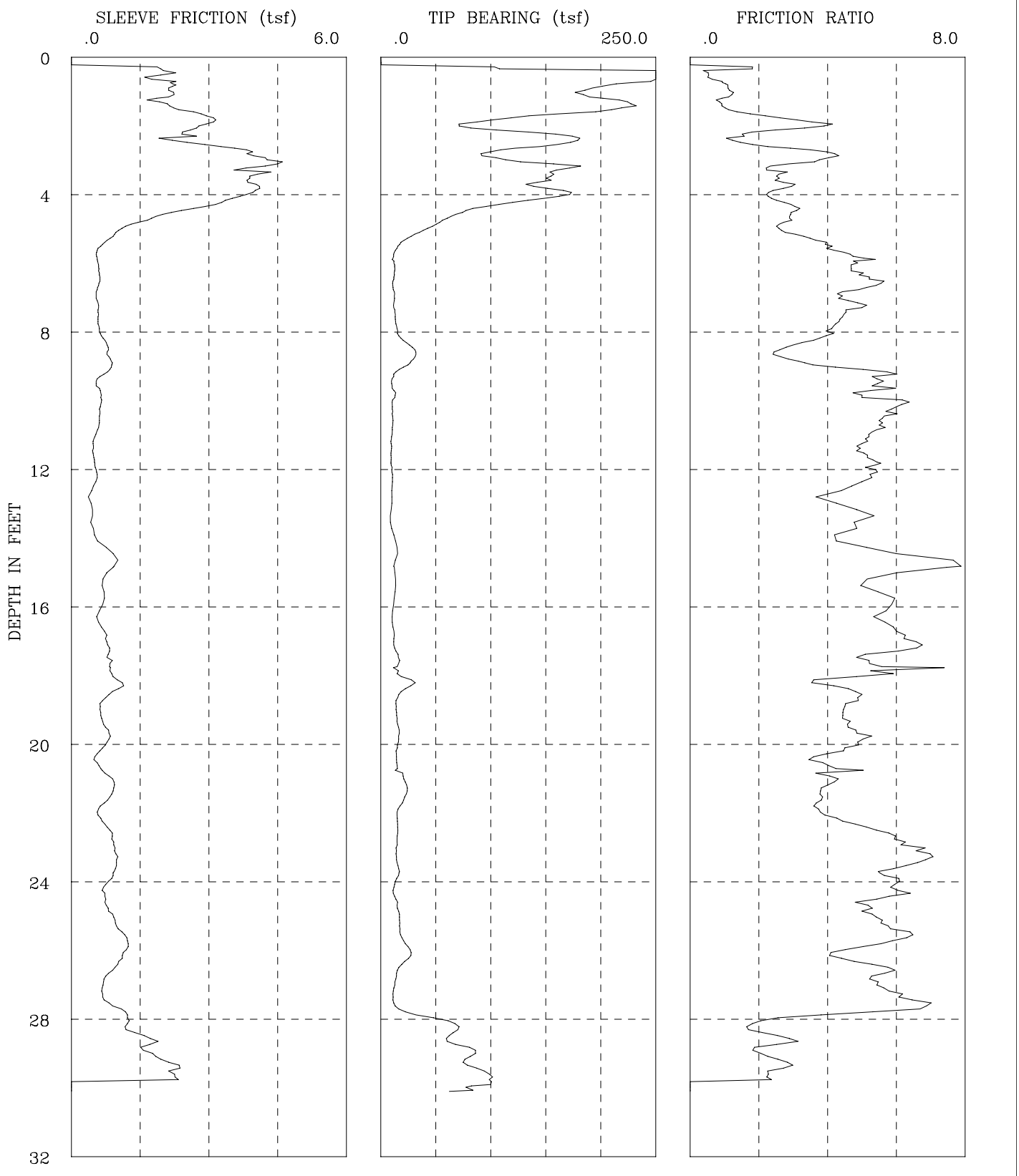
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	117.04	2.44	2.08	1.41	silty sand to sandy silt	60-70	40-42	37	UNDEFINED
12.15	40	88.28	2.21	2.50	1.44	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
12.45	41	88.67	2.17	2.44	1.47	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
12.80	42	64.22	3.79	5.90	1.50	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
13.10	43	38.47	1.82	4.72	1.53	silty clay to clay	UNDFND	UNDFD	25	2.3
13.40	44	24.58	1.05	4.28	1.56	silty clay to clay	UNDFND	UNDFD	16	1.4
13.75	45	20.63	1.03	4.99	1.59	clay	UNDFND	UNDFD	20	1.1
14.05	46	24.81	1.10	4.45	1.62	clay	UNDFND	UNDFD	24	1.4
14.35	47	25.70	1.14	4.43	1.65	silty clay to clay	UNDFND	UNDFD	16	1.5
14.65	48	24.39	1.06	4.35	1.68	silty clay to clay	UNDFND	UNDFD	16	1.4
14.95	49	43.74	2.59	5.91	1.70	clay	UNDFND	UNDFD	42	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-34c



CPT-08-103	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-35a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-103
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

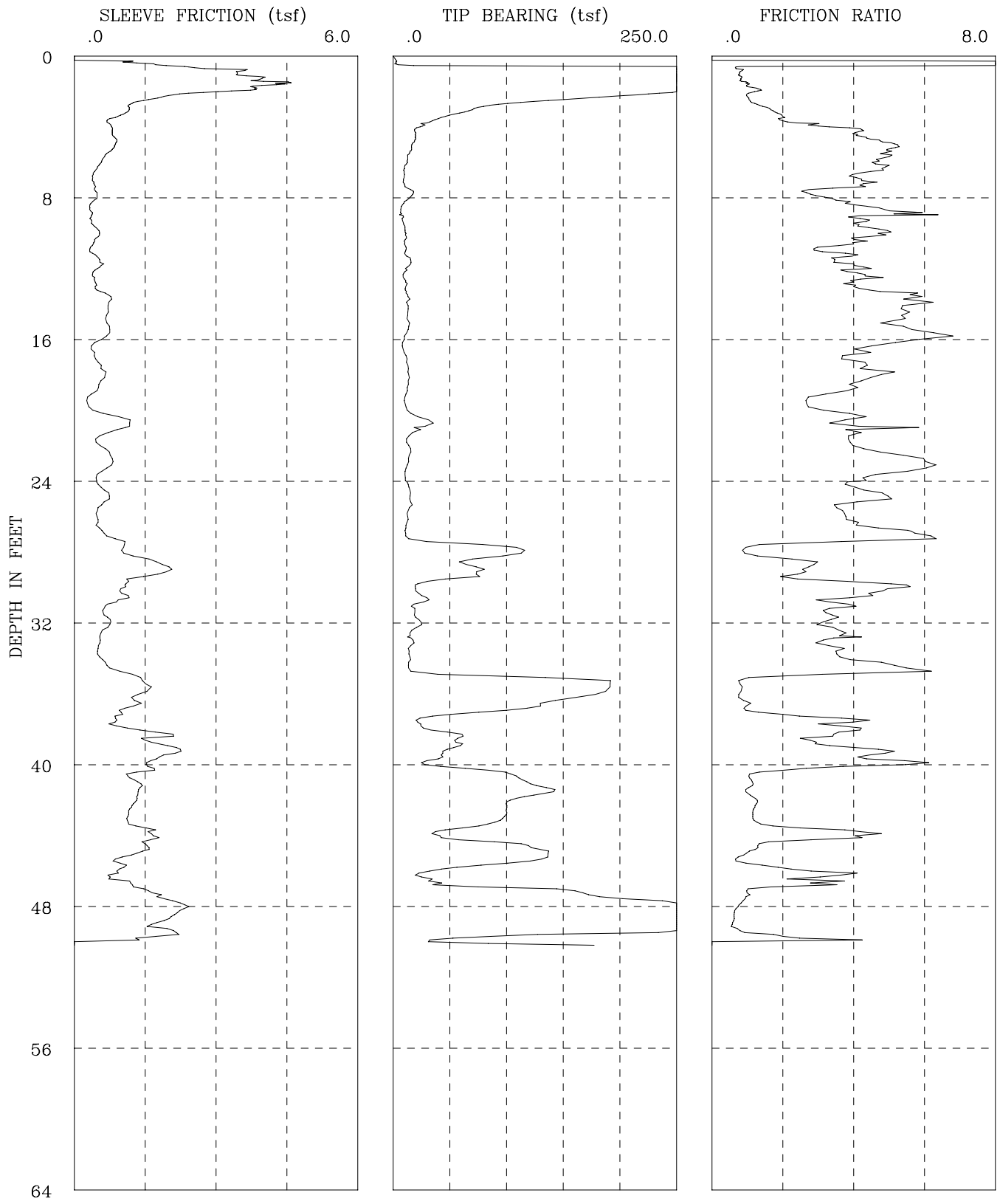
CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	191.77	1.72	0.90	0.03	sand	>90	>48	37	UNDEFINED
0.60	2	162.78	2.52	1.55	0.09	sand to silty sand	>90	>48	39	UNDEFINED
0.95	3	136.86	3.39	2.47	0.15	silty sand to sandy silt	>90	>48	44	UNDEFINED
1.25	4	154.99	3.82	2.46	0.22	silty sand to sandy silt	>90	>48	49	UNDEFINED
1.55	5	66.13	1.91	2.88	0.28	sandy silt to clayey silt	UNDFND	UNDFD	25	4.3
1.85	6	15.46	0.64	4.14	0.33	clay	UNDFND	UNDFD	15	1.0
2.15	7	11.89	0.58	4.88	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	13.45	0.59	4.42	0.45	clay	UNDFND	UNDFD	13	.8
2.75	9	25.91	0.81	3.11	0.51	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
3.05	10	11.36	0.63	5.56	0.57	clay	UNDFND	UNDFD	11	.7
3.35	11	10.59	0.59	5.61	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	9.55	0.49	5.15	0.64	clay	UNDFND	UNDFD	9	.5
3.95	13	10.30	0.47	4.56	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	9.78	0.45	4.56	0.69	clay	UNDFND	UNDFD	9	.5
4.55	15	13.38	0.90	6.70	0.72	clay	UNDFND	UNDFD	13	.8
4.85	16	12.83	0.70	5.49	0.75	clay	UNDFND	UNDFD	12	.7
5.15	17	10.91	0.62	5.70	0.78	clay	UNDFND	UNDFD	10	.6
5.45	18	14.71	0.83	5.64	0.81	clay	UNDFND	UNDFD	14	.9
5.75	19	19.84	0.87	4.39	0.84	clay	UNDFND	UNDFD	19	1.2
6.05	20	15.49	0.73	4.70	0.86	clay	UNDFND	UNDFD	15	.9
6.40	21	16.20	0.67	4.12	0.89	clay	UNDFND	UNDFD	16	.9
6.70	22	20.30	0.78	3.82	0.93	silty clay to clay	UNDFND	UNDFD	13	1.2
7.00	23	14.98	0.82	5.47	0.95	clay	UNDFND	UNDFD	14	.9
7.35	24	14.57	0.91	6.24	0.98	clay	UNDFND	UNDFD	14	.8
7.65	25	14.73	0.80	5.44	1.02	clay	UNDFND	UNDFD	14	.8
7.95	26	21.24	1.14	5.35	1.04	clay	UNDFND	UNDFD	20	1.3
8.25	27	16.26	0.85	5.25	1.07	clay	UNDFND	UNDFD	16	.9
8.55	28	24.87	0.97	3.90	1.10	silty clay to clay	UNDFND	UNDFD	16	1.5
8.85	29	71.81	1.56	2.17	1.13	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
9.15	30	88.99	1.47	1.65	1.16	silty sand to sandy silt	60-70	38-40	28	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-35b



CPT-08-104	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-36a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-104
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	209.97	2.07	0.98	0.03	sand	>90	>48	40	UNDEFINED
0.60	2	399.45	3.94	0.99	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	127.87	1.48	1.16	0.15	sand to silty sand	>90	>48	31	UNDEFINED
1.25	4	34.74	0.82	2.36	0.22	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
1.55	5	18.46	0.85	4.59	0.28	clay	UNDFND	UNDFD	18	1.2
1.85	6	13.47	0.66	4.87	0.33	clay	UNDFND	UNDFD	13	.8
2.15	7	9.59	0.42	4.41	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	14.07	0.45	3.22	0.45	silty clay to clay	UNDFND	UNDFD	9	.9
2.75	9	8.05	0.35	4.40	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	9.68	0.43	4.48	0.57	clay	UNDFND	UNDFD	9	.6
3.35	11	10.86	0.40	3.70	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	13.23	0.50	3.81	0.64	silty clay to clay	UNDFND	UNDFD	8	.8
3.95	13	10.38	0.42	4.07	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	12.30	0.66	5.38	0.69	clay	UNDFND	UNDFD	12	.7
4.55	15	13.15	0.69	5.24	0.72	clay	UNDFND	UNDFD	13	.8
4.85	16	12.26	0.73	5.98	0.75	clay	UNDFND	UNDFD	12	.7
5.15	17	8.81	0.35	4.02	0.78	clay	UNDFND	UNDFD	8	.5
5.45	18	13.19	0.63	4.78	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	12.91	0.51	3.98	0.84	clay	UNDFND	UNDFD	12	.7
6.05	20	2.47	0.10	3.99	0.86	clay	UNDFND	UNDFD	2	8.7
6.40	21	41.00	1.34	3.27	0.89	clayey silt to silty clay	UNDFND	UNDFD	20	2.6
6.70	22	13.00	0.44	3.40	0.93	silty clay to clay	UNDFND	UNDFD	8	.7
7.00	23	13.46	0.89	6.58	0.95	clay	UNDFND	UNDFD	13	.8
7.35	24	9.74	0.42	4.26	0.98	clay	UNDFND	UNDFD	9	.5
7.65	25	15.78	0.75	4.77	1.02	clay	UNDFND	UNDFD	15	.9
7.95	26	13.59	0.40	2.93	1.04	silty clay to clay	UNDFND	UNDFD	9	.8
8.25	27	-24.11	0.57	-2.34	1.07	undefined	UNDFND	UNDFD	UDF	UNDEFINED
8.55	28	115.85	0.85	0.74	1.10	sand to silty sand	60-70	40-42	28	UNDEFINED
8.85	29	79.10	2.16	2.73	1.13	sandy silt to clayey silt	UNDFND	UNDFD	30	5.1
9.15	30	36.54	1.11	3.03	1.16	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
9.45	31	24.00	0.94	3.91	1.19	silty clay to clay	UNDFND	UNDFD	15	1.4
9.75	32	20.66	0.68	3.29	1.21	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
10.05	33	17.44	0.60	3.44	1.24	silty clay to clay	UNDFND	UNDFD	11	1.0
10.35	34	14.95	0.51	3.44	1.27	silty clay to clay	UNDFND	UNDFD	10	.8
10.65	35	23.92	0.86	3.59	1.30	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
10.95	36	183.31	1.51	0.83	1.33	sand	70-80	42-44	35	UNDEFINED
11.25	37	137.54	1.23	0.89	1.36	sand to silty sand	70-80	40-42	33	UNDEFINED
11.55	38	33.36	0.91	2.73	1.38	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

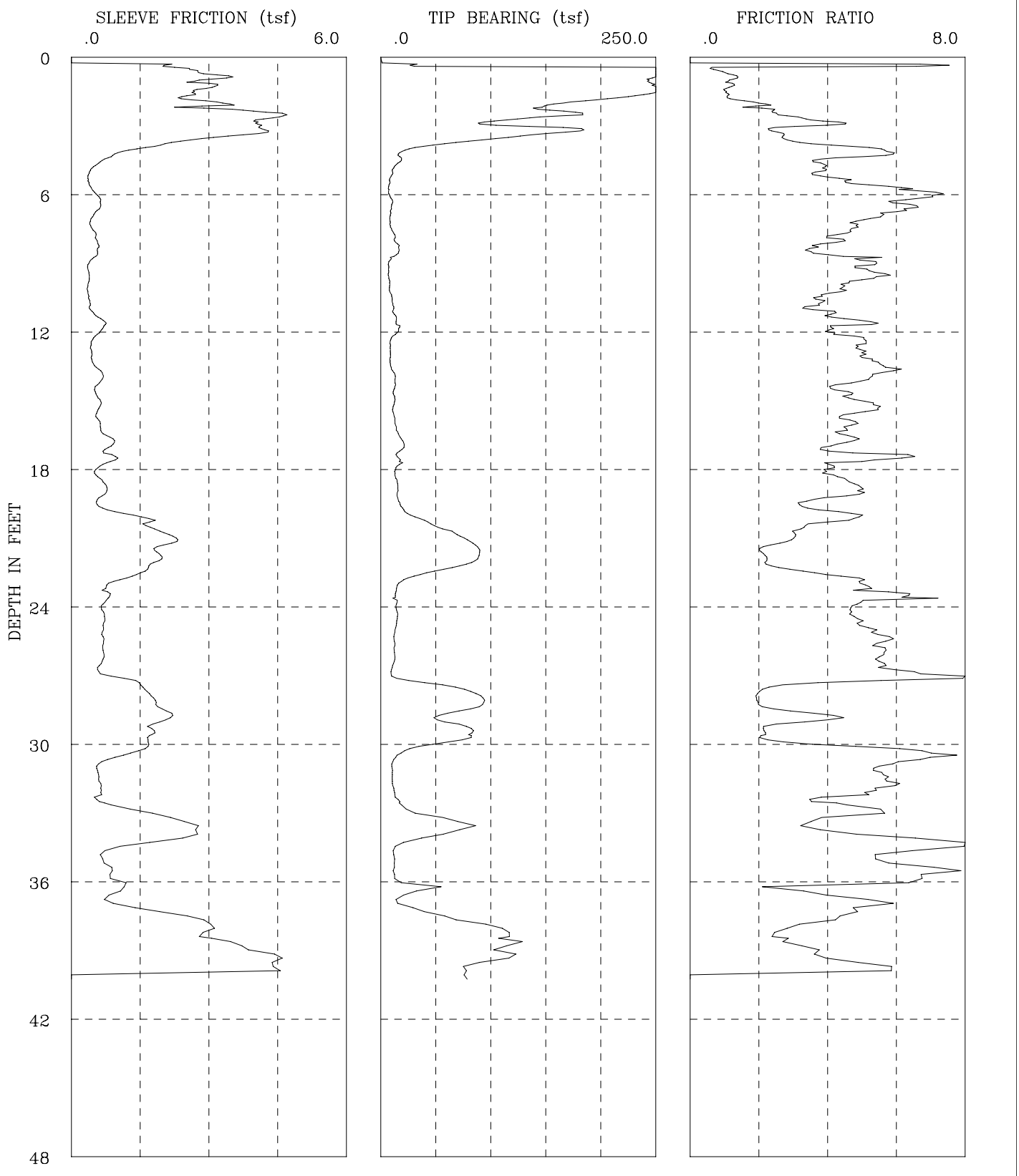
Figure A-36b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	54.03	1.74	3.22	1.41	sandy silt to clayey silt	UNDFND	UNDFD	21	3.4
12.15	40	41.04	1.93	4.70	1.44	silty clay to clay	UNDFND	UNDFD	26	2.5
12.45	41	85.26	1.38	1.62	1.47	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
12.80	42	124.36	1.36	1.09	1.50	sand to silty sand	60-70	40-42	30	UNDEFINED
13.10	43	99.48	1.18	1.18	1.53	sand to silty sand	60-70	38-40	24	UNDEFINED
13.40	44	63.31	1.41	2.23	1.56	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
13.75	45	107.97	1.49	1.38	1.59	sand to silty sand	60-70	38-40	26	UNDEFINED
14.05	46	77.55	0.95	1.22	1.62	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
14.35	47	61.75	1.12	1.81	1.65	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
14.65	48	241.40	2.04	0.85	1.68	sand	80-90	42-44	46	UNDEFINED
14.95	49	320.91	1.97	0.61	1.70	gravelly sand to sand	>90	42-44	>50	UNDEFINED
15.25	50	146.04	1.53	1.05	1.73	sand to silty sand	60-70	40-42	35	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-36c



CPT−08−105	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-37a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-105
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

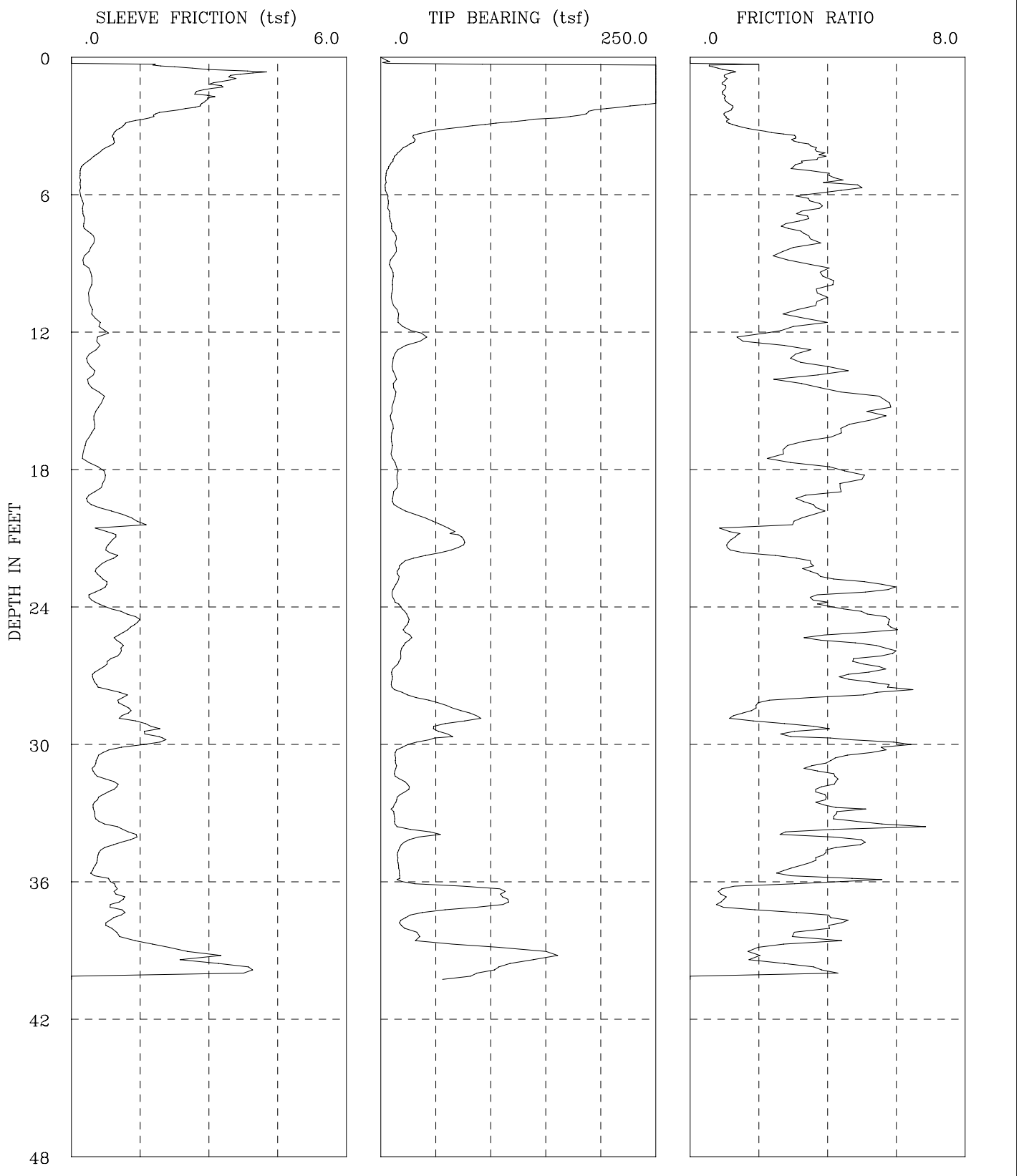
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	206.04	2.29	1.11	0.03	sand	>90	>48	39	UNDEFINED
0.60	2	232.09	2.85	1.23	0.09	sand	>90	>48	44	UNDEFINED
0.95	3	143.90	3.98	2.77	0.15	silty sand to sandy silt	>90	>48	46	UNDEFINED
1.25	4	82.25	2.51	3.05	0.22	sandy silt to clayey silt	UNDFND	UNDFD	32	5.4
1.55	5	14.19	0.59	4.19	0.28	clay	UNDFND	UNDFD	14	.9
1.85	6	7.76	0.44	5.70	0.33	clay	UNDFND	UNDFD	7	.4
2.15	7	9.30	0.56	6.01	0.39	clay	UNDFND	UNDFD	9	.5
2.45	8	10.90	0.49	4.46	0.45	clay	UNDFND	UNDFD	10	.6
2.75	9	12.67	0.51	4.01	0.51	clay	UNDFND	UNDFD	12	.8
3.05	10	7.43	0.37	5.00	0.57	clay	UNDFND	UNDFD	7	.4
3.35	11	10.04	0.38	3.81	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	14.31	0.63	4.43	0.64	clay	UNDFND	UNDFD	14	.9
3.95	13	9.30	0.46	4.91	0.67	clay	UNDFND	UNDFD	9	.5
4.25	14	10.14	0.56	5.50	0.69	clay	UNDFND	UNDFD	10	.6
4.55	15	12.52	0.57	4.57	0.72	clay	UNDFND	UNDFD	12	.7
4.85	16	11.92	0.59	4.96	0.75	clay	UNDFND	UNDFD	11	.7
5.15	17	16.94	0.77	4.54	0.78	clay	UNDFND	UNDFD	16	1.0
5.45	18	17.00	0.79	4.64	0.81	clay	UNDFND	UNDFD	16	1.0
5.75	19	14.25	0.65	4.53	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	17.62	0.69	3.92	0.86	silty clay to clay	UNDFND	UNDFD	11	1.0
6.40	21	52.82	1.83	3.46	0.89	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
6.70	22	87.09	1.97	2.26	0.93	silty sand to sandy silt	60-70	40-42	28	UNDEFINED
7.00	23	42.20	1.36	3.23	0.95	clayey silt to silty clay	UNDFND	UNDFD	20	2.7
7.35	24	13.68	0.74	5.39	0.98	clay	UNDFND	UNDFD	13	.8
7.65	25	14.17	0.71	4.98	1.02	clay	UNDFND	UNDFD	14	.8
7.95	26	12.34	0.69	5.63	1.04	clay	UNDFND	UNDFD	12	.7
8.25	27	11.09	0.69	6.25	1.07	clay	UNDFND	UNDFD	11	.6
8.55	28	70.90	1.62	2.29	1.10	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
8.85	29	69.40	2.01	2.89	1.13	sandy silt to clayey silt	UNDFND	UNDFD	27	4.5
9.15	30	72.46	1.71	2.36	1.16	sandy silt to clayey silt	UNDFND	UNDFD	28	4.7
9.45	31	15.33	0.99	6.44	1.19	clay	UNDFND	UNDFD	15	.9
9.75	32	10.85	0.61	5.65	1.21	clay	UNDFND	UNDFD	10	.5
10.05	33	18.59	0.93	4.99	1.24	clay	UNDFND	UNDFD	18	1.1
10.35	34	68.12	2.64	3.87	1.27	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
10.65	35	14.81	1.03	6.96	1.30	clay	UNDFND	UNDFD	14	.8
10.95	36	15.29	0.93	6.07	1.33	clay	UNDFND	UNDFD	15	.8
11.25	37	15.30	0.61	4.00	1.36	clay	UNDFND	UNDFD	15	.8
11.55	38	80.91	2.51	3.10	1.38	sandy silt to clayey silt	UNDFND	UNDFD	31	5.2
11.85	39	120.28	3.32	2.76	1.41	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-37b



CPT-08-106	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-38a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-106
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

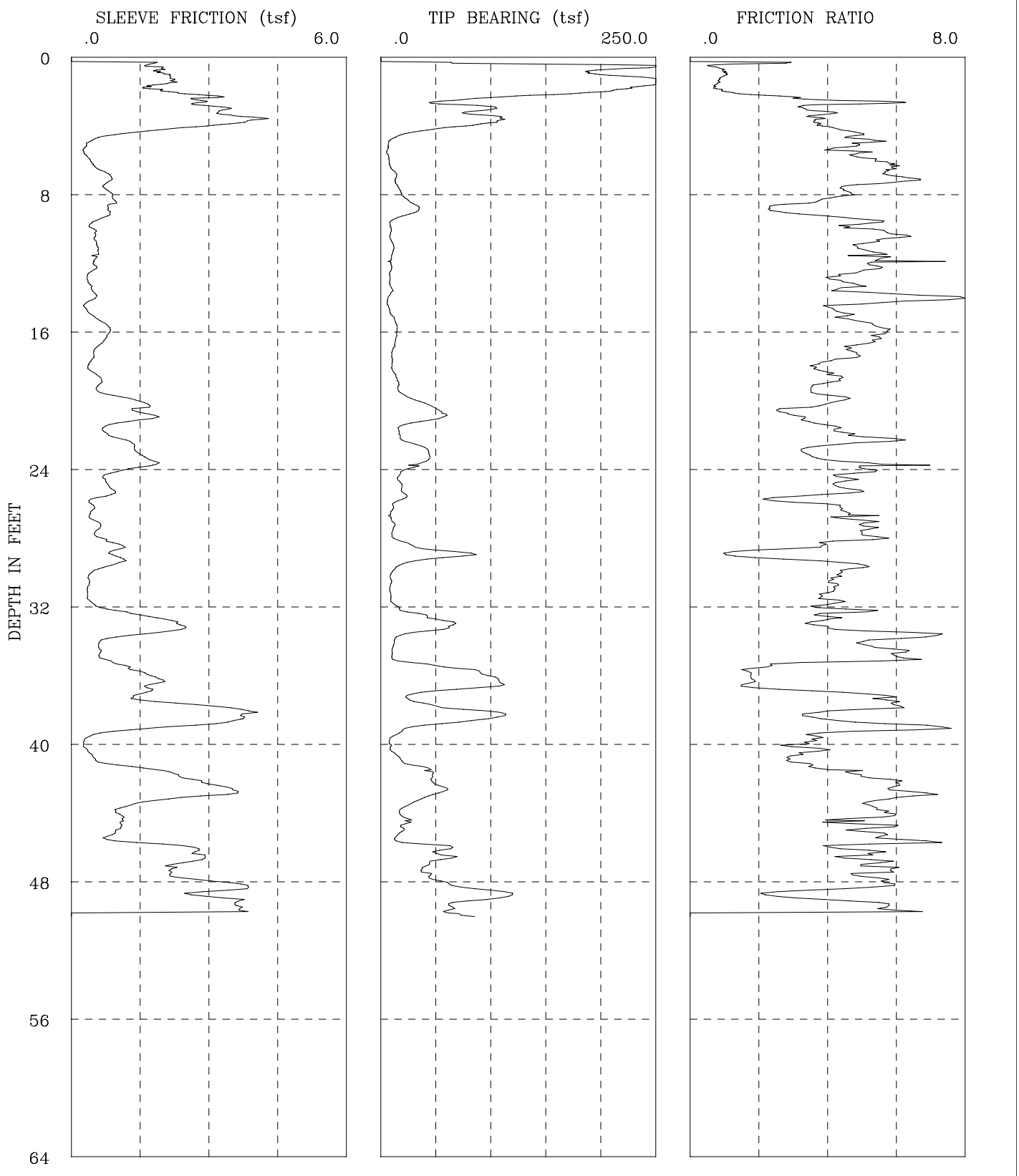
CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	261.49	2.61	1.00	0.03	sand	>90	>48	>50	UNDEFINED
0.60	2	297.96	2.96	0.99	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	149.99	1.75	1.17	0.15	sand to silty sand	>90	>48	36	UNDEFINED
1.25	4	27.59	0.84	3.06	0.22	clayey silt to silty clay	UNDFND	UNDFD	13	1.8
1.55	5	8.92	0.31	3.53	0.28	clay	UNDFND	UNDFD	9	.5
1.85	6	4.75	0.19	4.03	0.33	clay	UNDFND	UNDFD	5	.2
2.15	7	7.36	0.26	3.48	0.39	clay	UNDFND	UNDFD	7	.4
2.45	8	11.69	0.38	3.25	0.45	silty clay to clay	UNDFND	UNDFD	7	.7
2.75	9	11.38	0.33	2.92	0.51	silty clay to clay	UNDFND	UNDFD	7	.7
3.05	10	10.78	0.43	3.96	0.57	clay	UNDFND	UNDFD	10	.6
3.35	11	11.11	0.38	3.44	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	19.60	0.62	3.15	0.64	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
3.95	13	24.59	0.50	2.03	0.67	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
4.25	14	10.60	0.34	3.25	0.69	silty clay to clay	UNDFND	UNDFD	7	.6
4.55	15	13.12	0.66	5.03	0.72	clay	UNDFND	UNDFD	13	.8
4.85	16	9.25	0.58	6.29	0.75	clay	UNDFND	UNDFD	9	.5
5.15	17	6.72	-0.03	-0.38	0.78	undefined	UNDFND	UNDFD	UDF	UNDEFINED
5.45	18	19.05	1.03	5.40	0.81	clay	UNDFND	UNDFD	18	1.2
5.75	19	-8.17	-0.34	4.12	0.84	undefined	UNDFND	UNDFD	UDF	UNDEFINED
6.05	20	21.26	1.27	5.96	0.86	clay	UNDFND	UNDFD	20	1.3
6.40	21	57.67	0.90	1.56	0.89	silty sand to sandy silt	50-60	38-40	18	UNDEFINED
6.70	22	56.92	0.82	1.44	0.93	silty sand to sandy silt	50-60	38-40	18	UNDEFINED
7.00	23	15.95	0.63	3.97	0.95	silty clay to clay	UNDFND	UNDFD	10	.9
7.35	24	13.61	0.61	4.47	0.98	clay	UNDFND	UNDFD	13	.8
7.65	25	23.42	1.31	5.58	1.02	clay	UNDFND	UNDFD	22	1.4
7.95	26	21.88	1.04	4.77	1.04	clay	UNDFND	UNDFD	21	1.3
8.25	27	13.16	0.65	4.96	1.07	clay	UNDFND	UNDFD	13	.7
8.55	28	19.81	0.83	4.20	1.10	silty clay to clay	UNDFND	UNDFD	13	1.2
8.85	29	72.28	1.22	1.69	1.13	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
9.15	30	45.84	1.76	3.85	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.45	31	13.99	0.63	4.50	1.19	clay	UNDFND	UNDFD	13	.8
9.75	32	19.17	0.76	3.98	1.21	silty clay to clay	UNDFND	UNDFD	12	1.1
10.05	33	13.57	0.55	4.04	1.24	clay	UNDFND	UNDFD	13	.7
10.35	34	24.39	0.91	3.72	1.27	silty clay to clay	UNDFND	UNDFD	16	1.4
10.65	35	19.05	0.84	4.39	1.30	clay	UNDFND	UNDFD	18	1.1
10.95	36	16.36	0.56	3.44	1.33	silty clay to clay	UNDFND	UNDFD	10	.9
11.25	37	96.26	1.00	1.04	1.36	sand to silty sand	60-70	38-40	23	UNDEFINED
11.55	38	39.97	0.92	2.31	1.38	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
11.85	39	49.00	1.37	2.79	1.41	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
12.15	40	130.64	3.15	2.41	1.44	silty sand to sandy silt	60-70	40-42	42	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****→

Figure A-38b



CPT-08-107	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-39a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-107
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	163.17	1.56	0.96	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	241.48	1.99	0.82	0.09	sand	>90	>48	46	UNDEFINED
0.95	3	97.09	2.97	3.06	0.15	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
1.25	4	91.11	3.40	3.73	0.22	clayey silt to silty clay	UNDFND	UNDFD	44	6.0
1.55	5	16.95	0.81	4.79	0.28	clay	UNDFND	UNDFD	16	1.1
1.85	6	6.72	0.33	4.88	0.33	clay	UNDFND	UNDFD	6	.4
2.15	7	11.57	0.69	5.93	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	16.33	0.79	4.86	0.45	clay	UNDFND	UNDFD	16	1.0
2.75	9	29.64	0.86	2.91	0.51	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
3.05	10	12.15	0.56	4.58	0.57	clay	UNDFND	UNDFD	12	.7
3.35	11	9.67	0.53	5.50	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	10.16	0.54	5.35	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	8.86	0.43	4.80	0.67	clay	UNDFND	UNDFD	8	.5
4.25	14	8.84	0.46	5.23	0.69	clay	UNDFND	UNDFD	8	.5
4.55	15	7.16	0.35	4.94	0.72	clay	UNDFND	UNDFD	7	.4
4.85	16	13.57	0.70	5.18	0.75	clay	UNDFND	UNDFD	13	.8
5.15	17	13.23	0.70	5.26	0.78	clay	UNDFND	UNDFD	13	.8
5.45	18	10.32	0.45	4.39	0.81	clay	UNDFND	UNDFD	10	.6
5.75	19	12.76	0.52	4.11	0.84	clay	UNDFND	UNDFD	12	.7
6.05	20	19.16	0.75	3.94	0.86	silty clay to clay	UNDFND	UNDFD	12	1.2
6.40	21	49.32	1.61	3.27	0.89	clayey silt to silty clay	UNDFND	UNDFD	24	3.2
6.70	22	22.17	0.87	3.93	0.93	silty clay to clay	UNDFND	UNDFD	14	1.3
7.00	23	31.58	1.28	4.06	0.95	silty clay to clay	UNDFND	UNDFD	20	2.0
7.35	24	35.08	1.53	4.38	0.98	silty clay to clay	UNDFND	UNDFD	22	2.2
7.65	25	17.48	0.77	4.41	1.02	clay	UNDFND	UNDFD	17	1.0
7.95	26	17.69	0.63	3.57	1.04	silty clay to clay	UNDFND	UNDFD	11	1.0
8.25	27	9.94	0.46	4.66	1.07	clay	UNDFND	UNDFD	10	.5
8.55	28	11.48	0.60	5.20	1.10	clay	UNDFND	UNDFD	11	.6
8.85	29	48.92	0.96	1.97	1.13	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
9.15	30	20.99	0.80	3.80	1.16	silty clay to clay	UNDFND	UNDFD	13	1.2
9.45	31	8.81	0.37	4.19	1.19	clay	UNDFND	UNDFD	8	.4
9.75	32	10.69	0.42	3.92	1.21	clay	UNDFND	UNDFD	10	.5
10.05	33	42.94	1.68	3.91	1.24	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
10.35	34	32.47	1.61	4.97	1.27	clay	UNDFND	UNDFD	31	2.0
10.65	35	10.68	0.61	5.71	1.30	clay	UNDFND	UNDFD	10	.5
10.95	36	59.65	1.23	2.07	1.33	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
11.25	37	92.44	1.80	1.95	1.36	silty sand to sandy silt	60-70	38-40	30	UNDEFINED
11.55	38	37.16	2.15	5.78	1.38	clay	UNDFND	UNDFD	36	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

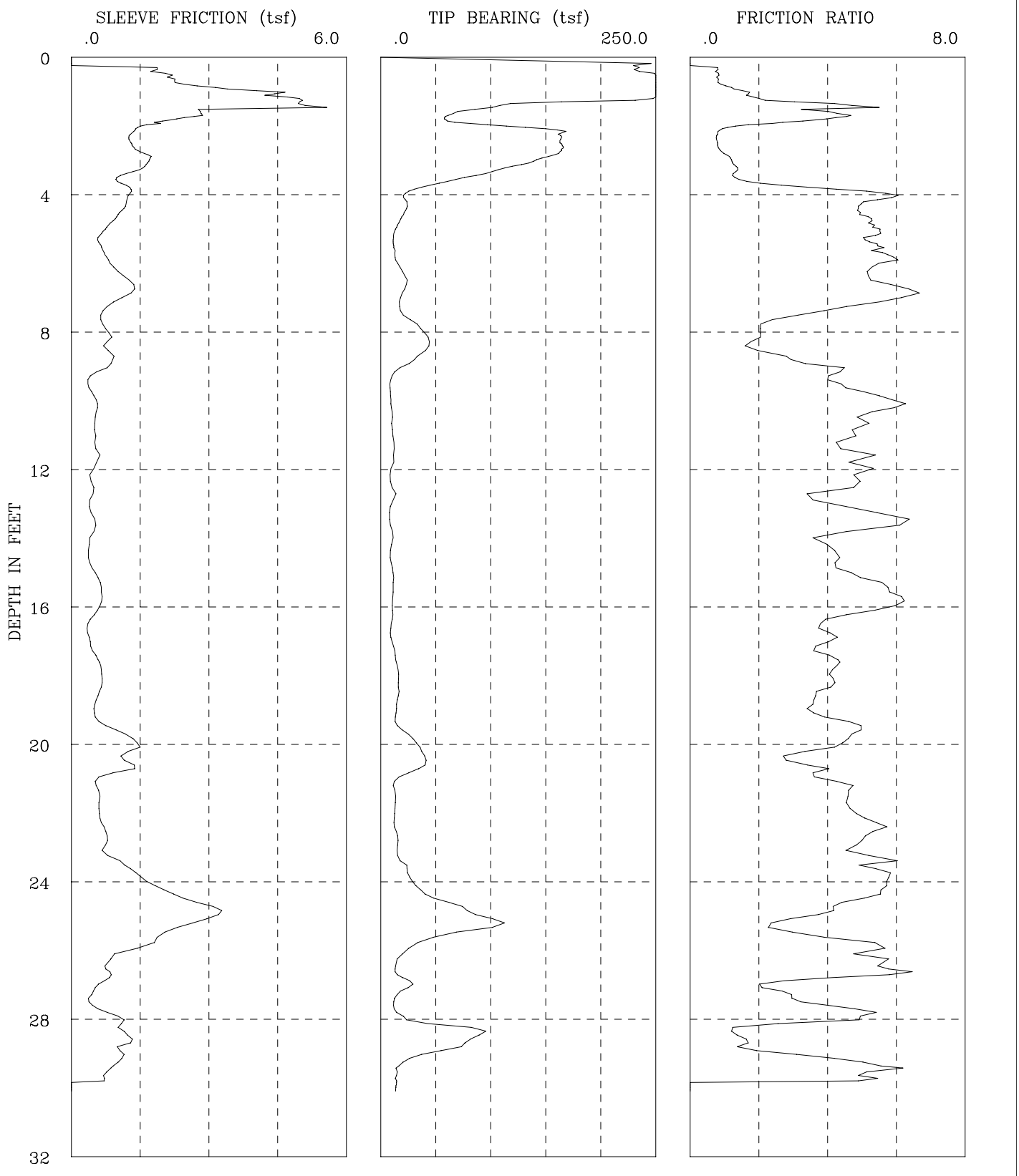
Figure A-39b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	86.62	3.53	4.07	1.41	clayey silt to silty clay	UNDFND	UNDFD	41	5.6
12.15	40	14.22	0.72	5.10	1.44	clay	UNDFND	UNDFD	14	.7
12.45	41	12.29	0.38	3.13	1.47	silty clay to clay	UNDFND	UNDFD	8	.6
12.80	42	38.53	1.72	4.45	1.50	silty clay to clay	UNDFND	UNDFD	25	2.4
13.10	43	52.05	3.23	6.21	1.53	clay	UNDFND	UNDFD	50	3.3
13.40	44	25.40	1.39	5.46	1.56	clay	UNDFND	UNDFD	24	1.5
13.75	45	20.68	1.06	5.15	1.59	clay	UNDFND	UNDFD	20	1.2
14.05	46	32.98	1.60	4.84	1.62	clay	UNDFND	UNDFD	32	2.0
14.35	47	50.49	2.61	5.17	1.65	clay	UNDFND	UNDFD	48	3.1
14.65	48	45.90	2.53	5.52	1.68	clay	UNDFND	UNDFD	44	2.8
14.95	49	97.36	3.35	3.44	1.70	sandy silt to clayey silt	UNDFND	UNDFD	37	6.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-39c



CPT-08-108	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-40a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-108
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

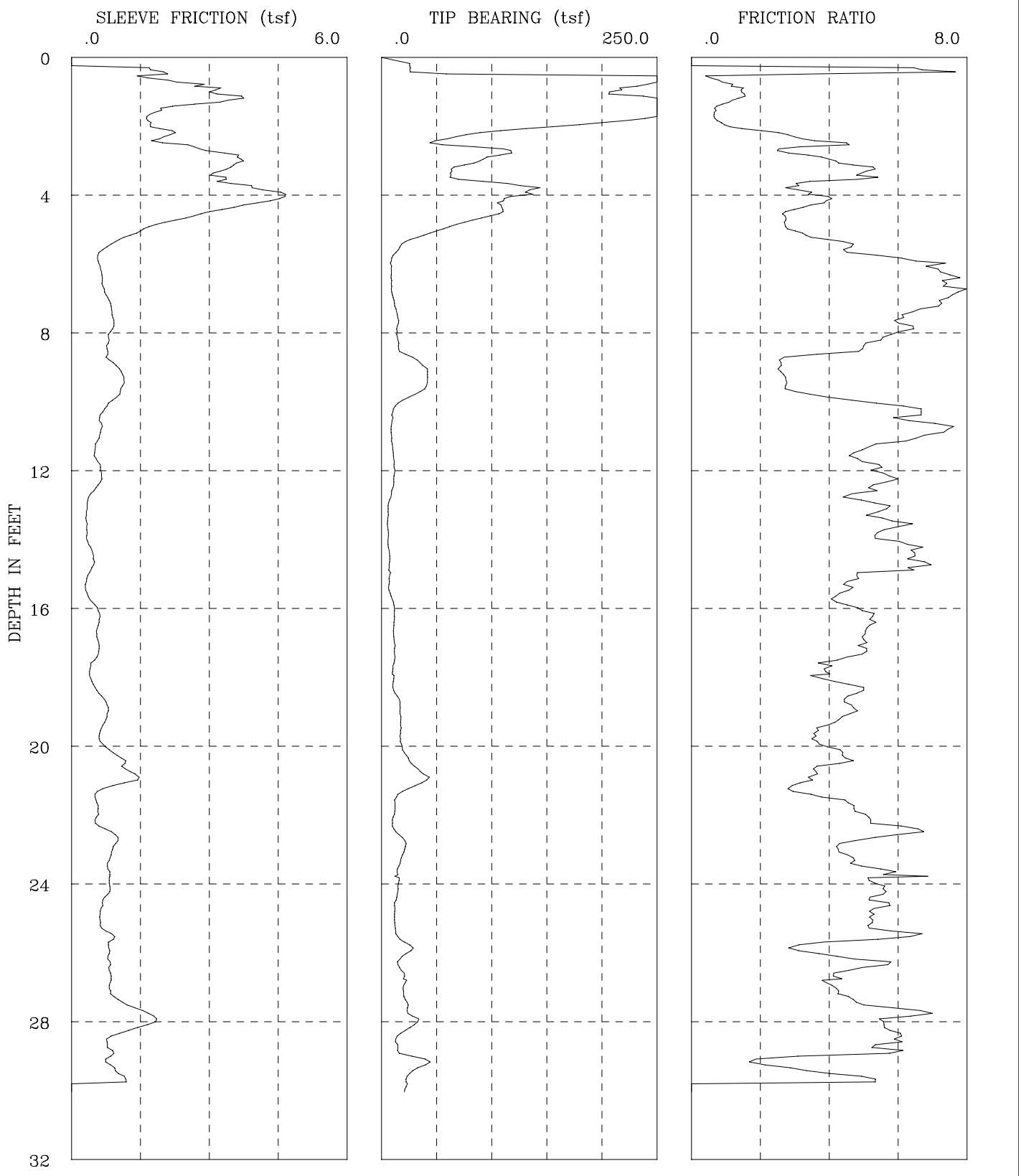
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	253.21	2.19	0.86	0.03	sand	>90	>48	49	UNDEFINED
0.60	2	120.87	3.52	2.91	0.09	sandy silt to clayey silt	UNDFND	UNDFD	46	8.0
0.95	3	155.93	1.46	0.93	0.15	sand	>90	>48	30	UNDEFINED
1.25	4	55.91	1.22	2.17	0.22	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.55	5	18.58	0.95	5.12	0.28	clay	UNDFND	UNDFD	18	1.2
1.85	6	13.01	0.72	5.50	0.33	clay	UNDFND	UNDFD	12	.8
2.15	7	20.72	1.19	5.77	0.39	clay	UNDFND	UNDFD	20	1.3
2.45	8	27.25	0.73	2.67	0.45	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
2.75	9	34.70	0.83	2.38	0.51	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
3.05	10	9.36	0.45	4.80	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	10.26	0.53	5.14	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	11.26	0.53	4.71	0.64	clay	UNDFND	UNDFD	11	.7
3.95	13	10.42	0.41	3.98	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	9.52	0.49	5.20	0.69	clay	UNDFND	UNDFD	9	.5
4.55	15	9.06	0.36	3.94	0.72	clay	UNDFND	UNDFD	9	.5
4.85	16	11.01	0.67	6.13	0.75	clay	UNDFND	UNDFD	11	.6
5.15	17	9.95	0.42	4.20	0.78	clay	UNDFND	UNDFD	10	.5
5.45	18	13.45	0.54	4.04	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	15.62	0.60	3.85	0.84	silty clay to clay	UNDFND	UNDFD	10	.9
6.05	20	18.74	0.84	4.47	0.86	clay	UNDFND	UNDFD	18	1.1
6.40	21	32.58	1.13	3.47	0.89	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
6.70	22	12.78	0.59	4.63	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	13.95	0.72	5.14	0.95	clay	UNDFND	UNDFD	13	.8
7.35	24	23.02	1.27	5.53	0.98	clay	UNDFND	UNDFD	22	1.4
7.65	25	68.60	2.76	4.02	1.02	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
7.95	26	52.75	1.79	3.40	1.04	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
8.25	27	18.50	0.74	4.00	1.07	silty clay to clay	UNDFND	UNDFD	12	1.1
8.55	28	16.93	0.67	3.93	1.10	silty clay to clay	UNDFND	UNDFD	11	1.0
8.85	29	70.90	1.15	1.63	1.13	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
9.15	30	15.91	0.57	3.61	1.16	silty clay to clay	UNDFND	UNDFD	10	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-40b



CPT-08-109	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-41a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-109
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

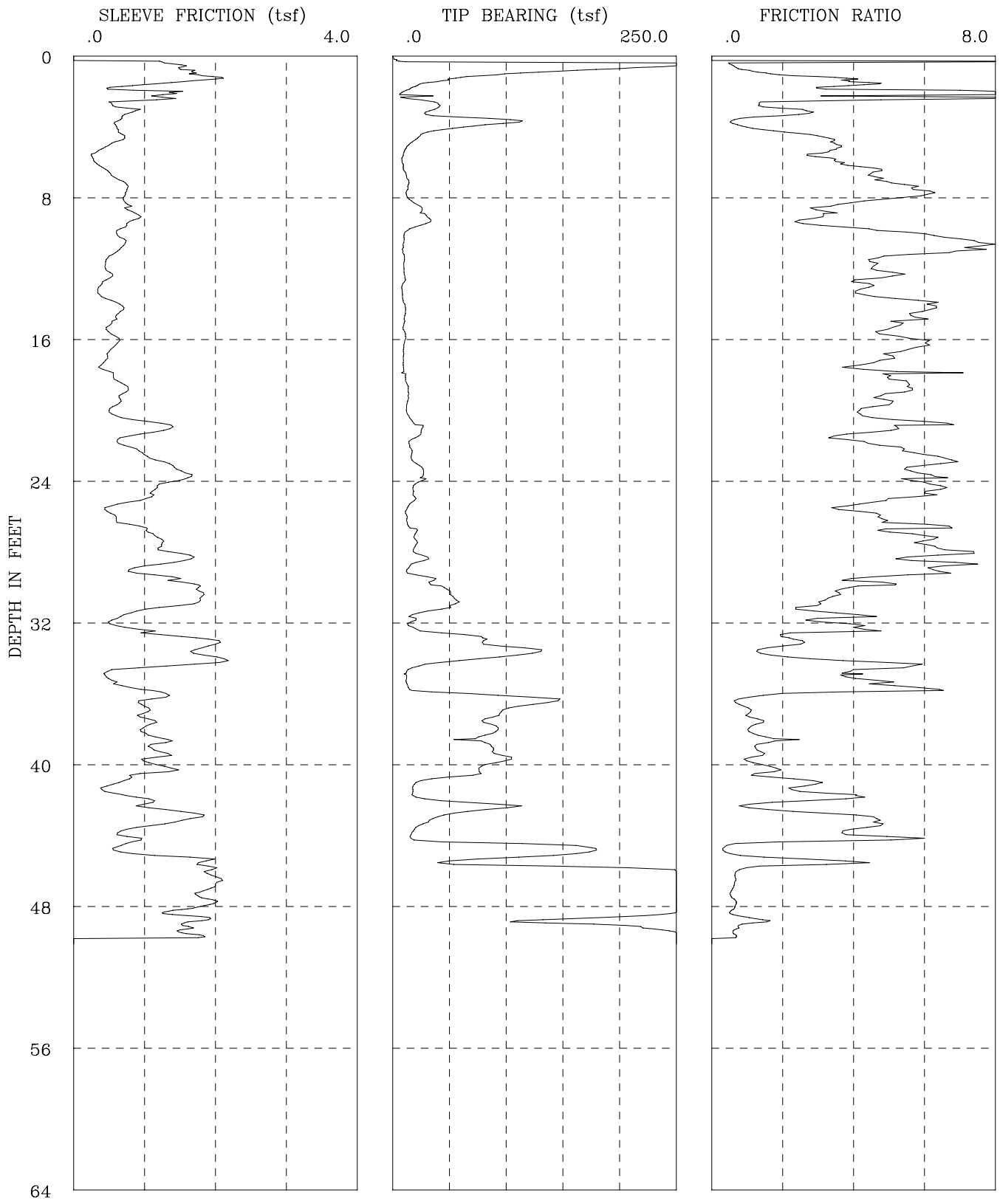
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	146.98	1.92	1.31	0.03	sand to silty sand	>90	>48	35	UNDEFINED
0.60	2	250.76	2.31	0.92	0.09	sand	>90	>48	48	UNDEFINED
0.95	3	86.10	2.78	3.23	0.15	sandy silt to clayey silt	UNDFND	UNDFD	33	5.7
1.25	4	101.03	3.79	3.75	0.22	clayey silt to silty clay	UNDFND	UNDFD	48	6.7
1.55	5	83.75	2.50	2.99	0.28	sandy silt to clayey silt	UNDFND	UNDFD	32	5.5
1.85	6	15.53	0.74	4.75	0.33	clay	UNDFND	UNDFD	15	1.0
2.15	7	9.44	0.71	7.52	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	13.87	0.88	6.31	0.45	clay	UNDFND	UNDFD	13	.8
2.75	9	24.81	0.84	3.39	0.51	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
3.05	10	33.90	1.04	3.08	0.57	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
3.35	11	9.67	0.65	6.72	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	10.71	0.56	5.20	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	9.38	0.50	5.31	0.67	clay	UNDFND	UNDFD	9	.5
4.25	14	5.92	0.33	5.54	0.69	clay	UNDFND	UNDFD	6	.3
4.55	15	6.92	0.44	6.29	0.72	clay	UNDFND	UNDFD	7	.4
4.85	16	8.32	0.37	4.46	0.75	clay	UNDFND	UNDFD	8	.4
5.15	17	11.32	0.58	5.12	0.78	clay	UNDFND	UNDFD	11	.6
5.45	18	11.28	0.50	4.43	0.81	clay	UNDFND	UNDFD	11	.6
5.75	19	13.34	0.60	4.53	0.84	clay	UNDFND	UNDFD	13	.8
6.05	20	17.10	0.68	3.98	0.86	silty clay to clay	UNDFND	UNDFD	11	1.0
6.40	21	29.04	1.12	3.85	0.89	silty clay to clay	UNDFND	UNDFD	19	1.8
6.70	22	16.18	0.61	3.75	0.93	silty clay to clay	UNDFND	UNDFD	10	.9
7.00	23	15.66	0.80	5.13	0.95	clay	UNDFND	UNDFD	15	.9
7.35	24	15.82	0.82	5.21	0.98	clay	UNDFND	UNDFD	15	.9
7.65	25	12.55	0.67	5.36	1.02	clay	UNDFND	UNDFD	12	.7
7.95	26	18.86	0.80	4.26	1.04	clay	UNDFND	UNDFD	18	1.1
8.25	27	18.58	0.84	4.50	1.07	clay	UNDFND	UNDFD	18	1.1
8.55	28	25.43	1.40	5.52	1.10	clay	UNDFND	UNDFD	24	1.5
8.85	29	19.02	0.92	4.84	1.13	clay	UNDFND	UNDFD	18	1.1
9.15	30	27.37	0.66	2.42	1.16	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-41b



CPT-08-110	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-42a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-110
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	129.71	1.27	0.98	0.03	sand to silty sand	>90	>48	31	UNDEFINED
0.60	2	33.10	1.34	4.06	0.09	silty clay to clay	UNDFND	UNDFD	21	2.2
0.95	3	28.14	0.93	3.29	0.15	clayey silt to silty clay	UNDFND	UNDFD	13	1.8
1.25	4	69.97	0.64	0.92	0.22	sand to silty sand	70-80	46-48	17	UNDEFINED
1.55	5	21.21	0.62	2.91	0.28	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
1.85	6	9.26	0.31	3.32	0.33	clay	UNDFND	UNDFD	9	.5
2.15	7	11.41	0.53	4.62	0.39	clay	UNDFND	UNDFD	11	.7
2.45	8	12.99	0.74	5.66	0.45	clay	UNDFND	UNDFD	12	.8
2.75	9	23.89	0.80	3.35	0.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.5
3.05	10	22.23	0.73	3.27	0.57	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
3.35	11	9.49	0.68	7.16	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	9.93	0.48	4.80	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	10.00	0.47	4.66	0.67	clay	UNDFND	UNDFD	10	.6
4.25	14	8.78	0.43	4.95	0.69	clay	UNDFND	UNDFD	8	.5
4.55	15	10.82	0.64	5.88	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	10.31	0.53	5.13	0.75	clay	UNDFND	UNDFD	10	.6
5.15	17	9.77	0.55	5.63	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	9.26	0.44	4.80	0.81	clay	UNDFND	UNDFD	9	.5
5.75	19	12.38	0.67	5.41	0.84	clay	UNDFND	UNDFD	12	.7
6.05	20	13.07	0.63	4.84	0.86	clay	UNDFND	UNDFD	13	.7
6.40	21	17.76	0.90	5.10	0.89	clay	UNDFND	UNDFD	17	1.1
6.70	22	19.41	0.81	4.18	0.93	silty clay to clay	UNDFND	UNDFD	12	1.2
7.00	23	17.18	1.05	6.13	0.95	clay	UNDFND	UNDFD	16	1.0
7.35	24	25.16	1.49	5.91	0.98	clay	UNDFND	UNDFD	24	1.5
7.65	25	18.43	1.09	5.89	1.02	clay	UNDFND	UNDFD	18	1.1
7.95	26	12.88	0.54	4.23	1.04	clay	UNDFND	UNDFD	12	.7
8.25	27	16.81	0.93	5.55	1.07	clay	UNDFND	UNDFD	16	1.0
8.55	28	19.79	1.27	6.43	1.10	clay	UNDFND	UNDFD	19	1.2
8.85	29	20.83	1.26	6.07	1.13	clay	UNDFND	UNDFD	20	1.2
9.15	30	32.20	1.46	4.53	1.16	silty clay to clay	UNDFND	UNDFD	21	2.0
9.45	31	53.05	1.74	3.28	1.19	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
9.75	32	24.59	0.74	3.01	1.21	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
10.05	33	47.59	1.24	2.61	1.24	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
10.35	34	104.78	1.87	1.78	1.27	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
10.65	35	25.30	1.12	4.42	1.30	silty clay to clay	UNDFND	UNDFD	16	1.5
10.95	36	18.85	0.77	4.09	1.33	silty clay to clay	UNDFND	UNDFD	12	1.1
11.25	37	118.02	1.08	0.92	1.36	sand to silty sand	60-70	40-42	28	UNDEFINED
11.55	38	88.07	1.03	1.17	1.38	sand to silty sand	50-60	38-40	21	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-42b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	81.44	1.13	1.39	1.41	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
12.15	40	94.19	1.14	1.21	1.44	sand to silty sand	50-60	38-40	23	UNDEFINED
12.45	41	64.87	1.07	1.66	1.47	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
12.80	42	21.49	0.66	3.07	1.50	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
13.10	43	71.26	1.38	1.93	1.53	silty sand to sandy silt	50-60	36-38	23	UNDEFINED
13.40	44	22.43	0.98	4.39	1.56	clay	UNDFND	UNDFD	21	1.3
13.75	45	117.51	0.79	0.68	1.59	sand to silty sand	60-70	38-40	28	UNDEFINED
14.05	46	149.05	1.87	1.25	1.62	sand to silty sand	70-80	40-42	36	UNDEFINED
14.35	47	315.50	1.99	0.63	1.65	sand	>90	42-44	>50	UNDEFINED
14.65	48	300.01	1.83	0.61	1.68	sand	>90	42-44	>50	UNDEFINED
14.95	49	193.83	1.57	0.81	1.70	sand	70-80	40-42	37	UNDEFINED
15.25	50	251.82	1.10	0.44	1.73	sand	80-90	42-44	48	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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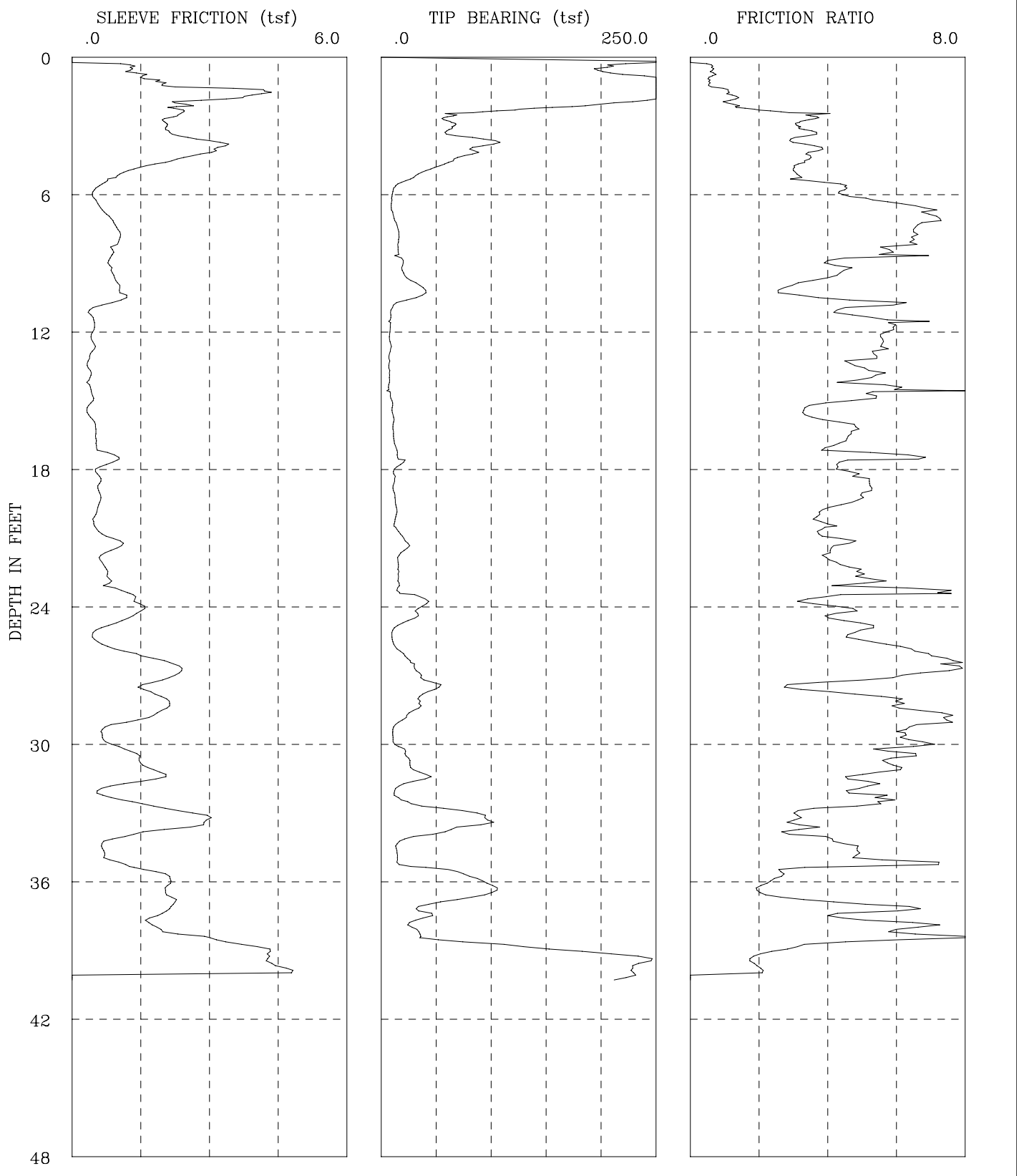
Figure A-42c



CPT-08-111	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-43a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-111
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	243.03	1.20	0.50	0.03	sand	>90	>48	47	UNDEFINED
0.60	2	320.84	3.08	0.96	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	87.57	2.22	2.53	0.15	sandy silt to clayey silt	UNDFND	UNDFD	34	5.8
1.25	4	83.54	2.84	3.40	0.22	sandy silt to clayey silt	UNDFND	UNDFD	32	5.5
1.55	5	55.92	1.83	3.27	0.28	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.85	6	15.89	0.62	3.90	0.33	silty clay to clay	UNDFND	UNDFD	10	1.0
2.15	7	10.12	0.67	6.61	0.39	clay	UNDFND	UNDFD	10	.6
2.45	8	15.27	1.00	6.54	0.45	clay	UNDFND	UNDFD	15	.9
2.75	9	16.64	0.86	5.18	0.51	clay	UNDFND	UNDFD	16	1.0
3.05	10	25.33	0.93	3.69	0.57	silty clay to clay	UNDFND	UNDFD	16	1.6
3.35	11	24.88	0.89	3.58	0.61	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
3.65	12	8.24	0.45	5.47	0.64	clay	UNDFND	UNDFD	8	.5
3.95	13	8.04	0.44	5.52	0.67	clay	UNDFND	UNDFD	8	.4
4.25	14	7.27	0.37	5.14	0.69	clay	UNDFND	UNDFD	7	.4
4.55	15	7.75	0.41	5.29	0.72	clay	UNDFND	UNDFD	7	.4
4.85	16	10.61	0.39	3.66	0.75	clay	UNDFND	UNDFD	10	.6
5.15	17	11.26	0.52	4.61	0.78	clay	UNDFND	UNDFD	11	.6
5.45	18	15.46	0.77	5.00	0.81	clay	UNDFND	UNDFD	15	.9
5.75	19	11.43	0.57	5.02	0.84	clay	UNDFND	UNDFD	11	.6
6.05	20	13.14	0.59	4.47	0.86	clay	UNDFND	UNDFD	13	.7
6.40	21	14.89	0.58	3.88	0.89	silty clay to clay	UNDFND	UNDFD	10	.9
6.70	22	19.77	0.83	4.20	0.93	silty clay to clay	UNDFND	UNDFD	13	1.2
7.00	23	15.67	0.77	4.90	0.95	clay	UNDFND	UNDFD	15	.9
7.35	24	30.16	1.31	4.33	0.98	silty clay to clay	UNDFND	UNDFD	19	1.9
7.65	25	21.12	0.95	4.48	1.02	clay	UNDFND	UNDFD	20	1.3
7.95	26	13.63	0.82	6.03	1.04	clay	UNDFND	UNDFD	13	.8
8.25	27	30.51	2.18	7.15	1.07	clay	UNDFND	UNDFD	29	1.9
8.55	28	43.03	1.78	4.13	1.10	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
8.85	29	26.31	1.78	6.78	1.13	clay	UNDFND	UNDFD	25	1.6
9.15	30	11.25	0.73	6.45	1.16	clay	UNDFND	UNDFD	11	.6
9.45	31	23.99	1.43	5.94	1.19	clay	UNDFND	UNDFD	23	1.4
9.75	32	28.10	1.42	5.04	1.21	clay	UNDFND	UNDFD	27	1.7
10.05	33	37.63	1.49	3.97	1.24	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
10.35	34	75.85	2.37	3.13	1.27	sandy silt to clayey silt	UNDFND	UNDFD	29	4.9
10.65	35	15.60	0.72	4.58	1.30	clay	UNDFND	UNDFD	15	.9
10.95	36	55.23	1.64	2.97	1.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
11.25	37	86.99	2.13	2.45	1.36	sandy silt to clayey silt	UNDFND	UNDFD	33	5.6
11.55	38	34.29	1.88	5.49	1.38	clay	UNDFND	UNDFD	33	2.1
11.85	39	67.62	2.99	4.43	1.41	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
12.15	40	224.63	4.43	1.97	1.44	sand to silty sand	80-90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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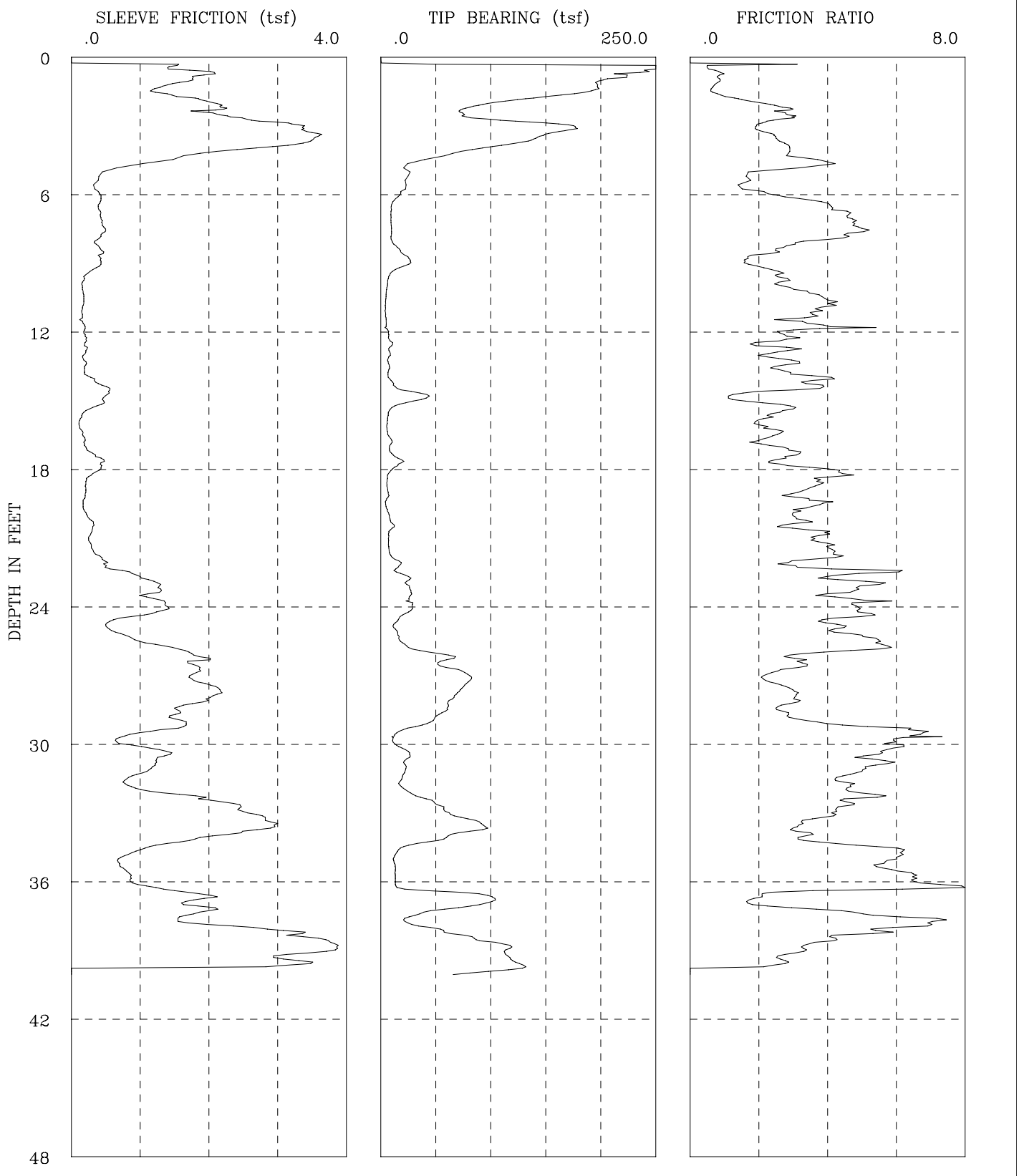
Figure A-43b



CPT-08-113	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-44a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-113
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

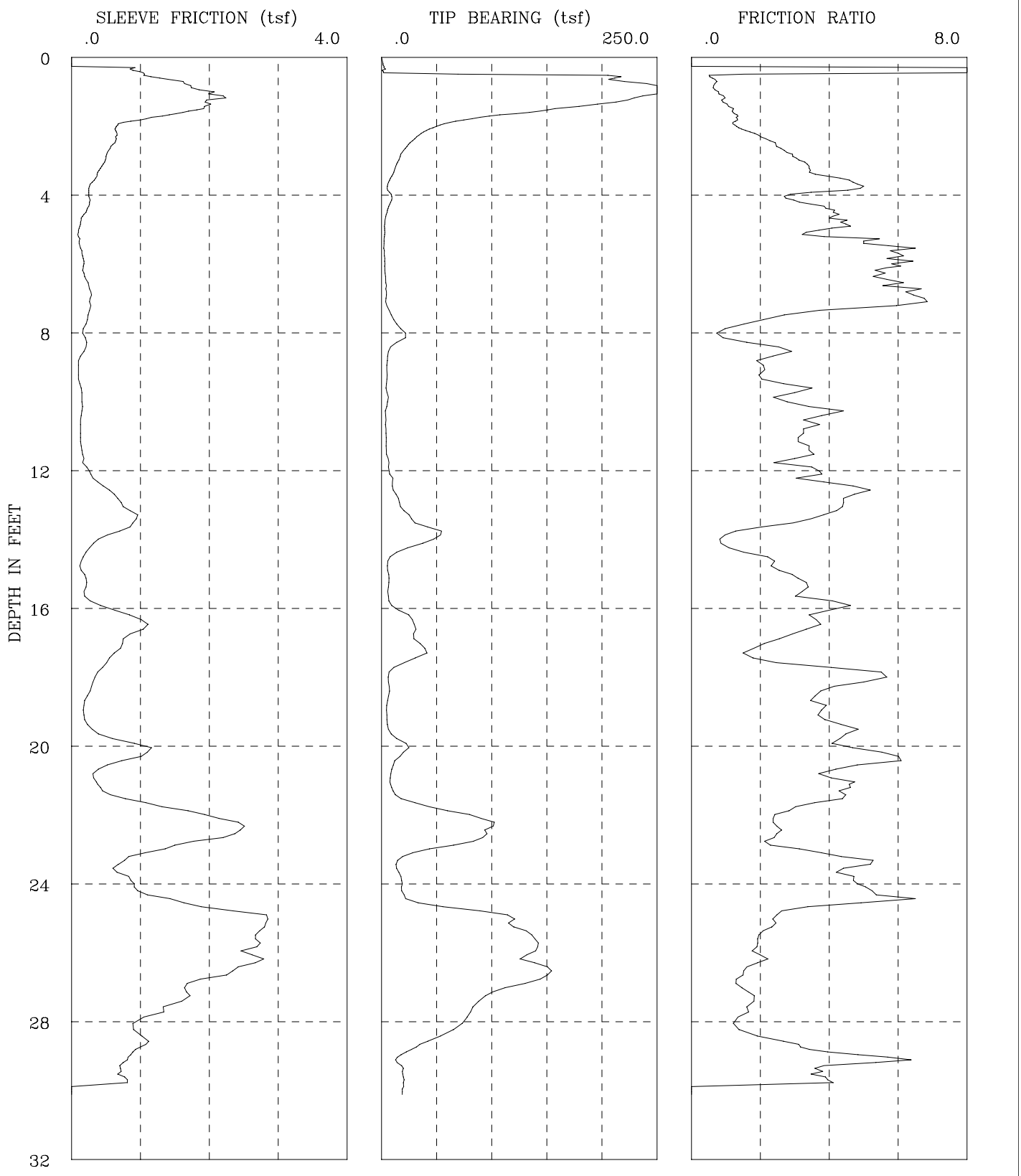
CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	183.30	1.43	0.78	0.03	sand	>90	>48	35	UNDEFINED
0.60	2	164.79	1.54	0.93	0.09	sand	>90	>48	32	UNDEFINED
0.95	3	112.11	2.60	2.32	0.15	silty sand to sandy silt	>90	>48	36	UNDEFINED
1.25	4	121.40	3.14	2.58	0.22	silty sand to sandy silt	>90	>48	39	UNDEFINED
1.55	5	34.19	1.03	3.01	0.28	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
1.85	6	21.04	0.38	1.79	0.33	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
2.15	7	9.87	0.42	4.21	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	9.64	0.43	4.49	0.45	clay	UNDFND	UNDFD	9	.6
2.75	9	20.86	0.42	2.01	0.51	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
3.05	10	9.04	0.22	2.47	0.57	silty clay to clay	UNDFND	UNDFD	6	.5
3.35	11	4.55	0.17	3.78	0.61	clay	UNDFND	UNDFD	4	.2
3.65	12	4.98	0.17	3.36	0.64	clay	UNDFND	UNDFD	5	.2
3.95	13	8.38	0.20	2.44	0.67	silty clay to clay	UNDFND	UNDFD	5	.5
4.25	14	6.96	0.20	2.91	0.69	clay	UNDFND	UNDFD	7	.4
4.55	15	24.18	0.46	1.92	0.72	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
4.85	16	10.00	0.24	2.39	0.75	silty clay to clay	UNDFND	UNDFD	6	.6
5.15	17	7.35	0.16	2.24	0.78	silty clay to clay	UNDFND	UNDFD	5	.4
5.45	18	12.93	0.36	2.78	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	6.51	0.26	3.94	0.84	clay	UNDFND	UNDFD	6	.3
6.05	20	5.71	0.19	3.26	0.86	clay	UNDFND	UNDFD	5	.3
6.40	21	8.61	0.28	3.25	0.89	clay	UNDFND	UNDFD	8	.4
6.70	22	9.29	0.35	3.78	0.93	clay	UNDFND	UNDFD	9	.5
7.00	23	19.80	0.87	4.39	0.95	clay	UNDFND	UNDFD	19	1.2
7.35	24	27.14	1.28	4.70	0.98	clay	UNDFND	UNDFD	26	1.7
7.65	25	15.73	0.71	4.50	1.02	clay	UNDFND	UNDFD	15	.9
7.95	26	29.18	1.29	4.42	1.04	silty clay to clay	UNDFND	UNDFD	19	1.8
8.25	27	67.36	1.82	2.70	1.07	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
8.55	28	71.83	2.03	2.82	1.10	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
8.85	29	54.36	1.59	2.92	1.13	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
9.15	30	17.22	1.01	5.86	1.16	clay	UNDFND	UNDFD	16	1.0
9.45	31	23.25	1.26	5.44	1.19	clay	UNDFND	UNDFD	22	1.4
9.75	32	19.83	0.91	4.61	1.21	clay	UNDFND	UNDFD	19	1.1
10.05	33	47.15	2.16	4.59	1.24	silty clay to clay	UNDFND	UNDFD	30	3.0
10.35	34	80.64	2.70	3.35	1.27	sandy silt to clayey silt	UNDFND	UNDFD	31	5.2
10.65	35	26.66	1.17	4.39	1.30	silty clay to clay	UNDFND	UNDFD	17	1.6
10.95	36	12.95	0.78	6.03	1.33	clay	UNDFND	UNDFD	12	.7
11.25	37	63.62	1.54	2.43	1.36	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
11.55	38	40.09	1.83	4.56	1.38	silty clay to clay	UNDFND	UNDFD	26	2.5
11.85	39	85.57	3.50	4.09	1.41	clayey silt to silty clay	UNDFND	UNDFD	41	5.5
12.15	40	118.55	2.69	2.27	1.44	silty sand to sandy silt	60-70	40-42	38	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-44b



CPT-08-114	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-45a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-114
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

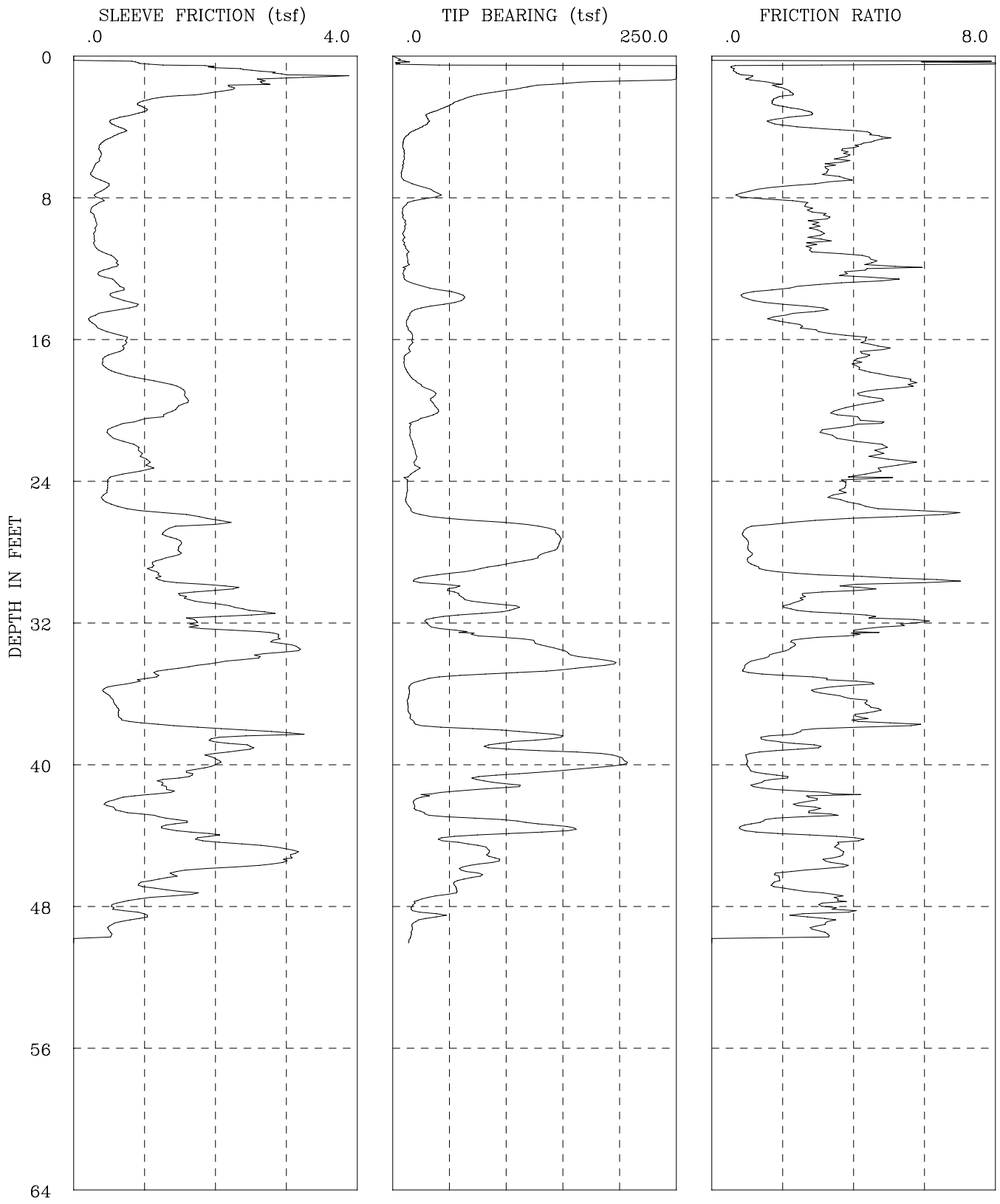
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	139.95	1.19	0.85	0.03	sand to silty sand	>90	>48	34	UNDEFINED
0.60	2	142.04	1.55	1.09	0.09	sand to silty sand	>90	>48	34	UNDEFINED
0.95	3	24.07	0.56	2.34	0.15	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
1.25	4	8.32	0.31	3.69	0.22	clay	UNDFND	UNDFD	8	.5
1.55	5	4.25	0.17	3.91	0.28	clay	UNDFND	UNDFD	4	.2
1.85	6	2.51	0.15	5.80	0.33	organic material	UNDFND	UNDFD	2	.1
2.15	7	3.86	0.24	6.17	0.39	clay	UNDFND	UNDFD	4	.2
2.45	8	12.44	0.22	1.77	0.45	clayey silt to silty clay	UNDFND	UNDFD	6	.7
2.75	9	8.26	0.15	1.87	0.51	clayey silt to silty clay	UNDFND	UNDFD	4	.5
3.05	10	5.04	0.13	2.56	0.57	clay	UNDFND	UNDFD	5	.2
3.35	11	3.91	0.14	3.51	0.61	clay	UNDFND	UNDFD	4	.2
3.65	12	5.37	0.17	3.23	0.64	clay	UNDFND	UNDFD	5	.3
3.95	13	11.98	0.52	4.33	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	36.10	0.77	2.14	0.69	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
4.55	15	14.45	0.20	1.36	0.72	sandy silt to clayey silt	UNDFND	UNDFD	6	.9
4.85	16	6.81	0.25	3.62	0.75	clay	UNDFND	UNDFD	7	.3
5.15	17	27.03	0.88	3.27	0.78	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
5.45	18	25.14	0.55	2.19	0.81	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
5.75	19	6.03	0.25	4.13	0.84	clay	UNDFND	UNDFD	6	.3
6.05	20	8.29	0.35	4.23	0.86	clay	UNDFND	UNDFD	8	.4
6.40	21	13.64	0.68	4.97	0.89	clay	UNDFND	UNDFD	13	.8
6.70	22	33.14	1.02	3.09	0.93	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
7.00	23	84.45	2.08	2.46	0.95	sandy silt to clayey silt	UNDFND	UNDFD	32	5.5
7.35	24	17.60	0.82	4.63	0.98	clay	UNDFND	UNDFD	17	1.0
7.65	25	67.85	2.04	3.01	1.02	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
7.95	26	134.55	2.67	1.99	1.04	silty sand to sandy silt	70-80	42-44	43	UNDEFINED
8.25	27	136.24	2.12	1.55	1.07	sand to silty sand	70-80	42-44	33	UNDEFINED
8.55	28	82.96	1.32	1.59	1.10	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
8.85	29	39.32	0.96	2.44	1.13	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
9.15	30	18.85	0.52	2.77	1.16	clayey silt to silty clay	UNDFND	UNDFD	9	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-45b



CPT-08-117	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-46a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-117
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	203.64	1.58	0.78	0.03	sand	>90	>48	39	UNDEFINED
0.60	2	180.03	2.57	1.43	0.09	sand to silty sand	>90	>48	43	UNDEFINED
0.95	3	56.05	1.15	2.05	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	28.63	0.64	2.25	0.22	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
1.55	5	11.39	0.51	4.47	0.28	clay	UNDFND	UNDFD	11	.7
1.85	6	9.82	0.36	3.68	0.33	clay	UNDFND	UNDFD	9	.6
2.15	7	8.76	0.30	3.39	0.39	clay	UNDFND	UNDFD	8	.5
2.45	8	31.38	0.40	1.29	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
2.75	9	10.80	0.30	2.74	0.51	silty clay to clay	UNDFND	UNDFD	7	.6
3.05	10	10.30	0.31	2.99	0.57	silty clay to clay	UNDFND	UNDFD	7	.6
3.35	11	10.74	0.31	2.87	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	12.68	0.56	4.40	0.64	clay	UNDFND	UNDFD	12	.7
3.95	13	13.56	0.49	3.65	0.67	silty clay to clay	UNDFND	UNDFD	9	.8
4.25	14	53.61	0.66	1.23	0.69	silty sand to sandy silt	50-60	38-40	17	UNDEFINED
4.55	15	18.83	0.47	2.50	0.72	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
4.85	16	14.84	0.48	3.24	0.75	silty clay to clay	UNDFND	UNDFD	9	.9
5.15	17	14.61	0.66	4.50	0.78	clay	UNDFND	UNDFD	14	.9
5.45	18	11.04	0.47	4.22	0.81	clay	UNDFND	UNDFD	11	.6
5.75	19	23.43	1.23	5.23	0.84	clay	UNDFND	UNDFD	22	1.4
6.05	20	36.35	1.55	4.28	0.86	silty clay to clay	UNDFND	UNDFD	23	2.3
6.40	21	25.88	0.99	3.83	0.89	silty clay to clay	UNDFND	UNDFD	17	1.6
6.70	22	16.34	0.63	3.85	0.93	silty clay to clay	UNDFND	UNDFD	10	1.0
7.00	23	19.89	0.98	4.93	0.95	clay	UNDFND	UNDFD	19	1.2
7.35	24	16.25	0.74	4.52	0.98	clay	UNDFND	UNDFD	16	.9
7.65	25	12.31	0.45	3.62	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	22.54	1.12	4.97	1.04	clay	UNDFND	UNDFD	22	1.4
8.25	27	126.63	1.57	1.24	1.07	sand to silty sand	70-80	40-42	30	UNDEFINED
8.55	28	143.98	1.49	1.03	1.10	sand to silty sand	70-80	42-44	34	UNDEFINED
8.85	29	102.15	1.19	1.16	1.13	sand to silty sand	60-70	40-42	24	UNDEFINED
9.15	30	37.71	1.55	4.10	1.16	silty clay to clay	UNDFND	UNDFD	24	2.3
9.45	31	69.29	1.77	2.55	1.19	sandy silt to clayey silt	UNDFND	UNDFD	27	4.4
9.75	32	62.93	2.16	3.43	1.21	clayey silt to silty clay	UNDFND	UNDFD	30	4.0
10.05	33	71.46	2.46	3.44	1.24	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
10.35	34	147.89	2.91	1.96	1.27	silty sand to sandy silt	70-80	40-42	47	UNDEFINED
10.65	35	149.13	1.58	1.06	1.30	sand to silty sand	70-80	40-42	36	UNDEFINED
10.95	36	19.56	0.68	3.50	1.33	silty clay to clay	UNDFND	UNDFD	12	1.1
11.25	37	13.51	0.57	4.23	1.36	clay	UNDFND	UNDFD	13	.7
11.55	38	22.35	0.97	4.32	1.38	silty clay to clay	UNDFND	UNDFD	14	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-46b

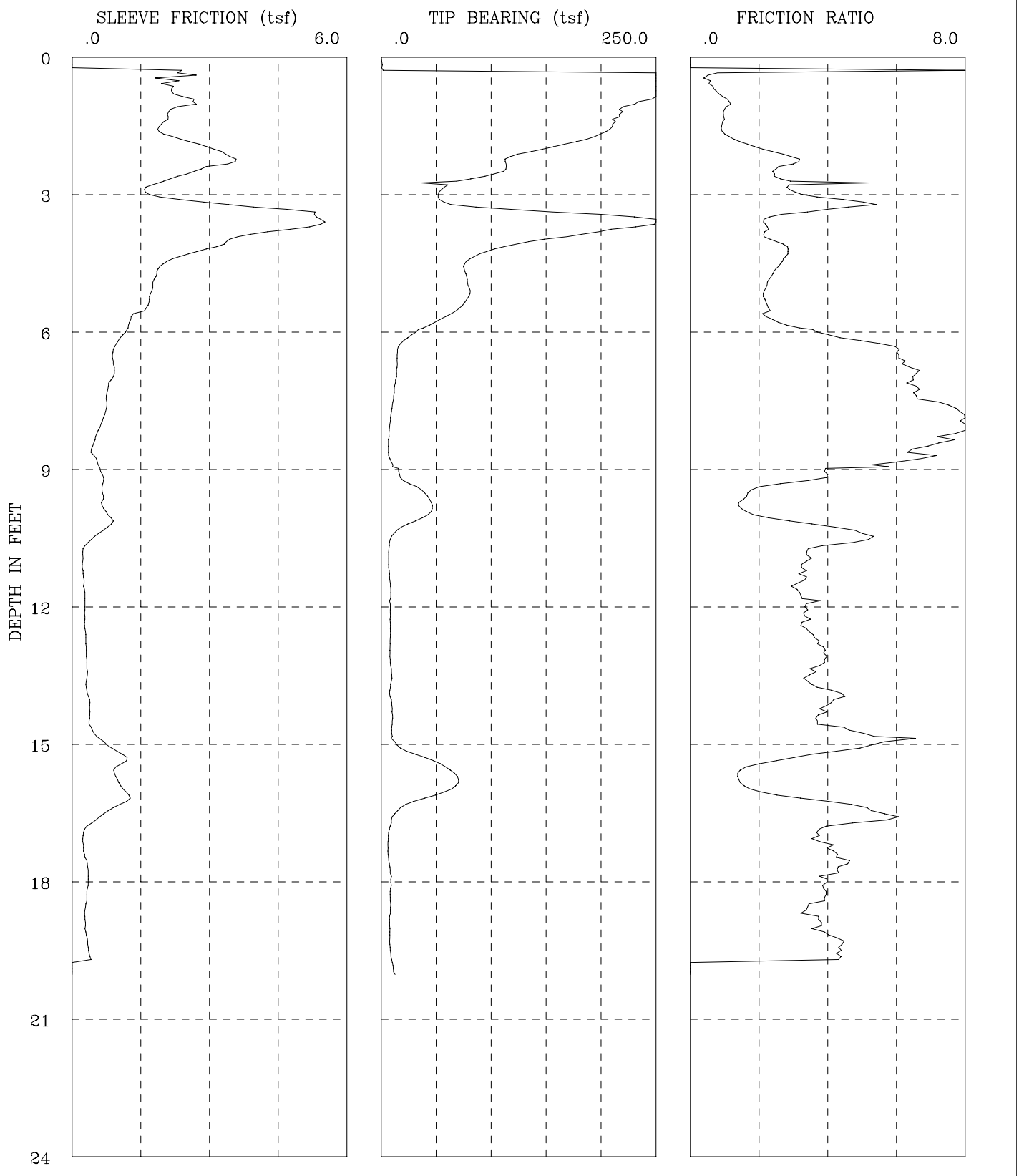
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	117.56	2.39	2.04	1.41	silty sand to sandy silt	60-70	40-42	38	UNDEFINED
12.15	40	168.09	2.14	1.27	1.44	sand to silty sand	70-80	40-42	40	UNDEFINED
12.45	41	128.61	1.65	1.28	1.47	sand to silty sand	60-70	40-42	31	UNDEFINED
12.80	42	59.33	1.08	1.83	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	28.77	0.75	2.61	1.53	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
13.40	44	124.55	1.55	1.24	1.56	sand to silty sand	60-70	40-42	30	UNDEFINED
13.75	45	69.32	2.57	3.70	1.59	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
14.05	46	75.76	2.35	3.11	1.62	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
14.35	47	60.75	1.17	1.92	1.65	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
14.65	48	28.44	0.97	3.42	1.68	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.95	49	26.01	0.79	3.02	1.70	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
15.25	50	15.82	0.34	2.16	1.73	clayey silt to silty clay	UNDFND	UNDFD	8	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-46c



CPT−08−118	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-47a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-118
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	245.53	1.93	0.79	0.03	sand	>90	>48	47	UNDEFINED
0.60	2	197.36	2.25	1.14	0.09	sand	>90	>48	38	UNDEFINED
0.95	3	86.08	2.53	2.93	0.15	sandy silt to clayey silt	UNDFND	UNDFD	33	5.7
1.25	4	173.77	4.39	2.53	0.22	silty sand to sandy silt	>90	>48	>50	UNDEFINED
1.55	5	80.63	2.00	2.48	0.28	sandy silt to clayey silt	UNDFND	UNDFD	31	5.3
1.85	6	55.94	1.39	2.49	0.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
2.15	7	14.85	0.90	6.09	0.39	clay	UNDFND	UNDFD	14	.9
2.45	8	9.87	0.72	7.32	0.45	clay	UNDFND	UNDFD	9	.6
2.75	9	8.71	0.52	5.98	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	36.57	0.69	1.89	0.57	sandy silt to clayey silt	UNDFND	UNDFD	14	2.4
3.35	11	11.58	0.45	3.93	0.61	clay	UNDFND	UNDFD	11	.7
3.65	12	8.06	0.26	3.24	0.64	clay	UNDFND	UNDFD	8	.4
3.95	13	8.18	0.29	3.54	0.67	clay	UNDFND	UNDFD	8	.4
4.25	14	8.54	0.33	3.81	0.69	clay	UNDFND	UNDFD	8	.5
4.55	15	10.09	0.45	4.48	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	51.54	1.02	1.97	0.75	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
5.15	17	20.99	0.76	3.61	0.78	silty clay to clay	UNDFND	UNDFD	13	1.3
5.45	18	7.21	0.29	4.09	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	8.26	0.31	3.72	0.84	clay	UNDFND	UNDFD	8	.4
6.05	20	8.66	0.29	3.30	0.86	clay	UNDFND	UNDFD	8	.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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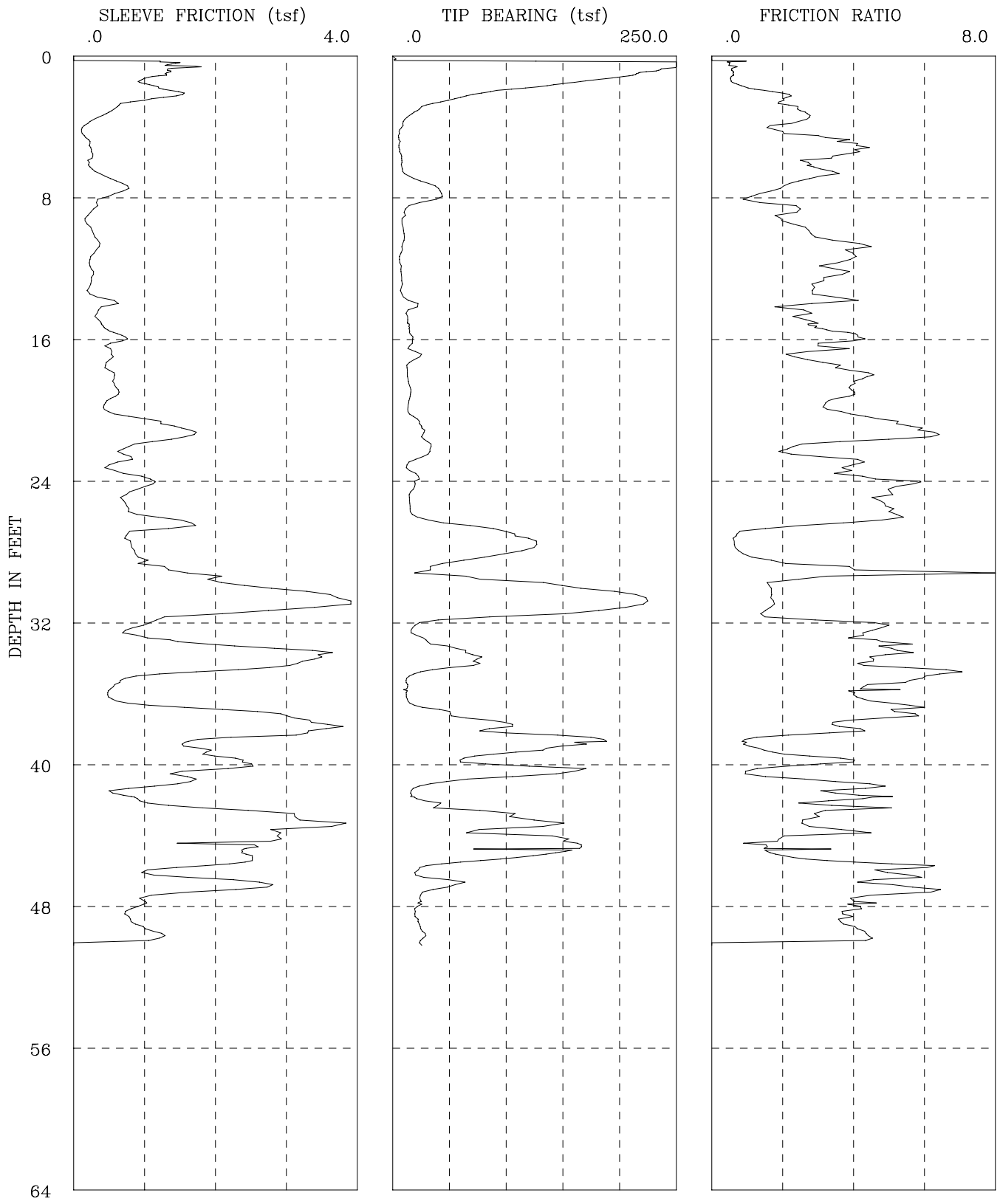
Figure A-47b



CPT-08-119	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-48a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-119
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	208.56	1.12	0.54	0.03	sand	>90	>48	40	UNDEFINED
0.60	2	148.63	1.12	0.76	0.09	sand	>90	>48	28	UNDEFINED
0.95	3	42.63	0.91	2.14	0.15	sandy silt to clayey silt	UNDFND	UNDFD	16	2.8
1.25	4	10.65	0.25	2.39	0.22	silty clay to clay	UNDFND	UNDFD	7	.6
1.55	5	5.54	0.18	3.28	0.28	clay	UNDFND	UNDFD	5	.3
1.85	6	7.18	0.24	3.36	0.33	clay	UNDFND	UNDFD	7	.4
2.15	7	13.63	0.39	2.87	0.39	silty clay to clay	UNDFND	UNDFD	9	.8
2.45	8	39.78	0.62	1.56	0.45	silty sand to sandy silt	50-60	40-42	13	UNDEFINED
2.75	9	15.21	0.28	1.81	0.51	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.05	10	8.90	0.22	2.45	0.57	silty clay to clay	UNDFND	UNDFD	6	.5
3.35	11	9.19	0.34	3.70	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	6.36	0.23	3.62	0.64	clay	UNDFND	UNDFD	6	.3
3.95	13	7.59	0.25	3.25	0.67	clay	UNDFND	UNDFD	7	.4
4.25	14	14.21	0.40	2.81	0.69	clayey silt to silty clay	UNDFND	UNDFD	7	.8
4.55	15	10.43	0.32	3.04	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	15.48	0.54	3.48	0.75	silty clay to clay	UNDFND	UNDFD	10	.9
5.15	17	18.47	0.54	2.94	0.78	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
5.45	18	14.88	0.50	3.33	0.81	silty clay to clay	UNDFND	UNDFD	10	.9
5.75	19	14.32	0.58	4.08	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	14.45	0.51	3.51	0.86	silty clay to clay	UNDFND	UNDFD	9	.8
6.40	21	20.25	1.00	4.92	0.89	clay	UNDFND	UNDFD	19	1.2
6.70	22	29.01	1.35	4.66	0.93	clay	UNDFND	UNDFD	28	1.8
7.00	23	25.76	0.70	2.73	0.95	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
7.35	24	18.18	0.81	4.47	0.98	clay	UNDFND	UNDFD	17	1.1
7.65	25	16.19	0.80	4.95	1.02	clay	UNDFND	UNDFD	16	.9
7.95	26	17.67	0.90	5.08	1.04	clay	UNDFND	UNDFD	17	1.0
8.25	27	79.04	1.23	1.56	1.07	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
8.55	28	119.58	0.81	0.68	1.10	sand to silty sand	70-80	40-42	29	UNDEFINED
8.85	29	44.72	1.05	2.35	1.13	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
9.15	30	105.39	2.14	2.03	1.16	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
9.45	31	228.13	3.95	1.73	1.19	sand to silty sand	80-90	42-44	>50	UNDEFINED
9.75	32	97.81	1.66	1.69	1.21	silty sand to sandy silt	60-70	40-42	31	UNDEFINED
10.05	33	19.22	0.77	4.03	1.24	silty clay to clay	UNDFND	UNDFD	12	1.1
10.35	34	57.80	2.92	5.05	1.27	silty clay to clay	UNDFND	UNDFD	37	3.7
10.65	35	47.68	2.39	5.01	1.30	clay	UNDFND	UNDFD	46	3.0
10.95	36	11.98	0.59	4.94	1.33	clay	UNDFND	UNDFD	11	.6
11.25	37	20.70	1.05	5.06	1.36	clay	UNDFND	UNDFD	20	1.2
11.55	38	78.53	3.27	4.17	1.38	clayey silt to silty clay	UNDFND	UNDFD	38	5.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

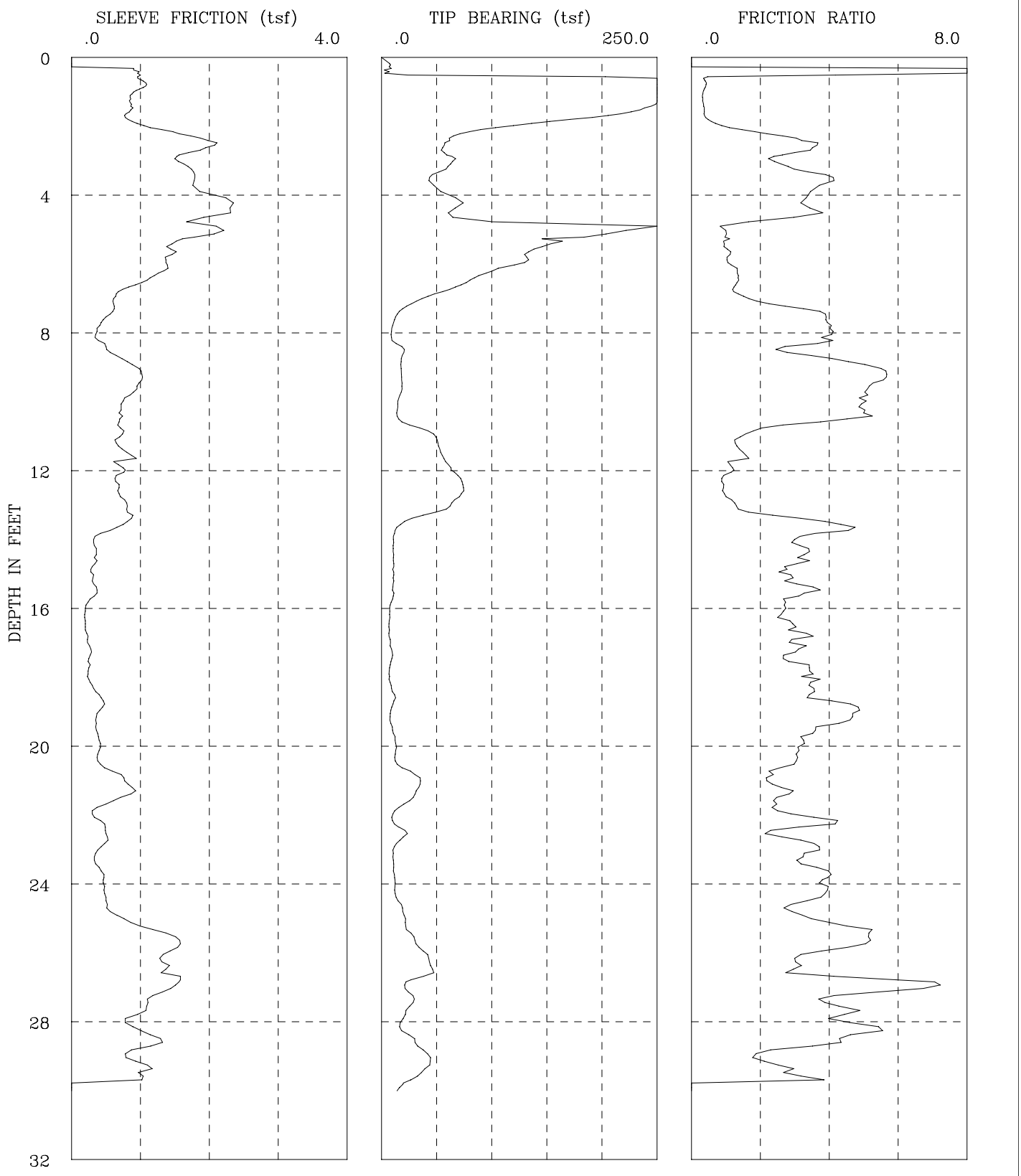
Figure A-48b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	143.15	2.38	1.66	1.41	sand to silty sand	70-80	40-42	34	UNDEFINED
12.15	40	91.91	2.05	2.23	1.44	silty sand to sandy silt	50-60	38-40	29	UNDEFINED
12.45	41	121.87	1.84	1.51	1.47	sand to silty sand	60-70	40-42	29	UNDEFINED
12.80	42	23.01	0.93	4.02	1.50	silty clay to clay	UNDFND	UNDFD	15	1.3
13.10	43	72.75	2.25	3.10	1.53	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
13.40	44	112.15	3.22	2.87	1.56	sandy silt to clayey silt	UNDFND	UNDFD	43	7.3
13.75	45	146.17	2.54	1.73	1.59	sand to silty sand	70-80	40-42	35	UNDEFINED
14.05	46	47.25	1.80	3.80	1.62	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
14.35	47	42.67	2.22	5.20	1.65	clay	UNDFND	UNDFD	41	2.6
14.65	48	23.89	1.05	4.38	1.68	silty clay to clay	UNDFND	UNDFD	15	1.4
14.95	49	21.26	0.80	3.76	1.70	silty clay to clay	UNDFND	UNDFD	14	1.2
15.25	50	25.99	0.98	3.76	1.73	silty clay to clay	UNDFND	UNDFD	17	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-48c



CPT−08−121	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-49a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-121
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	137.74	0.82	0.59	0.03	sand	>90	>48	26	UNDEFINED
0.60	2	211.26	0.87	0.41	0.09	sand	>90	>48	40	UNDEFINED
0.95	3	64.09	1.71	2.67	0.15	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.25	4	53.29	1.89	3.54	0.22	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
1.55	5	125.87	2.11	1.68	0.28	silty sand to sandy silt	>90	46-48	40	UNDEFINED
1.85	6	138.02	1.46	1.06	0.33	sand to silty sand	>90	46-48	33	UNDEFINED
2.15	7	66.57	0.90	1.36	0.39	silty sand to sandy silt	60-70	42-44	21	UNDEFINED
2.45	8	13.36	0.48	3.56	0.45	silty clay to clay	UNDFND	UNDFD	9	.8
2.75	9	16.74	0.65	3.89	0.51	silty clay to clay	UNDFND	UNDFD	11	1.0
3.05	10	17.31	0.91	5.27	0.57	clay	UNDFND	UNDFD	17	1.1
3.35	11	26.34	0.71	2.69	0.61	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
3.65	12	56.16	0.76	1.34	0.64	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.95	13	70.37	0.70	0.99	0.67	sand to silty sand	60-70	40-42	17	UNDEFINED
4.25	14	26.09	0.67	2.57	0.69	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
4.55	15	10.86	0.33	3.06	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	10.00	0.30	3.03	0.75	silty clay to clay	UNDFND	UNDFD	6	.6
5.15	17	7.20	0.21	2.88	0.78	clay	UNDFND	UNDFD	7	.4
5.45	18	8.28	0.26	3.09	0.81	clay	UNDFND	UNDFD	8	.4
5.75	19	9.55	0.37	3.85	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	9.74	0.37	3.84	0.86	clay	UNDFND	UNDFD	9	.5
6.40	21	20.01	0.52	2.58	0.89	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
6.70	22	23.31	0.61	2.61	0.93	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
7.00	23	15.08	0.47	3.10	0.95	silty clay to clay	UNDFND	UNDFD	10	.9
7.35	24	11.32	0.41	3.64	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	17.72	0.60	3.36	1.02	silty clay to clay	UNDFND	UNDFD	11	1.0
7.95	26	31.58	1.39	4.40	1.04	silty clay to clay	UNDFND	UNDFD	20	2.0
8.25	27	35.23	1.42	4.03	1.07	silty clay to clay	UNDFND	UNDFD	23	2.2
8.55	28	23.55	1.00	4.27	1.10	silty clay to clay	UNDFND	UNDFD	15	1.4
8.85	29	31.56	1.03	3.26	1.13	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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Figure A-49b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-01**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	26	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	25											**Silty, Clayey Sand (SC)** dry, brown, fine grained with scattered medium grains and few subrounded granite gravel up to 1" moist
			B-1				RV	56	30:10			**Lean Clay with Sand (CL)** moist, dark brown, some fine grains
5												**Sandy Silt (ML)** moist, olive brown, fine grained
	20											Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-50

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-02**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	27	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Sandy Silt (ML) dry, gray brown, fine to coarse grained with scattered fine gravel
												Poorly Graded Sand with Silt (SP-SM) dry, yellow-brown, fine to coarse grained with fine grains dominant and few scattered fine gravel
	25		B-1				RV	55	28:09			**Sandy Lean Clay to Lean Clay with Sand (CL)** dry, olive brown, fine grained with scattered medium grains
												moist, with some silt
5												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	20											
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-51

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **HA-08-03**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 10/8/2008	**FINISH** 10/8/2008	**SHEET NO.** 1 of 1
DRILLING COMPANY GDC	**DRILLING METHOD** Hand Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Hand Auger	**BORING DIA. (in)** 3"	**TOTAL DEPTH (ft)** 5	**GROUND ELEV (ft)** 28
SAMPLING METHOD Bulk			**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ Not Encountered / *na*
			NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1				RV	69	32:13			**Sandy Lean Clay (CL)** dry, light orange-brown, fine grained
	25											**Lean Clay (CL)** moist, dark brown, scattered fine grains with pieces of bark and small rootlets with some silt
5												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	20											
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-52

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **HA-08-04**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 10/8/2008	**FINISH** 10/8/2008	**SHEET NO.** 1 of 1
DRILLING COMPANY GDC	**DRILLING METHOD** Hand Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Hand Auger	**BORING DIA. (in)** 3"	**TOTAL DEPTH (ft)** 5	**GROUND ELEV (ft)** 43
SAMPLING METHOD Bulk			**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ Not Encountered / *na*
			NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Aggregate Base (AB)
												Sandy Silt (ML) dry, light gray, fine to coarse grained
												Sandy Lean Clay (CL) dry, light orange-brown, fine grained with some fine gravel
	40		B-1				RV	57	30:09			few scattered subrounded granite gravel up to 1.5
5												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	35											
10												
	30											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-53

LOG OF TEST BORING

PROJECT NAME	SR-22 West Orange County Connectors	**PROJECT NUMBER**	I-436
BORING	**HA-08-05**		
SITE LOCATION	Cities of Seal Beach, Westminster, and Garden Grove, California	**START**	10/8/2008
FINISH	10/8/2008	**SHEET NO.**	1 of 1
DRILLING COMPANY	GDC	**DRILLING METHOD**	Hand Auger
LOGGED BY	A. Tucker	**CHECKED BY**	C. Scheyhing
DRILLING EQUIPMENT	Hand Auger	**BORING DIA. (in)**	3"
TOTAL DEPTH (ft)	5	**GROUND ELEV (ft)**	24.9
DEPTH/*ELEV.* GROUND WATER (ft)	▼ Not Encountered / *na*		
SAMPLING METHOD	Bulk	**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Clayey Sand (SC) dry, brown, fine grained with scattered medium grains and scattered fine pea-sized gravel up to 1", organics
												orange brown
			B-1				RV	56	30:13			**Sandy Lean Clay (CL)** dry-moist, dark brown, some fine grains
												dry
5	20											Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
10	15											
	10											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-54

LOG OF TEST BORING

PROJECT NAME	SR-22 West Orange County Connectors	**PROJECT NUMBER**	I-436
BORING	**HA-08-06**		
SITE LOCATION	Cities of Seal Beach, Westminster, and Garden Grove, California	**START**	10/8/2008
FINISH	10/8/2008	**SHEET NO.**	1 of 1
DRILLING COMPANY	GDC	**DRILLING METHOD**	Hand Auger
LOGGED BY	A. Tucker	**CHECKED BY**	C. Scheyhing
DRILLING EQUIPMENT	Hand Auger	**BORING DIA. (in)**	3"
TOTAL DEPTH (ft)	5	**GROUND ELEV (ft)**	29
DEPTH *ELEV.* GROUND WATER (ft)	▼ Not Encountered / *na*		
SAMPLING METHOD	Bulk	**NOTES**	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silty Sand (SM) moist, light red brown, fine to coarse grained with few scattered 3/4" gravel, rootlets in upper 6"
												Sandy Silt (ML) moist, olive gray, fine to coarse grained with few scattered 3/4" gravel, some clay
			B-1				RV	51	28:10			
												Sandy Lean Clay (CL) moist, olive brown, fine grained, low to moderate plasticity
	25											
5												**Silty Sand (SM)** moist, olive brown, fine grained, some clay, grading coarser and drier
												Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
	20											
10												
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-55

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-07**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/8/2008	10/8/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	28.5	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silty Sand (SM) dry, brown, fine grained with occasional piece of broken subrounded granite gravel up to 3/4", grading finer moist
			B-1				RV	40	27:10			**Sandy Lean Clay to Clayey Sand (CL/SC)** moist, brown, fine grained with occasional piece of broken subrounded granite gravel up to 1", with chunks of sandy clay
5	25											Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
10	20											
	15											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-56

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**HA-08-08**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	10/4/2006	10/4/2006	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
GDC	Hand Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3"	5	20	▼ Not Encountered / *na*

SAMPLING METHOD	NOTES
Bulk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1				RV	53	33:16			**Sandy Lean Clay (CL)** dry, olive brown, fine grained with occasional coarse grain and pea-sized gravel with few 2" subrounded granite gravel, with chunks of clay and some silt moist, coarser
												Clayey Sand to Sandy Lean Clay (SC/CL) moist to wet, orange-brown, fine grained, with chunks of clay
5	15											Boring terminated at 5 feet below ground surface (bgs). Groundwater not encountered. Boring backfilled with soil cuttings.
10	10											

GDC_LOG_BORING_1A I-436 HAND AUGER BORING LOGS.GPJ GDCLOG.GDT 10/16/08

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FIGURE A-57

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples were then transported to the laboratory for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of moisture content and dry unit weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Consolidation, R-Value, and Soil Corrosivity. A summary of laboratory test results are included in Table B-1. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The USCS soil classifications are presented on key for soil classification and on the boring logs in Figures A-1a through A-17d and Figures A-50 through A-57 of Appendix A and summarized in Table B-1.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented in Table B-1 and on the boring logs in Figures A-2a through A-17d of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a and A-17d and Figures A-50

through A-57 of Appendix A and in Table B-1 and in Figures B-1a through B-1f of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided in Figure B-2 and Table B-1 of this appendix. The relative proportion (or percentage) by dry weight percent fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a through A-17d and Figures A-50 through A-57 of Appendix A.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under two additional normal loads for selected samples. The test results are presented in Tables B-2a and B-2b and Figures B-3a through B-3d of this appendix.

B.7 Consolidation Test

One-dimensional consolidation test was performed on selected undisturbed samples in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation tests are graphically shown in Figures B-4a to B-4e and consolidation parameters are summarized in Table B-3 of this appendix.

B.8 R-Value

A Resistance or R-Value test was performed on selected bulk samples of the subgrade soils encountered under proposed pavement locations. The test was conducted in general accordance with CTM 301. The test results are summarized in Table B-4 of this appendix.

B.9 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included minimum resistivity and soil pH (Caltrans method 643), water-soluble chlorides (Caltrans Test Method 422), water-soluble sulfates (Caltrans Test Method 417) and electrical resistivity (Caltrans Test Method 643). The test results are summarized in Table B-5.

B.10 List of Attached Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table B-1	Summary of Index Test Results
Table B-2a	Summary of Single Point Direct Shear Test Results
Table B-2b	Summary of Direct Shear Test Results
Table B-3	Summary of Consolidation Test Results
Table B-4	Summary of R-Value Test Results
Table B-5	Summary of Corrosion Test Results

List of Figures

Figures B-1a to B-1f	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figures B-3a to B-3d	Direct Shear Test Results
Figures B-4a to B-4e	Consolidation Test Results

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-101	B-1	1.0-4	SC	-	12	-	-	37	31	20	11	-
A-08-101	R-2	2.5	SC	110.3	15	-	-	-	-	-	-	-
A-08-101	S-3	5	CL	-	24	-	-	86	-	-	-	-
A-08-101	R-4	10	CL	91.3	29	-	-	-	-	-	-	2
A-08-101	S-5	15	CL	-	28	-	-	72	-	-	-	1.25
A-08-101	R-6	20	CL	93.5	28	-	-	-	-	-	-	1.25
A-08-103	B-1	0.8-5	SC	-	-	-	-	-	-	-	-	-
A-08-103	R-2	5	SM	88.8	26	-	-	-	-	-	-	-
A-08-103	S-3	10	CL	-	31	-	-	-	-	-	-	0.5
A-08-103	R-4	15	CL	96.1	28	-	-	65	-	-	-	1.5
A-08-103	S-5	20	CL	-	24	-	-	-	-	-	-	1.25
A-08-103	R-6	25	CL	101.7	24	-	-	-	-	-	-	2.75
A-08-103	S-7	30	SM	-	29	-	-	45	-	-	-	-
A-08-105	B-1	1.2-5	SC	-	11	-	-	27	28	14	14	-
A-08-105	R-2	10	CL	99.2	23	-	-	62	-	-	-	1
A-08-105	R-3	20	SC	105.4	22	-	-	-	-	-	-	-
A-08-105	R-4	30	SM	107.2	18	-	-	-	-	-	-	-
A-08-105	R-5	40	SM	104.6	22	-	-	35	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-112	B-1	1.2-5	SC	-	11	-	-	45	-	-	-	-
A-08-112	S-2	5	CL	-	31	-	-	-	-	-	-	-
A-08-112	R-3	10	ML	88.8	33	-	-	62	-	-	-	1
A-08-112	S-4	15	ML	-	32	-	-	77	NP	-	-	0.75
A-08-112	R-5	20	ML	101.8	24	-	-	-	-	-	-	1.2
A-08-112	S-6	25	ML	-	24	-	-	-	-	-	-	1.25-1.5
A-08-112	R-7	30	CL	93.8	26	-	-	-	-	-	-	2.0-3.0
A-08-112	S-8	35	CL	-	44	-	-	-	-	-	-	-
A-08-112	R-9	40	ML	95.2	27	-	-	-	-	-	-	3.5
A-08-115	B-1	1.1-5	CL/SC	-	24	-	-	75	-	-	-	-
A-08-115	R-2	5	CL	89.6	29	-	-	80	-	-	-	2
A-08-115	S-3	10	CL	-	29	-	-	-	-	-	-	1.25
A-08-115	R-4	15	CL	94	27	-	-	-	-	-	-	1.7
A-08-116	B-1	1.0-5	SW-SM	-	4	13	80	8	-	-	-	-
A-08-116	R-2	5	CL	99	23	-	-	86	37	20	17	2
A-08-116	S-3	11	CL	-	29	-	-	-	-	-	-	1
A-08-116	R-4	15	SM	96.7	27	-	-	-	-	-	-	2.1-2.6
A-08-119	B-1	0.8-5	SC	-	15	-	-	36	32	20	12	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-119	S-2	5	SC	-	-	-	-	-	-	-	-	-
A-08-119	R-3	10	CL	88.3	31	-	-	-	-	-	-	1
A-08-119	S-4	15	CL	-	27	-	-	72	-	-	-	1.75-2.0
A-08-119	R-5	20	CL	99.4	26	-	-	-	-	-	-	-
A-08-119	S-6	25	CL	-	24	-	-	-	-	-	-	1.5-2.0
A-08-119	R-7	30	CL	99.1	26	-	-	-	-	-	-	1.25
A-08-120	B-1	1.0-5	CL & SM	-	9	-	-	27	-	-	-	-
A-08-120	R-2	5	SM	103.7	11.0	-	-	-	-	-	-	-
A-08-120	S-3	10	SC	-	21.0	-	-	-	-	-	-	-
A-08-120	R-4	15	CL	-	29.0	-	-	72	36	19	17	0.5
A-08-120	S-5	20	CL	-	26.0	-	-	-	-	-	-	2.0-2.25
A-08-120	R-6	25	SC	99.2	25.0	-	-	-	-	-	-	-
A-08-120	S-7	30	ML	-	24.0	-	-	-	-	-	-	-
A-08-120	R-8	35	ML	100.3	25.0	-	-	55	NP	-	-	-
A-08-120	S-9	40	ML	-	21.0	-	-	-	-	-	-	-
A-08-120	R-10	45	SC	97.1	27.0	-	-	19	-	-	-	-
A-08-120	S-11	50	SC	-	28.0	-	-	-	-	-	-	-
A-08-122	B-1	1.2-5	SC	-	7	-	-	23	26	15	11	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-122	R-2	5	SC	107.6	18	-	-	-	-	-	-	-
A-08-122	S-3	10	SC	-	13	-	-	40	-	-	-	-
A-08-122	R-4	15	SM	100	23	-	-	26	-	-	-	-
A-08-122	S-5	20	CL	-	-	-	-	-	-	-	-	1
A-08-122	R-6	25	CL	87.2	31	-	-	88	-	-	-	1.5-1.75
A-08-122	S-7	30	SM	-	26	-	-	-	-	-	-	-
A-08-122	R-8	35	SM	96.8	28	-	-	26	-	-	-	-
A-08-122	S-9A	40	SC/SM	-	30	-	-	-	-	-	-	-
A-08-122	S-9B	40.75	CL	-	-	-	-	-	-	-	-	2.0-2.5
A-08-122	R-10	45	CL	86.4	35	-	-	-	-	-	-	2.0-2.75
A-08-122	S-11	50	SM/ML	-	27	-	-	-	-	-	-	-
R-08-004	B-1	1.3-3.5	CL	-	16	-	-	66	29	17	12	-
R-08-004	R-2	3.5	CL	117.1	16	-	-	-	-	-	-	4.5+
R-08-004	S-3	10	ML	-	22	-	-	66	-	-	-	4.5+
R-08-004	R-4	15	SM	100.5	24	-	-	27	-	-	-	-
R-08-004	S-5	20	CL	-	31	-	-	66	-	-	-	1
R-08-004	R-6	25	CL	91.1	31	-	-	-	-	-	-	1.25-1.5
R-08-004	S-7	30	CL	-	29	-	-	55	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-004	R-8	35	CL	92.3	30	-	-	-	-	-	-	1.5-2.2
R-08-004	S-9	40	CL	-	32	-	-	-	-	-	-	2
R-08-004	R-10	45	SM/ML	105.2	22	-	-	51	-	-	-	4.5
R-08-004	S-11	50	CL	-	32	-	-	86	-	-	-	-
R-08-004	R-12	55	ML	109.6	19	-	-	-	-	-	-	4.5+
R-08-004	S-13	60	ML	-	26	-	-	56	-	-	-	-
R-08-005	B-1	1.9-5	CL	-	16	-	-	63	29	20	9	-
R-08-005	R-1	5	CL	108.3	19	7	40	53	32	19	13	4.5+
R-08-005	S-2	10	SM	-	26	0	82	18	-	-	-	-
R-08-005	R-3	15	CL	98	27	-	-	65	-	-	-	-
R-08-005	S-4	20	SM	-	29	-	-	-	-	-	-	-
R-08-005	R-5	25	SM	97.6	26	-	-	24	-	-	-	-
R-08-005	S-6	30	CL	-	41	-	-	97	46	26	20	1.25
R-08-005	S-7	40	CL	-	31	-	-	-	39	19	20	1.5
R-08-005	R-8	50	ML	103	23	-	-	86	-	-	-	4.5
R-08-005	R-9	70	CL	-	45	-	-	75	43	24	19	4.5
R-08-005	R-10	105	CL	82.4	39	-	-	-	-	-	-	2.5
R-08-005	S-11	135	CL	-	27	-	-	-	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-011	S-1	5	SC	-	19	-	-	47	33	19	14	-
R-08-011	R-2	10	SC	96.9	19	-	-	-	-	-	-	-
R-08-011	S-3	15	CL	-	31	-	-	-	-	-	-	0.5
R-08-011	R-4	20	CL	94.6	24	-	-	52	34	16	18	1
R-08-011	S-5	25	CL	-	46	-	-	-	-	-	-	-
R-08-011	R-6	30	ML	93.2	30	-	-	-	-	-	-	1.5
R-08-011	S-7	35	ML	-	28	-	-	68	-	-	-	1
R-08-011	R-8	40	CL	97.9	25	-	-	80	-	-	-	4
R-08-011	S-9	45	ML	-	33	-	-	-	-	-	-	-
R-08-011	R-10	50	ML	83.9	35	-	-	-	-	-	-	3.5
R-08-011	S-11	60	SW-SM	-	15	4	89	7	-	-	-	-
R-08-011	R-12	70	CL	114.8	17	-	-	-	31	15	16	3.5
R-08-011	S-13	80	SC	-	17	-	-	45	-	-	-	-
R-08-011	R-14	90	SM	-	24	-	-	29	-	-	-	-
R-08-011	S-15	100	CL	-	40	-	-	-	-	-	-	-
R-08-011	R-16	120	SM	-	24	-	-	27	-	-	-	-
R-08-012	R-1	5	CL	95.8	28	-	-	80	47	20	27	2.4
R-08-012	S-2	10	CL	-	39	-	-	-	-	-	-	0.75

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-012	R-3	15	CL	102.1	24	-	-	58	-	-	-	2.75
R-08-012	S-4	20	CL	-	27	-	-	-	-	-	-	1.1
R-08-012	R-5	25	CL	92.7	29	-	-	80	33	21	12	2.25
R-08-012	S-6	30	CL	-	34	-	-	-	-	-	-	1.25-1.5
R-08-012	R-7	35	CL	93.9	30	-	-	-	-	-	-	4
R-08-012	S-8	40	ML	-	28	-	-	-	-	-	-	-
R-08-012	R-9	45	ML	99	26	-	-	70	26	23	3	-
R-08-012	S-10	50	CL	-	38	-	-	-	-	-	-	3.3
R-08-012	R-11	55	CL	88.5	33	-	-	96	-	-	-	2.8
R-08-012	S-12	60	CL	-	29	-	-	-	-	-	-	3.75
R-08-012	R-13	67	CL	107.1	21	-	-	61	-	-	-	3
R-08-012	S-14	72	CL	-	21	-	-	-	-	-	-	1.5
R-08-012	R-15	80	CL	97.9	31	-	-	57	-	-	-	-
R-08-012	S-16	90	No Recovery									
R-08-012	S-17	91.5	ML/CL	-	31	-	-	89	-	-	-	-
R-08-012	R-18	100	SC	134.9	18	-	-	-	-	-	-	-
R-08-017	S-1	5	CL/SC	-	-	-	-	-	-	-	-	3
R-08-017	R-2	10	CL	89.3	32	-	-	82	35	21	14	2.5

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-017	S-3	15	CL	-	27	-	-	55	34	20	14	1.25
R-08-017	R-4	20	CL	108.8	19	-	-	-	-	-	-	4.5+
R-08-017	S-5	25	CL	-	20	-	-	63	-	-	-	4.5+
R-08-017	R-6	30	CL	109.3	15	-	-	-	-	-	-	4
R-08-017	S-7	35	ML	-	34	-	-	57	-	-	-	-
R-08-017	R-8	40	CL	96.2	28	-	-	-	39	20	19	-
R-08-017	S-9	45	CL	-	36	-	-	-	-	-	-	1.2
R-08-017	R-10	50	ML	100	25	-	-	-	-	-	-	3
R-08-017	S-11	60	CL	-	31	-	-	82	-	-	-	2
R-08-017	R-12	70	ML	96.7	27	-	-	-	-	-	-	-
R-08-017	S-13	80	SM	-	19	-	-	22	-	-	-	-
R-08-017	R-14	90	SW	111.4	18	-	-	-	-	-	-	-
R-08-017	S-15	100	CL	-	-	-	-	-	-	-	-	1.5
R-08-019	S-1	5	CL	-	20	-	-	59	34	20	14	4
R-08-019	R-2	10	CL	114.3	17	-	-	-	39	20	19	4.5+
R-08-019	S-3	15	ML	-	27	-	-	57	-	-	-	-
R-08-019	R-4	20	CL	110.8	15	-	-	-	-	-	-	4.5+
R-08-019	S-5	25	SM/ML	-	18	-	-	-	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-019	R-6	30	CL	107.6	19	-	-	71	33	21	12	4.5+
R-08-019	S-7	35	SM	-	29	-	-	-	-	-	-	-
R-08-019	R-8	40	CL	103.8	23	-	-	-	-	-	-	1.25
R-08-019	S-9	50	SM	-	-	-	-	31	-	-	-	-
R-08-019	R-10	60	ML	100.2	24	-	-	-	-	-	-	4.5
R-08-019	S-11	70	SP-SM	-	-	-	-	-	-	-	-	-
R-08-019	R-12	76	SP-SM	103.8	23	-	-	-	-	-	-	-
R-08-019	R-13	85	SP-SM	94.4	29	-	-	12	-	-	-	-
R-08-023	R-1	5	CL	115.8	10	-	-	54	32	19	13	4.5+
R-08-023	S-2	10	SC	-	23	-	-	-	-	-	-	-
R-08-023	R-3	15	CL	113.8	15	-	-	55	-	-	-	4.5
R-08-023	S-4	20	CL	-	22	-	-	61	-	-	-	3.25
R-08-023	R-5	25	CL	88.7	31	-	-	-	-	-	-	1.5
R-08-023	S-6	30	CL	-	34	-	-	-	-	-	-	-
R-08-023	R-7	35	CL	-	28	-	-	-	-	-	-	1.0-1.25
R-08-023	S-8	40	SC/CL	-	24	-	-	49	29	19	10	2
R-08-023	R-9	45	SP-SM	107.8	19	0	89	11	-	-	-	-
R-08-023	S-10	55	ML	98.8	26	-	-	84	-	-	-	2

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-023	R-11	65	CL	-	40	-	-	-	-	-	-	-
R-08-023	S-12	75	SP	106.8	21	-	-	2	-	-	-	-
R-08-023	R-13	80	SP	-	25	-	-	-	-	-	-	-
R-08-023	S-14	85	SW-SM	108.1	19	-	-	8	-	-	-	-
R-08-023	R-15	95	SP	101.4	23	-	-	4	-	-	-	-
HA-08-01	B-1	0-5	SC, CL & ML	-	-	6	38	56	30	20	10	-
HA-08-02	B-1	0-5	ML, SP-SM & CL	-	-	10	35	55	28	19	9	-
HA-08-03	B-1	0-5	CL	-	-	1	30	69	32	19	13	-
HA-08-04	B-1	0.6-5	ML & CL	-	-	11	32	57	30	21	9	-
HA-08-05	B-1	1.0-5	SC & CL	-	-	1	43	56	30	17	13	-
HA-08-06	B-1	0.5-5	SM, ML & CL	-	-	4	45	51	28	18	10	-
HA-08-07	B-1	0-5	SM & CL/SC	-	-	7	53	40	27	17	10	-
HA-08-08	B-1	0-5	CL & SC/CL	-	-	14	33	53	33	17	16	-

TABLE B-2a:
SUMMARY OF SINGLE POINT DIRECT SHEAR TEST RESULTS

Boring No.	Sample No.	Sample Depth (ft.)	Description	Shear Rate (in./min.)	Normal Stress (psf)	Peak Shear Stress (psf)	Shear Stress at 0.25 in.(psf)
R-08-004	R-6	25-26.5	Lean Clay (CL)	0.0042	1500	1200 @ 0.095 in.	1100
R-08-005	R-3	16-16.5	Silty Clay with Sand (CL)	0.0042	800	780 @ 0.11 in.	700
R-08-005	R-3	16-16.5	Silty Clay with Sand (CL)	0.0042	5000	3350 @ 0.185 in.	3320
R-08-012	R-3	15-16.5	Sandy Lean Clay (CL)	0.0042	4000	2540 @ 0.245 in.	2530
R-08-019	R-8	41-41.5	Sandy Lean Clay (CL)	0.0042	3000	2140 @ 0.15 in.	1970
R-08-019	R-8	41-41.5	Sandy Lean Clay (CL)	0.0042	7000	4880 @ 0.20 in.	4730
R-08-023	R-7	36-36.5	Lean Clay (CL)	0.0042	2000	1340 @ 0.09 in.	1180

TABLE B-2b:
SUMMARY OF DIRECT SHEAR TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Peak		Ultimate	
				Shear Strength (psf)	Friction Angle (deg)	Shear Strength (psf)	Friction Angle (deg)
R-08-004	R-2	3.5	CL	600	35	150	33
R-08-017	R-2	10	CL	750	24	350	20
R-08-019	R-2	10	CL	900	32	300	32
R-08-023	R-5	25	CL	400	30	250	30

TABLE B-3:
SUMMARY OF CONSOLIDATION TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Atterberg Limits			Consolidation Parameters					
				LL	PL	PI	Cc	Cr	Ccε	Crε	e_0	σ'_p (psf)
A-08-120	R-4	16	CL	36	19	17	0.280	0.026	0.155	0.015	0.809	3800
A-08-122	R-2	6	SC	-	-	-	0.096	0.025	0.064	0.016	0.503	6500
R-08-005	R-1	6	CL	32	19	13	0.136	0.023	0.090	0.015	0.510	5900
R-08-011	R-4	21	CL	34	16	18	0.228	0.022	0.137	0.013	0.667	3700
R-08-017	R-8	41	CL	39	20	19	0.300	0.038	0.170	0.022	0.744	4800

Note: The value of C_v was based on available correlations.

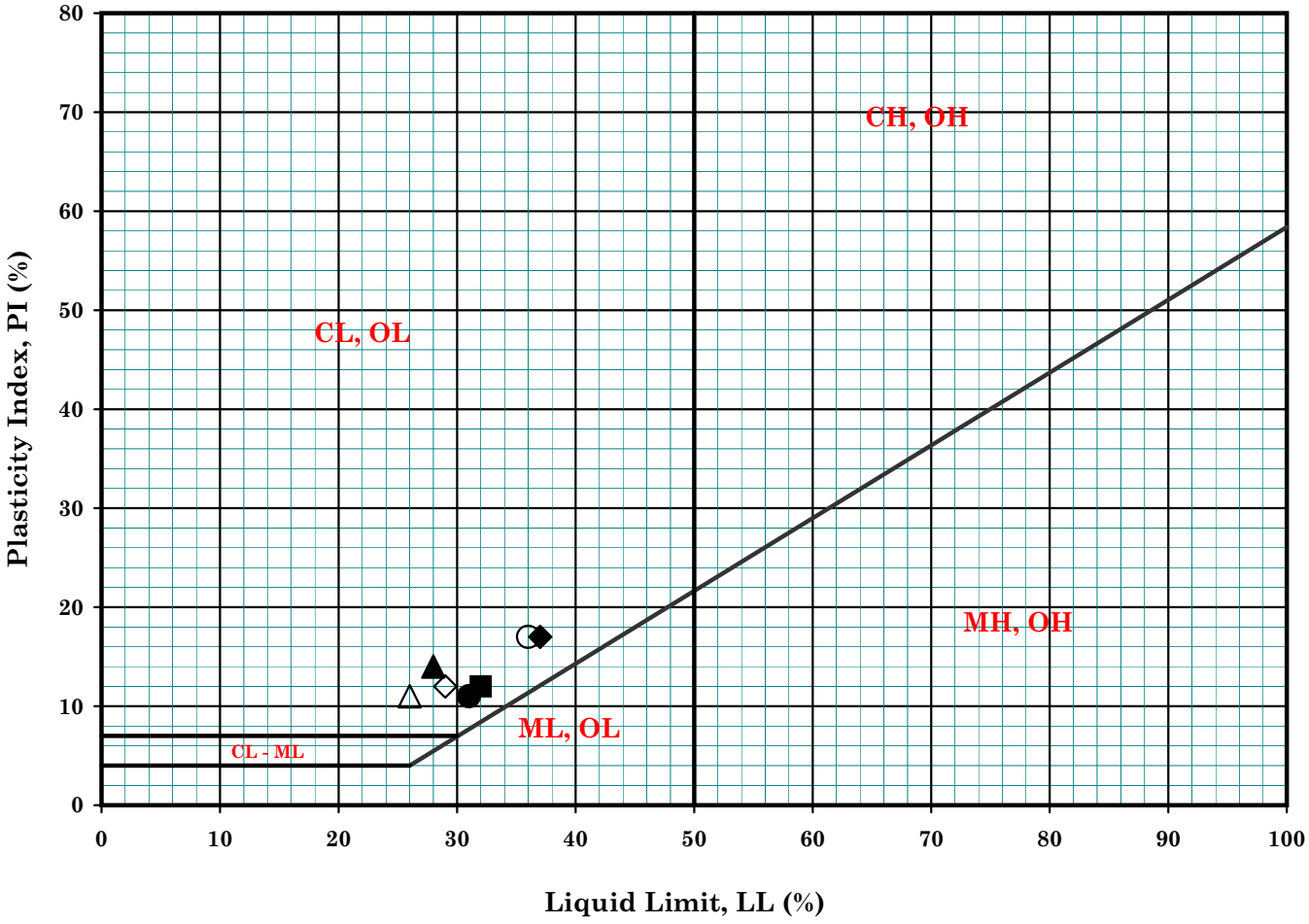
TABLE B-4:
SUMMARY OF R-VALUE TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	R-Value
A-08-101	B-1	1 - 5	SC	21
A-08-103	B-1	1 - 5	SC	46
A-08-115	B-1	1 - 5	CL/SC	34
A-08-120	B-1	1 - 5	SM	54
HA-08-01	B-1	0-5	CL	35
HA-08-02	B-1	0-5	CL	29
HA-08-03	B-1	0-5	CL	17
HA-08-04	B-1	0.5-5	CL	43
HA-08-05	B-1	1-5	CL	27
HA-08-06	B-1	0.5-5	CL/SC	15
HA-08-07	B-1	0-5	SC	29
HA-08-08	B-1	0-5	CL	23
R-08-004	B-1	1.5-3.5	CL	39
R-08-005	B-1	2 - 5	CL	25

TABLE B-5:
SUMMARY OF CORROSION TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-101	B-1	1-4	SC	2000	8.5	100	30
A-08-105	R-2	10-11.5	CL	NA	9.3	74	218
A-08-112	B-1	1.2-5	SC	<500	8.2	3900	626
A-08-116	S-3	11-11.5	CL	NA	8.3	4720	388
A-08-119	R-5	20-21.5	CL	NA	7.9	1140	96
A-08-122	B-1	1.2-5	SC	2750	8.3	132	163
R-08-004	B-1	1.3-3.5	CL	1350	9.1	465	604
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20-21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35-36.5	ML	NA	8.8	576	255
R-08-019	S-7	35-36.5	SM	NA	8.5	538	336
R-08-023	S-4	20-21.5	CL	NA	7.8	2432	2897
R-08-023	S-6	30-31.5	CL	NA	8.0	490	25

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-101	B-1	1.0	2.5	0.3	0.8	12	31	20	11	-0.73	Brown Clayey Sand (SC)
▲	A-08-105	B-1	1.2	5.0	0.4	1.5	11	28	14	14	-0.21	Brown Clayey Sand (SC)
◆	A-08-116	R-2	6.0	6.5	1.8	2.0	23	37	20	17	0.18	Olive Brown Lean Clay (CL)
■	A-08-119	B-1	1.0	5.0	0.3	1.5	15	32	20	12	-0.42	Olive Brown Clayey Sand (SC)
○	A-08-120	R-4	16.0	16.5	4.9	5.0	29	36	19	17	0.59	Dark Brown Lean Clay with Sand (CL)
△	A-08-122	B-1	1.0	5.0	0.3	1.5	7	26	15	11	-0.73	Light Brown Clayey Sand (SC)
◇	R-08-004	B-1	1.3	3.5	0.4	1.1	16	29	17	12	-0.08	Dark Brown Sandy Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

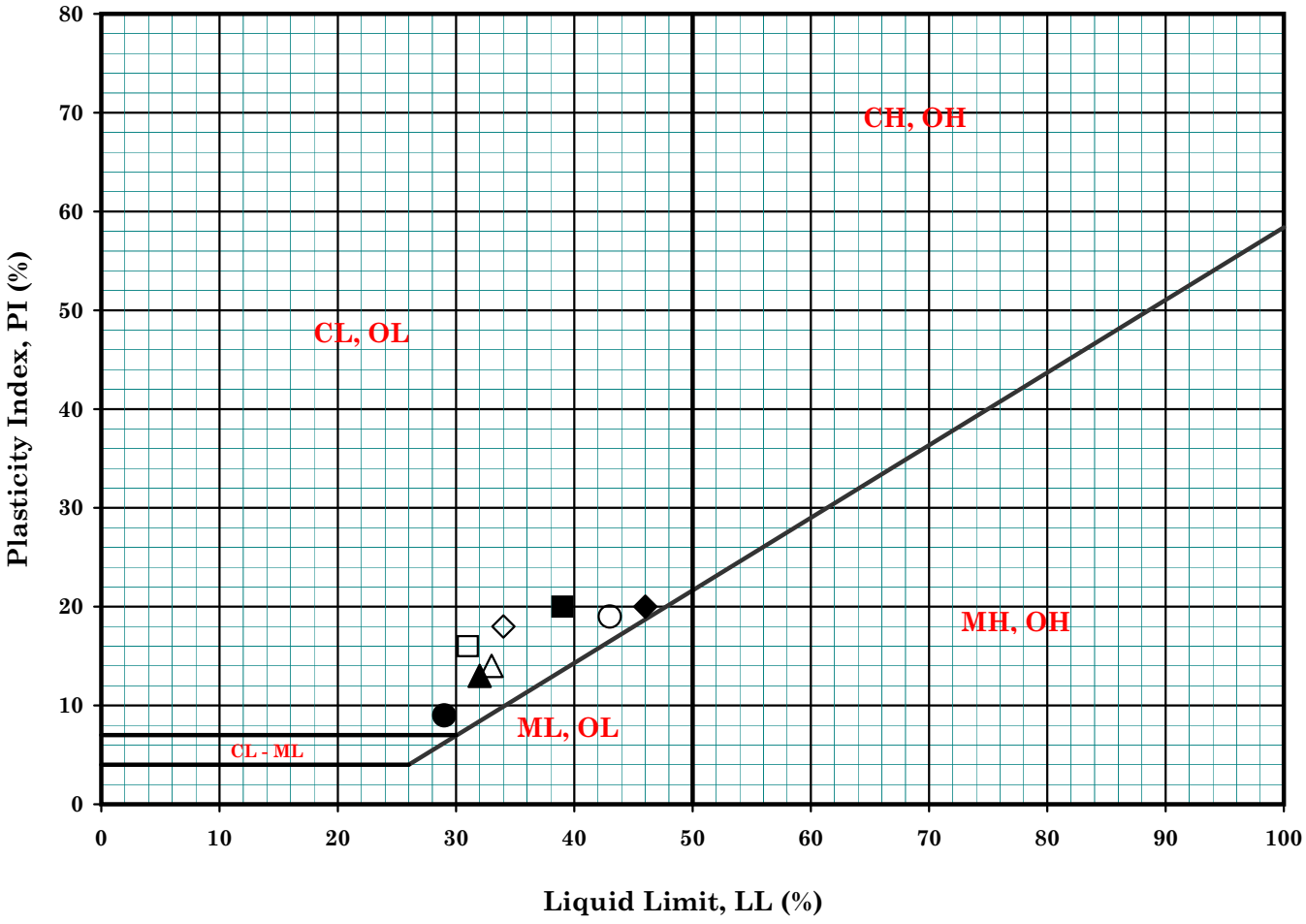
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1a

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-005	B-1	2.0	5.0	0.6	1.5	16	29	20	9	-0.44	Gray Sandy Lean Clay (CL)
▲	R-08-005	R-1	6.0	6.5	1.8	2.0	19	32	19	13	0.00	Dark Gray Sandy Lean Clay (CL)
◆	R-08-005	S-6	30.0	32.0	9.2	9.8	41	46	26	20	0.75	Gray Brown Lean Clay (CL)
■	R-08-005	S-7	40.0	41.5	12.2	12.7	31	39	19	20	0.60	Gray Brown Lean Clay (CL)
○	R-08-005	R-9	71.0	71.5	21.7	21.8	45	43	24	19	1.11	Lean Clay with Sand (CL)
△	R-08-011	S-1	5.0	6.5	1.5	2.0	19	33	19	14	0.00	Olive Brown Clayey Sand (SC)
◇	R-08-011	R-4	21.0	21.5	6.4	6.6	24	34	16	18	0.44	Olive Brown Sandy Lean Clay (CL)
□	R-08-011	R-12	71.0	71.5	21.7	21.8	17	31	15	16	0.13	Light Brown Gray Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

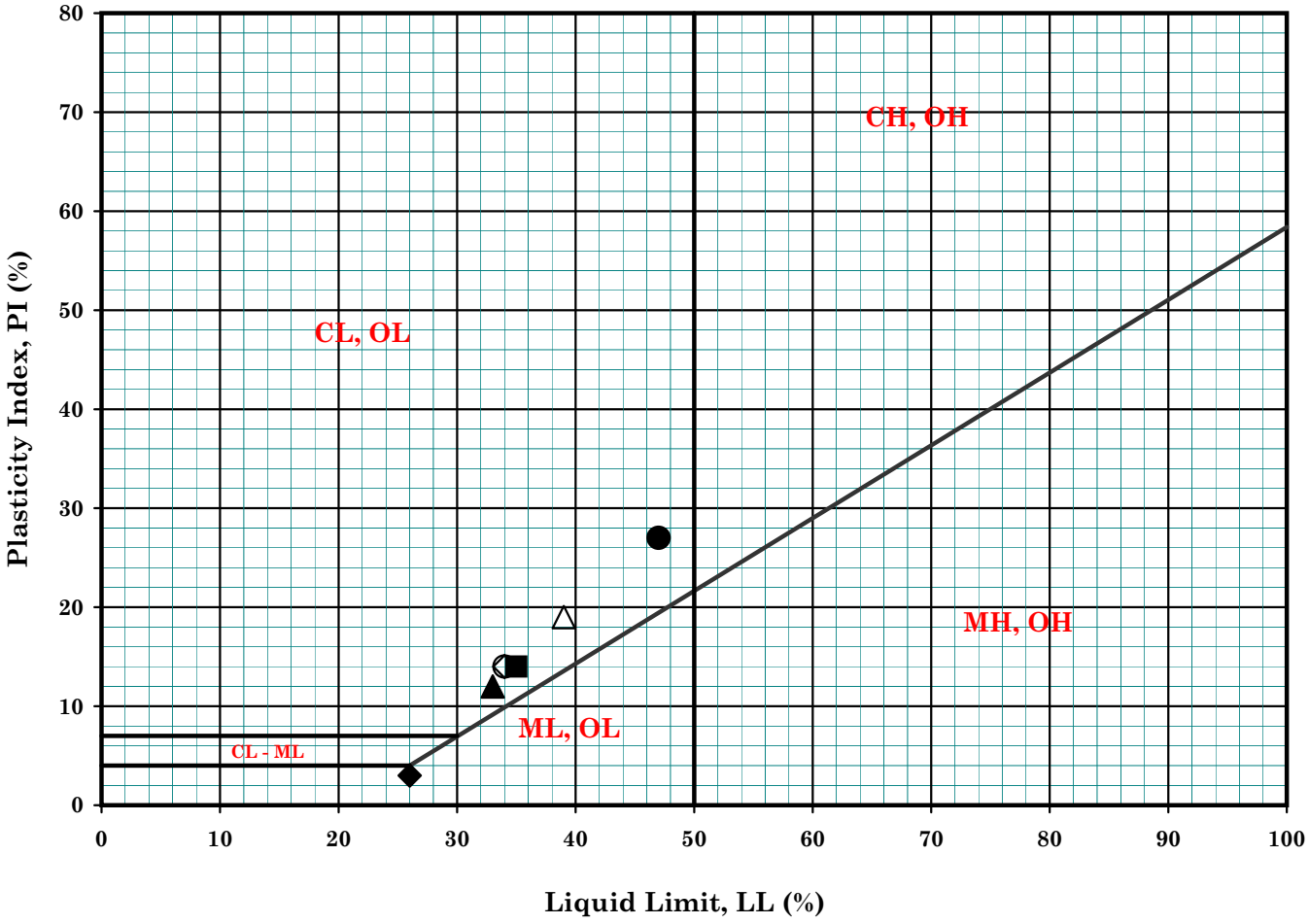
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1b

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-012	R-1	6.0	6.5	1.8	2.0	28	47	20	27	0.30	Dark Brown Lean Clay with Sand (CL)
▲	R-08-012	R-5	26.0	26.5	7.9	8.1	29	33	21	12	0.67	Dark Brown Lean Clay with Sand (CL)
◆	R-08-012	R-9	46.0	46.5	14.0	14.2	26	26	23	3	1.00	Dark Brown Sandy Silt (ML)
■	R-08-017	R-2	11.0	11.5	3.4	3.5	32	35	21	14	0.79	Dark Brown Lean Clay with Sand (CL)
○	R-08-017	S-3	15.0	16.5	4.6	5.0	27	34	20	14	0.50	Light Brown Sandy Lean Clay (CL)
△	R-08-017	R-8	41.0	41.5	12.5	12.7	28	39	20	19	0.42	Gray Brown Lean Clay (CL)
◇	R-08-019	S-1	5.0	6.5	1.5	2.0	20	34	20	14	0.00	Red Brown Sandy Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

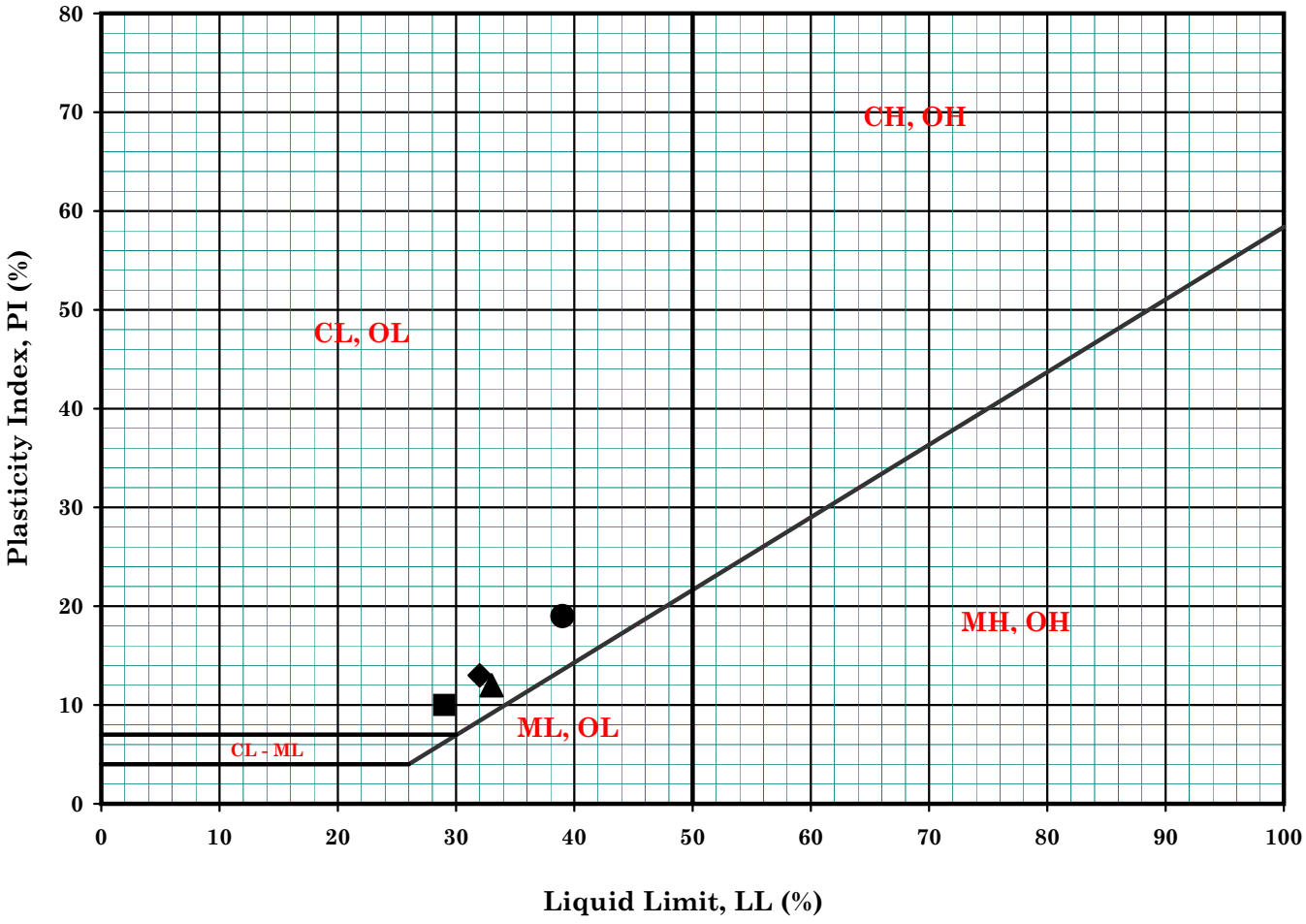
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1c

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-019	R-2	11.0	11.5	3.4	3.5	17	39	20	19	-0.16	Brown Yellow Clayey Sand (SC)
▲	R-08-019	R-6	31.0	31.5	9.5	9.6	19	33	21	12	-0.17	Gray Brown Lean Clay (CL)
◆	R-08-023	R-1	6.0	6.5	1.8	2.0	10	32	19	13	-0.69	Red Brown Sandy Lean Clay (CL)
■	R-08-023	S-8	40.0	41.5	12.2	12.7	24	29	19	10	0.50	Light Brown Gray Clayey Sand/Sandy Lean Clay (SC/CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

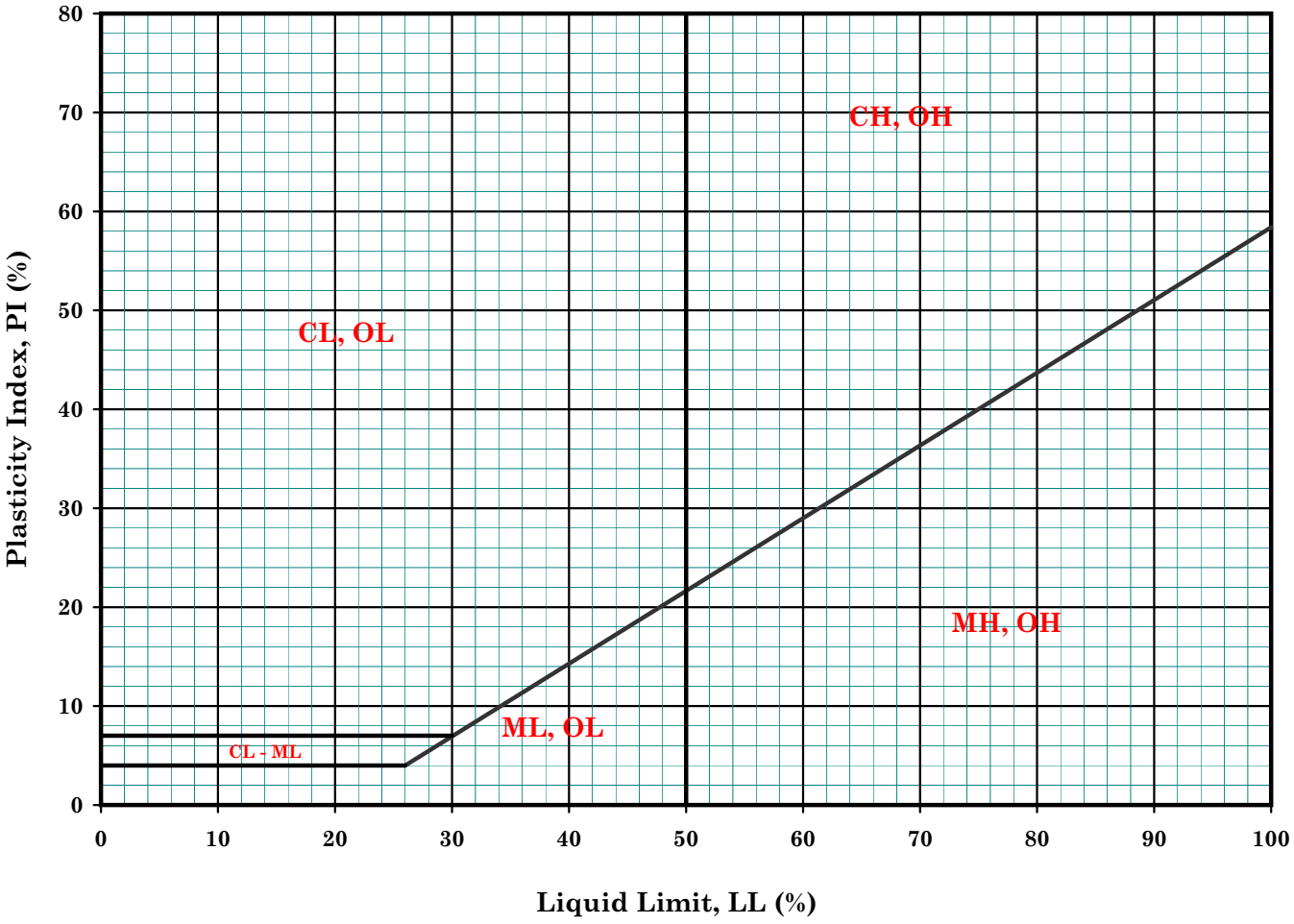
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1d

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-105	R-5	41.0	41.5	12.5	12.7	22	Non-Plastic			-	Olive Brown Silty Sand (SM)
▲	A-08-112	S-4	15.0	16.5	4.6	5.0	32	Non-Plastic			-	Olive Gray Silt with Sand (ML)
◆	A-08-120	R-8	36.0	36.5	11.0	11.1	25	Non-Plastic			-	Dark Brown Sandy Silt (ML)

Remarks :

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SR-22 West County Connector Segment

Project No. : I-436

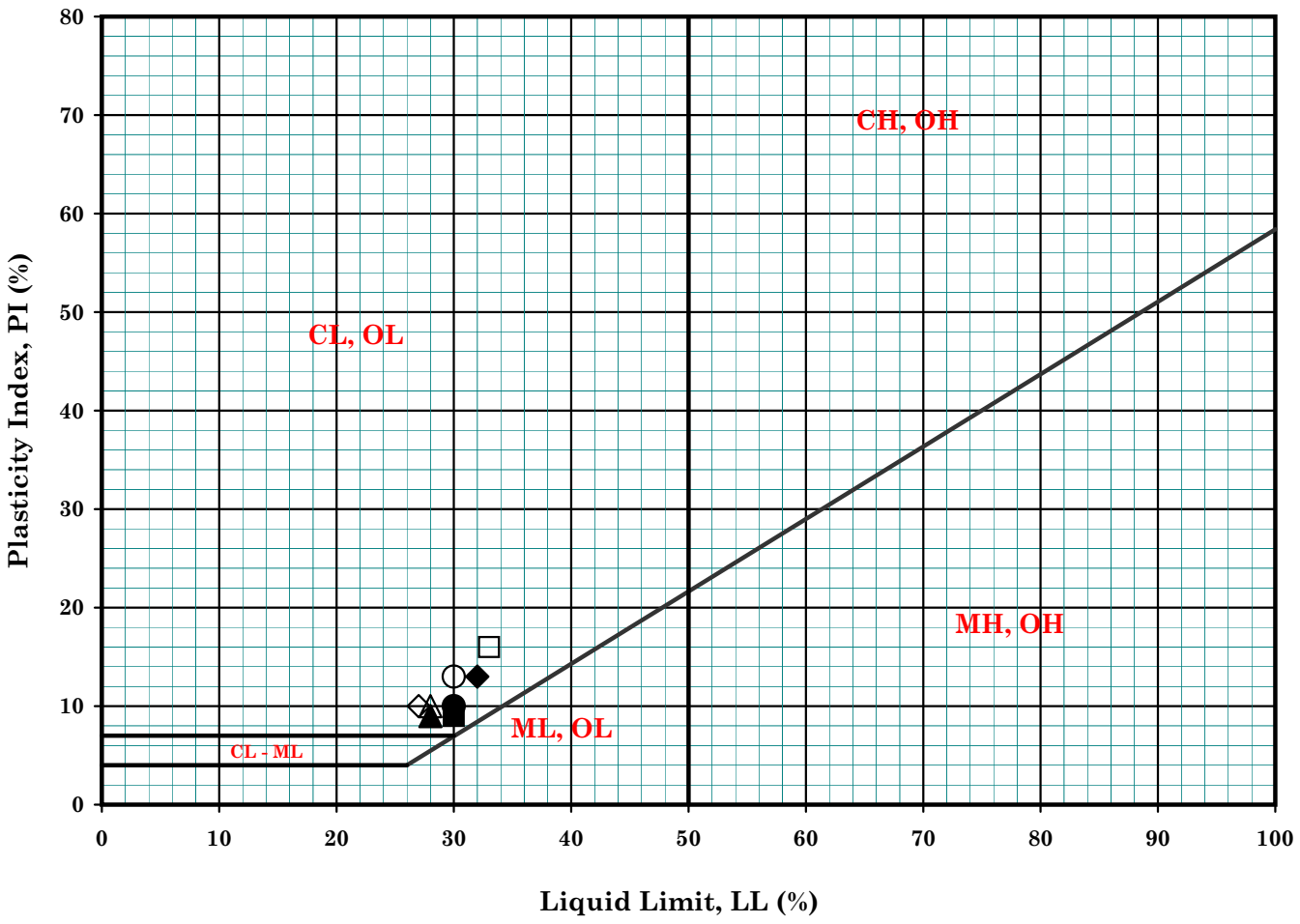
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1e

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	HA-08-01	B-1	0.0	5.0	0.0	1.5	N/A	30	20	10	N/A	Light Brown Sandy CLAY (CL)
▲	HA-08-02	B-1	0.0	5.0	0.0	1.5	N/A	28	19	9	N/A	Grayish Brown Sandy CLAY (CL)
◆	HA-08-03	B-1	0.0	5.0	0.0	1.5	N/A	32	19	13	N/A	Grayish Brown Sandy CLAY (CL)
■	HA-08-04	B-1	0.0	5.0	0.0	1.5	N/A	30	21	9	N/A	Brown Sandy CLAY (CL)
○	HA-08-05	B-1	0.0	5.0	0.0	1.5	N/A	30	17	13	N/A	Grayish Brown Sandy CLAY (CL)
△	HA-08-06	B-1	0.0	5.0	0.0	1.5	N/A	28	18	10	N/A	Dark Brown Sandy CLAY (CL)
◇	HA-08-07	B-1	0.0	5.0	0.0	1.5	N/A	27	17	10	N/A	Light Brown Clayey SAND (SC)
□	HA-08-08	B-1	0.0	5.0	0.0	1.5	N/A	33	17	16	N/A	Dark Brown Sandy CLAY (CL)

Remarks :

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SR-22

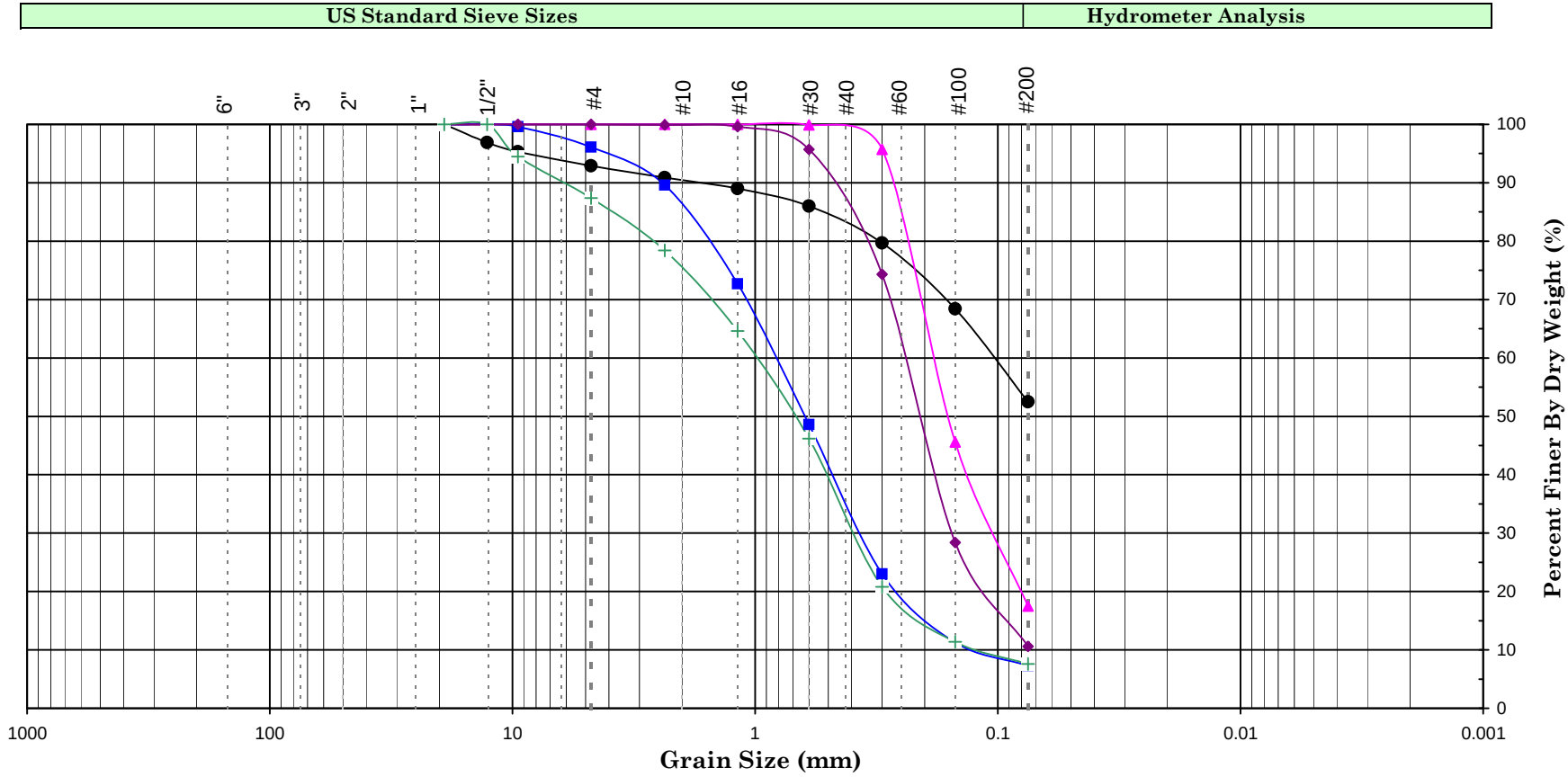
Project No. : I-436

Date : 10/14/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1f



Boulders	Cobbles	Gravel		Sand			Fines (Silt / Clay)
		Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Sample Depth [from/to] (ft)		Sample Depth [from/to] (m)		Grain Size Percentage Gravel	Sand	Fines	Atterberg Limits LL	PI	Soil Description	U.S.C.S.
●	R-08-005	R-1	5.0	6.5	1.52	1.98	7	40	53	32	13	Sandy Lean Clay	CL
▲	R-08-005	S-2	10.0	11.5	3.05	3.51	0	83	18			Silty Sand	SM
■	R-08-011	S-11	60.0	61.3	18.29	18.68	4	89	7			Well Graded Sand with Silt	SW-SM
◆	R-08-023	S-9	45.0	46.5	13.72	14.17	0	89	11			Poorly Graded Sand with Silt	SP-SM
+	A-08-116	B-1	1.0	5.0	0.30	1.52	13	80	8			Well Graded Sand with Silt	SW-SM

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SR-22 West County Connector Segment

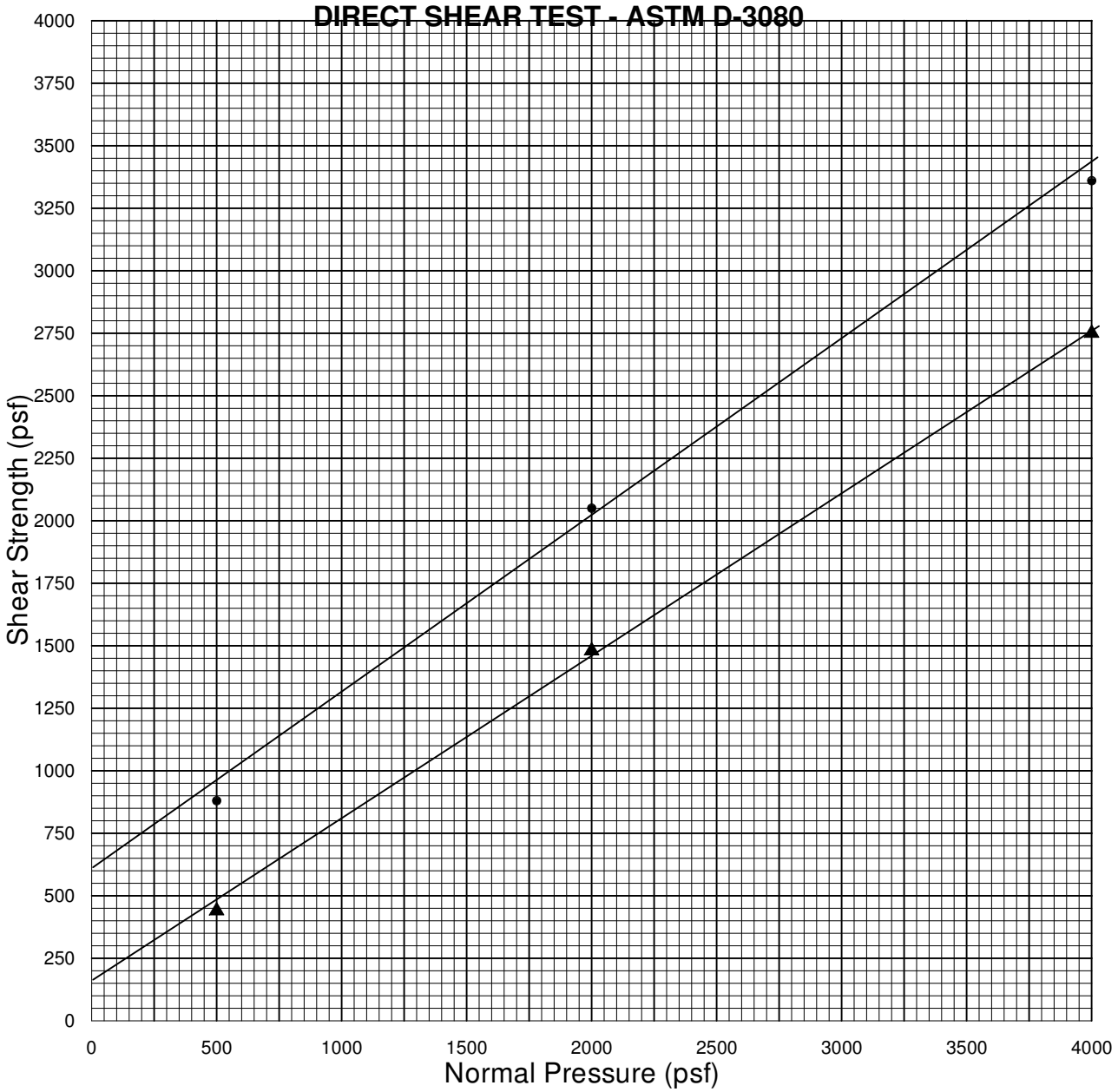
Project No. : I-436

Date : 05/30/08

GRAIN SIZE ANALYSIS

(ASTM D-422)

Figure No. : B-2



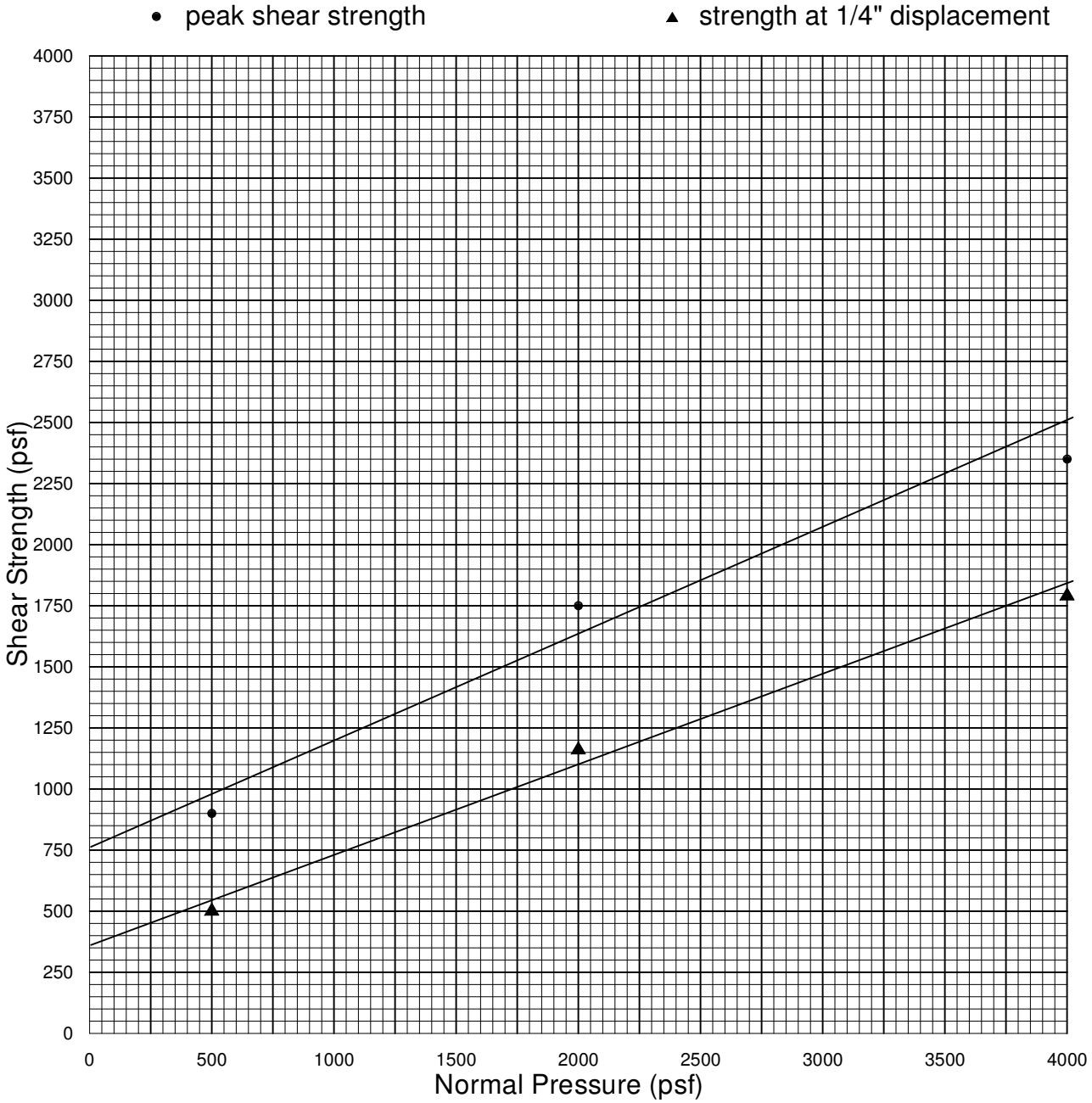
Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-004 @ 3'-5'	Undisturbed & Saturated	Sandy Lean Clay	120.4	10.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	880 @ 0.0750"	440
2000	2050 @ 0.1000"	1480
4000	3360 @ 0.1050"	2750
	C = 600 psf	C = 150 psf
	ϕ = 35 deg.	ϕ = 33 deg.

FIGURE B-3a

DIRECT SHEAR TEST - ASTM D-3080



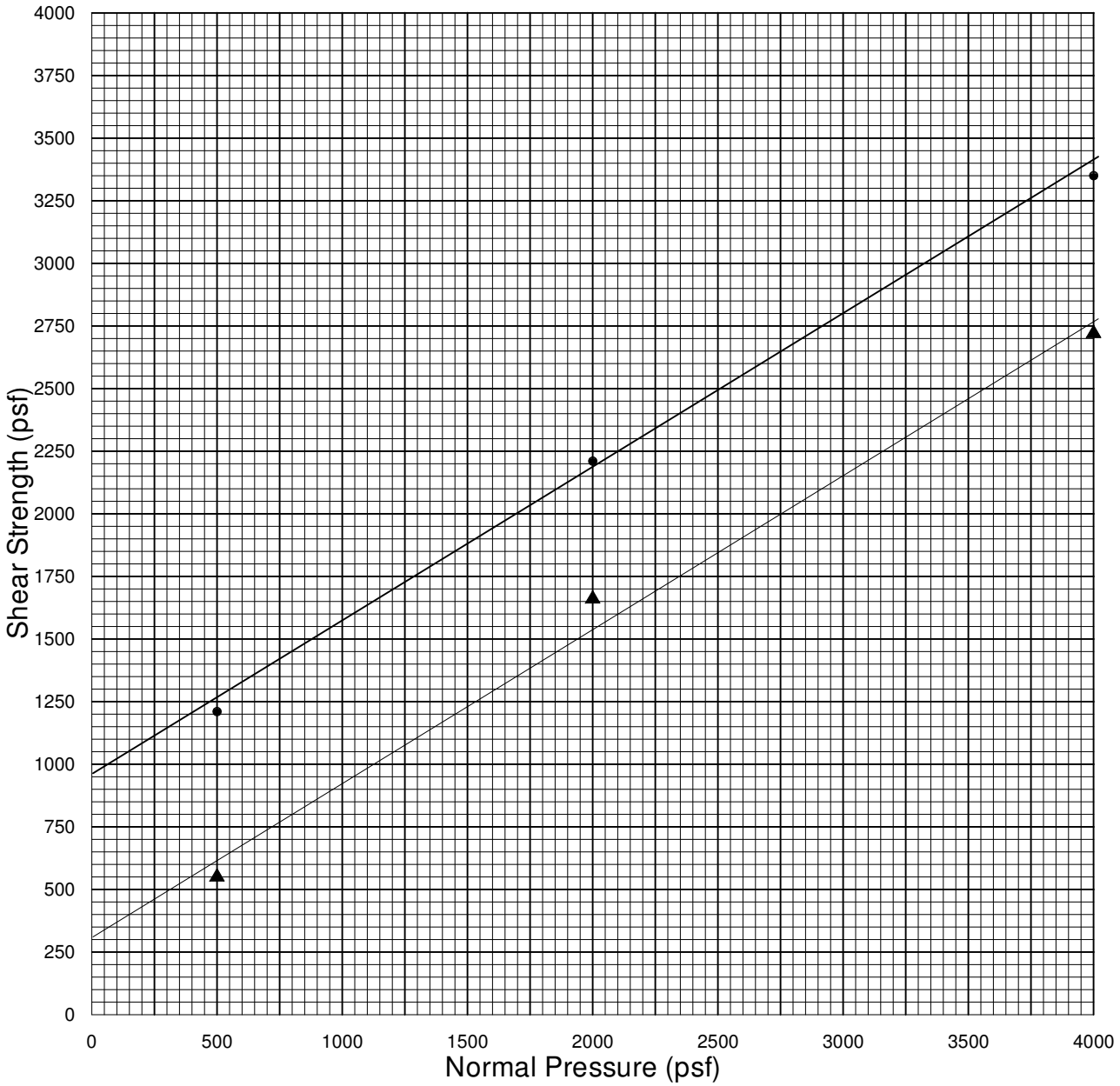
Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-017 @ 10'-11.5'	Undisturbed & Saturated	Lean Clay w/Sand	92.4	25.8

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	900 @ 0.0500"	500
2000	1750 @ 0.0550"	1160
4000	2350 @ 0.0650"	1790
	C = 750 psf	C = 350 psf
	ϕ = 24 deg.	ϕ = 20 deg.

FIGURE B-3b

DIRECT SHEAR TEST - ASTM D-3080

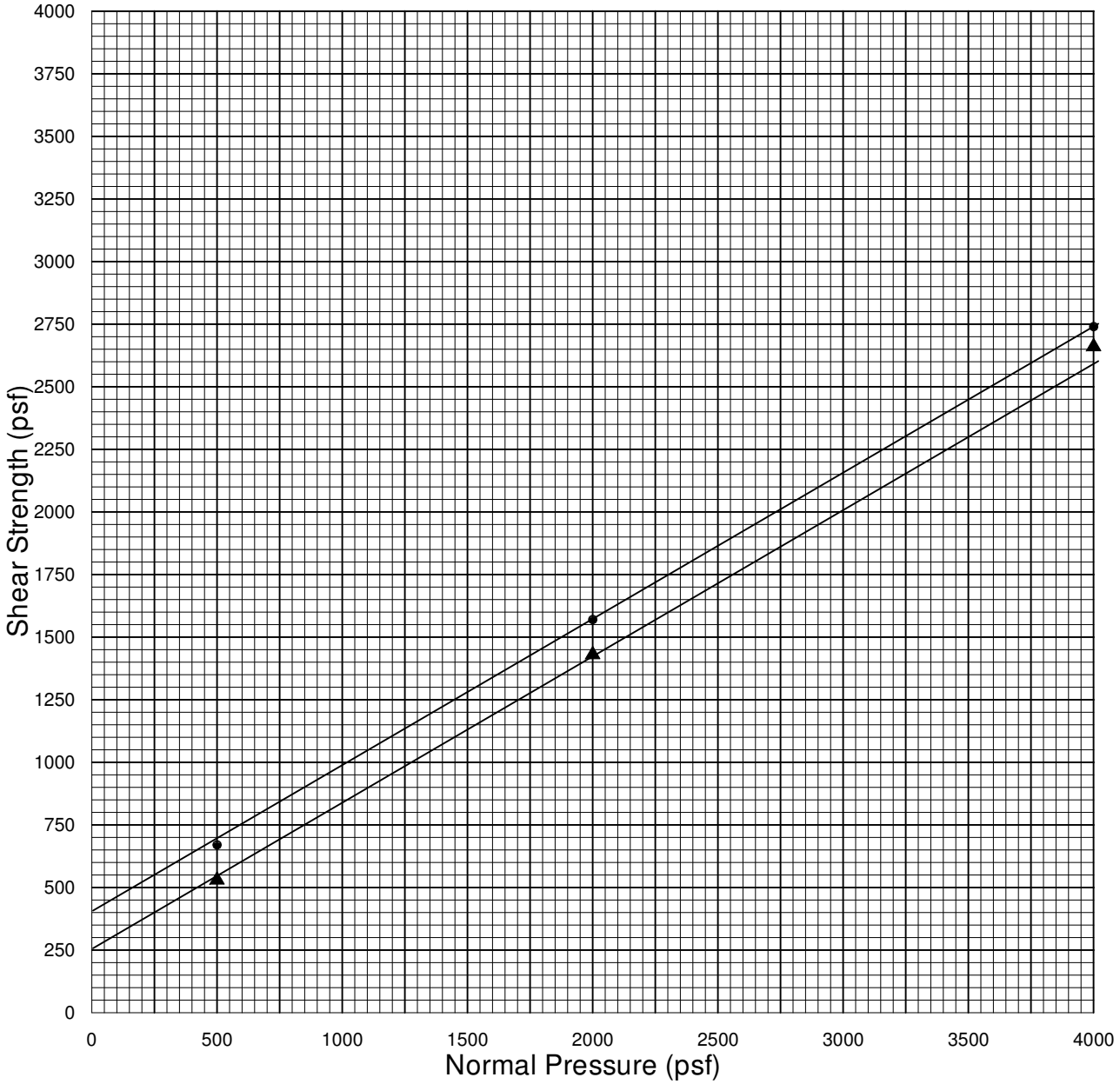


Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-019 @ 10'-11.5'	Undisturbed & Saturated	Sandy Lean Clay	115.5	15.9

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	1210 @ 0.0600"	550
2000	2210 @ 0.0900"	1660
4000	3350 @ 0.0800"	2720
	C = 900 psf	C = 300 psf
	ϕ = 32 deg.	ϕ = 32 deg.

Figure B-3c



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-023 @ 26'-26.5'	Undisturbed & Saturated	Sandy Lean Clay/ Lean Clay w/Sand	94.6	28.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	670 @ 0.1000"	530
2000	1570 @ 0.1200"	1430
4000	2740 @ 0.2000"	2660
	C = 400 psf	C = 250 psf
	ϕ = 30 deg.	ϕ = 30 deg.

Figure B-3d

Boring / Sample No.	R-08-005	Depth:	5' - 6.5'	Date	05-13-08

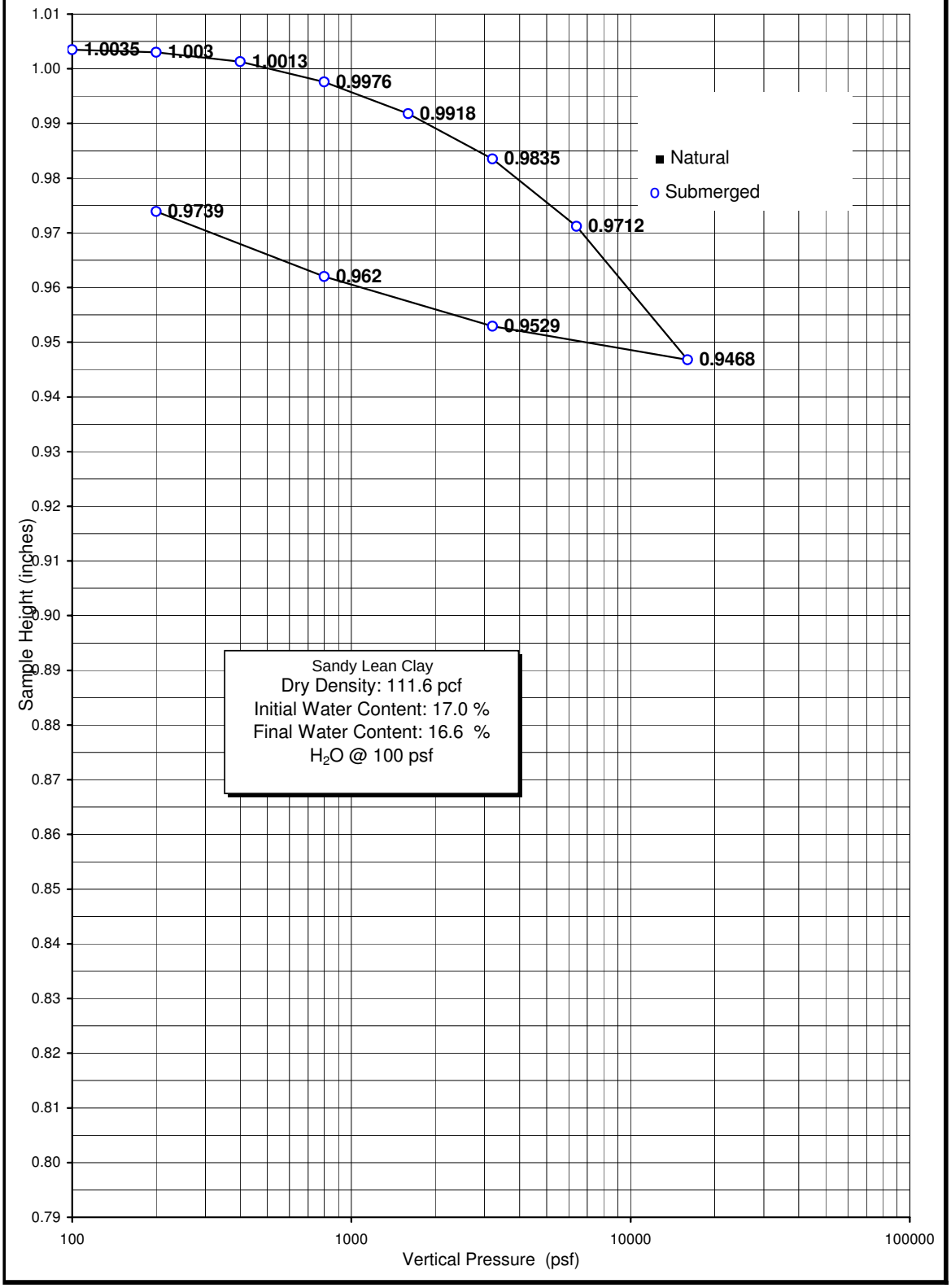


Figure No. B-4a

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-011	Depth:	20' - 21.5'	Date	05-13-08

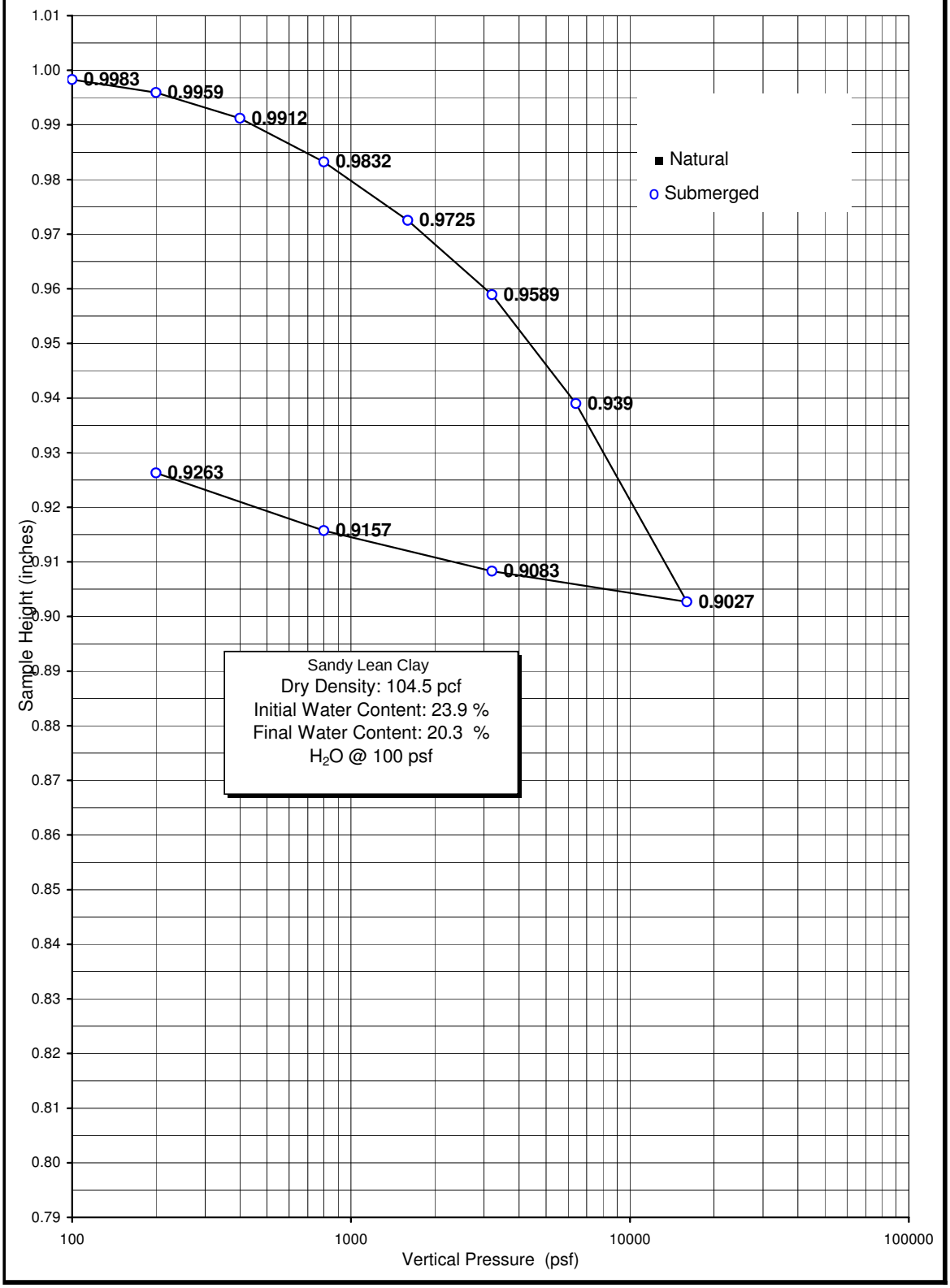


Figure No. B-4b

Boring / Sample No.	R-08-017	Depth:	40' - 41.5'	Date	05-13-08

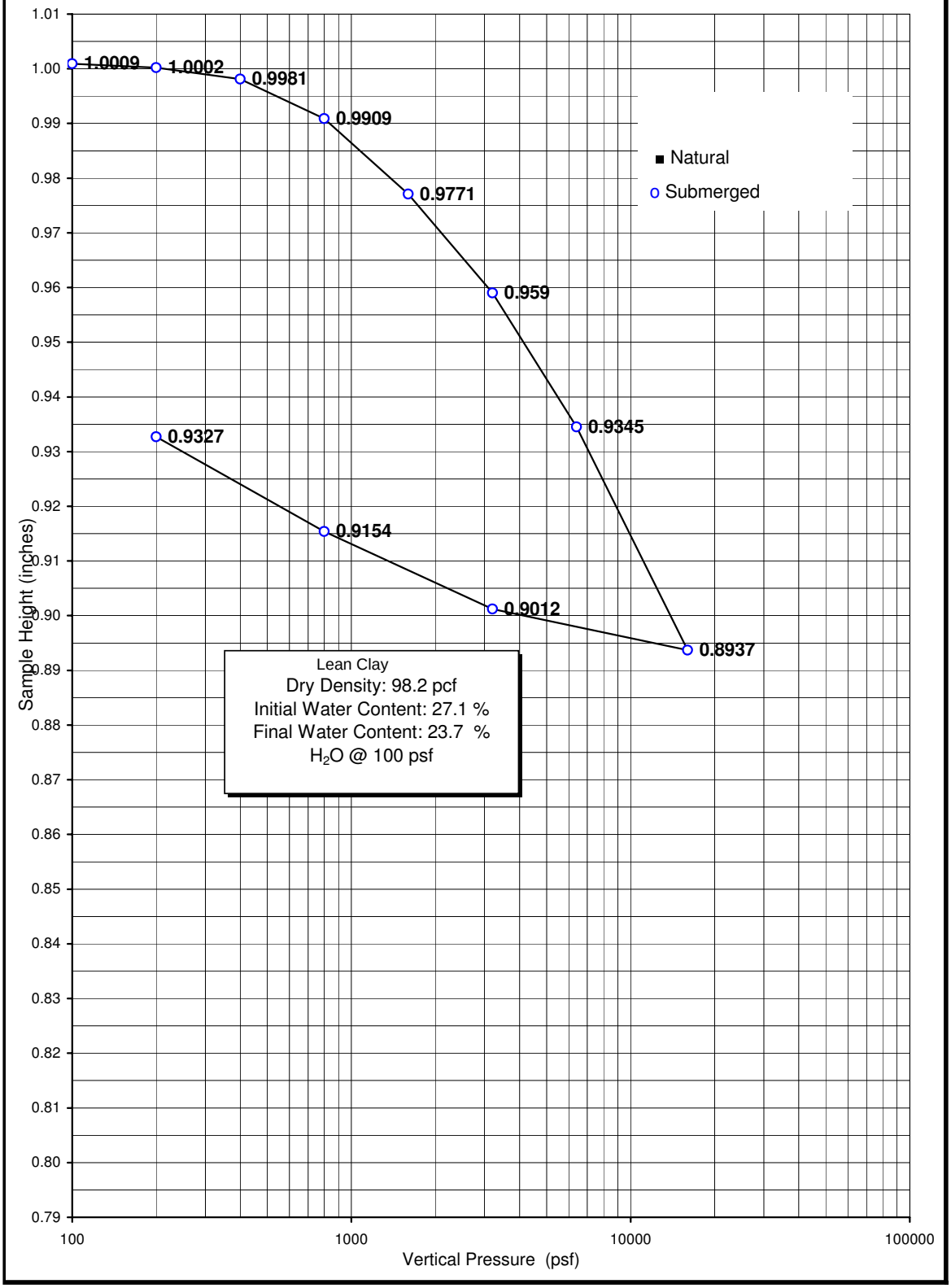


Figure No. B-4c

Boring / Sample No.	A-08-122	Depth:	5' - 6.5'	Date	05-13-08

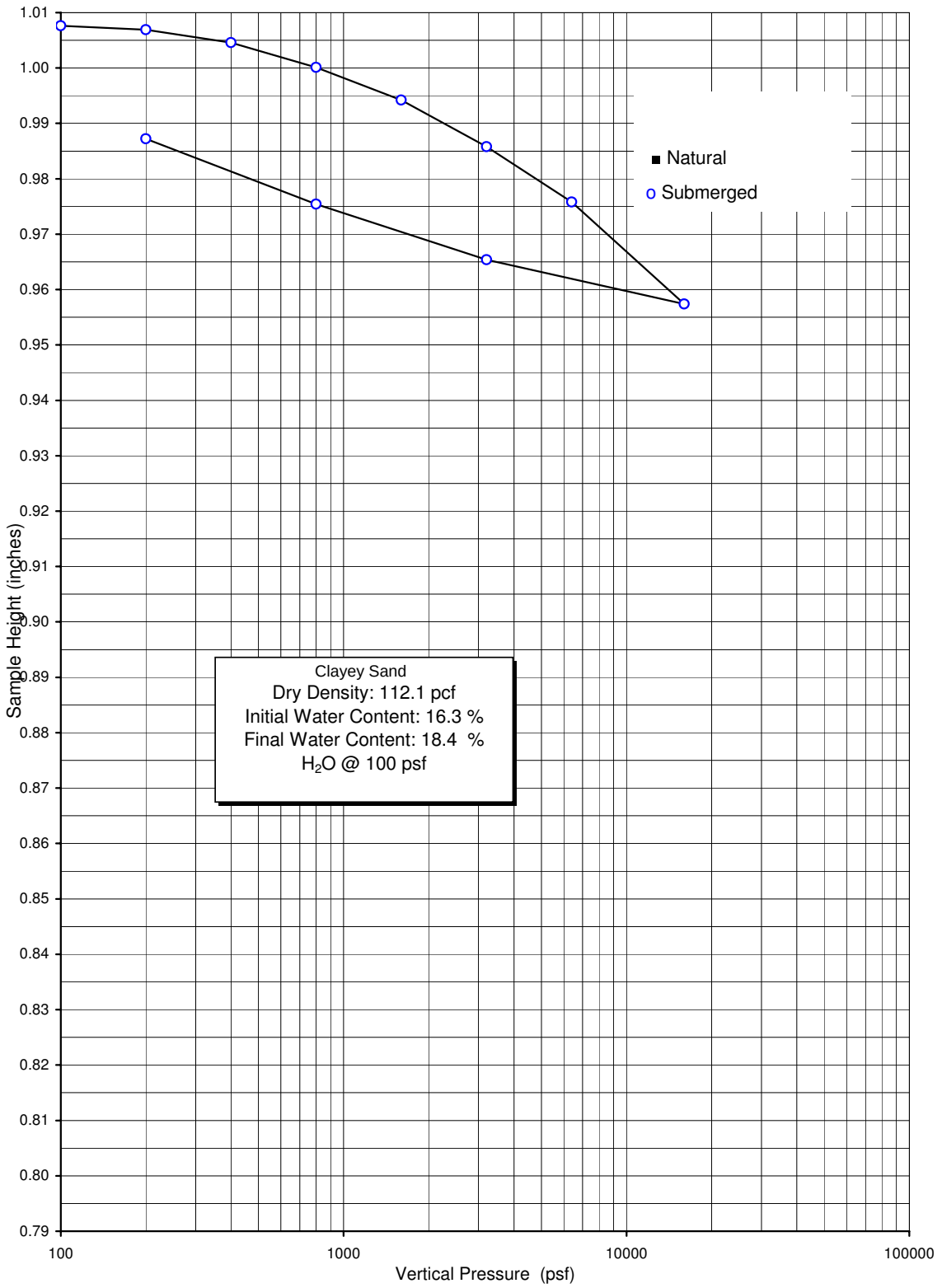


Figure No. B-4d

Geo**L**ogic **A**ssociates

Boring / Sample No.	A-08-120	Depth:	15' - 16.5'	Date	05-13-08

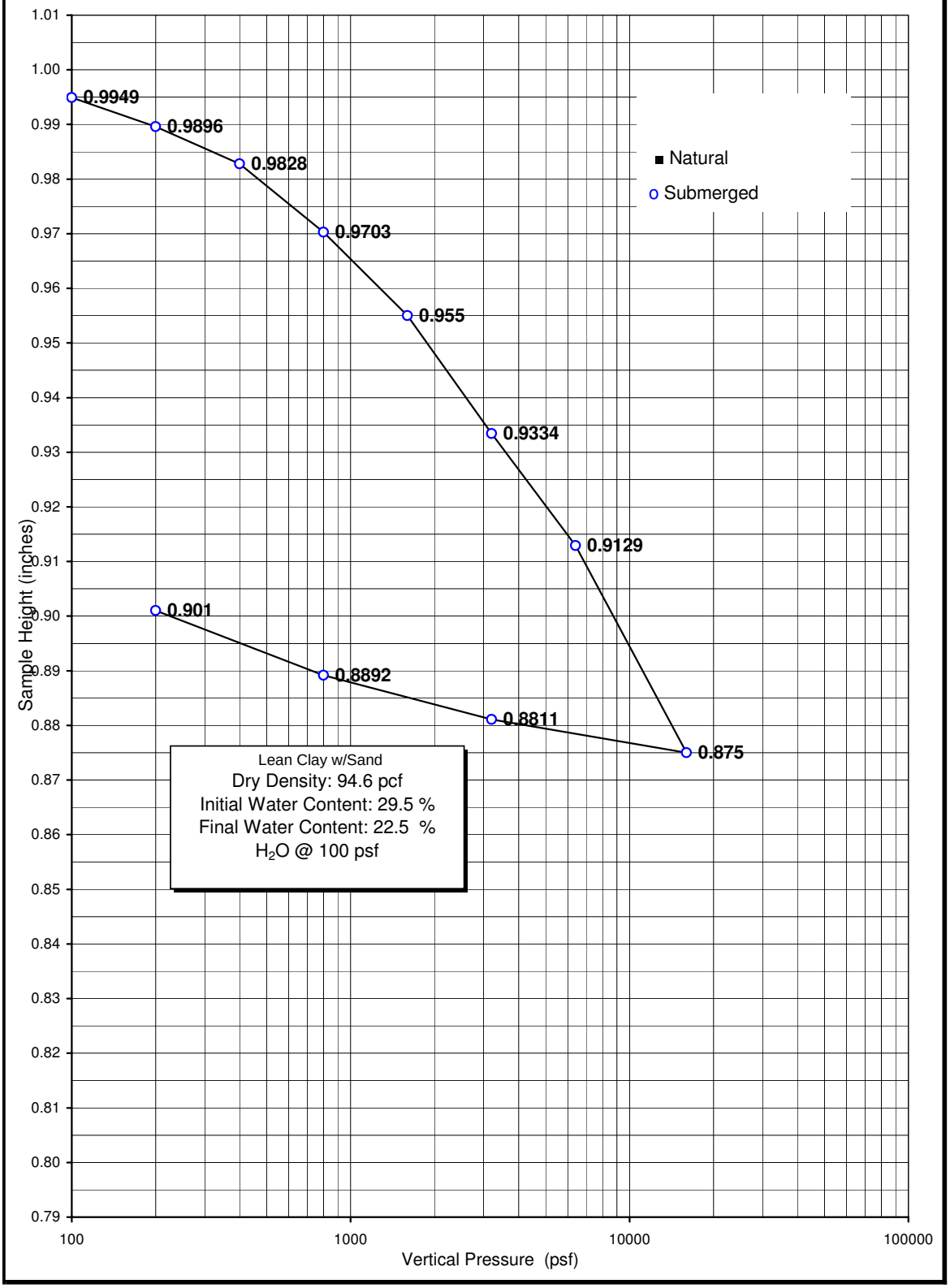


Figure No. 4-e

Geo**L**ogic **A**ssociates

FOUNDATION REPORT
RETAINING WALLS RW1300 (PM R0.917-1.12) AND RW1299 (PM R1.11-1.12)
PRECAST WALLS WITH LIGHTWEIGHT FILL
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-22, EA 071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Prepared By:

Group Delta Consultants, Inc.
32 Mauchly, Suite B
Irvine, CA 92618

GDC Project No. I-436
November 12, 2008
Revised February 18, 2009
Revised April 30, 2009

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

November 12, 2008
(Revised February 18, 2009 and April 30, 2009)

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: Foundation Report
Retaining Walls RW1300 (PM R0.917-1.12) and
RW1299 (PM R1.11-1.12)
Precast Walls with Lightweight Fill
West County Connector Project
I-405/SR-22 HOV Connector Segment
12-ORA-22, EA 071621, Orange County, California
GDC Project No. I-436

Dear Mohsen:

We are transmitting with this letter eight copies of our Foundation Report for the proposed Precast Walls RW1300 and RW1299 with Lightweight Fill (Cellular Concrete). This report presents the results of our field and laboratory investigations, and provides recommendations for the foundation design of the proposed retaining walls. This report has been revised to incorporate additional comments from Caltrans dated March 26, 2009 (Appendix E). We appreciate the opportunity to work with you on this important and challenging project. Should you have any questions, please give us a call at (949) 609-1020.

Very truly yours,
GROUP DELTA CONSULTANTS, INC.

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Senior Geotechnical Engineer

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FOUNDATION REPORT
RETAINING WALLS RW1300 AND RW1299
PRECAST WALLS WITH LIGHTWEIGHT FILL
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-22, EA 071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

1.1 General

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The overall project name is "West County Connector Project" and the proposed project has been divided into 2 segments. The easterly segment, "I-405/SR-22 HOV Connector Segment," extends from Valley View Street to just east of Seal Beach Boulevard, and the westerly segment, "I-405/I-605 HOV Connector Segment," extends from just east of Seal Beach Boulevard to the I-605 interchange. Precast Walls with Lightweight Fill RW1300 and RW1299 are part of the easterly segment. The walls are proposed south of the median of westbound SR-22 from west of Bolsa Chica Road OC extending west to the east abutment of the proposed 405-22 HOV Connector Separation. The site location is shown on the Vicinity Map in Figure 1.

1.2 Purpose and Scope of Work

The purpose of our study is to investigate and document site geotechnical conditions and provide site specific geotechnical recommendations for design and construction of the proposed walls. Our scope of work for this study included:

- Review existing data;
- Perform subsurface investigation along the proposed wall alignment;
- Perform laboratory testing on selected samples of the subsurface soils;
- Develop geologic profiles and engineering parameters for foundation design;
- Perform geotechnical analyses;
- Develop geotechnical recommendations for design and construction of the walls; and
- Present the results of our investigations and our recommendations in this report.

The design and construction of the project will be performed in accordance with current Caltrans Standard Plans and Specifications. This report is structured in general accordance with "Caltrans Guidelines for Foundation Investigation and Reports, Version 1.2 (dated June, 2002)."

1.3 Project Description

1.3.1 General

The length of main portion of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405, from just east of Valley View Street to just east of Seal Beach Boulevard (see Figure 1). In addition, from just east of Valley View Street to just east of Springdale Street, several signs are proposed which are outside the main project area. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges (Bolsa Chica Road OC over SR-22 and 22/405 Connector Separation [to be renamed S405-E22 Connector Separation]), and construct a new HOV Connector bridge (405-22 HOV Connector Separation);
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls (RW3311+3312 at east abutment of S405-E22 HOV Connector Separation);
- Pre-cast Lightweight Fill (PCLW) Retaining Walls (RW1325+1326 at west abutment of 405-22 HOV Connector Separation, RW1299+1300 at east abutment of 405-22 HOV Connector Separation, and RW3319+3320 at west abutment of S405-E22 HOV Connector Separation);
- Drainage improvements; and
- Lighting, roadside signs, and overhead signs.

This report presents the Retaining Walls RW1299 and RW1300 foundation recommendations.

1.3.2 RW 1300 and RW 1299

Retaining walls RW1300 and RW1299 will create the abutment approach to Abutment 1 (east abutment) of the proposed new 405-22 HOV Connector Separation (Bridge No. 55-1103E), which provides a direct High Occupancy Vehicle (HOV) connection between the eastbound/westbound Garden Grove Freeway (SR-22) and northbound/southbound San Diego Freeway (I-405). A site plan is shown in Figure 2.

Lightweight cellular concrete fill was selected for the walls in lieu of MSE walls due to moderately weak and compressible soils, low bearing capacity, and potential for long term settlement. In the eastern end, due to available space and time during construction temporary surcharge is recommended so that the embankment may be composed partially of normal embankment soil with 2h:1v slopes and partially of vertical lightweight fill wall. Use of lightweight fill, or a combination of lightweight fill and embankment with temporary surcharge, will eliminate long-term consolidation settlements and avoid need for ground improvements due to low bearing capacity.

The final approach embankment will be 59 feet wide at the HOV Bridge. Further east, the HOV approach embankment merges with the S405-E22 connector embankment. RW1300 is proposed on the north side of embankment, extending the full length from Valley View Street (Bolsa Chica Road OC) to the HOV Abutment 1. RW1299 is a relatively short wall on the south side adjacent to the HOV Abutment 1. Wall heights generally increase from low height on the east to maximum heights toward the west end. Wall limits with respect to the "H" Line and dimensions are as follows:

- **RW1299**: "H"1312+02 to 1312+68, Length=65 feet, Max Ht.=15.5 ft;
- **RW1300**: "H"1302+56 to 1312+68, Length=1015 feet, Max Ht. =29 ft.

Grades will be raised by 10 to 15 feet above original grade (OG) along RW1299 layout line, and grades will be raised up to 45 feet above OG along RW1300 layout line. RW1299 is a short wing wall to the bridge abutment and will be founded on the 2h:1v abutment slope, which will be a fill over cut into existing embankment. RW1300 will be a sidehill embankment placed against the existing north facing embankment for the S405-E22 connector ramp. RW1300 will be on level ground from "H" 1302+56 to 1306+45, and on a new north facing fill slope between 1307+00 and 1312+68. The new slope will be inclined at 2h:1v and increase from zero height near "H" 1306+45 to a maximum height of about 19 feet at 1312+68 (top of slope El. +18 feet). Grades along the HOV connector ramp rise from about El. +30 feet at Bolsa Chica Road OC to a maximum of El. +65 feet at the HOV

connector abutment. SR-22 below the wall ranges from El. 26 feet near Bolsa Chica Road OC to El. 29 feet at the HOV abutment. At the highest point of the embankment, the 2h: 1v slope is 19 feet high from freeway (El. +29 feet) to face of wall (El. +48 feet), and the exposed wall height is about 17 feet (El. +48 to +65 feet), for a total embankment height of 36 feet from freeway to top of wall RW1300. In the level ground portion, maximum vertical wall height is about 27 feet near Station "H" 1306+45.

The wall General Plans are shown in Figures 3A through 3F, and the contour grading plan is shown in Figures 3G and 3H. A general section across the freeway illustrating existing and proposed grades and general soil layering is shown in Figure 4A. More detailed transverse cross-sections showing existing and proposed grades are illustrated in Figures 4B through 4H. A profile cross-section along the alignment is shown in Figure 5. The transverse section locations are shown in Figure 2.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

The subsurface conditions at the wall site were investigated by performing two (2) soil borings and three (5) Cone Penetration Tests (CPTs) along the HOV alignment (see Log of Test Borings, Plates 1-6). Borings and CPTs were performed during the period of March 31st to April 24th, 2008. The CPT and boring locations were selected such that representative soil profiles could be developed along the wall alignment. Boring locations are shown in Figure 2, and a detailed description of the exploration and the boring / CPT logs are presented in Appendix A. The location and depth of borings and CPTs is summarized in Table A-1 of Appendix A. The Log of Test Boring Sheets (LOTBs) are presented in Plates 1 through 6.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, engineering, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

Test	ASTM Designation	Purpose
• Moisture Content and Dry Density	ASTM D 2216	Soil Classification
• Grain Size Distribution (Sieve Analysis)	ASTM D 422	Soil Classification
• Percent Passing #200 Sieve	ASTM D 1140	Soil Classification
• Atterberg Limits	ASTM D 4318	Soil Classification
• Direct Shear	ASTM D 3080	Shear Strength
• Pocket Penetrometer		Undrained Shear Strength
• Soil Corrosivity (pH, sulfate, and chloride)	CT 422. 443 417, and 643	Corrosion Potential
• Consolidation	ASTM D 2435	Compressibility

Moisture content, dry density, percentage passing a No. 200 sieve and the pocket penetrometer readings are shown on the boring logs in Appendix A. Detailed descriptions of the other tests performed and their results are presented in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

Refer to Figure 2 (topographic plan) and cross-sections in Figures 4B through 4H when reading the following text.

The eastern portion of RW1300 layout line is located within existing SR-22 freeway travel lanes and shoulder ("H" 1302+56 to 1308+00), and the western portion of RW1300 layout line is located in an unpaved area south of SR-22 at the base of the existing S405-E22 connector ramp embankment ("H" 1308+00 to 1312+68). A low-lying v-ditch is present at the far western end of RW1300 ("H" 1312+00 to 1312+68). Wall RW1299 layout line is located near the top of existing S405-E22 connector ramp embankment.

Westbound SR-22 freeway elevation varies from El. 26 feet near Valley View / Bolsa Chica Road OC ("E" 1302+56) to El. 29 feet at the west end ("E" 1312+68). The v-ditch near the west end of RW1300 has a low elevation near El. +20 feet, with side slopes of about 3h:1v descending from SR-22.

The existing S405-E22 connector ramp has elevations rising from El. 30 feet at Bolsa Chica Road OC ("H" 1302+50) to El. 56 feet at the existing connector abutment ("E" 3312+50, "H" 1313+00). The slope between SR-22 and the existing connector ramp is up to 27 feet high, with the exception that the highest slope near the west end of RW1300, from connector to bottom of v-ditch, is up to 36 feet high. The slope generally varies from 2h:1v to 1.5h:1v inclination. Unpaved areas and slopes are generally vegetated with iceplant, and locally with a thick growth of other vegetation and large trees.

3.2 Geologic Conditions

3.2.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange County coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin

of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

3.2.2 Stratigraphy

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County coastal plain of the southern portion of the Central Block of the Los Angeles Basin. The basin is in filled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of poorly consolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Stratigraphy consists of alternating layers of sands, silts, and clays (Figure 5B). Shallow compacted roadway fills and abutment approach fills up to about 30 feet high have been placed in the area over the natural alluvial deposits. Relative density and stiffness of the alluvial soils generally increases with depth.

3.2.3 Geologic Structure

Since the bedrock is more than 4,000 ft deep, geologic structure at the site is not a design issue.

3.2.4 Geologic Hazards

Geologic hazards include landslides, expansive or collapsible soils, and seismic hazards include liquefaction, lateral spreading, seismic slope stability, fault rupture, tsunamis, and seismic shaking. The site is not located in landslide prone area and no natural slopes are present. Expansive soils are present and recommendations regarding expansive soils with 4 ft of the finished grade are provided in the GDR and in expansive soil exclusion zone in the Bridge Foundation Reports.

3.3 Subsurface Soil Conditions

CPTs were used to accurately determine stratigraphy and correlate with data from borings. Cross-sections were developed and an idealized profile was adopted for design. The soils profile and general engineering characteristics of the subsurface soils are illustrated in the Soil Profile in Figure 5 and on the Cross-Sections in Figures 4A through 4H. The soil profile is divided into 5 general layers. Engineering properties, layer descriptions, and layer boundary elevations are summarized in Table 1 and are described below.

3.3.1 Layer 1 – Fill and Stiff Native CL

The existing ramp grades are near El. 30 feet to 56 feet along the wall alignments. The upper soil layer consists of approach embankment fills and stiff native soils above the water table, from existing grades of El. 30 to 56 feet down to El. 15 to 20 feet. The fill and stiff alluvium are similar in engineering properties and consist primarily of very stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent layers of medium dense silty sands (SM) and clayey sands (SC). The bottom of this layer varies from El. +20 feet on the east end of RW1300 to about El. +14.5 feet on the west end.

3.3.2 Layer 2 – Firm to Stiff CL

This top of this layer is near the water table, and varies from about El. +20 feet on the east to El. +14.5 feet on the west end of RW1300. The bottom of layer elevation varies from El. +6 feet on the east to El. +2.5 feet on the west end of RW1300. the layer thickness varies from 12 to 14 feet along the RW1300 alignment. The material classifies as locally firm but predominantly stiff lean clay or lean sandy clay (CL) with average undrained shear strengths of 1.2 to 1.4 ksf based on CPT correlations and pocket penetrometer readings. Thin seams of medium dense sand to silty sand to sandy silt, as well as stiffer clays, are present in this layer. Layer 2 is generally overconsolidated with respect to the adjacent freeway grades, but is close to normally consolidated below the 25 foot thick abutment fills. Since it is fairly shallow below the freeway grades and is moderately weak and compressible, it controls the magnitude and time rate of settlement, bearing capacity, and global stability of the walls.

3.3.3 Layer 3 – Very Stiff CL, ML

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with relatively thin interbeds of medium dense to dense sands (SP), silty sands (SM) and sandy silts (ML), and layers of stiff clay. The

top-of-layer elevations range from El. +2.5 to +6 feet, and bottom-of-layer elevations range from El. -14 to -17.5 feet. Pocket penetrometer readings in the fine grained materials typically range from 1.5 to 4 ksf, and CPT correlations indicate average undrained shear strengths in this layer of 2.6 to 3.8 ksf. These clays are overconsolidated.

3.3.4 Layer 4 – Dense to V. Dense SM/ML/SP

Layer 4 is a predominantly granular layer of variable thickness consisting of interbedded Sand (SP), Silty Sand (SM), and Sandy Silt (ML), with less frequent interbeds of clayey silt and clay (ML, CL). The top-of-layer elevations range from El. -14 to -17.5 feet, and bottom-of-layer elevations range from El. -41.5 to - 47 feet. The granular materials are generally dense to very dense with SPT N-values of 30 to more than 50 blows per foot, and cohesive materials are typically very stiff to hard based on pocket penetrometer and CPT correlations. Thin layers of medium dense silty sands and sandy silts soils are also present.

3.3.5 Layer 5 – V. Dense SP & Hard CL/ML

This layer is older alluvium primarily composed of alternating beds of dense to very dense sands (SP), silty sands (SM), and sandy silts (ML), interbedded with very stiff to hard clays and clayey silts. The layer is present below El. -41.5 to -47 feet. The cleaner sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 500 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf. The upper 10 to 17 feet of this layer (Layer 5-1) is typically very stiff to hard clay and silt.

3.4 Groundwater

Groundwater was measured in adjacent test explorations R-08-023 at the north abutment of Bolsa Chica Road OC near the east end of RW1300, and in Boring R-08-012 in the vicinity of the west end of RW1300, at El. +16 feet and +15.5 feet, respectively (Refer to the project Geotechnical Design Report). In CPT-08-013 the hole was sounded on completion and determined to be dry to below El. 12.5 feet, at which point it was obstructed. The measured groundwater elevation corresponds to a depth of about 10 feet below freeway grade.

In the Caltrans 1959 As-Built LOTB for the Route 22/405 Separation (Bridge No. 55-1101F), groundwater was reported near El. +7 feet. Based on California Geological Survey (CGS) (previously known as California Department of Conservation (CDC) Division of Mines and Geology) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater

is at a depth of about 10 to 20 feet (see Figure 6). The reference elevation is not known, but is expected to be near the freeway grades. If the 10 foot depth is taken below lowest adjacent freeway grade (roughly El. 26 ft) then the groundwater would be near El. 16 feet, which is consistent with our investigation data. Based on the above data, we selected a design groundwater elevation of 16 feet for analysis.

The top of leveling pad elevations for the walls, El. 25 to 42.5 feet for RW1300 and El. 50 to 57.5 feet for RW1299, are not expected to be below the permanent groundwater table. However, localized zones of moist or wet soils could be encountered due to perched or man-made sources of water.

3.5 Engineering Parameters

Recommended design engineering properties for the soil layers shown in Figure 5 are summarized in Table 1.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Seismic Evaluation

The project is located in a seismically active area. Seismic shaking should be anticipated during the life of the project. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding.

4.1.1 Ground Surface Rupture

The site is not located in an Alquist-Priolo Earthquake Fault Zone, and the closest known active fault is the Los Alamitos Fault at a closest distance of about 1.7 km from the west end of walls RW1300 and RW1299. A map of regional faults is shown in Figure 7. Due to the distance from the closest faults, ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed.

4.1.2 Ground Motion

4.1.2.1 Site Coordinates

The wall site latitude and longitude are approximately as follows:

- **West End (HOV East Abut)**: 33.7749 North, 118.0427 West
- **East End (Bolsa Chica Rd OC):** 33.7743 North, 118.0380 West

A map showing the site coordinates is presented in Appendix D-1.

4.1.2.2 Faulting and Seismicity

The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 7, and the closest regional faults are summarized in Table 2. The closest faults to the site are Los Alamitos (reverse fault, maximum credible earthquake (MCE) magnitude Mw=6.0, distance=1.7 km), Newport Inglewood (strike slip fault, Mw=7.0, distance=5.2 km), San Joaquin Hills (blind thrust fault, Mw=7.0, distance =13.3 km), and Puente Hills (blind thrust, Mw=7.25, distance=18.1 km).

4.1.2.3 Deterministic Analysis

We performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base. Los Alamitos is not in the EQFAULT CGS 2002 data base, so for this fault we estimated fault to site distance from the Caltrans 1996 map (see Figure 7). We used the mean value of the rock and soil attenuation relationships presented by Sadigh et. al. (1997) to estimate peak bedrock accelerations (PBA) and peak ground accelerations (PGA), respectively, based on the MCE magnitude and distance from the site. Results of the deterministic analyses are presented in Appendix D-1, and summarized in Table 2.

The largest deterministic site acceleration comes from a Mw=6.0 event on Los Alamitos fault, with calculated PGA of 0.50g. The computed PGA from a magnitude 7.0 event on Newport Inglewood gives PGA of 0.42g.

4.1.2.4 Design Accelerations

For pseudo-static slope stability calculations we recommend a design horizontal acceleration of 1/3 of the maximum PGA, or Kh=0.50/3=0.17. For liquefaction evaluation, it was determined that a Mw=7.0 event with PGA of 0.45 on Newport Inglewood was more critical than Mw=6.0 with PGA of 0.50 on Los Alamitos. Therefore, we used Mw=7.0 and PGA=0.45g for liquefaction analysis. For sliding and overturning evaluation of the precast lightweight cellular concrete fills we recommend using a PGA of 0.5g.

4.1.3 Seismic Compaction

Vibration such as seismic shaking can cause settlement of loose to medium dense dry clean granular soils. No zones of clean loose sand are present above the water table at the site, and therefore seismic compaction is not considered a hazard. Calculations in Appendix D-6 and the results in Table 3 show negligible settlement (less than 0.1 inch) from seismic compaction.

4.1.4 Liquefaction Evalauation

The site is located within a State Liquefaction Hazard Zone (CDMG, 1999). Groundwater level is near the high historical levels of 10 to 20 feet below freeway grades, and El. +16 feet was selected for analysis, or about 10 feet below lowest freeway grades. Sediments below the groundwater at the site are primarily stiff to very stiff clays and dense to very dense sands, but contain localized thin interbeds of

loose to medium dense sands, silty sands, and silts that may be prone to liquefaction.

We performed liquefaction calculations for CPT-08-013, CPT-08-015, CPT-08-018, CPT-08-021, and CPT-08-022. Triggering evaluation was based on the CPT method from the NCEER 1996/1998 Workshops (Youd and Idriss, 2001). Settlements were calculated using the method of Tokimatsu and Seed (1987), and residual strengths were based on the method of Seed and Harder (1990). Calculations were carried to a depth of 60 feet below existing grades. We determined that use of Magnitude 7.0 and PGA of 0.45g was more critical than using Magnitude 6.0 and PGA of 0.5g, and therefore used the higher magnitude case in our analyses.

The resulting analyses show that limited layers of silty and sandy soils below groundwater may liquefy in the design earthquake. Potentially liquefiable layers are shown as shaded on the geotechnical cross-section in Figure 5. Estimated liquefaction-induced ground settlements for all CPTs range between 0.1 and 0.8 inches with an average value of less than 0.5 inches. Maximum liquefaction settlements for the whole project are less than 1 inch, with less than ½ inch average. A summary of the calculated liquefaction settlements for the wall site is included in Table 3, and calculations are presented in Appendix D-6.

Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1,500 psf. The N1-60cs for liquefiable layers adjusted in accordance with Seed and Harder (1990) range from 16 to more than blows per foot (average 25), and estimated residual shear strengths range from a minimum of 723 psf up to a limiting value of 1,500 psf (average 1,300 psf). Residual undrained shear strengths of liquefied soils less than 1,000 psf occur only in rare isolated 1 ft thick layers, and generally exceed the design undrained shear strength of Layer 2 clays; therefore the clay layer (which is much thicker and of lower strength than liquefied layers) controls the bearing capacity and slope stability.

Due to the relatively isolated thin liquefied layers, depth of liquefiable layers, small ground settlements, and relatively high residual shear strengths, it is our conclusion that liquefaction does not have a significant adverse impact on the walls.

4.1.5 Other Seismic Hazards

The site has no known history of subsidence. Static and seismic stability of the walls and embankments is evaluated later in this report.

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the 100-yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

4.2 Corrosion Evaluation

Based on Caltrans Memo to Designers 3-1 (2008) and Caltrans Corrosion Guidelines (2003) a corrosive area is defined as "an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates, has a minimum resistivity of less than 1000 ohm-cm, or has a pH of less than 5.5."

Representative samples of the fill and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests performed for the subject walls are summarized as:

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20-21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35-36.5	ML	NA	8.8	576	255

Based on these test data the site soils classify as corrosive due to high chlorides in accordance with Caltrans Corrosion Guidelines (2003). Based on testing elsewhere in the overall site, high sulfates (between 2,000 and 15,000 ppm) are also present locally in the site area fills.

Design of reinforced concrete in contact with native soils should consider the site corrosion potential in accordance with Bridge Design Specifications (BDS) Section 8.22 (July 2000):

- For 500 to 5000 ppm Chlorides in soil the minimum concrete cover and mix design for protection of reinforcement against corrosion due to chlorides shall be as provided in BDS Table 8.22.1:
    - The maximum water to cementitious material ratio shall not exceed 0.40;
    - Minimum concrete cover for footings and pile caps is 3 inches;
    - Minimum concrete cover for walls and columns is 3 inches;
    - Minimum concrete cover for precast piles is 2 inches, and Mineral admixtures conforming to ASTM Designation C1240 and/or ASTM Designation C618 Type F and/or N, may be required.;
- For 2000 to 15,000 ppm Sulfates in soil the minimum requirements for protection of concrete against sulfate exposure shall conform to the requirements in BDS Table 8.22.2:
    - Cement shall be Type II modified or Type V;
    - The minimum cementitious material content shall be 658 pounds per cubic yard with a 25% mineral admixture replacement by weight. Maximum water to cementitious material ratio shall not exceed 0.40.

For cellular concrete in contact with native soils, we recommend use of Type V cement.

4.3 Scour Evaluation

The walls are not located in a significant flood/drainage or river channel. Surface runoff is by sheet flow and will be collected and conveyed off-site with storm drains. Therefore, scour potential is not significant.

4.4 Foundation Recommendations

4.4.1 Wall Type Selection

The subsurface soils in Layer 2 have low bearing capacity and are inadequate to support conventional Mechanically Stabilized Embankment (MSE) walls of this maximum height (up to 29 feet), and significant long-term settlements would be expected for conventional embankment in fill areas higher than about 15 to 20 feet above the freeway level.

For example, a 28 ft high MSE wall with foundation elevation of El. 25 ft (RW1300) would be within about 8 feet of Layer No. 2, and would require a minimum MSE base width of 0.7*27=19 ft. Since Layer 2 is within less than one foundation width of the base, bearing capacity is substantially reduced by this layer. Foundation pressure would be about 4 ksf (Bridge Design Aids 3-1, April 2002), and allowable bearing capacity of Layer 2 with factor of safety of 2 is 2.5 ksf. Therefore, for conventional MSE there is marginal to inadequate factor of safety against bearing failure.

Near the west end of RW1300 the grade increase for the connector ramp requires up to more than 40 feet of fill, and more than ½ of the wall alignment (west of Station "H" 1307+00) has grade increases of more than 20 feet. For conventional embankment or MSE walls consolidation settlement of 6 to 12 inches could occur over a period of 12 to 24 months.

To mitigate the low bearing capacity and high long-term settlement, all of the walls and much of the embankments will be constructed using low density cellular concrete. In the eastern end, due to available space and construction schedule, temporary surcharge will be used so that the embankment may be constructed partially of conventional fill with lightweight fill retaining walls on top of the conventional embankment.

4.4.2 Wall Segments

Conditions vary along the wall alignments. We have conceptually divided the site into 4 different geotechnical segments or areas, and different geotechnical recommendations have been developed in each area based on the conditions in each area. The areas are listed in Table 4, and summarized as follows:

- **Area 1 (east of "H"1305+55 [10+00 to 13+00])**: Wall RW1300 in this area is founded on level ground, with wall height of 4 to 16 feet. No surcharge is required in this area, and due to moderate embankment heights long-term settlement / bearing capacity are not major issues, even with conventional fill. Conventional MSE walls are feasible in this area; however, to maintain consistency with the rest of wall and for ease of contracting and construction, precast wall with lightweight fill was also selected for this segment. A cross-section is shown in Figure 4B, and a typical design section is shown in Figure 8A;
- **Area 2 ("H"1305+55 to 1309+05 [13+00 to 16+50])**: Wall RW1300 in this area is founded partially on level ground [13+00 to 14+00] and partially on a 2h:1v slope [14+00 to 16+50], with wall height of 16 to 29 feet and slope height up to about 6 feet. No space is available for surcharge in this

area; due to substantial embankment heights long-term settlement / bearing capacity are a major issue with conventional fill. Cross-sections are shown in Figures 4C and 4D, and a typical design section is shown in Figure 8B;

- **Area 3 ("H"1309+05 to 1311+55 [16+50 to 19+00])**: Wall RW1300 in this area is founded on a 2h:1v slope with slope heights of 6 to 16 feet, and a wall height of 25 to 29 feet . Space is available for only partial surcharge in this area; due to substantial embankment heights long-term settlement / bearing capacity are a major issue with conventional fill. Cross-sections are shown in Figures 4E and 4F, and a typical design section is shown in Figure 8C;
- **Area 4 ("H"1311+55 to 1312+70 [19+00 to 20+15])**: Wall RW1300 in this area is founded on a 2h:1v slope with slope heights of 16 to 20 feet, and wall height of 23 to 24 feet. RW1299 will be founded on a 2h:1v slope (cut in existing embankment fill), with slope height up to 30 feet and wall height up to 16 feet. Space is available for surcharge in this area; due to substantial embankment heights long-term settlement / bearing capacity are a major issue with conventional fill without surcharge. Cross-sections are shown in Figures 4G and 4H, and a typical design section is shown in Figure 8D.

The contour grading plan in Figures 3G and 3H, and sections in Figures 4B through 4H illustrate the existing and proposed geometry.

4.4.3 Temporary Surcharge

At the west end where space and construction schedule permit, temporary surcharge is proposed for a period of about 1 year to pre-consolidate the area to the east of the HOV abutment, allowing for a combination of conventional fill embankment and lightweight fill walls, resulting in smaller wall height and reduced volumes of lightweight fill. It also has the benefit that after completion of the surcharge a waiting period will not be required for the abutment construction. The recommended surcharge is shown in plan in Figure 9. The surcharge extends from about "H"1309+00 to 1313+50, and will be placed against the north side of existing embankment, with the north toe along SR-22, west toe in the v-ditch, and south toe of slope along the S405-E22 connector ramp detour road, with side slopes of 1.5h:1v and maximum elevation of El. +70 feet.

Much of the embankment will be left in place permanently, and all permanent fill supporting the walls or within 150 feet of the bridge abutment must be placed as engineered compacted fill at 95% relative compaction. In Segment / Area 4, we recommend that all fill placed for surcharge below El. +55 feet be 95% compacted fill. Additional surcharge above El. +55 should be placed in lifts and rolled, but

compaction testing is not required. In Area 3, all fill placed up to 1 foot above leveling pad should be 95% compacted fill.

After completion of the surcharge and settlement period, the temporary portion of the fill will be removed and the wall constructed on the new consolidated embankment.

4.4.4 Wall Details and Construction

The wall facing will be 5 ft square precast concrete panels similar to Mechanically Stabilized Embankment (MSE) walls, anchored into the cellular concrete with threaded steel studs. Panels will be placed on leveling pads, and backfilled with cellular concrete in lifts of about 2.5 feet. Each lift will be allowed to set at least 24 hours, or until adequate strength is achieved, before proceeding the next lift. The panels will be temporarily braced to resist the fluid pressure of each lift. After setting, the cellular concrete exerts no earth pressure. Additional panels, cellular concrete and threaded studs will be placed as the wall / embankment is built from the bottom up creating a continuous monolithic mass of lightweight cellular concrete. The typical sections are shown on the general plans in Figures 3A through 3F and Figures 8A through 8D.

4.4.5 Cellular Concrete

Cellular concrete is a mixture of hydraulic cement, water, and preformed foam, with cast unit weights typically ranging from 30 to 40 pcf, and compressive strengths typically ranging from 40 to 120 psi. The ACI guide for this material (ACI 523.1R-06) is included in Appendix C for reference. The materials are batched on site and poured in lifts. Vertical facing consisting of precast panels may be used as the temporary formwork and permanent facing for vertical walls, with aesthetic treatment identical to MSE walls.

Lightweight cellular concrete fills have the following advantages:

- Greatly reduced foundation pressures (maximum 1.2 ksf versus more than 4 ksf for conventional MSE walls 29 feet high), allowing construction on soils with lower bearing capacity without ground improvement;
- Greatly reduced settlement magnitude, since the reduced loading will remain in the over consolidated range;
- Greatly reduced time rate of consolidation at this site, since the lightweight fill loading is in the overconsolidated range;

- No lateral earth pressures are exerted by the lightweight fills, other than the temporary fluid pressure during placement and prior to set of each lift;
- The low weight of the fill decreases the gravitational forces and improves the global (slope) stability of the embankment;
- The material is batched on truck mounted plants on site, and can be pumped to the point of placement rather than hauled in trucks like conventional backfill, and no compaction of backfill is required; and
- The fill can be readily poured around utilities or other elements in the backfill, or placed behind bridge abutments.

4.4.6 Loads

For conventional compacted embankment, we used a total unit weight of 125 pcf. For surcharge fill, temporary portions of which may not be tested for compaction, we used an average unit weight of 120 pcf. The lightweight fill embankments/walls will have 3 basic layers. Wall foundation loads were based on these layers and unit weights as follows:

- **Layer 1**: 2 feet of Concrete (paving/slab, etc.), unit weight=150 pcf;
- **Layer 2**: 3 feet of Cellular Concrete, 42 pcf, 120 psi strength;
- **Layer 3**: Cellular Concrete, Wall Height minus 5 ft, 30 pcf, 60 psi strength.

Summing layer weights, the dead load at the base of the lightweight fill embankment (for walls higher than 5 feet) may be estimated by:

$$Q_{total}\ (psf) = 2(150) + 3(42) + 30\ (H-5)$$
$$= 276+30H, \text{ where } H = \text{ wall height in feet}$$

For the maximum wall height of 29 feet, gross foundation pressure is 1146 psf, or about 9.2 feet of equivalent soil.

Where wall foundations are excavated below existing grades, the removal of soil will cause unloading at the foundation level, and the net load at foundation level is the pressure due to lightweight fill minus the overburden pressure of the soil removed. Existing soil unit weight is taken as 125 pcf, so net pressure is:

$$Q_{net}\ (psf) = Q_{total} - 125D = 276+30H-125D$$

The depth below original grade for zero pressure increase ($Q_{net} = 0$) is:

$$D = 2.2 + 0.24H = 2.2 + 0.24\,(D+\Delta H)$$

Rearranging and solving for overexcavation depth D versus grade increase above existing grade ΔH:

$$D = 2.9 + 0.3\,\Delta H$$

For dynamic seismic lateral loads, the inertia force is the design acceleration coefficient times the weight, applied at the vertical center of gravity of the lightweight fill mass.

4.4.7 Allowable Net Bearing Pressure and Minimum Embedment

Lowest foundation level (occurring for the highest walls) is within about 8 feet of Layer No. 2 (Table 1) which is saturated clay with recommended design undrained shear strength of 1 ksf. Due to large width of the embankment, bearing capacity is controlled by Layer No. 2. Ultimate bearing capacity (using Brinch-Hansen's method) is about 5 times the undrained shear strength, or 5 ksf. Calculations are provided in Appendix D-2. Allowable bearing capacity with a factor of safety of 3 for static conditions is 1.7 ksf. For seismic loading, the bearing capacity factor of safety may be taken as 75% of the static value, or 2.25, resulting in a seismic allowable bearing capacity of 2.2 ksf. Walls at higher elevation will have somewhat higher bearing capacity due to presence of fill above Layer No. 2.

Portions of the walls are supported on sloping ground, and portions are supported on level ground. Recommended embedment below finish grade at face of wall for each wall segment is summarized in Table 4, shown on Figures 8A through 8D, and listed below:

- **Area 1**: Whole area is level ground, and recommended embedment depth is 0.1H or 2 feet minimum, whichever is deeper (where H=wall height), see Figure 8A;
- **Area 2**: For the portion on level ground recommended embedment depth is 0.1H or 2 feet minimum, whichever is deeper, and for the portion on a slope recommended embedment depth is 0.2H or 5 feet, whichever is deeper (Figure 8B);
- **Area 3**: Due to only partial surcharge in this area, lightweight fill is recommended to 8 feet below finished grade at face of wall to keep loading in recompression. The panels need only extend to 0.2H or 5 feet, whichever is deeper, and the remainder of the 8 feet may be overexcavation and replacement with lightweight fill (Figure 8C);

- **Area 4**: After completion of surcharge recommended embedment depth is 0.2H or 5 feet, whichever is deeper (Figure 8D).

4.4.8 Keying and Benching

We recommend that the walls be constructed with a level keyway behind the panels. Minimum key width (W) versus wall height (H) is recommended as follows:

- W = 8 feet ($H \leq 12$ ft)
- W= 12 feet (H=12-20 ft)
- W=15 feet (H>20 ft)

Additional recommendations for each wall segment are summarized in Table 4, and listed below:

- **Area 1**: The area between the wall and existing slope may be filled with either compacted granular fill or lightweight fill. The lightweight fill should be benched into existing or new fill at typical 2h:1v gradient (See Figure 8A);
- **Area 2**: Entire area between wall and existing slope must be lightweight fill. The lightweight fill should be benched into existing fill at typical 2h:1v gradient, with benches cut a minimum of 10 feet horizontally into the face of existing slope (See Figure 8B), which may result in more than the minimum key width;
- **Area 3**: Entire area between wall and existing slope must be lightweight fill. The lightweight fill should be benched into existing fill at typical 2h:1v gradient, with benches cut a minimum of 10 feet horizontally into the face of existing slope (See Figure 8C), which may result in more than the minimum key width. The benefit of surcharge in this area is that some conventional fill may be placed below the wall, and the overexcavation or benching into existing slope is reduced below what is required without surcharge;
- **Area 4**: After removal of temporary surcharge, use recommended minimum key width and embedment depth, bench at 2h:1v into new compacted fill, maintain minimum thickness of 10 feet of lightweight fill below top of RW1299 (See Figure 8D);

The 2h:1v benches should have a minimum width of 6 feet (3 feet vertical) and a maximum width of 10 feet (5 feet vertical). The recommended keying and benching are illustrated in Figures 8A through 8D.

4.4.9 Settlement

We used the soil profile and data listed in Table 1 and shown in Figure 5, and we used net loading, or gross load (per section 4.4.6) minus fill unit weight times depth of excavation below original grades (OG), to compute settlements in each area. A pre-consolidation pressure of 4.2 ksf was used for Layer 2, except where the existing overburden pressure exceeds 4.2 ksf, in which case the Layer 2 soil was taken as normally consolidated. All other soils were taken as overconsolidated. Terzaghi's theory of consolidation was used to compute magnitude and time rate of consolidation settlements. Calculations and a summary of wall heights, loads, and estimated settlements for each area is presented in Appendix D-3.

It should be noted that actual settlements may vary from the predicted values, and that they are usually less than or equal to the predictions using available methods. Time rate of consolidation may be quicker than estimated, due to a number of potential factors including higher degree of overconsolidation, lower plasticity and higher Cv, thinner clay layer, intermediate sand lenses, radial drainage, and other factors. Settlements should be monitored during construction to calibrate the actual site response.

A summary of the magnitude and time rate of settlement is presented in Table 5.

4.4.9.1 Layer 2 Overconsolidation Ratio

The existing overburden pressure (σ'_{vo}) at the center of Layer No. 2 below SR-22 freeway level is about 1.4 ksf on the east end of the site to about 2 ksf on the west end (due to different layer depth), and the average undrained shear strength (S_u) is about 1.2 ksf. Therefore, the (S_u/σ'_{vo}) ratio is about 0.6 to 0.9. The ratio for a normally consolidated clay [$(S_u/\sigma'_p)_{NC}$] may be estimated using Plasticity Index (PI). Using the correlation of Skempton (1957), and a PI of 20 for Layer No. 2 soils, we compute:

$$[(S_u/\sigma'_{vo})_{NC}] = 0.11+0.0037*PI = 0.11 + .0037*20 =0.18$$

For estimating overconsolidation ratio (OCR), we conservatively selected $(S_u/\sigma'_{vo})_{NC}$ of 0.3. Therefore, $(S_u/\sigma'_{vo})_{OC}$ / $(S_u/\sigma'_{vo})_{NC}$ = 0.6 / 0.3 to 0.9 / 0.3 or about 2 to 3. Based on the correlation of Ladd and Foot (1974) this ratio predicts an OCR of about 3 on the east end of site to 2.4 on the west end. Pre-consolidation pressure, or maximum past overburden pressure σ'_p = OCR x σ'_{vo} is estimated to range from 4.2 to 4.8 ksf. Based on the difference between σ'_p and σ'_{vo} , it is estimated that a load equal to 2.8 to 3.1 ksf, or 22 to 25 feet of equivalent soil, could be added to Layer No. 2 above the freeway level and still be in the overconsolidated range

(recompression). Where existing embankments are at elevations of El. +45 or higher, the underlying Layer No. 2 is close to normally consolidated. Computations and OCR correlations are included in Appendix D-3.

4.4.9.2 Settlements in Area 1

Magnitude

In Area 1 the width of fill is about 50 feet between wall Layout Line (LOL) and existing embankment, and wall height increases from about 4 feet to 16 feet. The amount of settlement will depend on whether all lightweight (LW) fill is used, or a combination of soil and lightweight (LW + Soil) fill is used. The estimated settlements versus wall LOL station are as follows:

Lightweight Fill Only

- **10+00-11+00**: 0.75-1.25 inches
- **11+00-12+00**: 0.75-1.25 inches
- **12+00-13+00**: 1.0-1.5 inches

Lightweight Fill Wall with soil Behind

- **10+00-11+00**: 1.0-1.5 inches
- **11+00-12+00**: 1.25-2.0 inches
- **12+00-13+00**: 1.5-2.5 inches

Since normal fill / MSE walls were not selected, the case of all conventional fill was not evaluated. Based on variation of wall height with distance along the alignment, the estimated differential settlements along the length of embankment and along wall panels, assuming perfectly uniform soil conditions, is less than 1/1700 (for combination normal fill and lightweight fill) and less than 1/3000 for all lightweight fill. To allow for some soil variability, design differential settlement may be taken as less than 1/1000. Based on FHWA, 1/500 is generally tolerable for MSE wall panels.

Time Rate

Since the applied net loads are less than 2800 psf at the freeway level, the Layer 2 soils are overconsolidated with respect to the applied loading. Other layers are very stiff, and are expected to consolidate within 30 days. Layer 2 will control the time rate of settlement. Layer 2 is estimated to comprise 30 % of the total settlement. Percent consolidation (U_{avg}) versus time for overconsolidated Layer 2 is as follows:

U_{avg} (%)	60	70	80	90	95
T	0.286	0.403	0.567	0.848	1.129
t (days)	23	32	45	68	90

As an example, if the total predicted settlement is the maximum value of 2.5 inches, Layer No. 2 contributes ¾ inch (30%) settlement while all other layers contribute 1-¾ inches. At 32 days, the 1- ¾ inches of settlement of all layers other than 2 will be essentially done, and 70% of Layer No. 2 settlement will be done (0.7* ¾ inch = 0.53 inches), leaving less than ¼ inch remaining settlement (¾ - 0.53 = 0.22 inches). After 45 days, 20% of Layer 2 settlement remains (0.2 * ¾ =0.15" or about 1/8 inch).

4.4.9.3 Settlements in Area 2

Magnitude

Width of embankment in this area is about 45 feet, and wall height increases from 16 to 29 feet. The following settlements are estimated in Area 2:

- **13+00-14+00**: 0.75-1.75 inches
- **14+00-15+00**: 1.0-2.0 inches
- **15+00-16+50**: 1.5-2.5 inches

Differential settlements for design may be taken as less than 1/1000. Based on FHWA, 1/500 is generally tolerable for MSE wall panels.

Time Rate

Since the applied net loads are less than 2800 psf at the freeway level, the Layer 2 soils are overconsolidated with respect to the applied loading. Other layers are very stiff and Layer 2 will control the time rate of settlement. Settlement versus time may be estimated as in Area 1. We estimate 90% consolidation will occur within about 2 months.

4.4.9.4 Settlements in Area 3

Magnitude

Width of embankment in this area is about 55 feet, and wall height is 26 to 28 feet. Assuming the surcharge is placed to the limits and for the time recommended, settlements under the temporary surcharge in this area may be 3 to 6 inches, as the surcharge will exceed the pre-consolidation pressure. After excavation of the surcharge and placement of lightweight fill the site will be overconsolidated with

respect to the final grades. The following post-surcharge settlements of the wall (due to placement of wall and lightweight backfill) are estimated in Area 3:

- **16+50-19+00**: 1.5-2.5

Design differential settlement may be taken as less than 1/1000.

Time Rate

Since the applied net wall loads are less than the pre-consolidation pressure, Layer 2 soils are overconsolidated with respect to the applied loading. Other layers are very stiff and Layer 2 will control the time rate of settlement. Settlement versus time may be estimated as in Area 1. It is estimated that 90% consolidation will be achieved in about 2 months.

4.4.9.5 Settlements in Area 4

Surcharge

The combination of soil embankment and lightweight fill retaining wall will cause stresses in Layer No. 2 exceeding the pre-consolidation pressure, and long-term consolidation settlements of Layer 2 would expected. Total settlements of 6 to 8 inches could occur under finished grade, and the time to complete 95% consolidation under the finished grades is:

$$t_{95} = T_{95} * H_d^2 / C_v = 1.129 * (13\ ft)^2 / (0.33\ ft^2/day) = 578\ days\ (19\ months)$$

where

t_{95} = time for 95% consolidation

T_{95} = Terzaghi's Time Factor for 95% consolidation

H_d = Layer 2 Drainage Height = 13 feet (single drained)

C_v = Coefficient of Consolidation = 0.33 ft^2/day

Temporary surcharge is recommended to pre-consolidate the area and eliminate long-term post-construction settlement of the walls. It is the intent of the surcharge to consolidate the entire layer to at least the final effective stress under the finished grade. The critical point for the single drained layer is at the bottom of layer where excess pore pressures take the longest to dissipate.

The effective stress (σ'_v) at the bottom of Layer No. 2 can be computed at any time (t) during consolidation as:

$$\sigma'_v = \sigma'_{vo} + \Delta\sigma_{SC} - u(t)$$

Where

σ'_{vo} = initial effective stress at bottom of Layer 2
$\Delta\sigma_{SC}$ increase in total stress at bottom of Layer 2 due to surcharge
u(t) = excess pore pressure at bottom of Layer 2 at time t

The effective stress should at least equal the effective stress at bottom of layer after 100% consolidation under the finished grade, or:

$$\sigma'_{vo} + \Delta\sigma_{SC} - u(t) > \sigma'_{vo} + \Delta\sigma_{FG}$$

or

$$u(t) < \Delta\sigma_{SC} - \Delta\sigma_{FG}$$

We performed settlement calculations at Station 1312+33 and for a point where computed settlement was the maximum under the center of the embankment, and determined the following at the bottom of Layer 2:

$\Delta\sigma_{SC}$ = 3000 psf = u_i
$\Delta\sigma_{FG}$= 2200 psf

This means the surcharge must be left in place until remaining excess pore pressure at the bottom of Layer 2 is 3000-2200 = 800 psf or less. This means degree of consolidation at bottom of layer must equal $[u_i - u(t)] / u_i$ = [3000-800]/3000 = 73%. Using Terzaghi's charts, this requires a time factor of about T = 0.65, or a corresponding surcharge time of 48 weeks, or about 11 months.

Calculations are presented in Appendix D-3.

Post-Surcharge Settlement in Area 4

After surcharging, the temporary fill will be removed and the walls constructed. Settlements are estimated as 1-½ inches or less, and will occur within 2 months or less.

4.4.9.6 Settlements at the New HOV Bridge Abutment

The abutment and pile foundations may be constructed after completion of the surcharge in Area 4, followed by placement of lightweight fill. Settlements at the back of the bridge abutment footing are estimated at ¾ inch or less. Since the pile supported footing will settle less than the adjacent embankment, it is recommended

that a continuous vertical joint in the lightweight fill be provided at the back edge of the bridge footing.

4.4.9.7 Settlements at Existing Connector Separation

Due to distance from the surcharge, settlement at the existing 22/405 Connector Separation abutment will be less than ½ inch and is not expected to adversely affect the pile supported abutment. The bridge ultimately will be demolished as part of the project.

4.4.9.8 Settlements of Pavements

Settlement of pavements adjacent to walls is discussed in the GDR.

4.4.9.9 Settlement in New Fill Area over Existing Connector Ramp

Settlement of new fill area over the existing connector ramp is discussed in the GDR.

4.4.9.10 Settlement Monitoring

To verify the predicted settlements, we recommend settlement monitoring by installing a minimum of 7 settlement plates in the Surcharge area and 2 plates in the wall only area. Suggested locations and a typical detail for a settlement plate are shown in Figures 9 and 10, respectively. The plates should be placed on sand bedding and the plate elevation surveyed after subgrade is prepared and before any fill is placed. Incremental sections of steel rods and PVC sleeve should be placed as the fill is being raised. The top of the plate or existing section of rod should be surveyed immediately prior to installing a new section of rod and the top of the new rod should be surveyed immediately after it is attached. In addition, each time the plate is surveyed the elevation of the surrounding fill should be surveyed. The plate should be surveyed daily as the fill is placed and weekly thereafter for at least 30-days, or until the recommended surcharge period is complete. GDC should review settlement data to confirm settlement has leveled off prior to construction of pavement and approach slab. Recommended settlement plate locations and survey procedures are listed in Table 6.

4.4.10 Lateral Resistance

In general, resistance to lateral loads is provided by a combination of frictional or adhesive sliding resistance at the cellular concrete-soil interface and passive soil resistance on the side of the embedded portion of the panels. For the cellular concrete embankment passive resistance will be much smaller than base resistance

and should be ignored for design. Existing fill soils along the base of the cellular concrete are very stiff to hard clays. Based on NAVFAC DM7.02, the adhesion at the soil/cellular concrete interface for sliding resistance may be taken as 0.9 ksf. Similar fill soils composed of on-site materials should be placed in new fill areas directly below the walls.

4.4.11 Seismic Overturning and Bearing Capacity

For seismic overturning analysis of the embankment, we recommend using a horizontal acceleration coefficient of 0.5. The horizontal inertia force equal to 0.5 times the weight should be applied at the center of gravity of the mass. Overturning stability is considered adequate if the base resultant falls within the middle 1/3 of the embankment. The maximum equivalent bearing pressure (weight per foot divided by equivalent foundation width [width minus 2 times eccentricity] should not exceed 2.2 ksf for seismic conditions. If higher bearing is required, it should be evaluated on a case-by-case basis.

4.4.12 Subgrade Preparation

Prior to placing panels and lightweight fill, the embankment subgrade area should be cleared and excavated / benched to foundation level. The foundation keyway area should be proof-rolled with loaded heavy equipment under geotechnical observation by GDC. Materials that cannot be proof-rolled or recompacted should be removed to competent material and replaced with compacted fill in accordance with Section 19-3.06 of Caltrans Standard Specifications. All foundation excavations should be observed by GDC. Soft or wet subgrade may require overexcavation of 12 inches and placement of biaxial geogrid (Tensar BX1200 or equal) and 12 inches of crushed rock.

After successful proof-rolling, the base of keyway excavation should be scarified, brought to near optimum moisture content, and recompacted to 95% as determined by ASTM D 1557-91. As fill is placed into new or existing embankment, it should be benched into competent compacted fill materials. We recommend that all foundation excavations and benches be observed by GDC to confirm foundation conditions and proper subgrade preparation prior to placing the cellular concrete backfill. Any soils disturbed by construction activities or weather should be excavated and recompacted as directed by GDC. Cellular concrete may be placed directly on the approved subgrade.

All new embankment (including replacement of unsuitable soils) supporting retaining walls within a zone defined by 1:1.5 planes extending down and out from

lines 1 foot outside the edge of footing should be placed at a relative compaction of not less than 95 percent (Caltrans Standard Specification 19-5.03 and SSP 19-600).

4.4.13 Cellular Concrete Backfill

Cellular concrete shall be placed in lifts not to exceed 2.5 feet, and subsequent lifts shall not be placed for at least 24 hours or until the specified strength has been obtained, in accordance with the plans and specifications.

4.4.14 Wall Drainage

The surface of the cellular concrete will be waterproofed with an impervious membrane. A layer of treated permeable material will be placed below the pavement and above the waterproofing layer to collect any water permeating the joints in concrete pavements, and conveyed to drains discharging to the base of the wall. Since the wall is above the water table and there are no upslope unpaved areas adjacent to the walls, no underdrain system is necessary for collection of groundwater. We understand geocomposite strip drains are being placed below the lightweight fill as a precautionary measure. The strips should be 2-sided with filter fabric on both sides. Crushing strength should be adequate to withstand the overburden pressure. They may be installed both horizontally and vertically with 90 degree bends on benches, and should be installed following the manufacturers recommendations.

4.5 Slope Stability Analyses

We analyzed the static and seismic global embankment stability using the computer program PCSTABL5M (Purdue University). The soil profile used in our analysis is shown in Table 1. Since the residual undrained shear strength of any shallow liquefiable layers is higher than the undrained shear strength of Layer No. 2, the Layer 2 undrained shear strength controls the stability. For cellular concrete fill, we modeled the embankment material as a cohesive soil with unconfined compressive strength of 40 psi, or undrained shear strength of 20 psi (2.8 ksf).

For pseudo-static analyses we used an acceleration coefficient of Kh = 1/3 of the PGA, or Kh=0.17. The results (Appendix D-5) indicate static and seismic factors of safety in excess of 1.5 and 1.1, respectively. Therefore, the static and seismic stability are considered adequate. Calculations results are presented in Appendix D-5.

4.6 Construction Considerations

4.6.1 Construction Advisories

- Construction of the wall is on an active freeway, and numerous transportation facilities, utilities, and other improvements are present. Construction staging and maintenance of existing traffic should be considered, along with detour roads and shoring requirements;
- For planning purposes, the recommended surcharge may need to be left in place for 11 months;
- Limited space is available for ingress/egress of equipment and construction operations;
- Zones of unsuitable foundation materials may be encountered, requiring stabilization with geogrid and rock;
- The foundation area must be proof-rolled with heavy equipment, and all benching should be observed by GDC;
- Settlement monitoring should be performed as listed in Table 6;
- Wall construction will need to be coordinated with Abutment 1 construction for the HOV Connector Separation and temporary detour roads and shoring.

4.6.2 Excavation

All earthwork and grading should be performed in accordance with Section 19 of Caltrans Standard Specifications. Excavated soils will consist mainly of shallow existing fill and native alluvium. Soils should be excavatable with moderate effort using heavy-duty grading equipment. During earthwork operations, the contractor should control the flow of water through the work area and maintain a dry excavation. No surcharge loads, such as the weight of heavy equipment should be placed within 5 feet (or height of excavation, whichever is greater) of the top of unsupported excavations. Care should be taken during excavation to avoid removing support for any existing improvements, such as foundations, pavements, or buried utilities. Excavation safety is the responsibility of the contractor, and should comply with applicable OSHA guidelines.

4.6.3 Buried Utilities

Buried and overhead utilities are present in the project area. The contractor should research utility locations and take the necessary precautions to protect-in-place or

relocate utilities prior to grading. If any utilities conflict with the wall construction, they should be shown on the plans and protected or relocated as necessary.

4.6.4 Remnants of Previous Construction

Construction of this improvement project will require the removal of existing facilities, including structures, v-ditches, pavements, fencing, walls, asphalt, concrete, buried utilities, and other improvements.

4.6.5 Hazardous Waste Considerations

Environmental investigation was not within the scope of our work; however, we did not observe any evidence of contamination of subsurface materials in our borings and along the alignment. Nonetheless, contaminated soils and / or groundwater may be present at the site. If encountered during construction, the owner should be notified and appropriate methods of handling and disposal should be used.

4.6.6 Differing Site Conditions

Our characterization of the site is based on the results of our field explorations, geologic analyses of cross-sections, and interpolation between exploration locations. All cuts, excavations, and foundation areas should be observed continuously during construction are consistent with the recommendations used in the design. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations.

5.0 LIMITATIONS

This report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report is provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report. This report is subject to revision.

6.0 REFERENCES

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TABLE 1
GENERALIZED SOIL PROFILE AND SUMMARY OF ENGINEERING PROPERTIES
RW1299 RW1300

Layer No.	Soil Type*	El. (feet)**	Index Properties*	SPT N-Value* (blow/ft)	Drained Shear Strength Parameters*				Undrained Shear Strength* (psf)	Compressibility Parameters*				
					Peak Cohesion c' (psf)	Peak Friction Angle ϕ' (deg)	Ultimate Cohesion c' (psf)	Ultimate Friction Angle ϕ' (deg)		Modulus E (ksf)	$Cc/(1+e_0)$	$Cr/(1+e_0)$	OCR	Cv (ft^2/day)
1	Very Stiff to Hard Sandy Clay / Silt (CL, ML)	Above +16	**(-)#200**=8 to 86% (avg 51%) **LL**=26 to 47 (avg 33) **PL**=14 to 20 (avg 19) **PI**=11 to 27 (avg 15) ω_N=4 to 32% (avg 19%) γ=125 pcf (average)	**Borings:** 9 to 43 (avg 25) **CPT:** 16 to 30#	400	30	250	30	2,500	-	-	0.018	7	**Over Consolidated:** 2.3
2	Firm to Stiff Sandy Clay (CL)	+16 to +2.0	**(-)#200**=26 to 86% (avg 58%) **LL**=33 to 39 (avg 36) **PL**=19 to 21 (avg 20) **PI**=12 to 19 (avg 16) ω_N=18 to 46% (avg 28%) γ=121 pcf (average)	**Borings:** 3 to 50 (avg 15)	250	28	100	28	1,000	-	0.17	0.016	2.5 at Freeway 1.0 below Abuts	**Normally Consolidated:** 0.33 **Over Consolidated:** 2.1
3	Very Stiff Clay, Sandy Clay, Silty Clay and Sandy to Clayey Silt (CL, ML)	+2.0 to -15.5	**(-)#200**=11 to 97% (avg 63%) **LL**=29 **PL**=19 **PI**=10 ω_N=19 to 44% (avg 29%) γ=122 pcf (average)	**Borings:** 12 to 50+ (avg 32) **CPT:** Avg 18#	-	-	-	-	2,000	-	-	0.019	>3	**Over Consolidated:** 3.3
4	Dense to Very dense Silty Sand, Sandy Silt, Sand and Stiff to Hard Clayey Silt and Clay (SM, ML, SP & CL, ML)	-15.5 to -41	**(-)#200**=2 to 86% (avg 35%) ω_N=15 to 40% (avg 25%) γ=126 pcf (average)	**Borings:** 19 to 50+ (avg 50+) **CPT:** Avg 30#	-	-	-	-	-	1,000	-	-	-	-
5 clay	Very Stiff to Hard Clay and Silt (CL, ML)	Below -41	**(-200)**=27 to 96% (avg 60%) **LL**=31 **PL**=15 **PI**=16 w_N=17 to 45% (avg 28%) **g**=124 pcf (average)	**Borings:** 21 to 50+ (Avg 44)	-	-	-	-	3,000	-	-	0.017	>2	**Over Consolidated:** 3.3
5 sand	Dense to Very Dense Sand and Silty Sand (SP, SM)			**Borings:** 21 to 50+ (Avg 44) **CPT:** (Avg 42)#	0	38	-	-	-	3,000	-	-	-	-

* Average values from the overall project were used

** For detailed layer elevations from each CPT refer Page 2 of 2 of Table 1 .

CPT N-Values are based on available correlations (Robertson et al., 1983) -see Appendix A

TABLE 1
GENERALIZED SOIL PROFILE
(Layer Elevations)
RW1299 RW1300

Layer No.	Top/ Bottom	CPTs														
		CPT-08-013			CPT-08-015			CPT-08-018			CPT-08-021			CPT-08-022		
		28.5			29.5			43.5			26			26		
		Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick
1	Top	0	28.5	14.0	0	29.5	13.0	0	43.5	27.0	0	26.0	6.0	0	26.0	6.0
	Bot	14	14.5		13	16.5		27	16.5		6	20.0		6	20.0	
2	Top	14	14.5	12.0	13	16.5	12.0	27	16.5	13.0	6	20.0	14.0	6	20.0	14.0
	Bot	26	2.5		25	4.5		40	3.5		20	6.0		20	6.0	
3	Top	26	2.5	19.0	25	4.5	22.0	40	3.5	18.0	20	6.0	20.0	20	6.0	20.0
	Bot	45	-16.5		47	-17.5		58	-14.5		40	-14.0		40	-14.0	
4	Top	45	-16.5	25.0	47	-17.5	24.0	58	-14.5	25.5	40	-14.0	30.0	40	-14.0	33.0
	Bot	70	-41.5		71	-41.5		83.5	-40.0		70	-44.0		73	-47.0	
5-1	Top	70	-41.5	10.0	71	-41.5	10.0	83.5	-40.0	N/A	70	-44.0	17.0	73	-47.0	16.0
	Bot	80	-51.5		81	-51.5		N/A	N/A		87	-61.0		89	-63.0	
5-2	Top	80	-51.5	N/A	81	-51.5	N/A	N/A	N/A	N/A	87	-61.0	N/A	89	-63.0	N/A
	Bot	N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A	

TABLE 2
SUMMARY OF NEARBY FAULTS AND SEISMICITY

Fault Name	Fault Type	Mw	LOCATION					
			Bolsa Chica Road OC			405/22 HOV Conn. Separation		
			Lat. 33.7743 Lon. 118.0380			Lat. 33.7749 Lon. 118.0427		
			Dist (km)	PBA	PGA	Dist (km)	PBA	PGA
Newport-Inglewood	Strike Slip	7.00	5.50	0.50	0.41	5.20	0.51	0.42
Los Alamitos	Reverse	6.00	2.00	0.57	0.48	1.70	0.59	0.50
San Joaquin Hills	Blind Thrust	7.00	13.30	0.37	0.35	13.60	0.36	0.35
Puente Hills	Blind Thrust	7.25	18.20	0.32	0.32	18.10	0.32	0.32

TABLE 3
SUMMARY OF LIQUEFACTION ANALYSES
RW1299 RW1300

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Design Ground Water Elevation (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-013	16	0.78	0.02	0.80
CPT-08-015	16	0.68	0.02	0.70
CPT-08-018	16	0.24	0.08	0.32
CPT-08-021	16	0.33	0.01	0.34
CPT-08-022	16	0.12	0.00	0.12

Min	**0.12**
Max	**0.80**
Average	**0.46**

TABLE 4
EMBEDMENT DEPTH, KEY WIDTH, AND BENCHING RECOMMENDATIONS

RW1300

Area No.	Wall Sta. From / To	"H" Sta. From / To	Wall Height H (ft)	Typical Section(s)	Figure No.	Min. Embedment below FG (ft) LW Fill D_{LW}	Min. Embedment below FG (ft) Panels D_P	Min. Key Width W (ft)	Benching Requirement
1	10+00 / 13+00	1302+55 / 1305+55	4.0 / 16.0	"H"1304+00	4B	2	2	8 ft (H≤12ft) 12 ft (H=12-20 ft)	Granular soil or lightweight fill may be placed between wall and existing slope Bench into new or existing fill at 10h:5v
2	13+00 / 16+50	1305+55 / 1309+05	16.0 / 28.5	"H"1306+23 / "H"1308+00	4C / 4D	2 (13+00-14+00) 5 (14+00-16+50)	2 (13+00-14+00) 5 (14+00-16+50)	12 ft (H=12-20 ft) 15 ft (H>20 ft) or as dictated by benching requirement	Entire area between wall and slope must be lightweight fill. Bench minimum 10' horizontal / 5' vertical into existing fill (results in more than minimum key width)
3	16+50 / 19+00	1309+05 / 1311+55	28.5 / 25.0	"H"1309+36 / "H"1310+90	4E / 4F	8	5	15 ft or as dictated by benching requirement	Entire area between wall and slope must be lightweight fill. Bench minimum 10' horizontal / 5' vertical into existing fill (may result in more than minimum key width)
4	19+00 / 20+15	1311+55 / 1312+70	25.0 / 22.5	"H"1312+33 / "H"1312+68	4G / 4H	5	5	15 ft or as dictated by benching requirement	After removal of temporary surcharge, use minimum embedment depth and key width, bench into new compacted fill at 10h:5v Minimum lightweight fill shall be 10 feet below top of RW1299 Permanent new fill below lightweight material @ 95% relative compaction

RW1299

Area No.	Wall Sta. From / To	"H" Sta. From / To	Wall Height H (ft)	Typical Section(s)	Figure No.	Min. Embedment below FG (ft) LW Fill D_{LW}	Min. Embedment below FG (ft) Panels D_P	Min. Key Width W (ft)	Benching Requirement
4	10+00 / 10+65	1312+02 / 1312+68	5.0 / 14.0	"H"1312+33 / "H"1312+68	4G / 4H	5	5	See benching requirement	Level base of lightweight fill shall be minimum 10 feet below top of wall RW1299 and extend to benched fill for RW1300

TABLE 5
SETTLEMENT SUMMARY

Area		Maximum Amount of Fill (Feet)	Recommended Surcharge	Estimated Total Settlement (inches)	# of Settlement Plates	Recommended Settlement Waiting Period	Estimated % of Settlement Complete upon Lightweight Fill Placement	Remaining Settlement, Time after Lightweight Fill Completion (days)				
								0	15	30	60	90
RW 1299+1300 East Approach to HOV Conn.	east of "H" 1305+55	4-16	None	1-2.5	0	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1305+55-1309+05	16-29	None	0.75-2.75	2	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1309+05-1311+55	25-29	None	1.5-2.5	2	None	40-60	<1	<1/2	<1/4	<1/10	<1/10
	"H"1311+55-1312+70	23-24	Yes, per surcharge plan	8-10 (under surcharge) 1-1.5 (post surcharge)	4	11 mos. Surcharge period before constructing lightweight fill walls or pile driving	40-60	<3/4 (<1/2 at Abut)	<1/4	<1/10	<1/10	<1/10

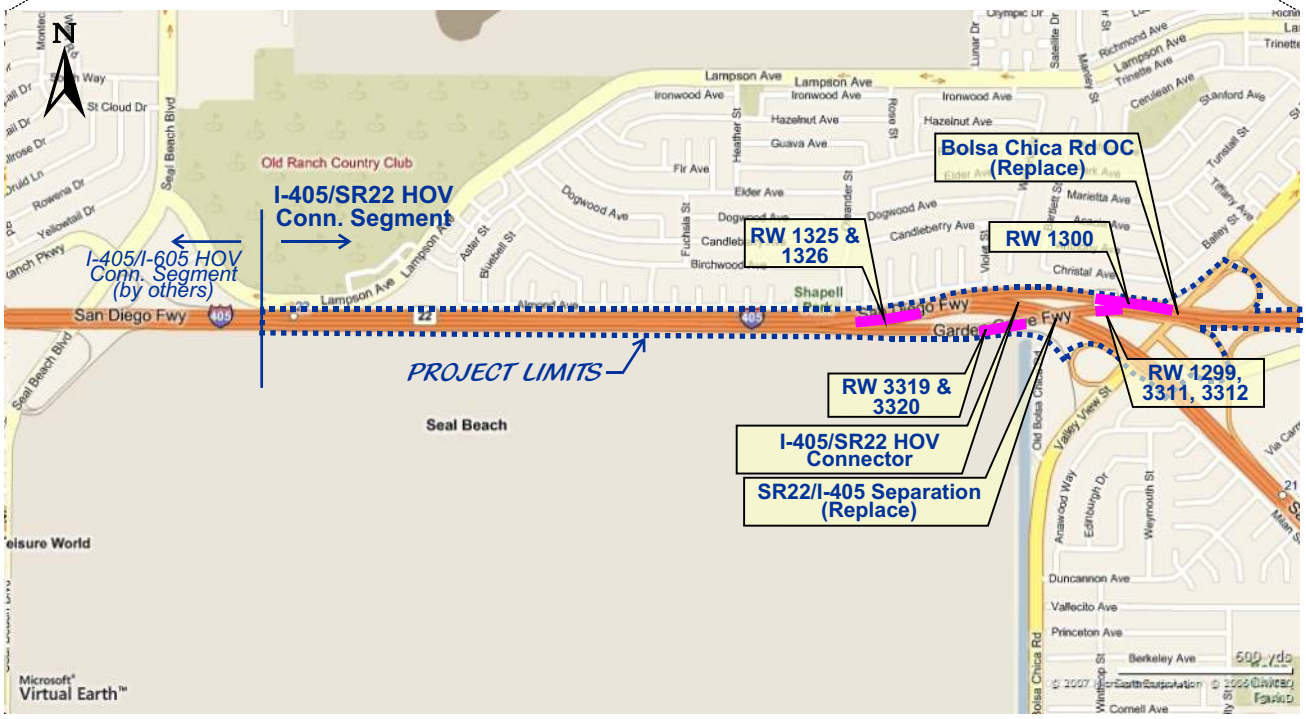
TABLE 6
SETTLEMENT PLATE LOCATIONS AND MONITORING PROCEDURE

SETTLEMENT PLATE LOCATIONS			
Structure	**Station Line**	**Station**	**Offset**
RW1299 & RW1300 and North Surcharge Area	"H"	1312+80	4 L
	"H"	1312+40	40 L
	"H"	1312+23	10 R
	"H"	1312+33	15 R
	"H"	1312+28	55 R
	"H"	1310+92	10 L
	"H"	1311+00	40 R
	"H"	1307+90	20 R
	"H"	1306+00	20 R

Settlement Plate Installation and Monitoring Procedure

1. Install settlement plate in sand bedding on leveled area prior to placing any fill (see detail, Figure 10).
2. Attach the first section of threaded steel pipe to the threaded fitting on plate by tightening firmly with pipe wrench.
3. Survey the top of plate elevation, top of threaded pipe elevation, and ground elevation before placing any fill, record date and time.
4. Place PVC pipe around the threaded pipe before placing any fill (Figure 10).
5. Place fill around the settlement monument taking care not to damage or destroy.
6. Survey the top of steel pipe elevation daily as fill is placed, and weekly after fill completion, recording date, time, and elevation.
7. Each time the steel pipe is surveyed, survey the ground elevation at 4 locations, 5 ft north, south, east, and west of monument.
8. Add sections of steel pipe as needed to stay above fill. Each time a pipe section is added, do not loosen or tighten existing pipes, survey the existing top of pipe elevation, add a new section by firmly tightening with a pipe wrench, then survey the top of new section of pipe. Add additional PVC as needed to stay above the top of fill.
9. Repeat steps 5 through 8 as necessary.
10. Transmit the settlement survey data to GDC within 24 hours of completing each survey.
11. Continue monitoring until recommended by GDC.

FIGURES



The base maps are from Microsoft's Virtual Earth

GROUP DELTA CONSULTANTS

GDC Project No. I-436

West County Connector Project
I-405/SR22 HOV Conn. Segment
Orange County, California

Vicinity Map

Figure 1

SCALE 1" = 50'

FIGURE 2

RW 1300 AND RW 1299
EXPLORATION LOCATION PLAN

RELATIVE BORDER SCALE
IS IN INCHES

0 1 2 3

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER _____ DATE _____

PLANS APPROVAL DATE _____

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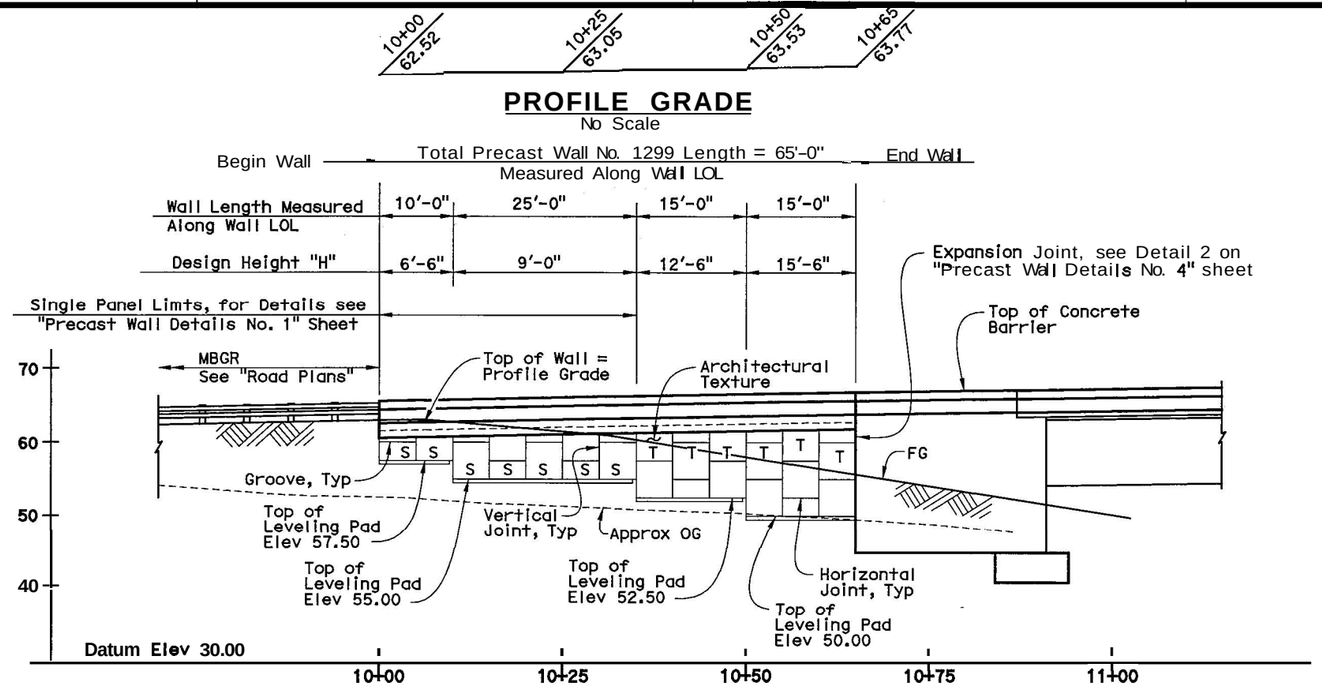
REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 02612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PROFILE GRADE

No Scale



NOTES:

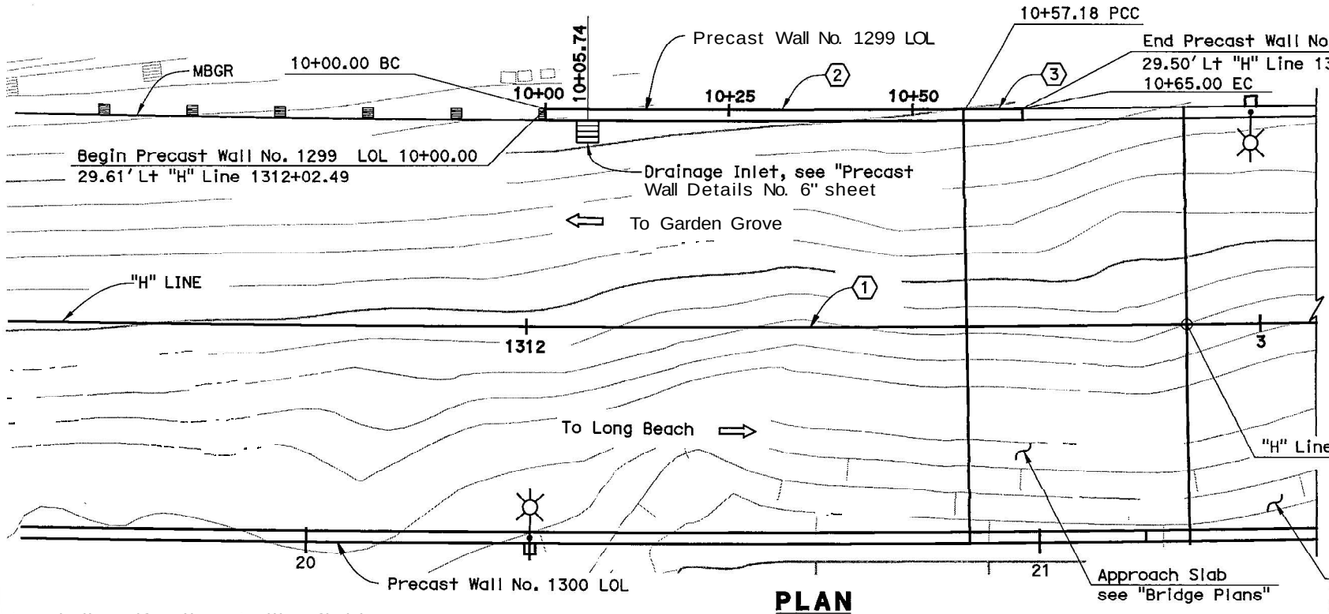
1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Details sheet.
3. For Joint and Groove Details, see "Precast Wall Details No. 1" sheet.

CURVE DATA

②	③
R = 4575.95'	R = 5095.50'
Δ = 0°42'57"	Δ = 0°05'17"
L = 57.18'	L = 7.82'
T = 28.59'	T = 3.91'

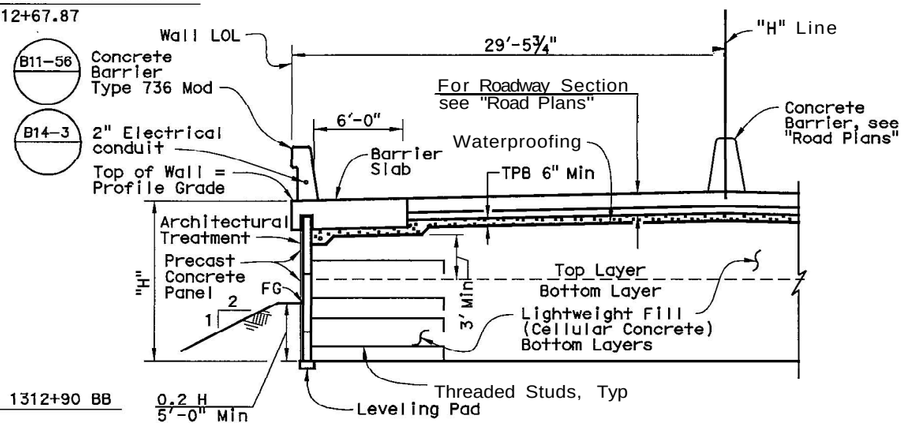
MIRROR ELEVATION

1" = 10'



PLAN

1" = 10'



TYPICAL SECTION

1" = 5'

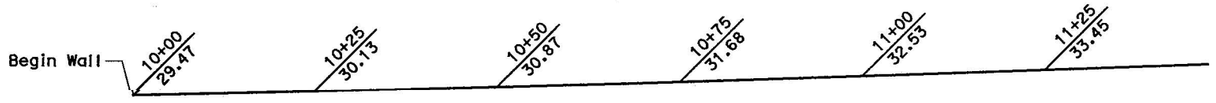
NOTE:
The Co[illegible]tor shall verify all controlling field dimensi[illegible]before ordering or fabricating any material

Figure 3A

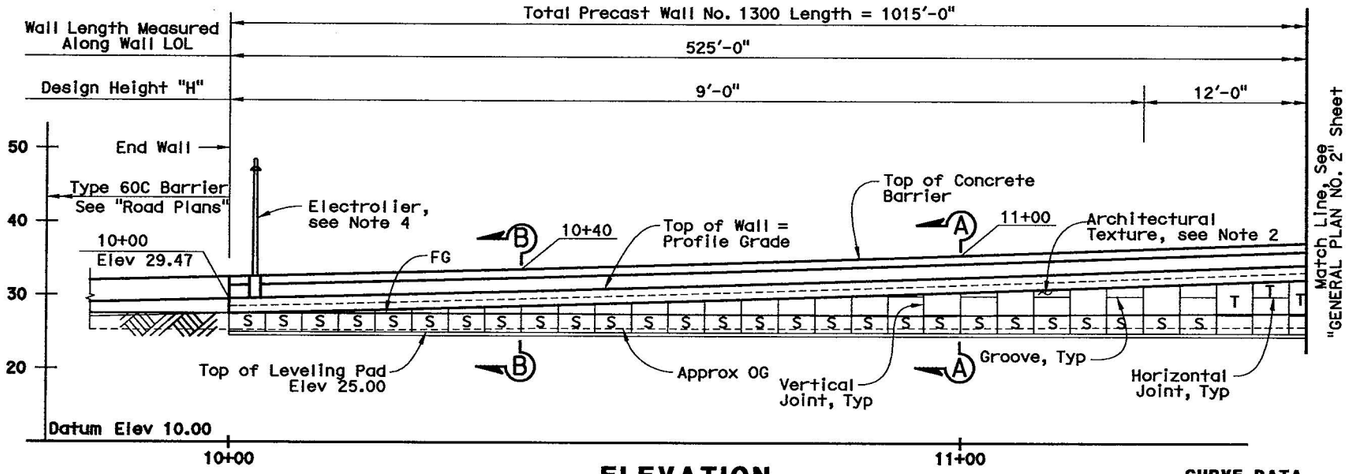
Sudhakar DESIGN OVER		DESIGN	BY M. Ruvalcaba	CHECKED	DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-XXX	PRECAST WALL No. 1299 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)	
SIGN OFF DA		DETAILS	BY P. Johnson	CHECKED	LAYOUT	CHECKED			POST MILES 20.91	GENERAL PLAN	
DESIGN GENER	SHEET (ENGLISH) (REV. 2/25/05)	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY PLANS AND SPECS COMPARED	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 1 2 a	CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES → 10/27/08	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET 2 OF 17

FILE => $REQUEST

Figure 3A



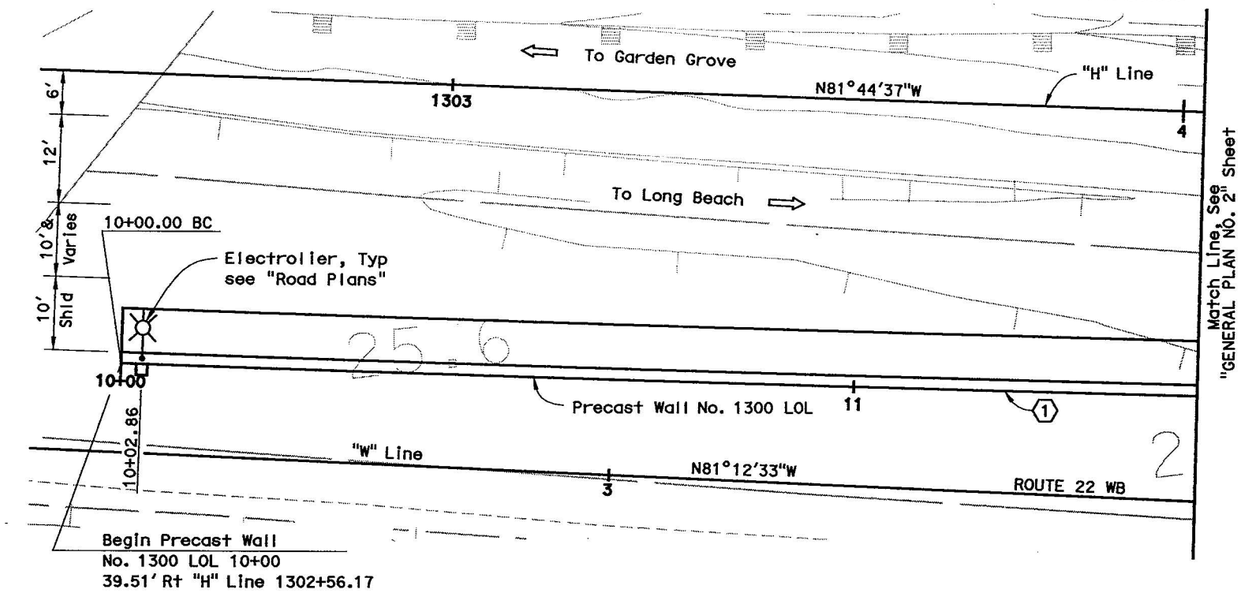
PROFILE GRADE
No Scale



ELEVATION
1" = 10'

CURVE DATA

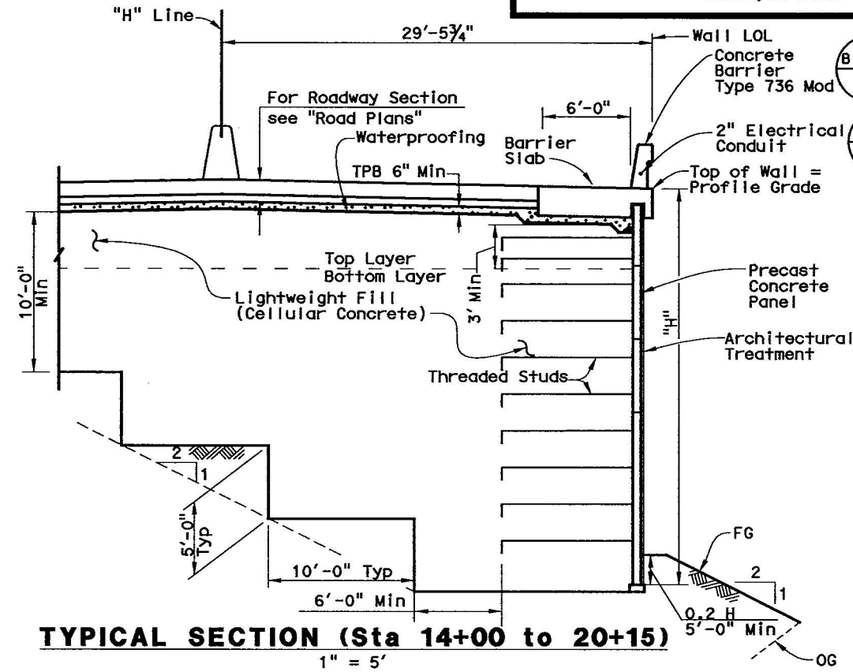
① R = 20023.48'
Δ = 1°59'02"
L = 693.35'
T = 346.70'



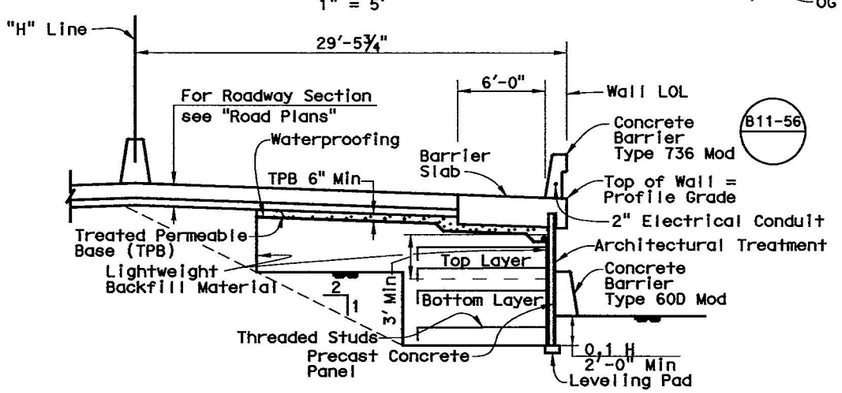
PLAN
1" = 10'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Detail, see "Precast Wall Details No. 6" sheet.
5. For Section A-A and Section B-B see "Precast Wall Details No.7" sheet.



TYPICAL SECTION (Sta 14+00 to 20+15)
1" = 5'



TYPICAL SECTION (Sta 10+00 to 14+00)
1" = 5'

Figure 3B

NOTE: The Co... ctor shall verify all controlling field dimens... before ordering or fabricating any material

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER ____ DATE
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

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PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD			
DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY N. Morcillo	CHECKED		
QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED		

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI, PROJECT ENGINEER

CU 12235 EA 071621

BRIDGE NO. 55-XXX

POST MILES 20.91

PRECAST WALL No. 1300 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
GENERAL PLAN No. 1

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/08)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) 10/27/08

SHEET 2 OF 25

FILE => @REQUEST

USERNAME => @USER DATE PLOTTED => @DATE TIME PLOTTED => @TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

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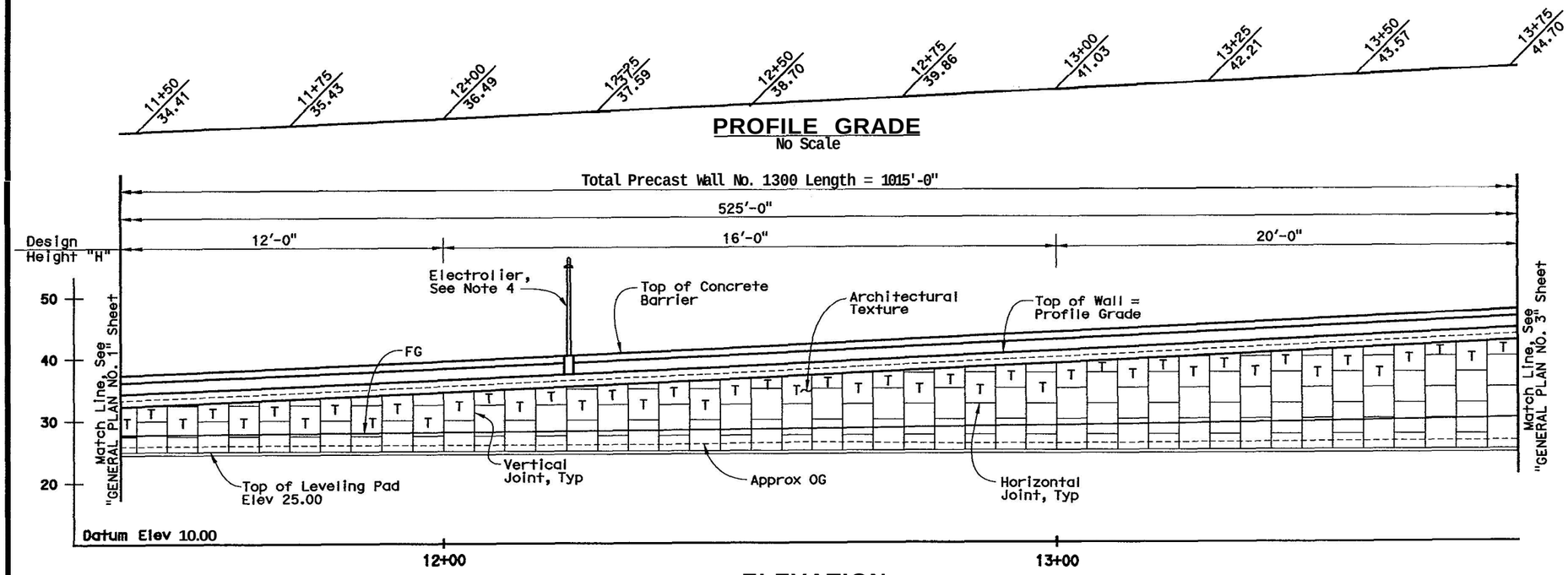
REGISTERED PROFESSIONAL ENGINEER
MOHSEN MOHSENI
No. C45999
Exp. 12/31/08
CIVIL
STATE OF CALIFORNIA

2201 DUPONT DRIVE
SUITE 200
IRVINE, CA 92612

OCTA

550 SOUTH MAIN STREET
ORANGE, CA 92863



NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. [or Joint and Groove Details, see Precast Wall Details No.2" sheet.
4. [or Electrolier Pedestal Detail, see Precast Wall Details No. 6" sheet.

CURVE DATA

(1) R = 20023.48'
Δ = 1°59'02"
L = 693.35'
T = 346.70'

NOTE: The C… ictor shall verify all controlling field dimen… before ordering or fabricating any material

Figure 3C

Sudhak … tti	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD		
DESIGN O …	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY N. Morallo	CHECKED	
SIGN OFF	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

CU 12235
EA 071621

BRIDGE NO. 55-XXX
POST MILES 20.91

PRECAST WALL No. 1300 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
GENERAL PLAN No. 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/08

SHEET 3 OF 25

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

FILE => @REQUEST

USERNAME => @USER DATE PLOTTED => @DATE TIME PLOTTED => @TIME

Figure 3C

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER _____ DATE X

PLANS APPROVAL DATE _____

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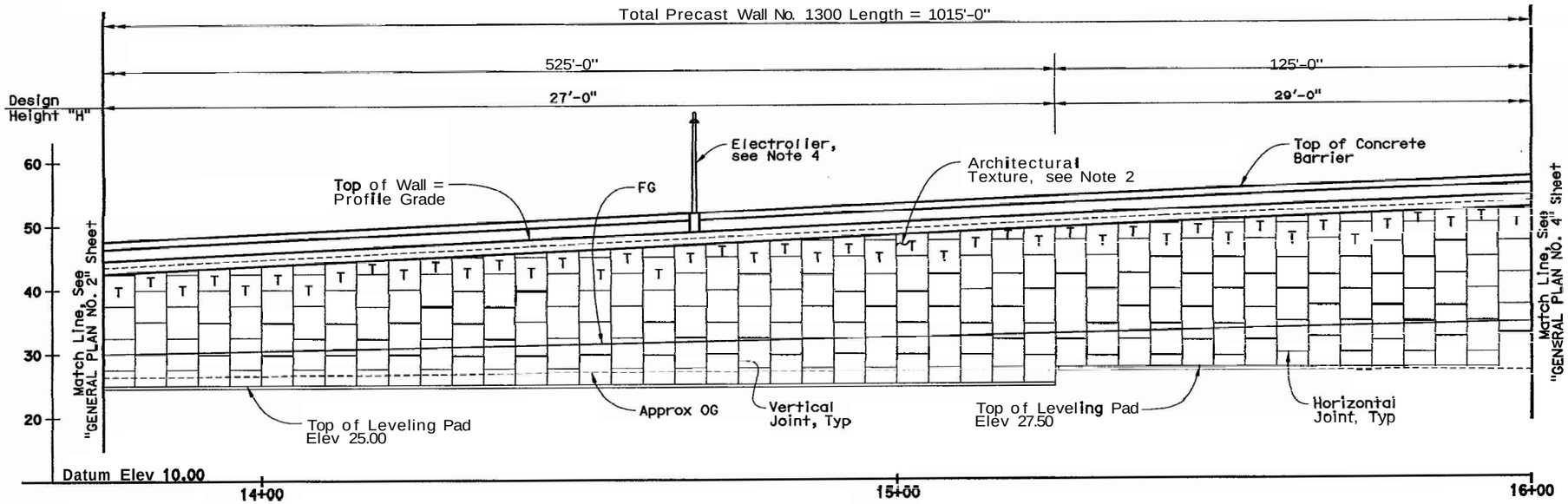
REGISTERED PROFESSIONAL ENGINEER * MOHSEN MOHSENI * No. C45999 Exp. 12/31/08 CIVIL * STATE OF CALIFORNIA *

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

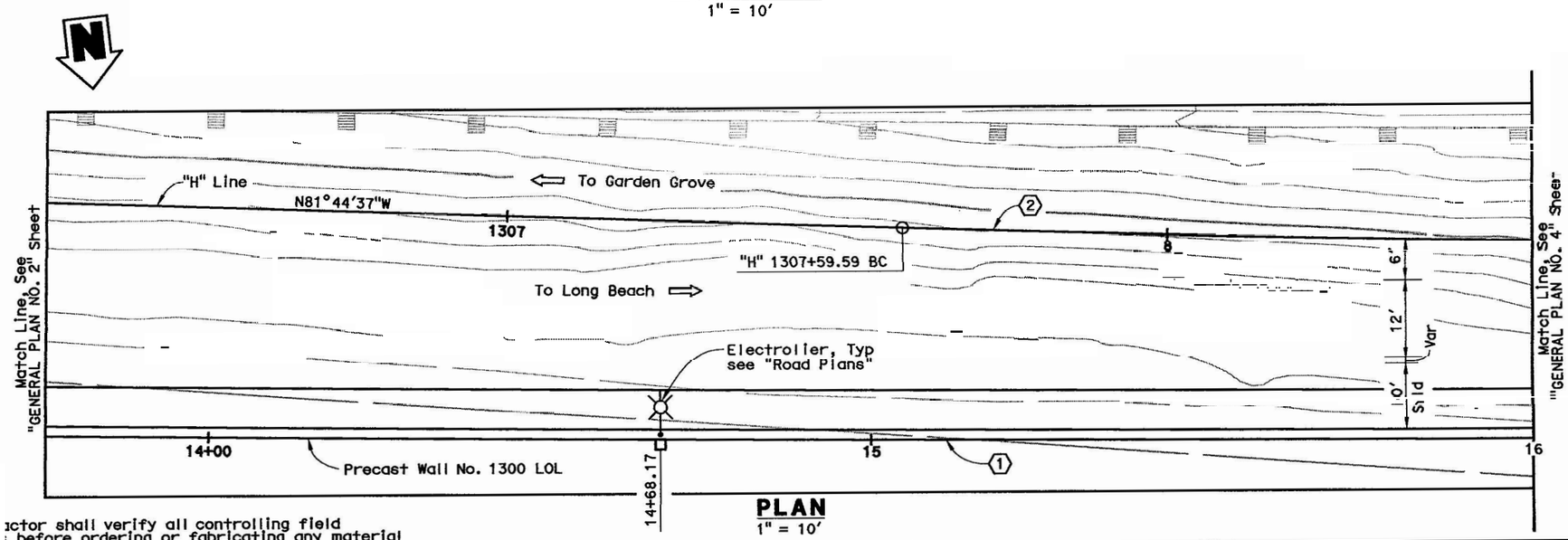
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

13+75 44.70 | 14+00 45.83 | 14+25 46.96 | 14+50 48.20 | 14+75 49.29 | 15+00 50.44 | 15+25 51.67 | 15+50 52.67 | 15+75 53.60 | 16+00 54.44

PROFILE GRADE
No Scale



ELEVATION
1" = 10'



PLAN
1" = 10'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.~" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. For Joint and Groove Details, see Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Detail, see Precast Wall Details No. 6" sheet.

CURVE DATA

(1) R = 20023.48'
Δ = 1°59'02"
L = 693.35'
T = 346.70'

(2) R = 5125.00'
Δ = 13°08'50"
L = 1176.01'
T = 590.60'

NOTE:
The C actor shall verify all controlling field dimen before ordering or fabricating any material

Figure 3D

Figure 3D

Sudhak DESIGN O	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-XXX	PRECAST WALL No. 1300 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
SIGN OFF	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY N. Morcillo	CHECKED			POST MILES 20.91	GENERAL PLAN No. 3
	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED		CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	SHEET 4 OF 25

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

REVISION DATES (PRELIMINARY STAGE ONLY) 10/27/06

FILE => @REQUEST

USERNAME => @USER DATE PLOTTED => @DATE TIME PLOTTED => @TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER X DATE

REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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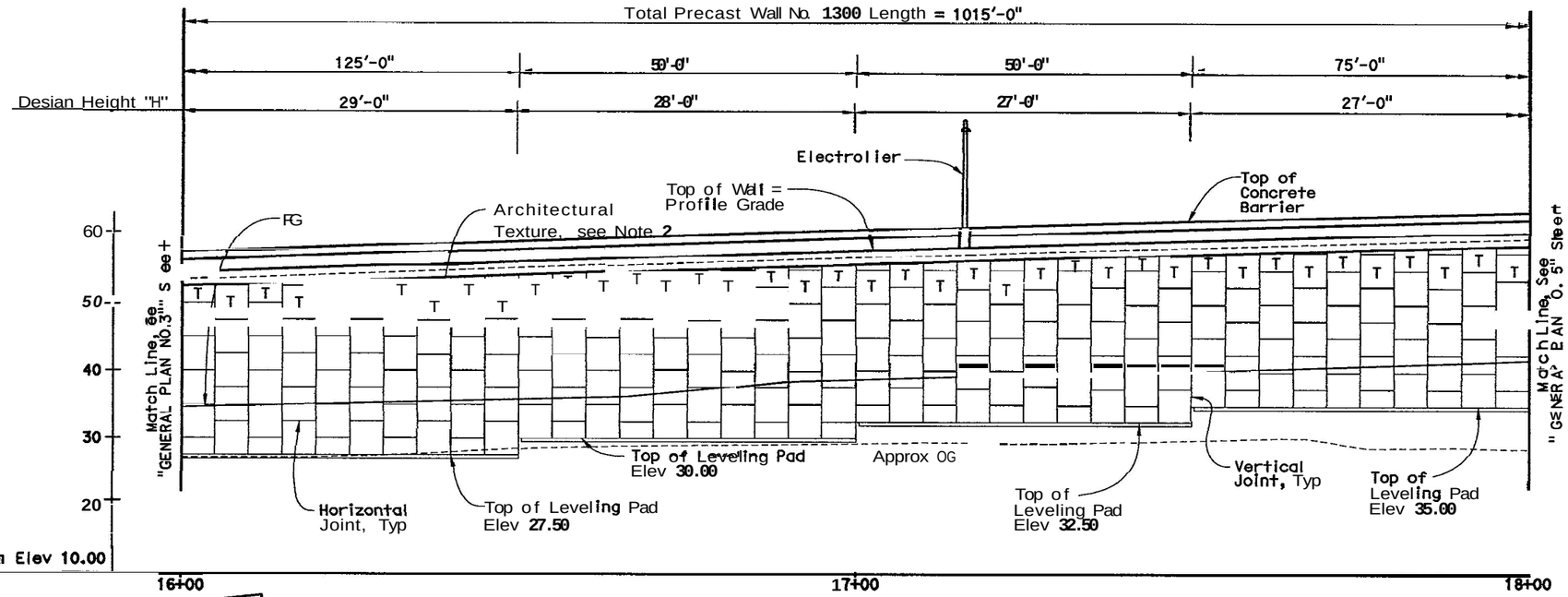
NS 2201 OUPONT DRIVE SUITE 200 IRVINE, CA 92612

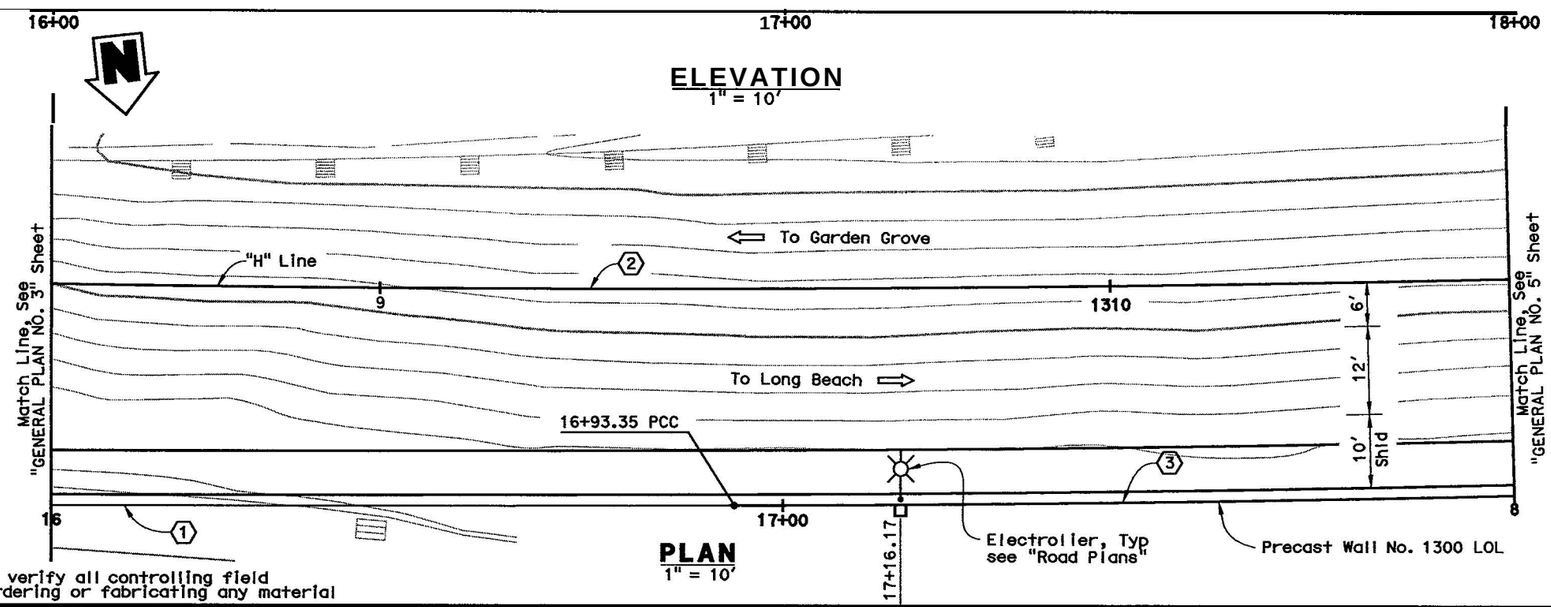
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PROFILE GRADE
No Scale

16+25 55.48 — 16+50 56.17 — 16+75 57.12 — 17+00 58.01 — 17+25 58.67 — 17+50 59.38 — 17+75 60.04 — 18+00 60.68



ELEVATION
1" = 10'



PLAN
1" = 10'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. For Precast Wall Details, see "Precast Wall Details No. 2" sheet.
   - For Electrolier Pedestal Detail, see "Precast Wall Details No. 6" sheet.

CURVE DATA

①	②	③
R = 20023.48'	R = 5125.00'	R = 5154.48'
Δ = 1°59'02"	Δ = 13°08'50"	Δ = 3°49'12"
L = 693.35'	L = 1176.01'	L = 343.65'
T = 346.70'	T = 590.60'	T = 388.46'

NOTE: The Co…ctor shall verify all controlling field dimens… before ordering or fabricating any material

Figure 3E

Figure 3E

Sudhaka…	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-XXX
DESIGN OVI…	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY N. Morcillo	CHECKED			POST MILES 20.91
SIGN OFF …	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY	CHECKED (PLANS AND SPECS COMPARED)			PRECAST WALL No. 1300 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE) GENERAL PLAN No. 4

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235 EA 071621

FILE => @REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/08

SHEET 5 OF 25

DATE PLOTTED => @DATE TIME PLOTTED => @TIME USERNAME => @USER

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER X DATE

REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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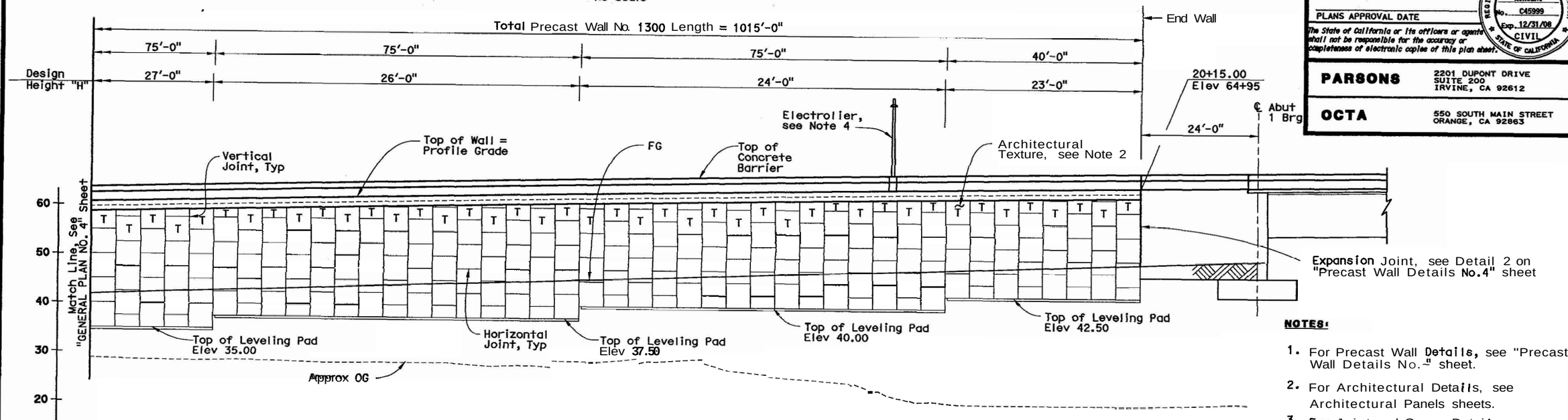
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

18+25 61.27 | 18+50 61.92 | 18+75 62.49 | 19+00 62.99 | 19+25 63.51 | 19+50 63.97 | 19+75 63.35 | 20+00 64.74 | 20+15 64.95

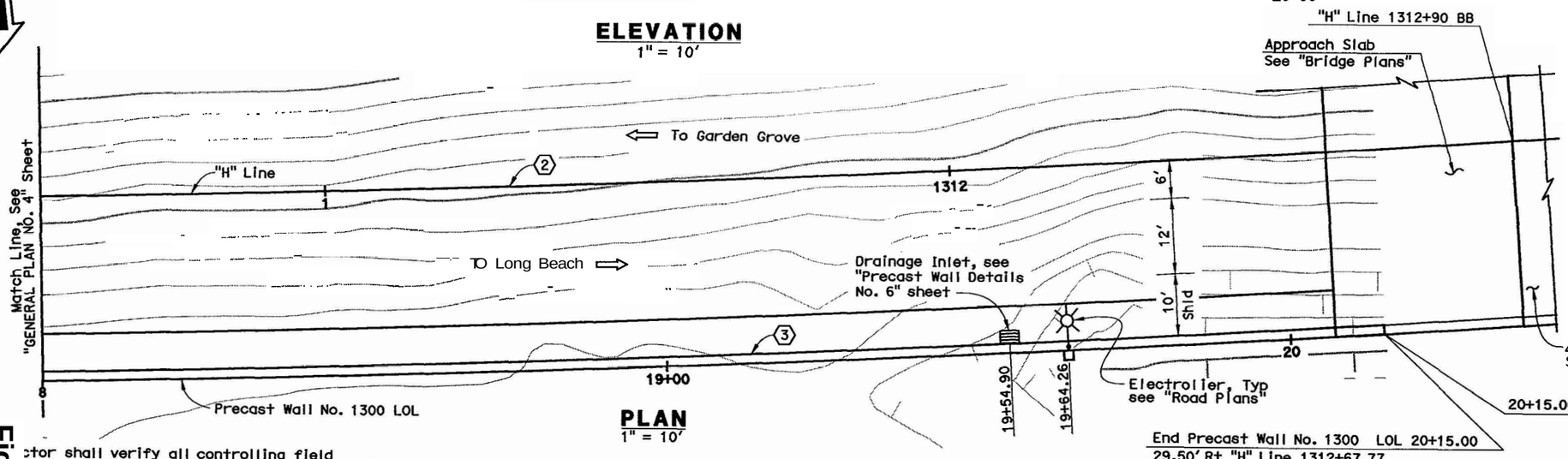
PROFILE GRADE
No Scale



NOTES:

1. For Precast Wall Details, see "Precast Wall Details No." sheet.
2. For Architectural Details, see Architectural Panels sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Detail, see "Precast Wall Details No. 6" sheet.

ELEVATION
1" = 10'



PLAN
1" = 10'

CURVE DATA

② R = 5125.00' Δ = 13°08'50" L = 1176.01' T = 590.60'

③ R = 5154.48' Δ = 3°49'12" L = 343.65' T = 171.89'

NOTE: The Co…tor shall verify all controlling field dimens… before ordering or fabricating any material

Figure 3F

Sudhaka… H	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER
DESIGN OVI…	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY N. Morcillo CHECKED		
SIGN OFF …	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY CHECKED PLANS AND SPECS COMPARED		

BRIDGE NO.	PRECAST WALL No. 1300 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
55-XXX	GENERAL PLAN No. 5
POST MILES 20.91	

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/06

SHEET 6 OF 25

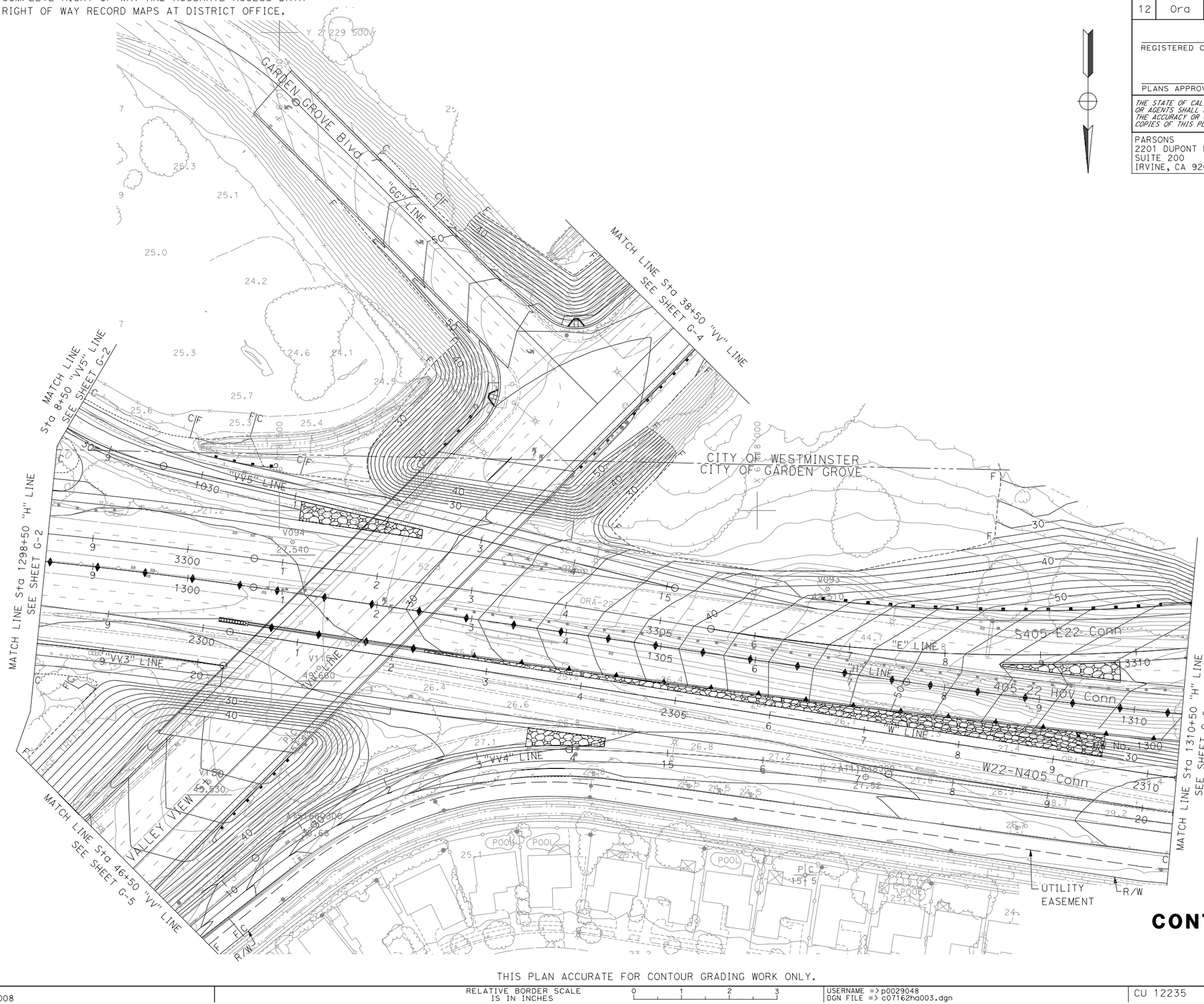
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

SHEET (ENGLISH) (REV. 2/28/06)

FILE => @REQUEST

DATE PLOTTED => @DATE TIME PLOTTED => @TIME USERNAME => @USER

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. — Exp. — CIVIL — STATE OF CALIFORNIA

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PARSONS
2201 DUPONT DRIVE
SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

Figure 3G

CONTOUR GRADING

SCALE 1" = 50'

G-3

THIS PLAN ACCURATE FOR CONTOUR GRADING WORK ONLY.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans®

CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY	DATE REVISED

LAST REVISION 10/7/2008
DATE PLOTTED => 10/7/2008
TIME PLOTTED => 10:02:32 AM
c07162ha003.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0029048
DGN FILE => c07162ha003.dgn

CU 12235

EA 071621

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. Exp. CIVIL — STATE OF CALIFORNIA

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PARSONS
2201 DUPONT DRIVE
SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

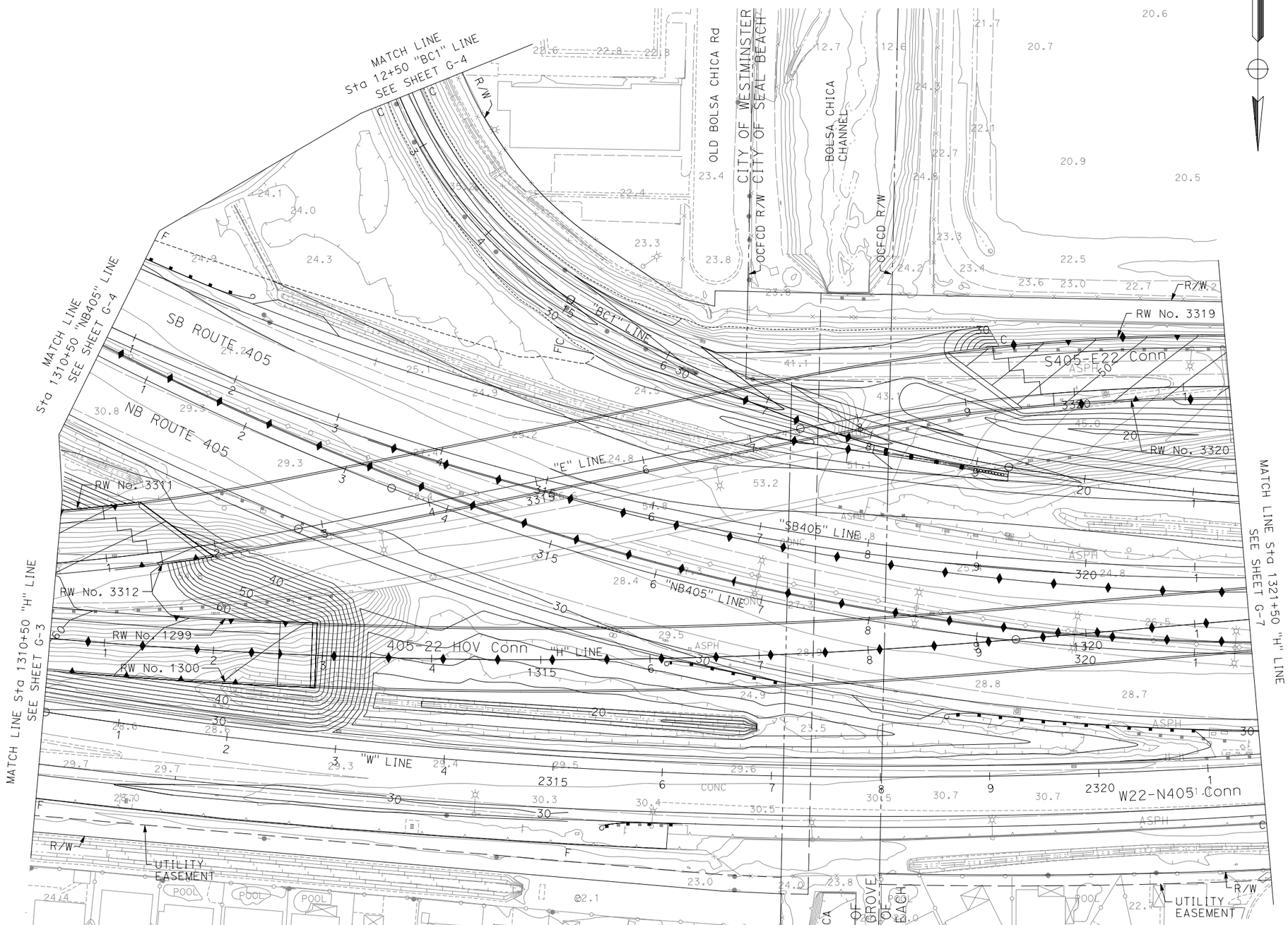

Figure 3H

CONTOUR GRADING

SCALE 1" = 50'

G-6

THIS PLAN ACCURATE FOR CONTOUR GRADING WORK ONLY.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY	DATE REVISED

LAST REVISION 10/7/2008

DATE PLOTTED => 10/7/2008
TIME PLOTTED => 10:02:52 AM
c07162ha006.dgn

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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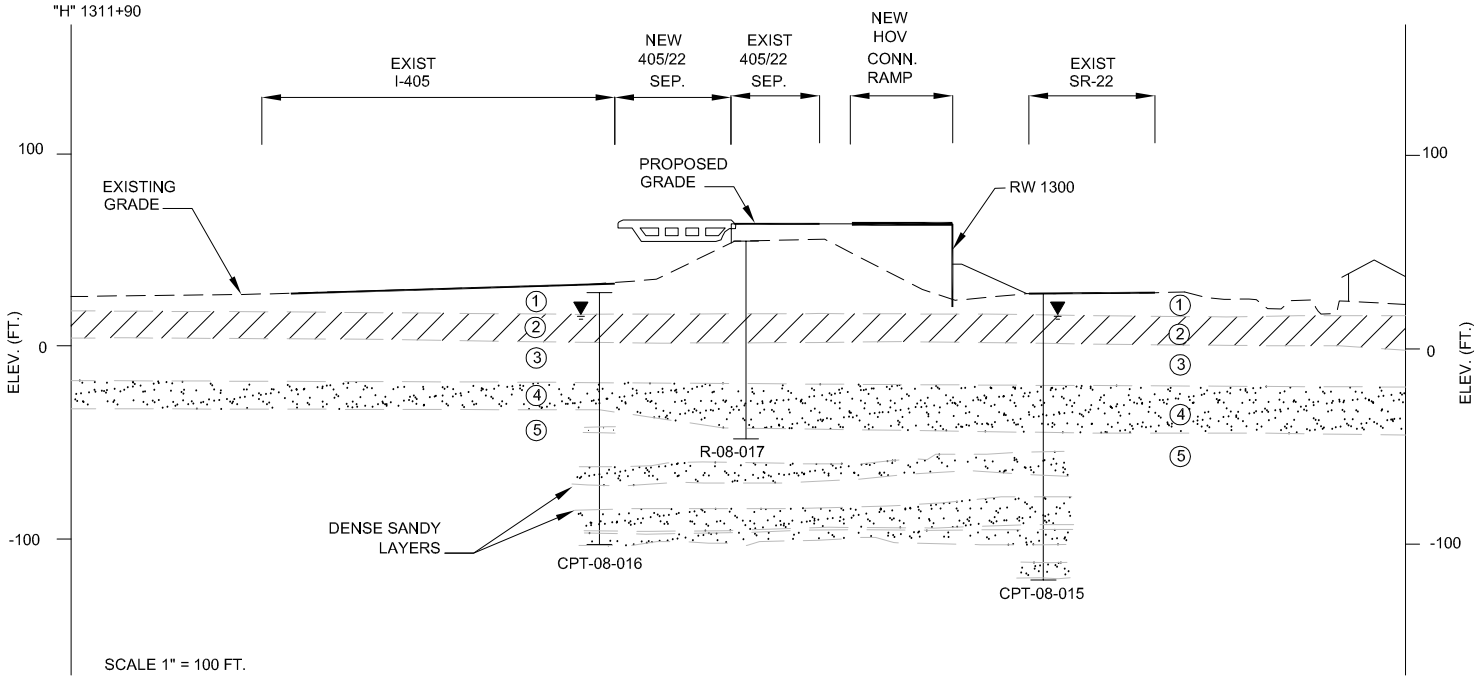
DGN FILE => c07162ha006.dgn

CU 12235

EA 071621



SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

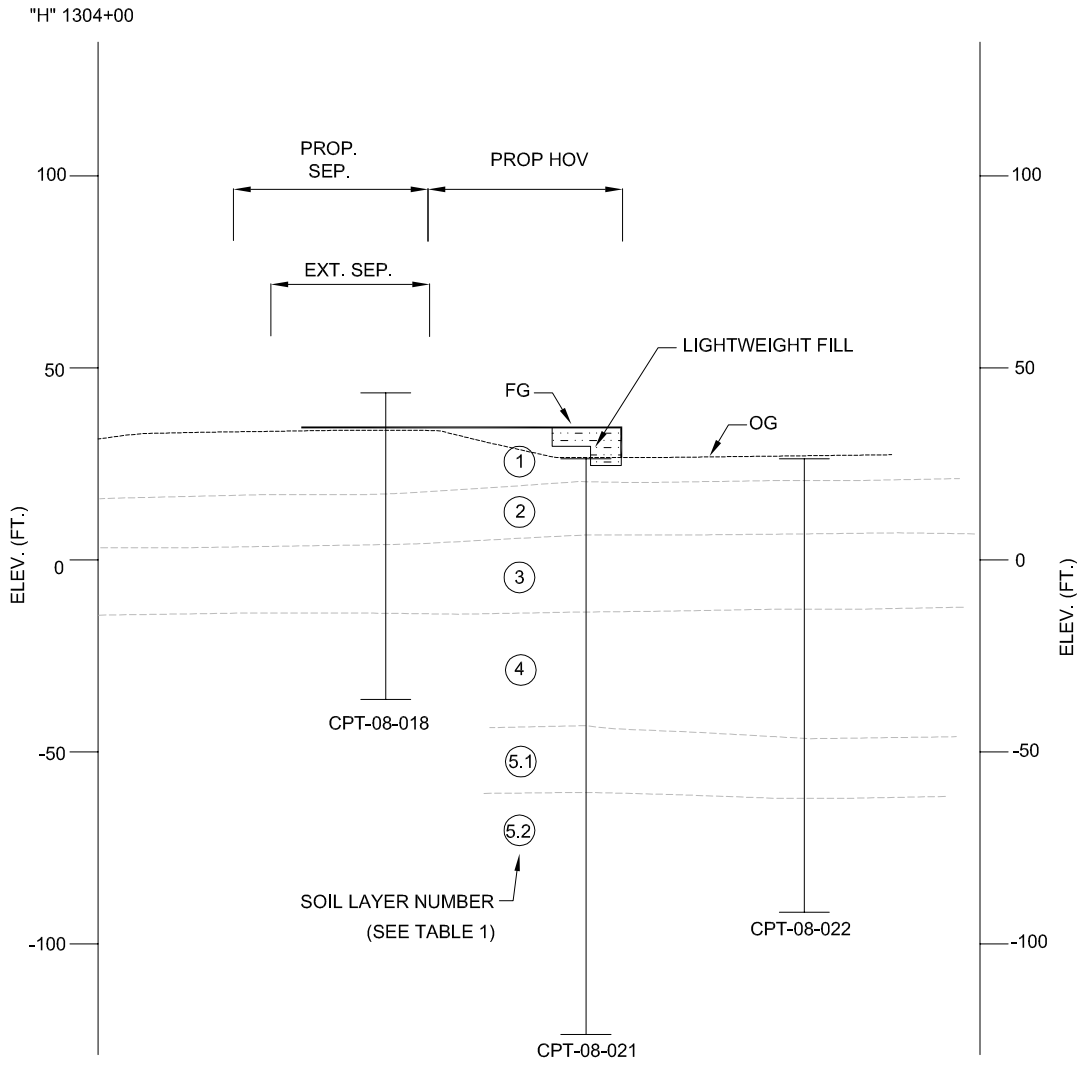
② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 92 ARGONAUT, SUITE 120 ALISO VIEJO, CA 92656 (949) 609-1020	FIGURE NUMBER 4A
	PROJECT NAME WEST COUNTY CONNECTOR PROJECT I-405/SR-22 HOV. CONN. SEGMENT	PROJECT NUMBER I-436
	CROSS SECTION - "H" 1311+90	



SCALE 1" = 50 FT.

GROUP DELTA

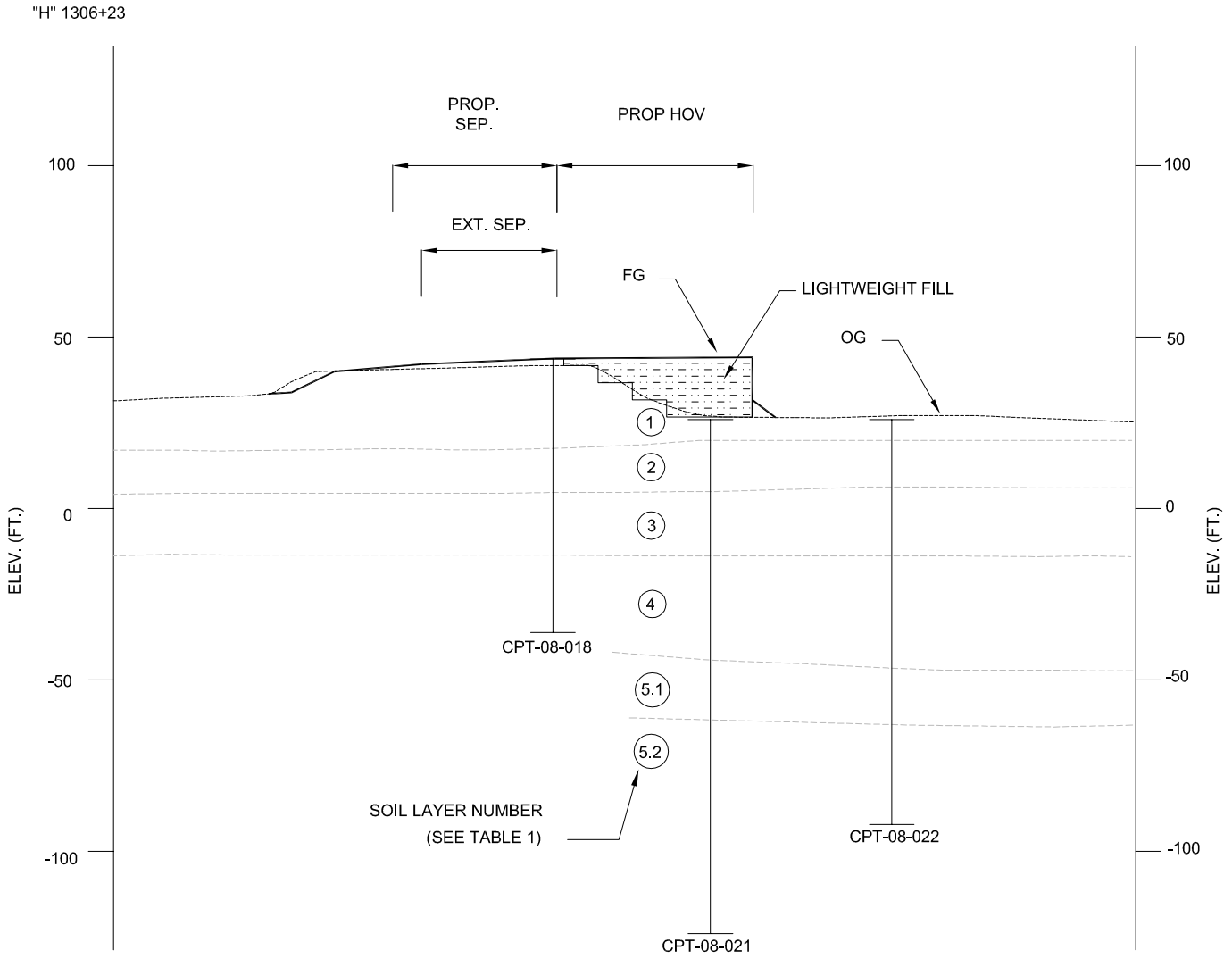
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER
4B

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

CROSS SECTION AT "H" 1304+00



GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

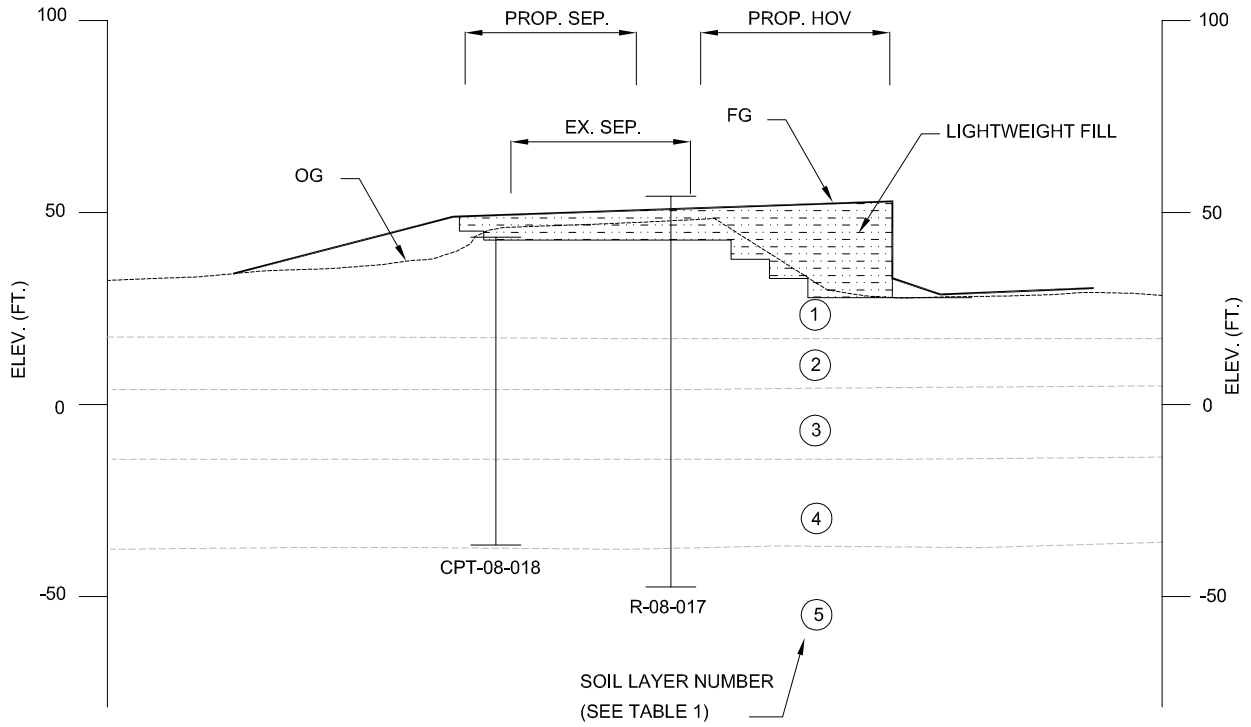
FIGURE NUMBER
4C

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

CROSS SECTION AT "H" 1306+23

"H" 1308+00



SCALE 1" = 50 FT.

GROUP DELTA

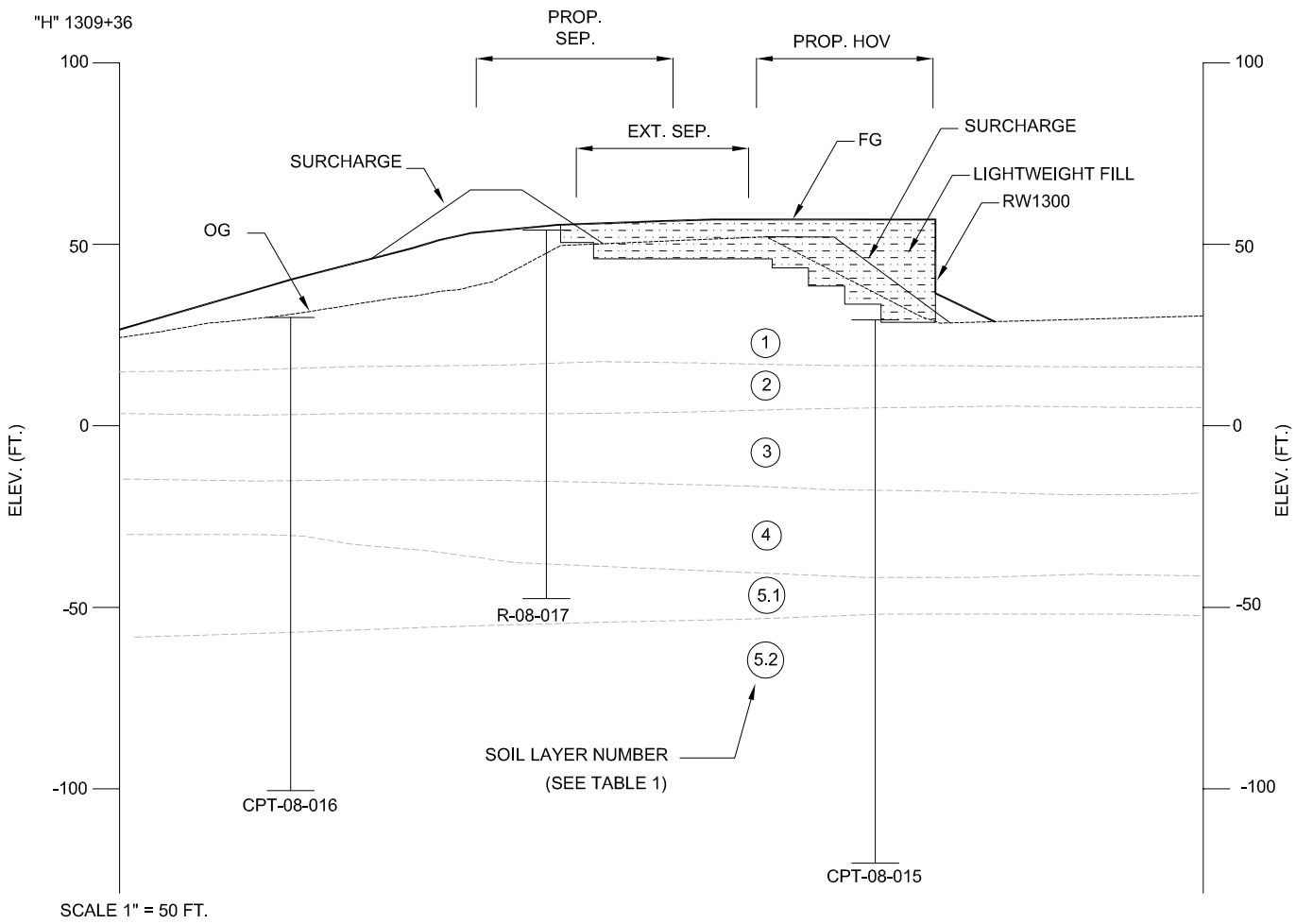
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER
4D

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

CROSS SECTION AT "H" 1308+00



GROUP DELTA

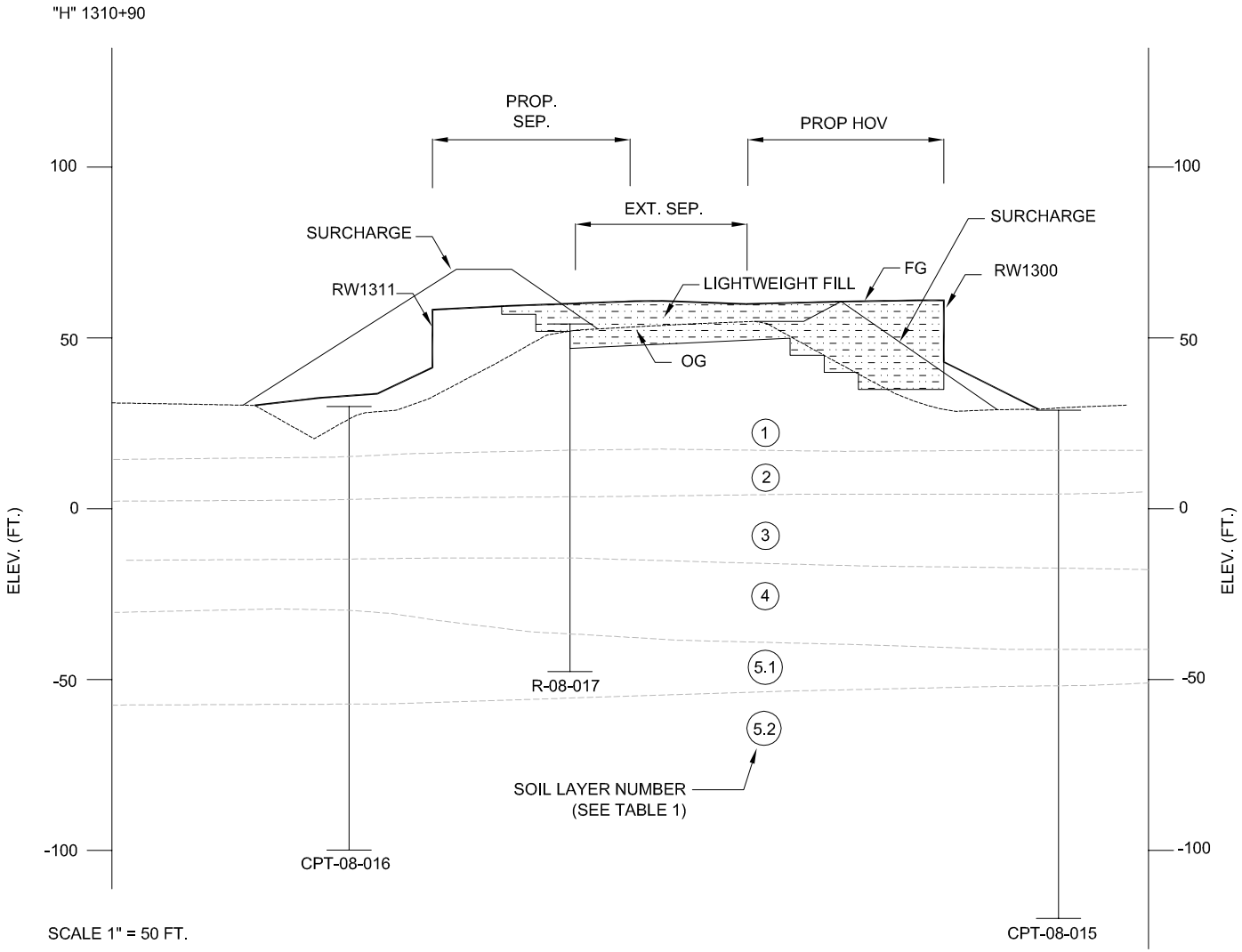
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER: 4E

PROJECT NAME: WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER: I-436

CROSS SECTION AT "H" 1309+36



GROUP DELTA

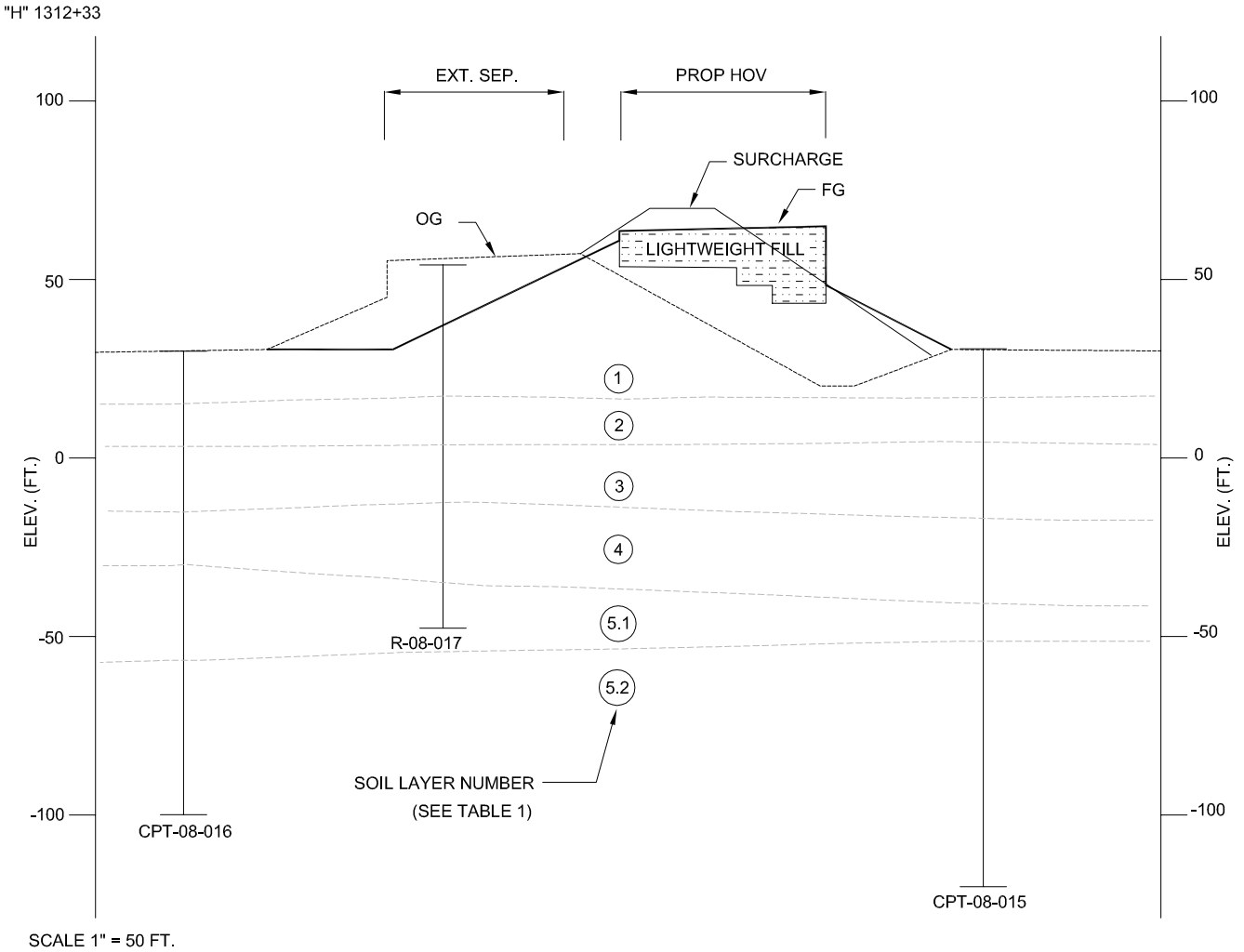
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER
4F

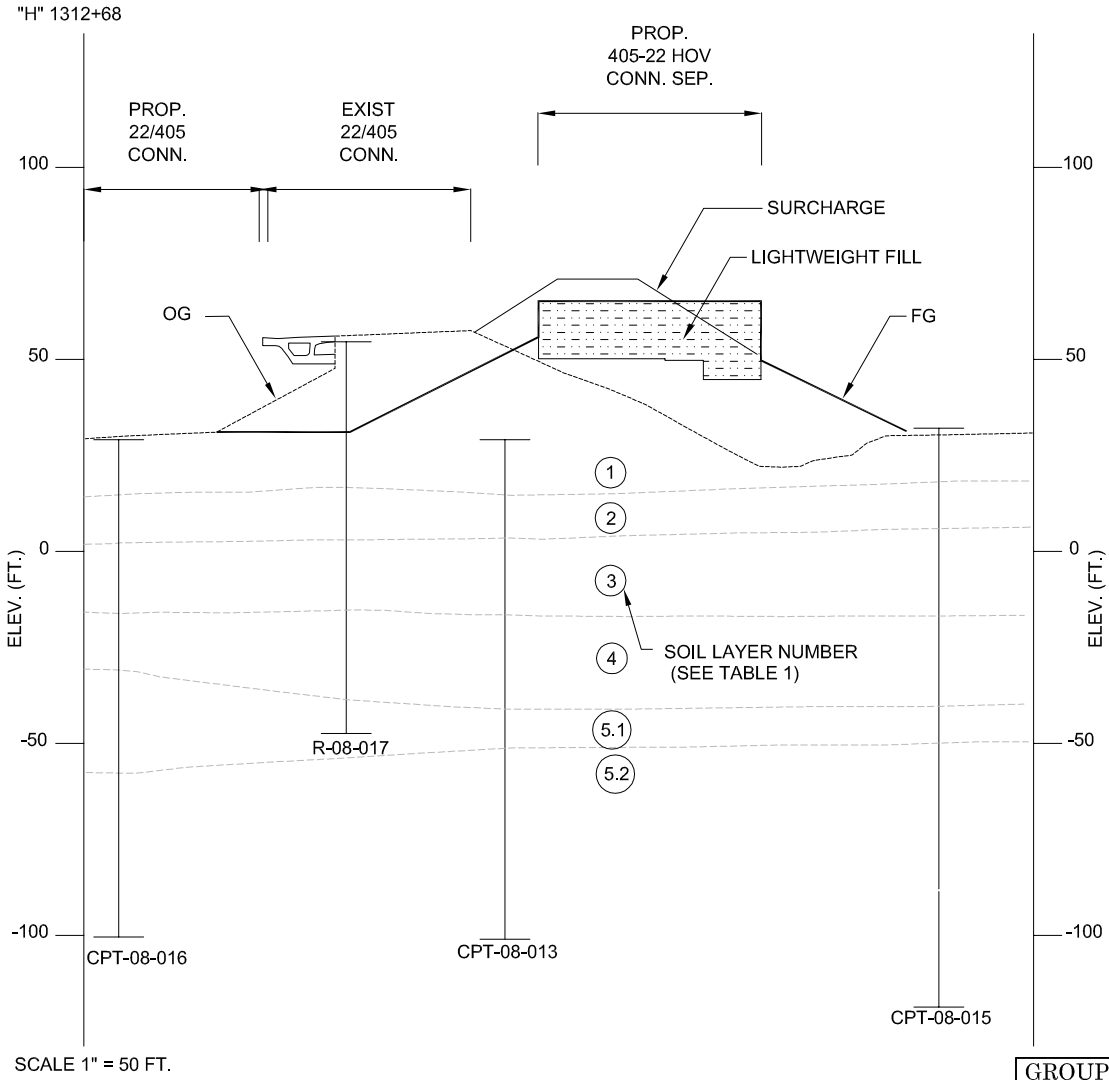
PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

CROSS SECTION AT "H" 1310+90



GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 92 ARGONAUT, SUITE 120 ALISO VIEJO, CA 92656 (949) 609-1020	FIGURE NUMBER 4G
	PROJECT NAME WEST COUNTY CONNECTOR PROJECT I-405/SR-22 HOV. CONN. SEGMENT	PROJECT NUMBER I-436
	CROSS SECTION AT "H" 1312+33	



GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER
4H

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

CROSS SECTION AT "H" 1312+68

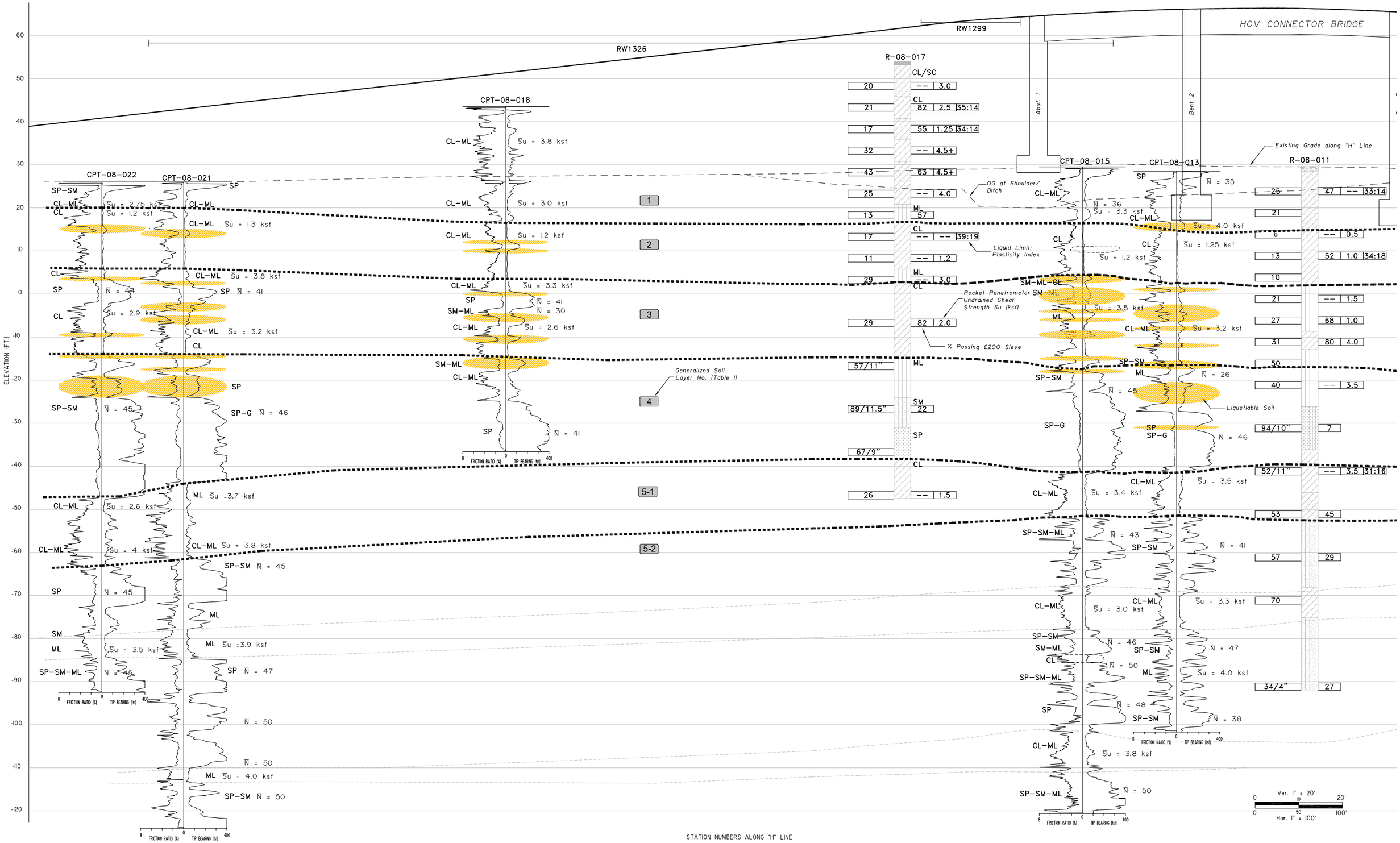


FIGURE 5
Geotechnical Cross Section - RW1300 & RW1299

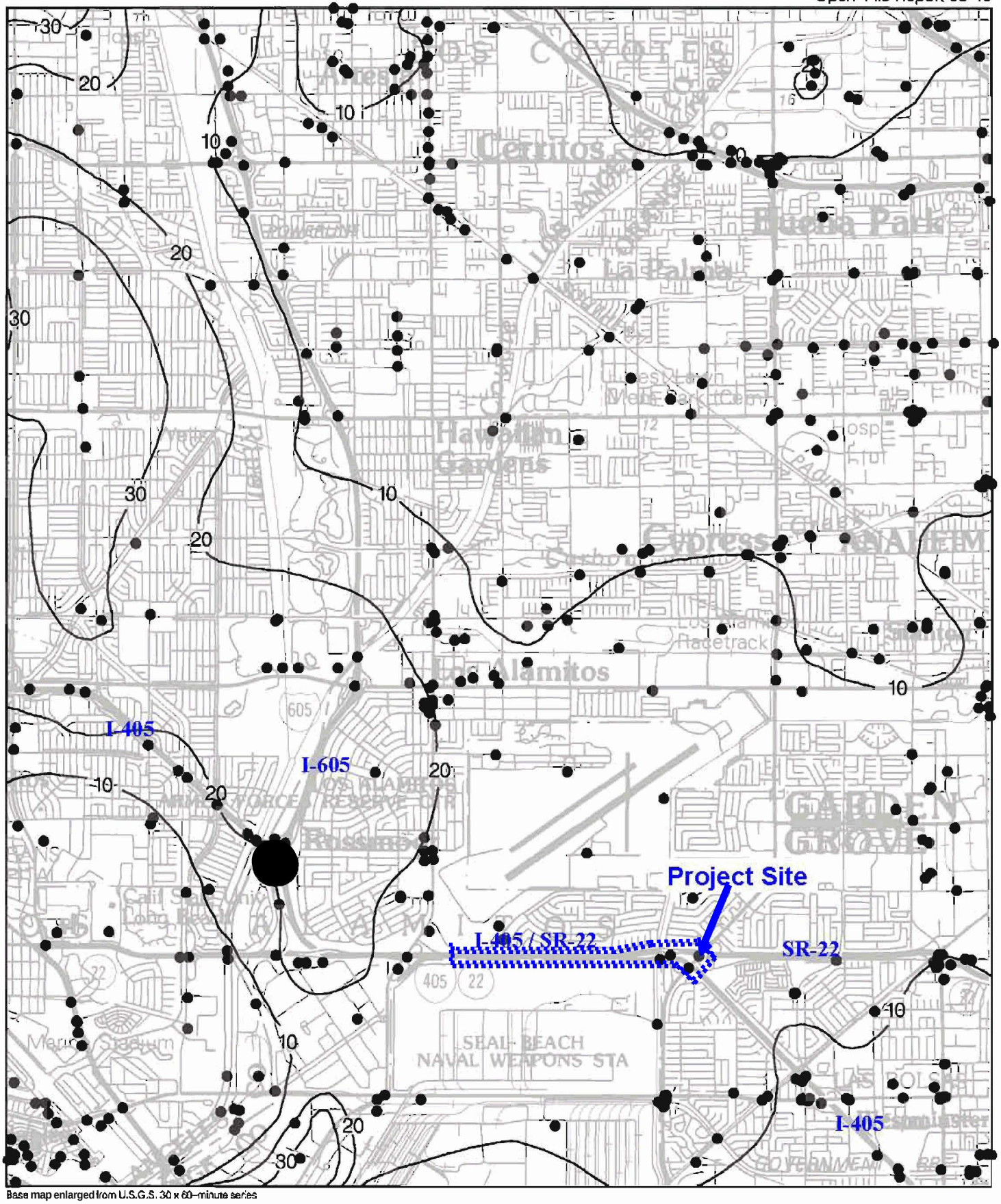


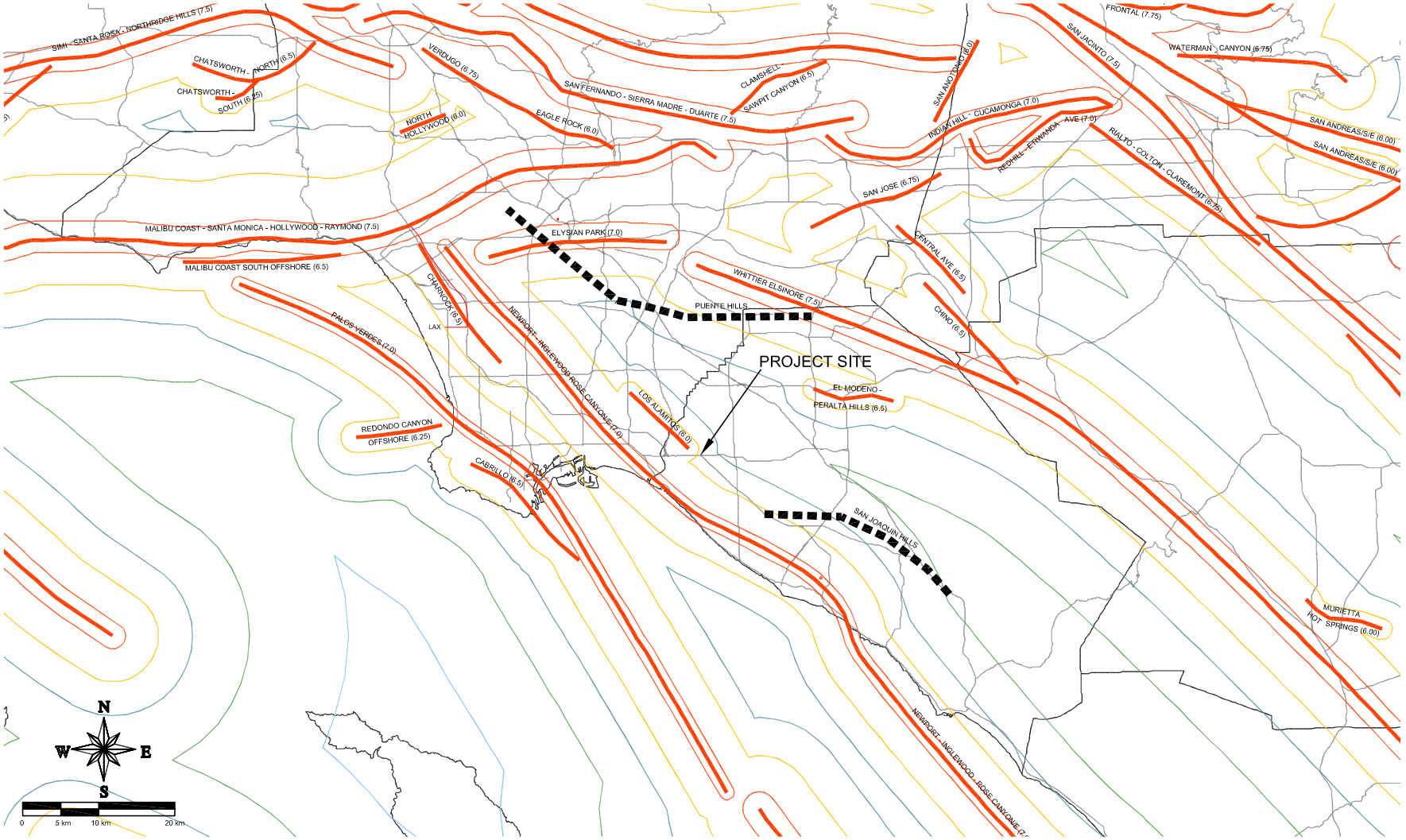
Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

● Borehole Site

30 Depth to ground water in feet

Figure 6: Historically Highest Groundwater Map

ONE MILE



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills fault in Orange County is currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

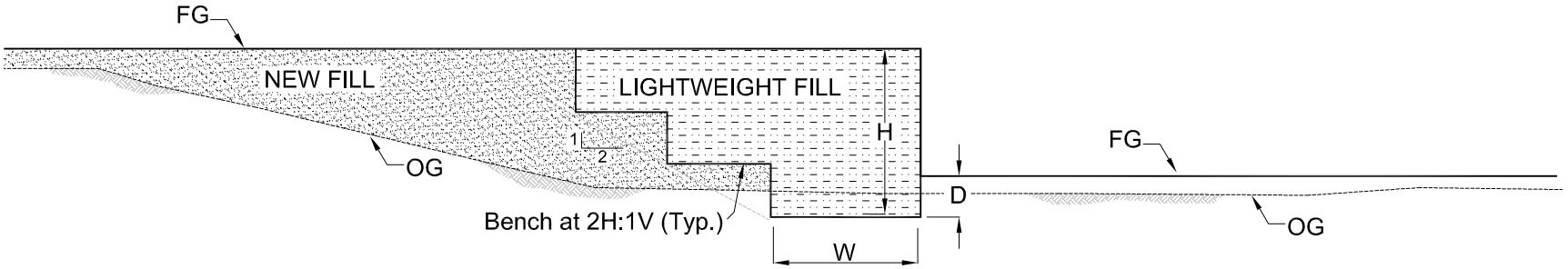
GROUP DELTA

GDC PROJECT NO. I-436

PRECAST WALLS NOS. RW1300 AND RW1299
SR 22 Improvements - Phase 2

Caltrans Fault and PBA Map

Figure 7



Key Width (min.)
W = 8' (H < 12')
W = 12' (H = 12 - 20')

Depth Below FG (min.)
D = 0.1H or 2' min.

NO SCALE

GROUP DELTA

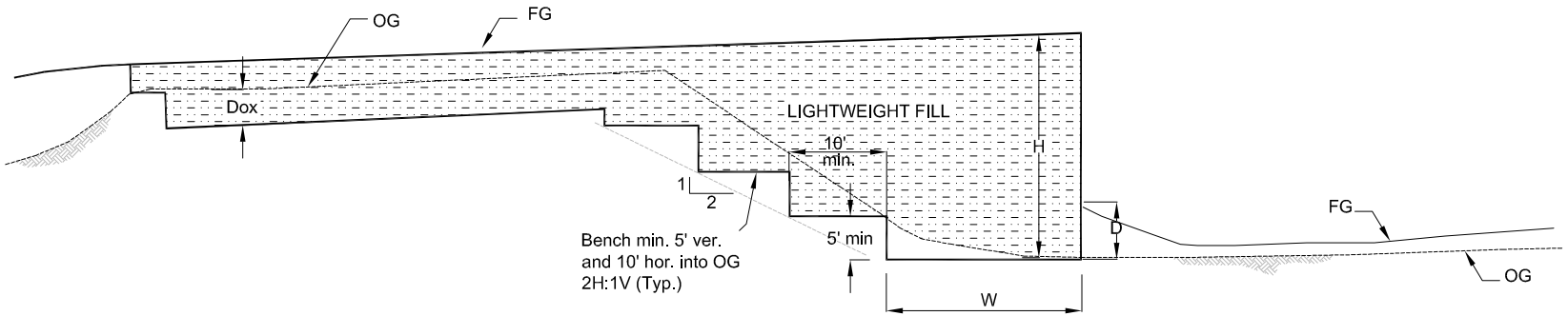
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER
8A

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

TYPICAL SECTION - AREA 1
(10+00 - 13+00)



Key Width (min.)
W = 15' (H >= 20') or as dictated by benching
W = 12' (H = 12 - 20') or as dictated by benching

NO SCALE

Depth Below FG (min.)
D = 0.1H or 2' (Level Ground)
D = 0.2H or 5' (Slope)

GROUP DELTA

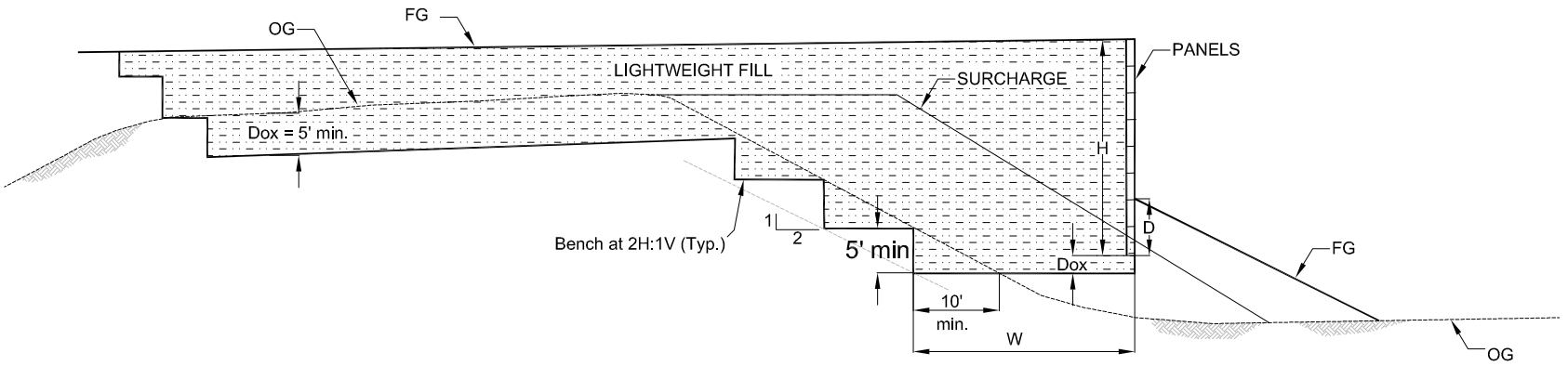
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER: 8B

PROJECT NAME: WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER: I-436

TYPICAL SECTION - AREA 2
(13+00 - 16+50)



RW1300

Key Width (min.)
W = 15' or min. 10' hor. into OG

Depth Below FG (min.)
D = 5' min. or 0.2H to bottom of panels
Dox = 3' min. below bottom of panels

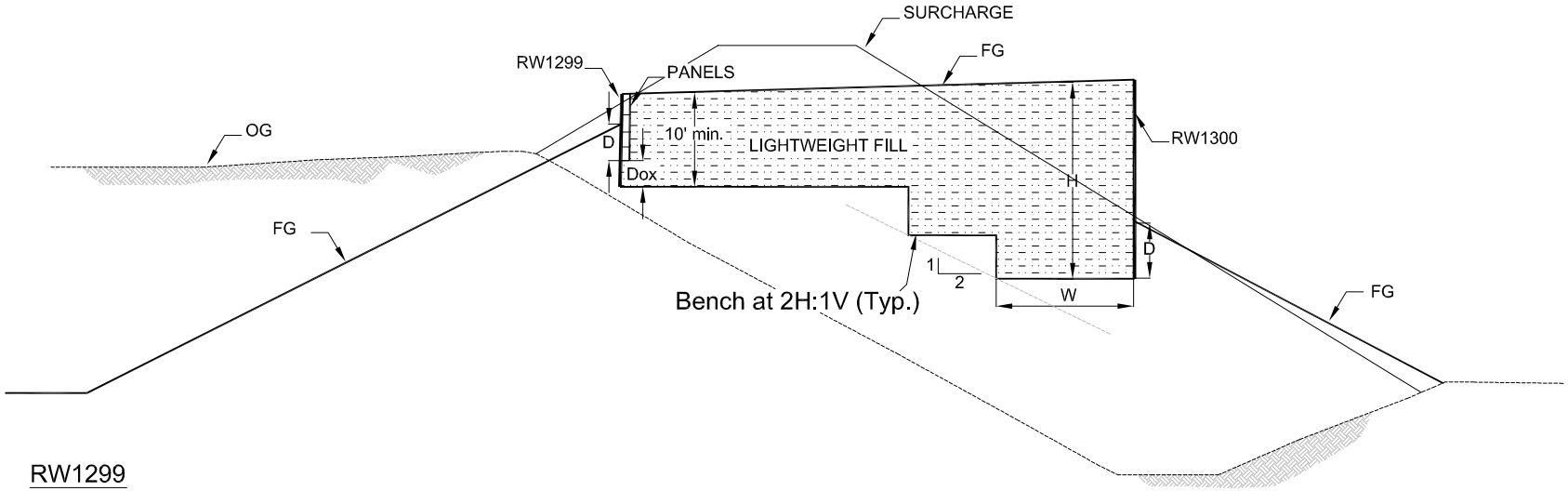
ROADWAY

Dox = 5' min.

NO SCALE

Note:
Surcharge to be left in place shall be placed as 95% compacted fill up to top of leveling pad elevation.

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 92 ARGONAUT, SUITE 120 ALISO VIEJO, CA 92656 (949) 609-1020	FIGURE NUMBER 8C
	PROJECT NAME WEST COUNTY CONNECTOR PROJECT I-405/SR-22 HOV. CONN. SEGMENT	PROJECT NUMBER I-436
	TYPICAL SECTION - AREA 3 (16+50 - 19+00)	



RW1299

Key Width (min.)
W = Level bench 10' below top of wall extending to RW1300 backfill

Depth Below FG (min.)
D = 5' min. or 0.2H to bottom of panels
Dox = as required to provide 10' min. lightweight fill below top of wall

NO SCALE

RW1300
D = 5' min. or 0.2H
W = 15' min.

Note:
Place surcharge as 95% compacted fill up to El. +55 ft.

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 92 ARGONAUT, SUITE 120 ALISO VIEJO, CA 92656 (949) 609-1020	FIGURE NUMBER 8D
	PROJECT NAME WEST COUNTY CONNECTOR PROJECT I-405/SR-22 HOV. CONN. SEGMENT	PROJECT NUMBER I-436
	TYPICAL SECTION - AREA 4 (19+00 - 20+15)	

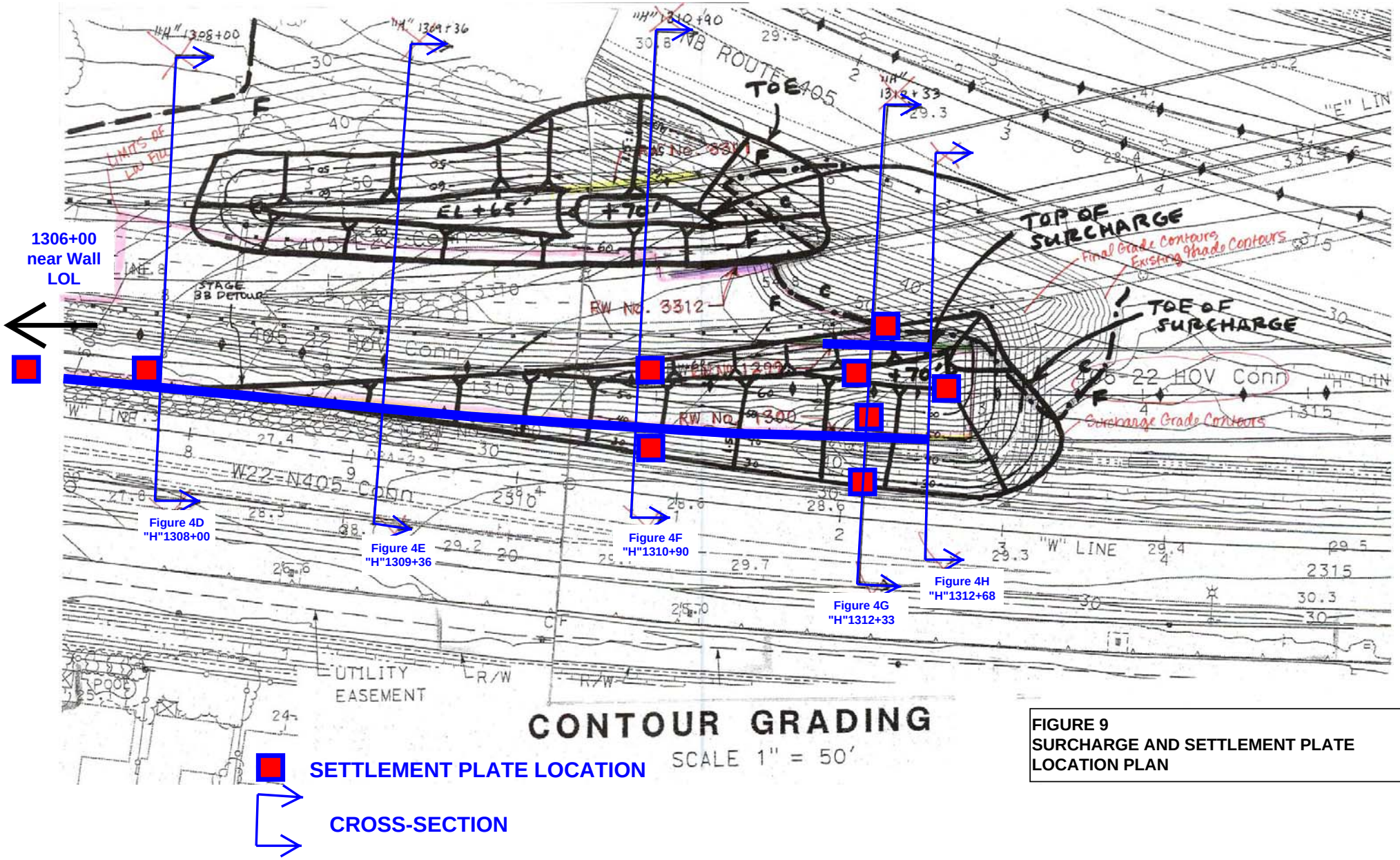
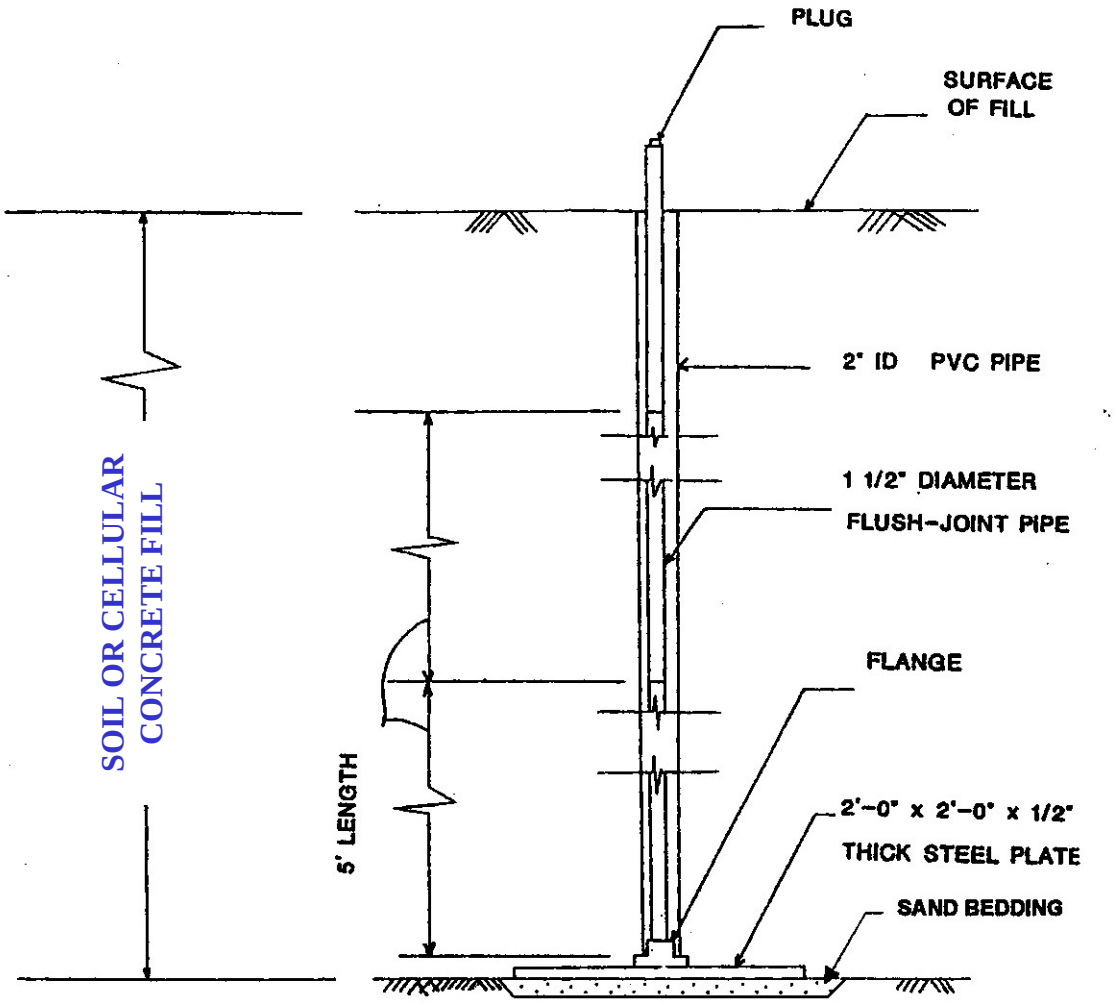


FIGURE 9
SURCHARGE AND SETTLEMENT PLATE LOCATION PLAN



No Scale

GROUP DELTA CONSULTANTS

GDC Project No. I-436

West County Connectors 405/22 HOV Segment
Orange County, CA

Settlement Plate Detail

Figure 10

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

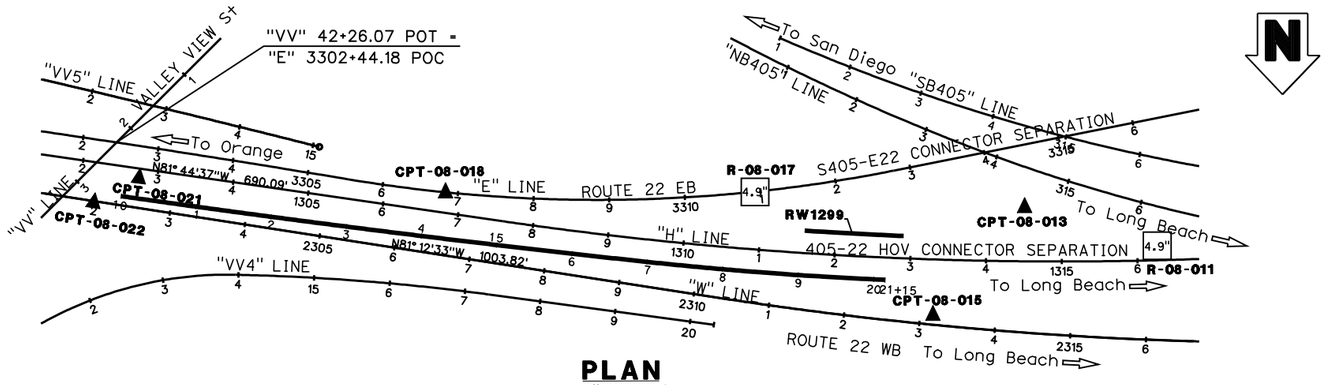
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

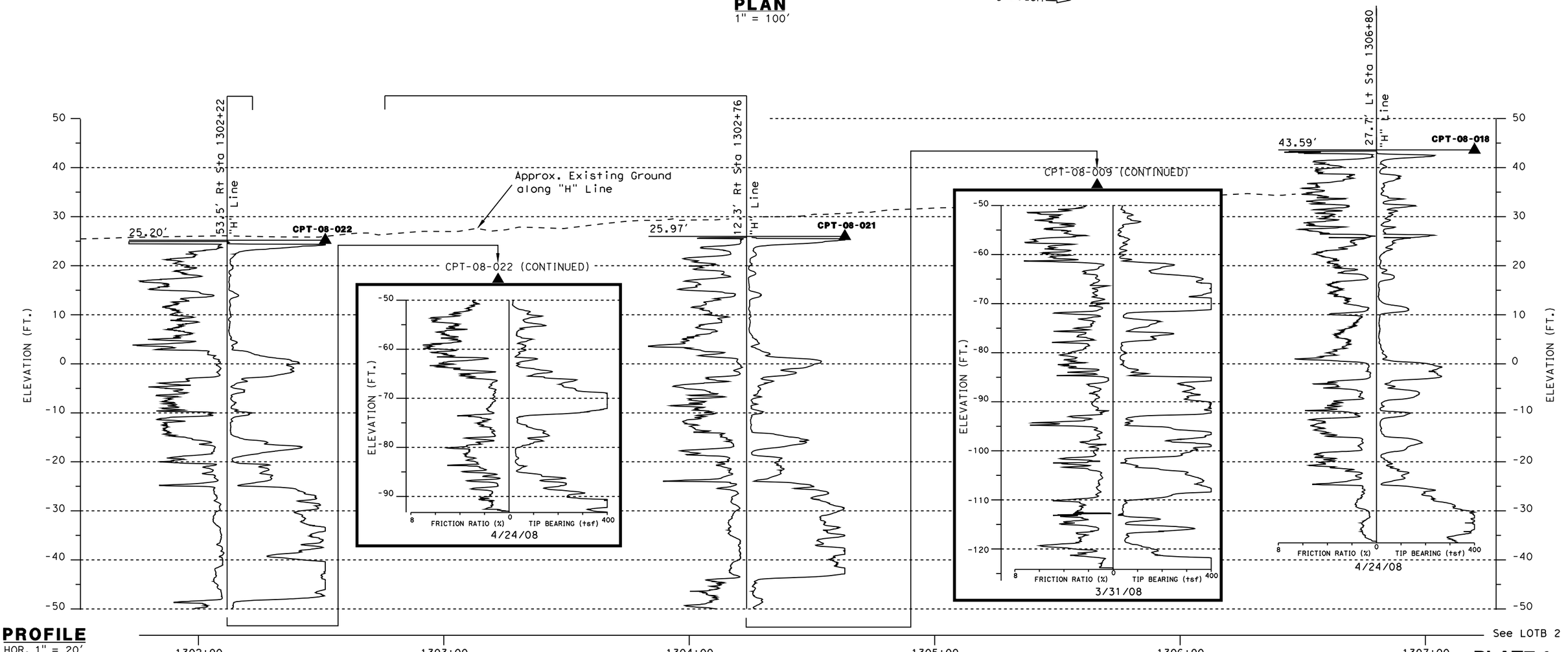
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 2

PLATE 1

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0073 POST MILES R1.11-1.12	PRECAST WALL NO. RW1299 LOG OF TEST BORINGS 1 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES: 10/23/08 02/23/09 05/18/09 — SHEET 12 OF 17

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

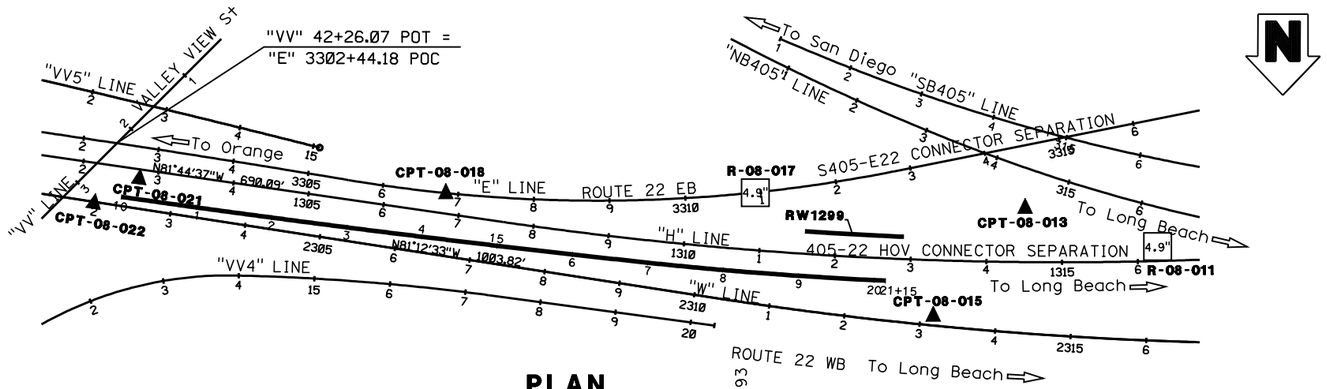
BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

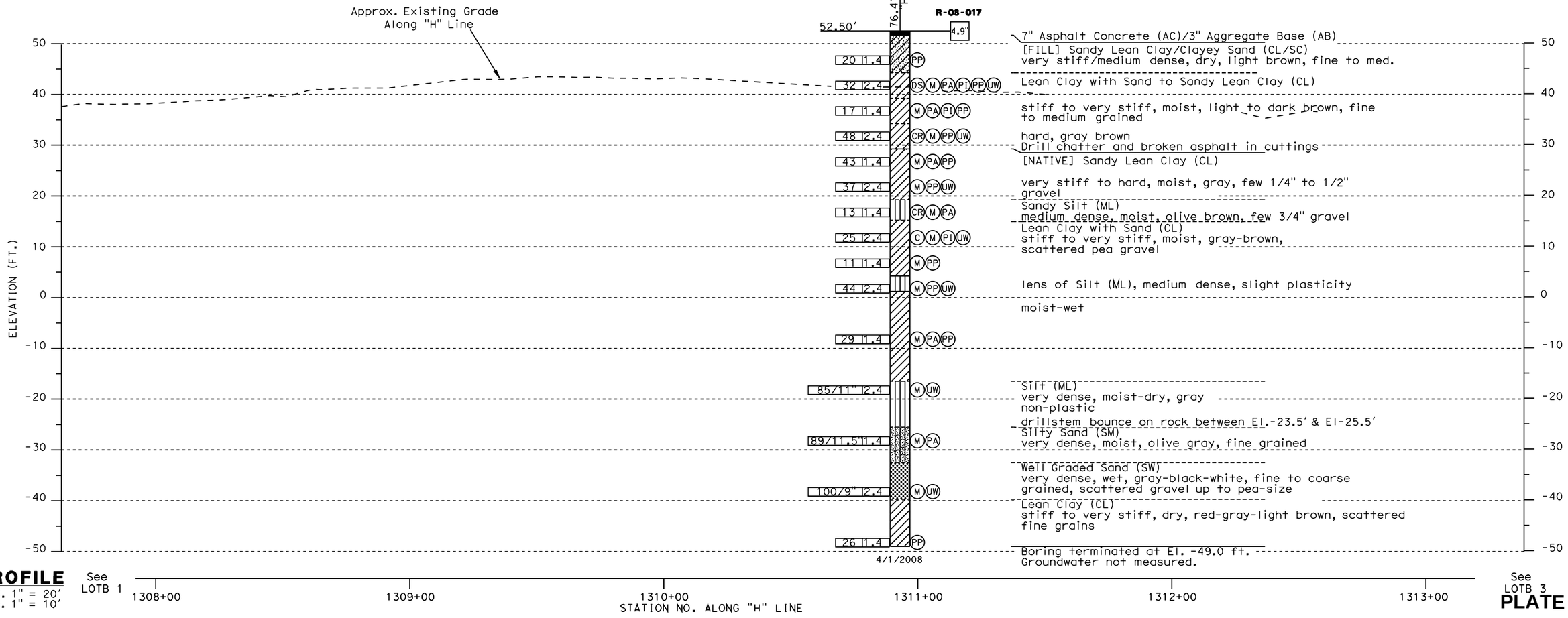
Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1

See LOTB 3

PLATE 2

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0073 POST MILES R1.11-1.12

PRECAST WALL NO. RW1299

LOG OF TEST BORINGS 2 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 13 OF 17

FILE => $REQUEST

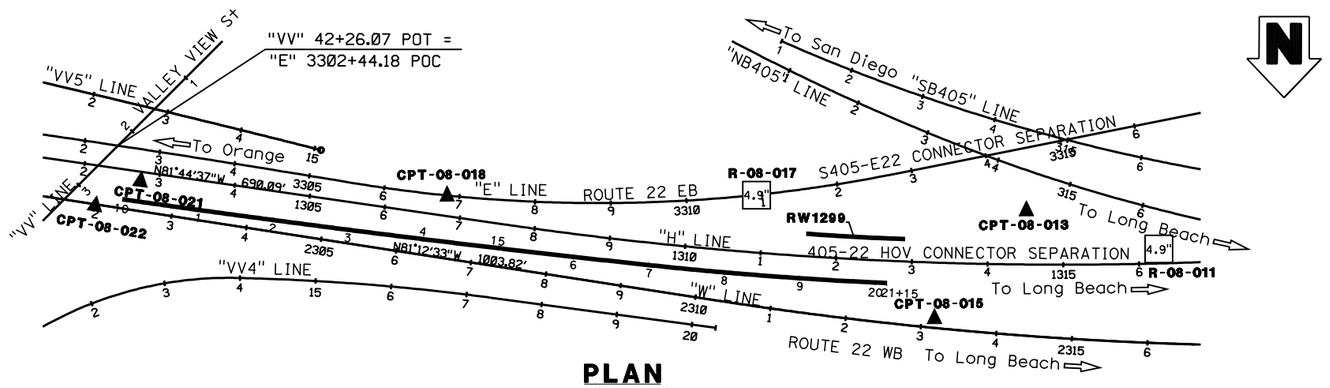
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:

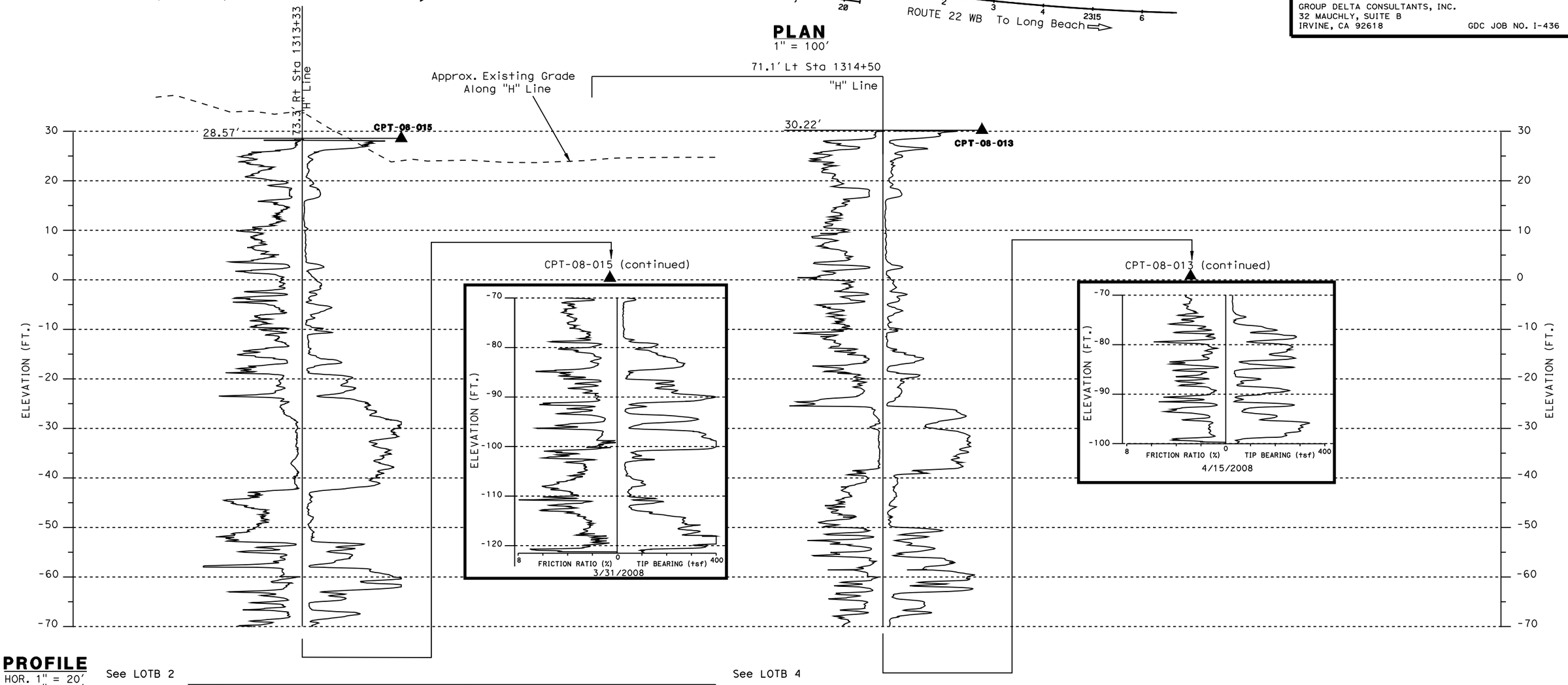
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 3

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

WALL NO. 55E0073
POST MILES R1.11-1.12

PRECAST WALL NO. RW1299
LOG OF TEST BORINGS 3 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621
FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 | 02/27/09 | 05/18/09

SHEET 14 OF 17

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

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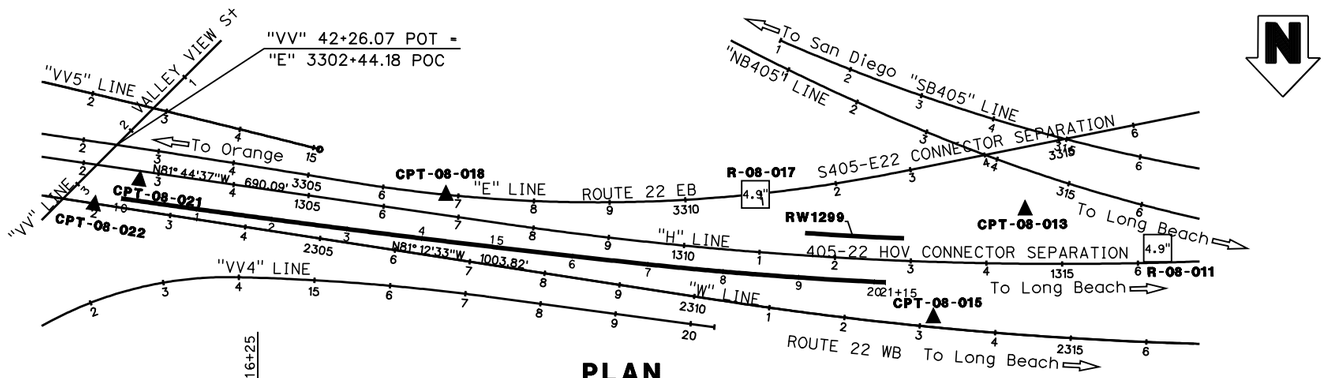
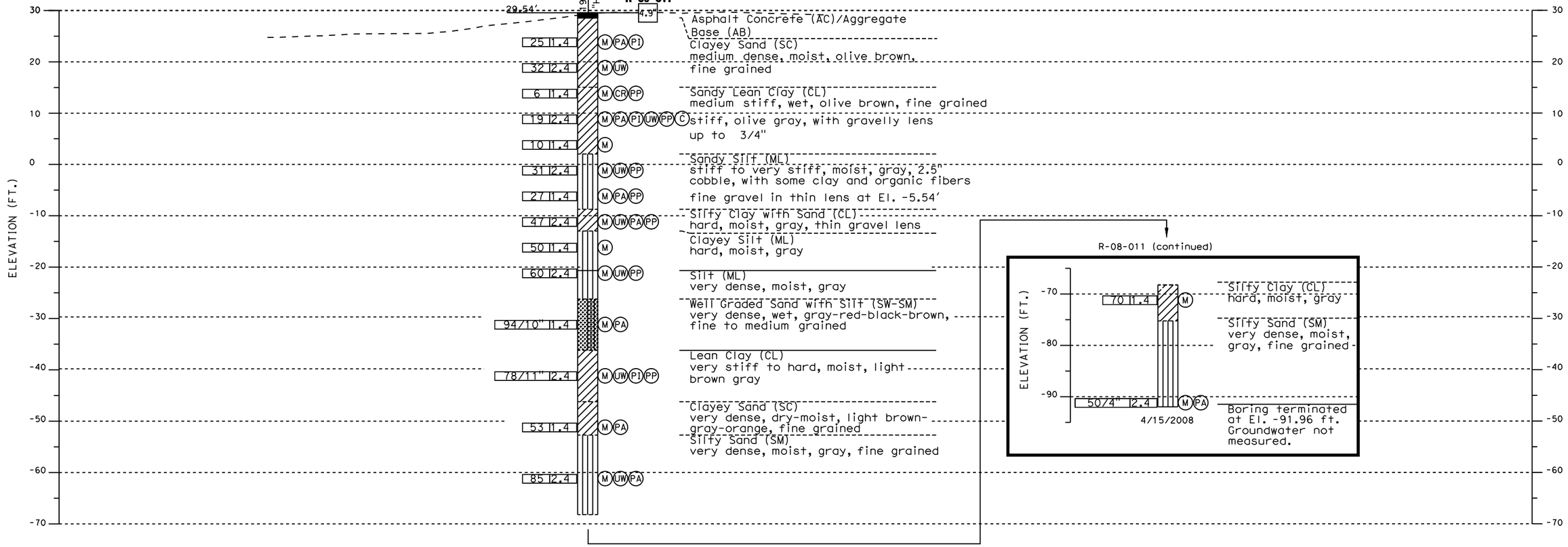
Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on Sheet 5 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 3

1315+00 1316+00 1317+00
STATION NO. ALONG "H" LINE

PLATE 4

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES / CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0073 / POST MILES R1.11-1.12	PRECAST WALL NO. RW1299 LOG OF TEST BORINGS 4 OF 6	
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3	CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 10/23/08 02/20/09 05/18/09	SHEET 15	OF 17	

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

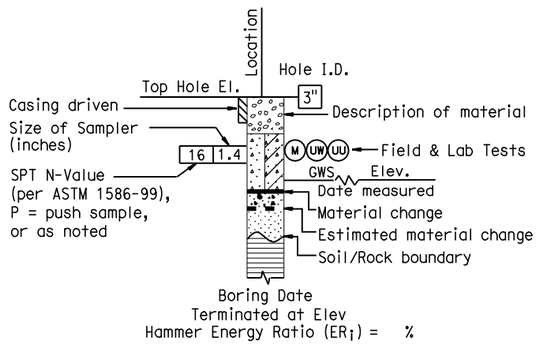
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes:

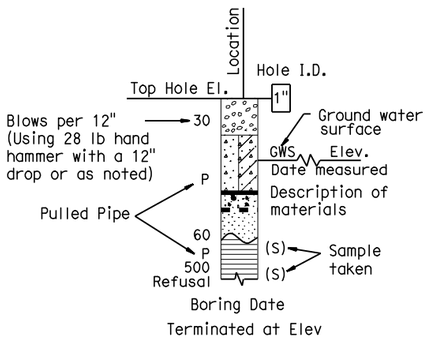
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers for rotary borings.

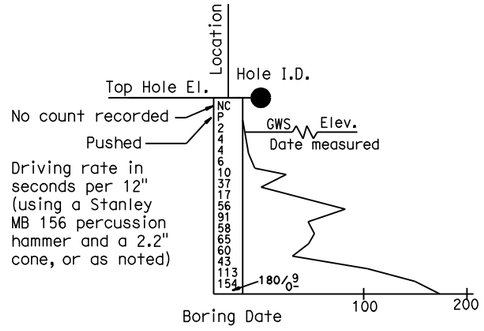
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



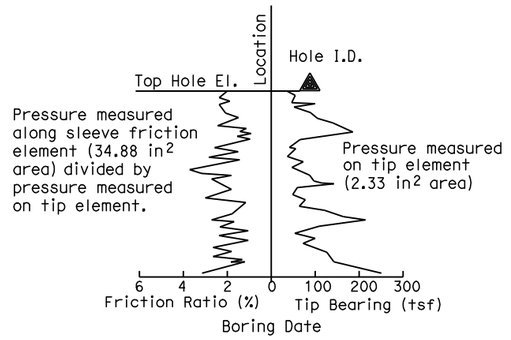
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 5

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55E0073
POST MILES R1.11-1.12

SOIL LEGEND
LOG OF TEST BORINGS 5 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 02/23/09 05/18/09

SHEET 16 OF 17

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 6

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55E0073
POST MILES R1.11-1.12

SOIL LEGEND
LOG OF TEST BORINGS 6 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 17 OF 17

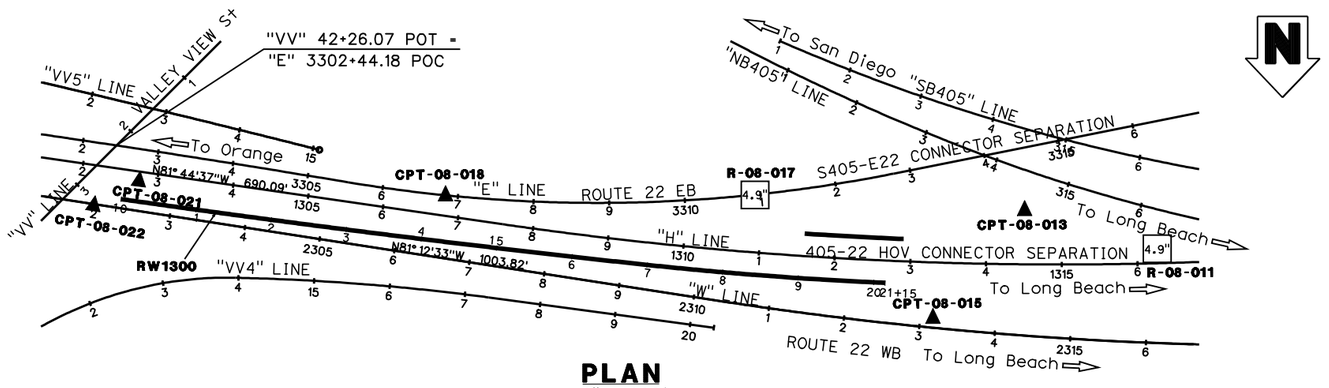
FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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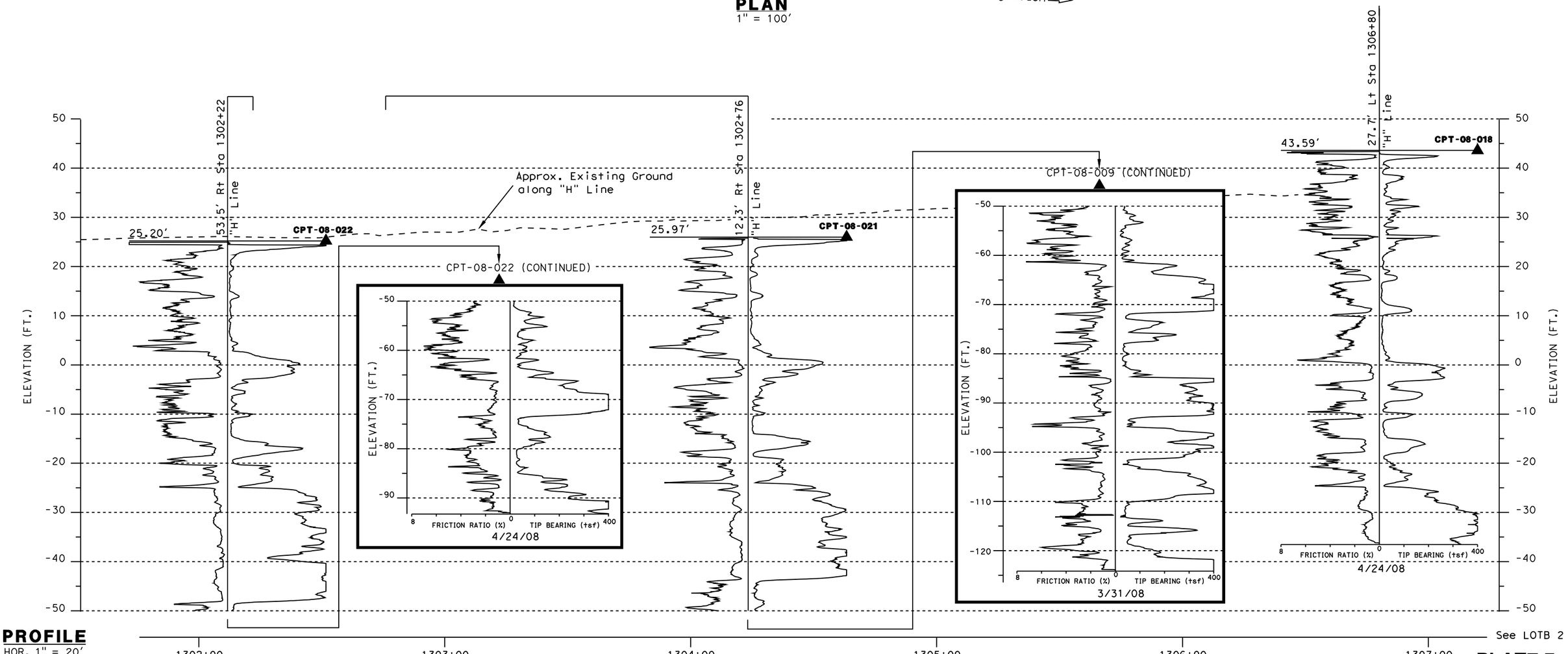
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 7

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0074 POST MILES R0.917-1.12	PRECAST WALL NO. RW1300 LOG OF TEST BORINGS 1 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES: 10/23/08 02/23/09 05/18/09 — SHEET 21 OF 26

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

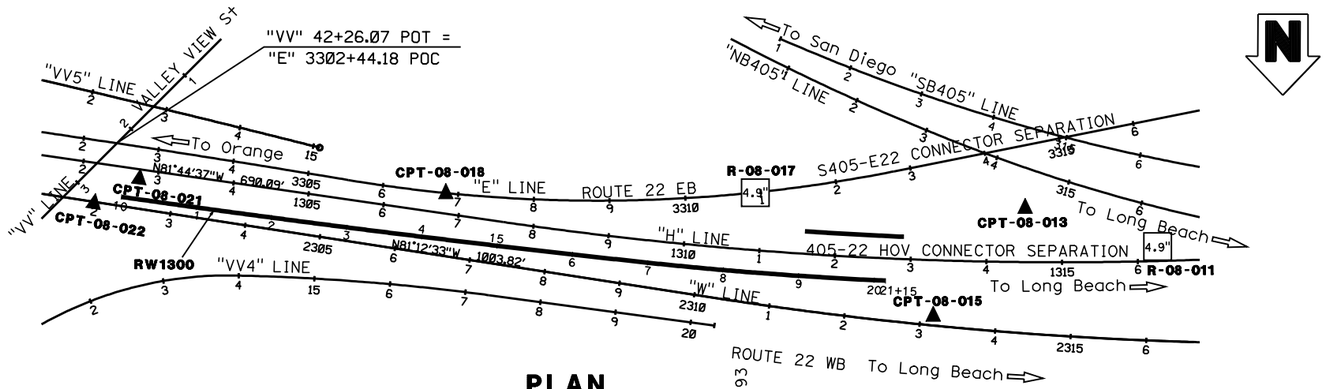
BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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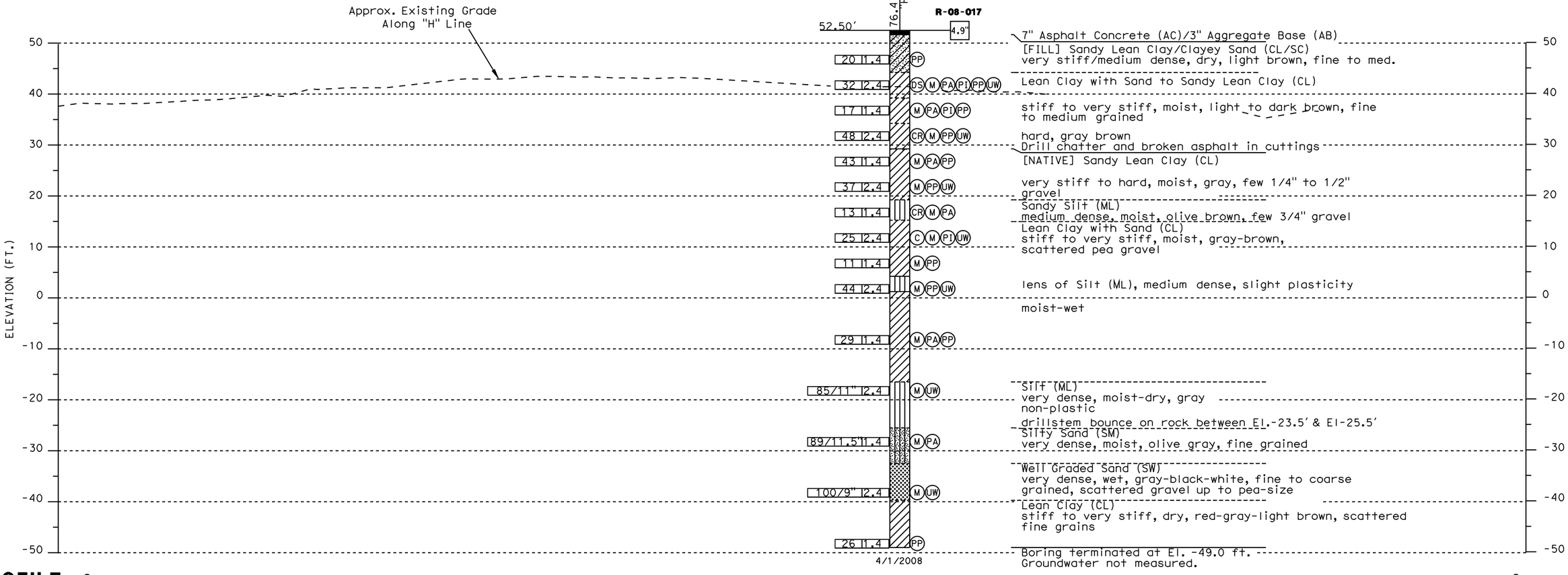
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1

See LOTB 3

PLATE 8

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0074 POST MILES R0.917-1.12

PRECAST WALL NO. RW1300

LOG OF TEST BORINGS 2 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 22 OF 26

FILE => $REQUEST

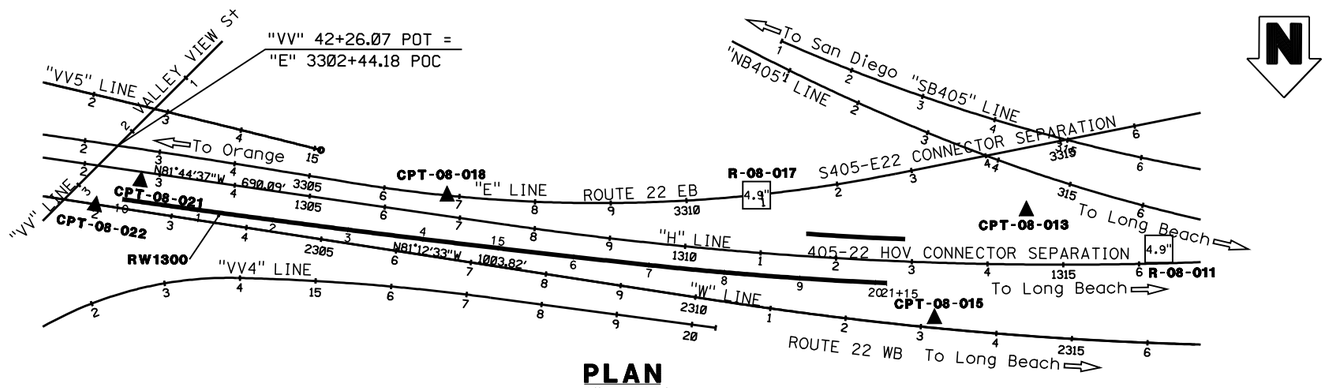
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:

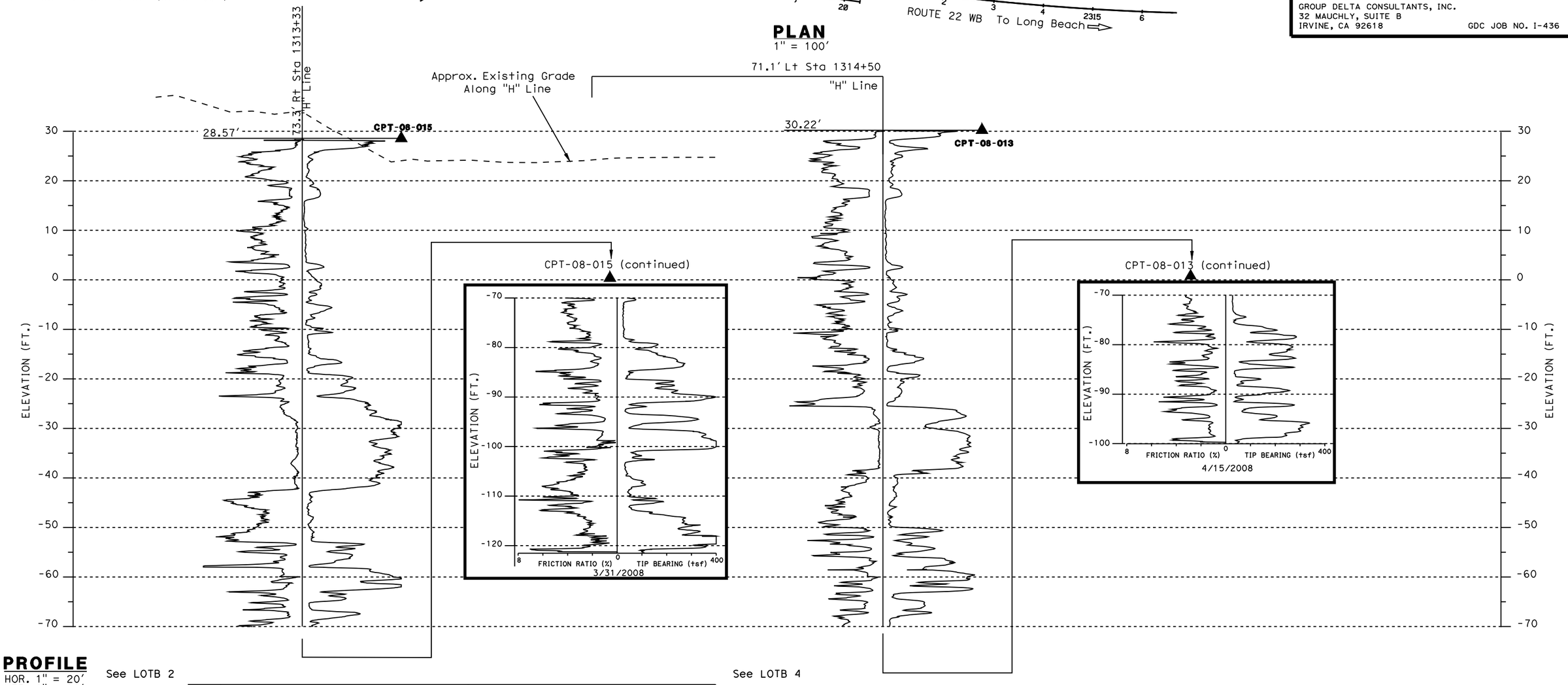
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 9

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

WALL NO. 55E0074
POST MILES R0.917-1.12

PRECAST WALL NO. RW1300
LOG OF TEST BORINGS 3 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621
FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 | 02/27/09 | 05/18/09

SHEET 23 OF 26

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

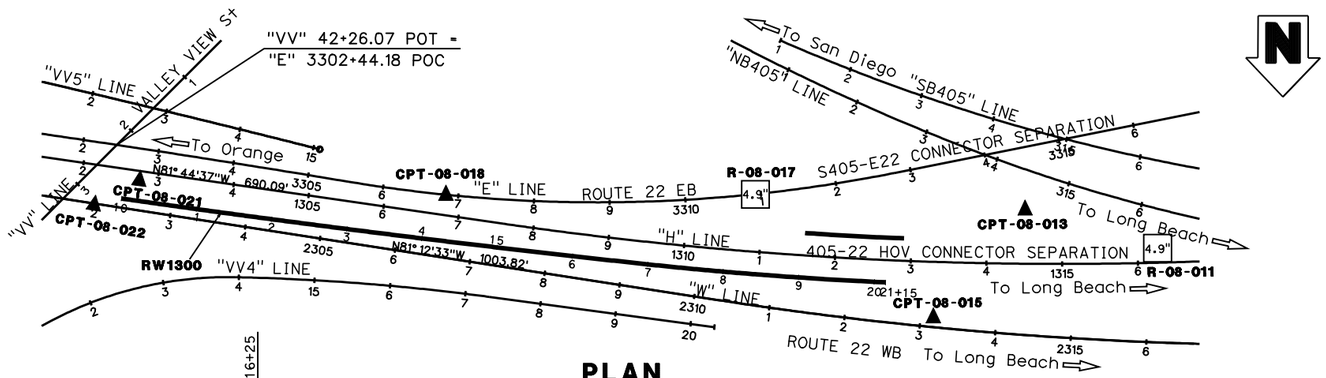
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

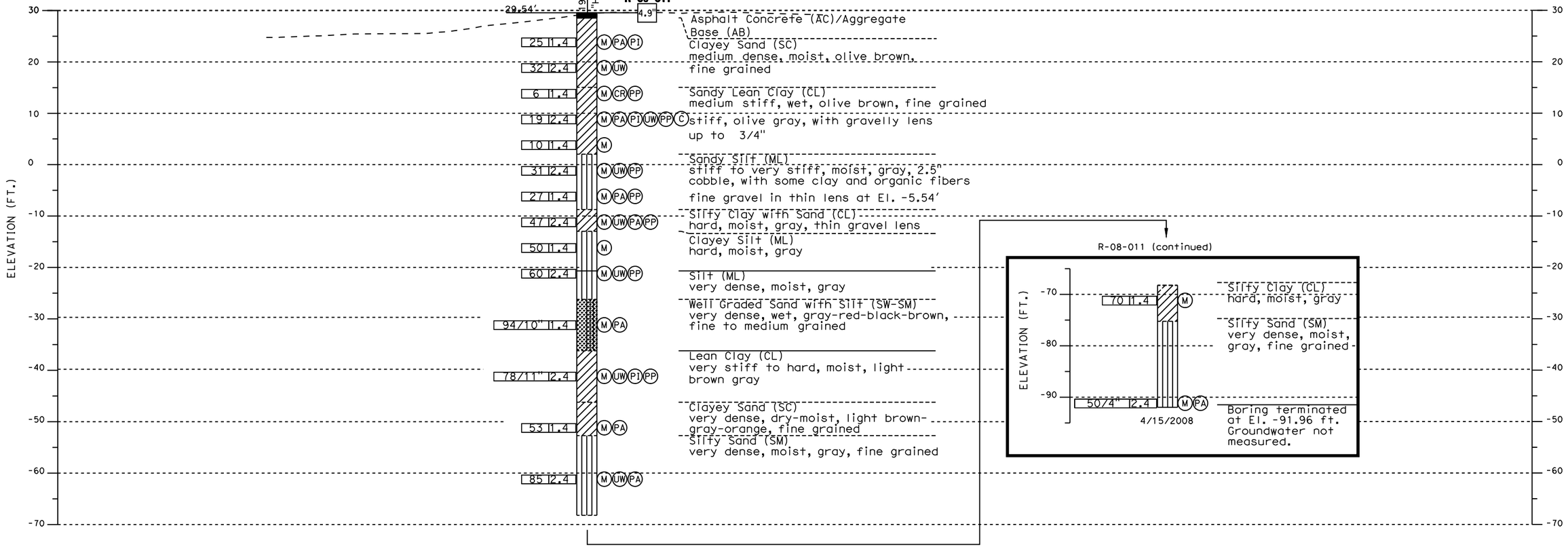
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on Sheet 5 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 3

1315+00 1316+00 1317+00
STATION NO. ALONG "H" LINE

PLATE 10

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0074 POST MILES R0.917-1.12	PRECAST WALL NO. RW1300 LOG OF TEST BORINGS 4 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES: 10/23/08 02/20/09 05/18/09 — SHEET 24 OF 26

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

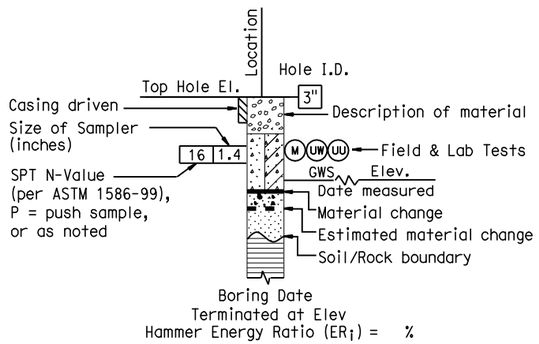
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes:

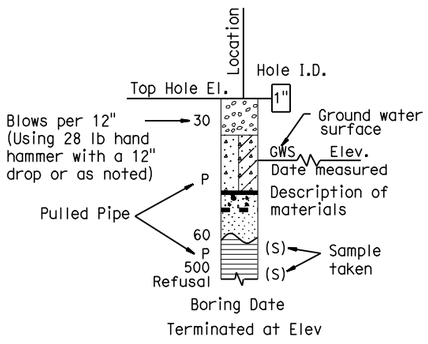
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers for rotary borings.

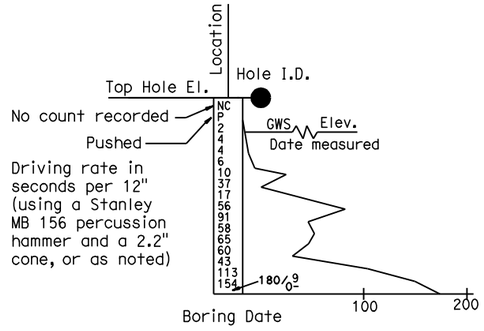
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



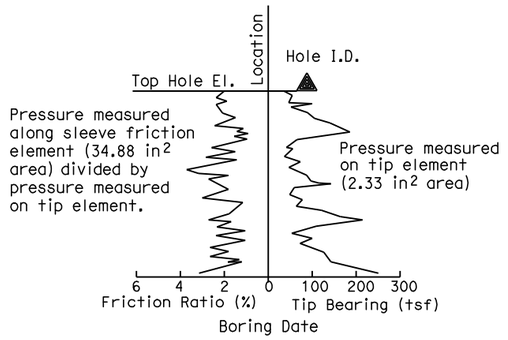
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 11

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55E0074 POST MILES R0.917-1.12	SOIL LEGEND LOG OF TEST BORINGS 5 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES: 10/23/08, 02/20/09, 05/18/09; SHEET 25 OF 26

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 12

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55E0074
POST MILES R0.917-1.12

SOIL LEGEND
LOG OF TEST BORINGS 6 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 26 OF 26

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the project site were investigated by Group Delta Consultants, Inc. (GDC) by performing two (2) rotary wash soil borings and five (5) Cone Penetration Tests (CPTs) during the period of March 31st to April 24th, 2008. The borings were performed to depths of 101.5 feet to 121.5 feet below ground surface (bgs) and the CPTs were performed to depths of roughly 80 to 150 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at the subject retaining wall. Locations of the borings and CPTs are presented in Figure 2 of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1.

The soil borings and CPTs were performed from the freeway lanes and shoulders of SR-22/I-405. All of the exploration locations were within the Caltrans Right-of-Way (ROW.

Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night.

The exploration methods are described in the following sections. Rotary wash boring and CPT logs from the current exploration program are presented in Figures A-2a through A-3e and A-4a through A-8d, respectively.

A.2 Soil Drilling and Sampling

A total of two (2) rotary wash soil borings (R-08-011and R-08-017) were drilled and sampled using a truck mounted Mayhew 1000 drill rig during this project. The Mayhew 1000 used a 4.875-inch drill bit in conjunction with bentonite slurry to drill to desired depths. C & L Drilling, Inc. of La Habra, California drilled and sampled the soil borings as a subcontractor to GDC.

All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS) and were assigned a group name and group symbol,

as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The rotary wash boring logs are presented in Figures A-2a through A-3e.

Drive samples were collected from the borings generally at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using a downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured using a well sounder.

The soil borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with either asphalt patch or quickset cement.

Soil borings drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California. for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to

an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of five (5) CPT soundings (CPT-08-013, CPT-08-015, CPT-08-018, CPT-08-021, and CPT-08-022), were performed during this project to depths ranging from 80 to 150 feet below ground surface. Kehoe Testing and Engineering, Inc. of Long Beach, California, performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D3441 test standard using an electronic cone penetrometer. A 2.32-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in Appendix A on Figures A-4a through A-8d. Soil behavior type and other interpretations of the CPT data provided by Kehoe are in our files.

At the completion of the sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned following each test by backfilling bentonite into the hole, to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1 Summary of Field Explorations

List of Figures

Figure A-1a Key for Soil Classification
Figure A-1b Boring Legend
Figures A-2a to A-3e Soil Boring Logs
Figures A-4a to A-8d Cone Penetration Test Results

TABLE A-1
SUMMARY OF TEST EXPLORATIONS
RW1300 RW1299
SR-22 WEST ORANGE COUNTY CONNECTORS PROJECT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Plan Figure No.	Appendix Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
CPT-08-013	1314+50 71 L	4/15/2008	CPT	30.22	130.3	L-6	A-4a to A-4e	Hole obstructed at 16' (dry)	NA	GW is below Elev. 12.5 feet
CPT-08-015	1313+33 73 R	3/31/2008	CPT	28.57	150.2	L-6	A-5a to A-5e	Hole obstructed at 12' (dry)	NA	GW is below EL. 17.5 feet
CPT-08-018	1306+80 28L	4/24/2008	CPT	43.59	80.1	L-3	A-6a to -6c	Hole obstructed at 24' (dry)	NA	GW is below Elev. 19.5 feet
CPT-08-021	1302+76 12R	3/31/2008	CPT	25.97	150.2	L-3	A-7a to A-7e	Hole obstructed at 7' (dry)	NA	GW is below Elev. 19 feet
CPT-08-022	1302+22 54 R	4/24/2008	CPT	25.20	118.5	L-3	A-8a to a-8d	Hole obstructed at 5' (dry)	NA	Tip Refusal to 118.5' GW is below Elev. 21 feet
R-08-011	1316+25 20 L	4/15/2008	R	29.54	121.5	L-6	A-2a to A-2e	NA	NA	
R-08-017	1310+93 76 L	4/1/2008	R	52.50	101.5	L-6	A-3a to A-3e	NA	NA	

Notes:
1. Stationing relative to SR-22 "H" line, except where noted otherwise. Right and left offsets defined by looking along SR-22 centerline in direction of increasing station.
2. Elevations based upon January 2009 survey

NA = Not Available
NE = Not encountered

CPT = Cone Penetration Test
R = Rotary Wash Boring

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

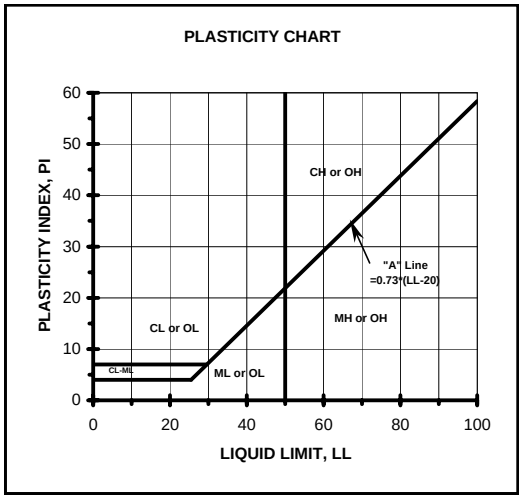
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375-inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 1 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Asphalt Concrete (AC) **Aggregate Base (AB)**
												Clayey Sand (SC) medium dense, moist, olive brown, fine grained, with some silt
5	25		S1	7 12 13		19		47	33:14			
10	20		R2	7 12 20	96.9	19						
15	15		S3	2 2 4		31	CR			0.5		**Sandy Lean Clay (CL)** firm, wet, olive brown, fine grained, scattered few fine gravel, rolls very good thread
20	10		R4	4 8 11	94.6	24	CN	52	34:18	1.0		stiff, olive gray, with gravelly lense at 20' to 20.3' containing sunrounded to angular black and gray with orange limonite stained granite pieces 1/4" to 3/4"
	5											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	4 5 5		46						**Sandy Lean Clay (CL)** stiff, wet, olive brown, fine grained, with few fine gravel
	0											**Sandy Silt (ML)** stiff to very stiff, moist, gray, single black and white granodiorite cobble 2.5", with some clay and decomposed organic fibers
30			R6	5 13 18	93.2	30				1.5		
	-5											
35			S7	4 11 16		28		68		1.0		with fine angular gravel in thin lense at 35', little to no clay
	-10											**Silty Clay with Sand (CL)** hard, moist, gray, rolls very poor thread, with some gravel in lense at 40'
40			R8	11 15 32	97.9	25		80		4.0		
	-15											
45			S9	10 20 30		33						**Clayey Silt (ML)** hard, moist, gray, no gravel
	-20											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	14 24 36	83.9	35				3.5		**Clayey Silt (ML)** hard, moist, gray, no gravel **Silt (ML)** very dense, moist, gray, trace to no clay
55	-25											
												Well Graded Sand with Silt (SW-SM) very dense, wet, gray-red-black-brown, fine to medium grained
60	-30		S11	26 44 50/4"		15	PA	7				
65	-35											**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains
70	-40		R12	27 28 50/5"	114.8	17			31:16	3.5		
	-45											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-2 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-50		S13	11 21 32		17		45				**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains **Clayey Sand (SC)** very dense, dry-moist, light brown-gray-orange, fine grained
85	-55											**Silty Sand (SM)** very dense, moist, gray, fine grains barely visible, trace to no clay
90	-60		R14	20 37 48	102.4	24		29				
95	-65											**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-70											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-2 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S15	11 22 48		40						**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-75											
105												**Silty Sand (SM)** very dense, moist, gray, fine grained
	-80											
110												
	-85											
115												
	-90											
120			R16	40 50/4"		24		27				*Boring terminated at 121.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-95											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-2 e

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-017
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/1/2008	**FINISH** 4/1/2008	**SHEET NO.** 1 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 101.5	**GROUND ELEV (ft)** 52.50
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **3" Aggregate Base (AB)** **[FILL]** **Lean Clay with Sand/Clayey Sand (CL/SC)** very stiff/medium dense, dry, light brown, fine to medium grained
5	50		S1	7 10 10						3.0		
	45											
10			R2	6 10 22	89.3	32	DS	82	35:14	2.5		**Lean Clay with Sand (CL)** very stiff, moist, dark brown with orange mottling, scattered fine grains
	40											
15			S3	4 6 11		27		55	34:14	1.25		**Sandy Lean Clay (CL)** stiff to very stiff, light brown, fine to medium grained
	35											
20			R4	8 23 25	108.8	19	CR			4.5+		**Lean Clay with Sand (CL)** hard, moist, gray brown, fine grained 19' - 19.5' Drill chatter at 21' Drill chatter and broken asphalt in cuttings, old asphalt in sampler shoe
	30											**[NATIVE]** **Sandy Lean Clay (CL)** hard, moist, gray, fine grained with scattered coarse grains and few 1/2" claystone gravel

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	8 20 23		20		63		4.5+		**Sandy Lean Clay (CL)** hard, moist, gray, scattered coarse grains and few 1/2" claystone gravel
	25											
30			R6	5 13 24	109.3	15				4.0		very stiff to hard, with scattered fine grains and few 1/4" gravel of dark purple-gray slate
	20											
												Sandy Silt (ML) medium dense, moist, olive brown, scattered coarse grains and few 3/4" pieces of slate, non-plastic
35			S7	5 5 8		34	CR	57				
	15											**Lean Clay (CL)** stiff to very stiff, moist, gray-brown, few fine grains and scattered pea-sized slate gravel
40			R8	8 10 15	96.2	28	CN		39:19			
	10											
45			S9	3 4 7		36				1.2		no gravel
	5											
												Silt (ML) medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	7 15 29	100.0	25				3.0		**Silt (ML)** medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity
	0											**Lean Clay with Sand (CL)** very stiff, moist-wet, gray-brown, scattered fine grains and pea-sized gray claystone gravel
55												
	-5											
60			S11	11 15 14		31		82		2.0		becomes gray, no gravel
	-10											
65												
	-15											
70			R12	21 35 50/5"	96.7	27						**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic
	-20											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-3 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-017

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-25											**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic 76' - 78' drillstem bounce on rock
80			S13	35 39 50/5.5"		19		22				**Silty Sand (SM)** very dense, moist, olive gray, fine grained, no gravel
	-30											
85												**Well Graded Sand (SW)** very dense, wet, gray-black-white, fine to coarse grained, with scattered granite gravel up to pea-size, no clay
	-35											
90			R14	50/6" 50/3"	111.4	18						
	-40											**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
95												
	-45											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-3 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S15	6 9 17						1.5		**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
	-50											*Boring terminated at 101.5 feet below ground surface (bgs).* *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
105												
	-55											
110												
	-60											
115												
	-65											
120												
	-70											

GDC_LOG_BORING_1A I-436 RW 1300 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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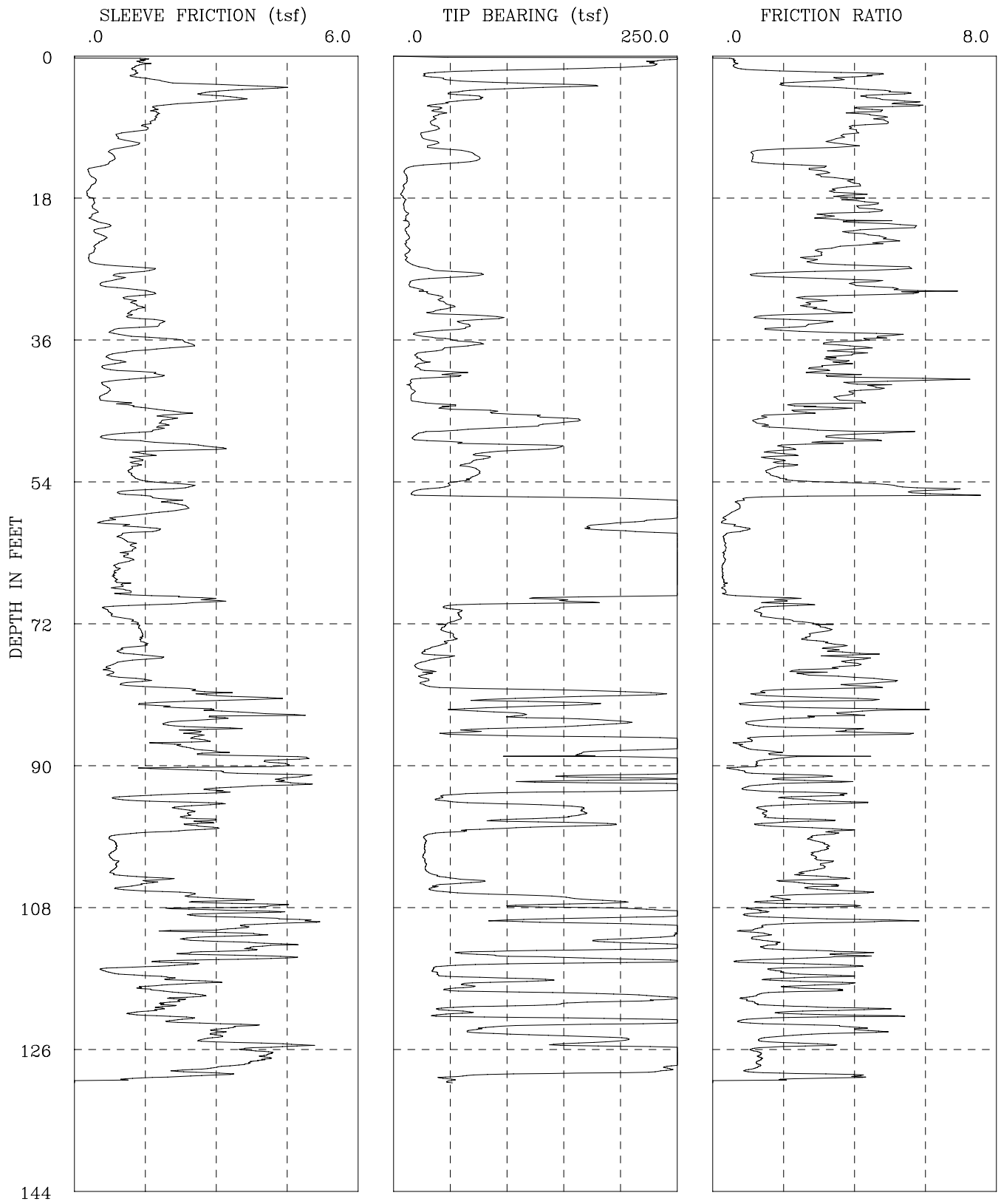
FIGURE A-3 e



CPT-08-013	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-4a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-013
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	221.69	1.21	0.54	0.03	sand	>90	>48	42	UNDEFINED
0.60	2	152.50	1.28	0.84	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	37.31	1.44	3.86	0.15	clayey silt to silty clay	UNDFND	UNDFD	18	2.4
1.25	4	131.37	3.31	2.52	0.22	silty sand to sandy silt	>90	>48	42	UNDEFINED
1.55	5	62.35	2.98	4.78	0.28	silty clay to clay	UNDFND	UNDFD	40	4.1
1.85	6	60.18	3.00	4.98	0.33	silty clay to clay	UNDFND	UNDFD	38	3.9
2.15	7	36.81	1.72	4.67	0.39	silty clay to clay	UNDFND	UNDFD	24	2.4
2.45	8	38.49	1.74	4.51	0.45	silty clay to clay	UNDFND	UNDFD	25	2.5
2.75	9	34.86	1.55	4.44	0.51	silty clay to clay	UNDFND	UNDFD	22	2.2
3.05	10	30.49	1.20	3.93	0.57	silty clay to clay	UNDFND	UNDFD	19	1.9
3.35	11	32.88	1.11	3.38	0.61	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
3.65	12	39.30	0.98	2.48	0.64	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
3.95	13	73.07	0.83	1.13	0.67	silty sand to sandy silt	60-70	40-42	23	UNDEFINED
4.25	14	51.62	0.72	1.39	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.53	0.32	3.02	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	11.70	0.41	3.51	0.75	silty clay to clay	UNDFND	UNDFD	7	.7
5.15	17	9.41	0.36	3.84	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.53	0.28	3.69	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	9.60	0.41	4.24	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	10.03	0.43	4.30	0.86	clay	UNDFND	UNDFD	10	.5
6.40	21	11.42	0.39	3.41	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	12.43	0.64	5.13	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	12.24	0.53	4.32	0.95	clay	UNDFND	UNDFD	12	.7
7.35	24	11.49	0.53	4.62	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	13.00	0.40	3.09	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	11.21	0.31	2.79	1.04	silty clay to clay	UNDFND	UNDFD	7	.6
8.25	27	22.68	1.08	4.78	1.07	clay	UNDFND	UNDFD	22	1.4
8.55	28	63.75	1.09	1.71	1.10	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
8.85	29	18.14	0.71	3.90	1.13	silty clay to clay	UNDFND	UNDFD	12	1.0
9.15	30	23.23	1.25	5.37	1.16	clay	UNDFND	UNDFD	22	1.4
9.45	31	39.65	1.28	3.22	1.19	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.75	32	48.68	1.32	2.71	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	49.00	1.19	2.43	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.35	34	72.45	1.65	2.28	1.27	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
10.65	35	54.74	1.20	2.19	1.30	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
10.95	36	29.90	1.37	4.59	1.33	silty clay to clay	UNDFND	UNDFD	19	1.8
11.25	37	65.90	2.40	3.64	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.2
11.55	38	31.44	1.21	3.86	1.38	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-4b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	24.01	0.84	3.48	1.41	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
12.15	40	22.03	0.70	3.20	1.44	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	47.99	1.67	3.49	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	14.78	0.73	4.92	1.50	clay	UNDFND	UNDFD	14	.8
13.10	43	17.07	0.70	4.10	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	18.06	0.70	3.86	1.56	silty clay to clay	UNDFND	UNDFD	12	1.0
13.75	45	58.87	1.54	2.62	1.59	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.05	46	128.95	2.08	1.61	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	135.90	1.84	1.36	1.65	sand to silty sand	60-70	40-42	33	UNDEFINED
14.65	48	40.11	1.35	3.36	1.68	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.95	49	30.92	1.08	3.50	1.70	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
15.25	50	126.49	2.68	2.12	1.73	silty sand to sandy silt	60-70	38-40	40	UNDEFINED
15.55	51	79.67	1.40	1.76	1.76	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
15.85	52	66.65	1.33	2.00	1.79	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
16.15	53	74.04	1.18	1.60	1.82	silty sand to sandy silt	40-50	36-38	24	UNDEFINED
16.45	54	65.99	1.35	2.05	1.85	silty sand to sandy silt	40-50	34-36	21	UNDEFINED
16.75	55	42.30	2.20	5.20	1.87	clay	UNDFND	UNDFD	41	2.6
17.05	56	42.41	1.22	2.88	1.90	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
17.35	57	270.93	2.05	0.76	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	322.94	2.17	0.67	1.96	sand	>90	42-44	>50	UNDEFINED
17.95	59	271.44	1.00	0.37	1.99	gravelly sand to sand	80-90	42-44	43	UNDEFINED
18.25	60	184.07	1.06	0.57	2.02	sand	70-80	40-42	35	UNDEFINED
18.55	61	240.92	1.31	0.54	2.04	sand	80-90	40-42	46	UNDEFINED
18.85	62	335.61	1.11	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	343.25	1.19	0.35	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	347.37	1.14	0.33	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	325.24	0.93	0.29	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	308.74	0.85	0.27	2.19	gravelly sand to sand	80-90	42-44	49	UNDEFINED
20.45	67	294.69	0.94	0.32	2.22	gravelly sand to sand	80-90	42-44	47	UNDEFINED
20.75	68	312.45	1.05	0.33	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	193.92	2.23	1.15	2.28	sand	70-80	40-42	37	UNDEFINED
21.35	70	85.13	1.54	1.81	2.31	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.65	71	57.93	0.75	1.30	2.34	silty sand to sandy silt	<40	32-34	18	UNDEFINED
21.95	72	54.08	1.20	2.22	2.37	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
22.25	73	43.96	1.39	3.15	2.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.6
22.55	74	53.03	1.43	2.69	2.42	sandy silt to clayey silt	UNDFND	UNDFD	20	3.2
22.85	75	42.52	1.42	3.33	2.45	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
23.15	76	29.27	1.07	3.65	2.48	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
23.45	77	36.28	1.39	3.83	2.51	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
23.75	78	22.25	0.73	3.27	2.54	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
24.05	79	28.59	0.88	3.07	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	27.66	1.25	4.53	2.59	clay	UNDFND	UNDFD	26	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-4c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	151.28	2.53	1.67	2.62	sand to silty sand	60-70	38-40	36	UNDEFINED
24.95	82	135.12	3.32	2.46	2.65	silty sand to sandy silt	60-70	36-38	43	UNDEFINED
25.25	83	122.70	1.99	1.62	2.68	sand to silty sand	50-60	36-38	29	UNDEFINED
25.60	84	105.54	3.53	3.34	2.71	sandy silt to clayey silt	UNDFND	UNDFD	40	6.7
25.90	85	187.58	2.18	1.16	2.74	sand	70-80	38-40	36	UNDEFINED
26.20	86	73.92	2.71	3.66	2.77	clayey silt to silty clay	UNDFND	UNDFD	35	4.5
26.55	87	216.57	2.51	1.16	2.80	sand	70-80	38-40	41	UNDEFINED
26.85	88	253.25	2.43	0.96	2.83	sand	70-80	40-42	49	UNDEFINED
27.15	89	193.09	3.70	1.91	2.86	sand to silty sand	70-80	38-40	46	UNDEFINED
27.45	90	336.49	4.31	1.28	2.88	sand	80-90	40-42	>50	UNDEFINED
27.75	91	329.36	2.78	0.84	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	176.66	4.55	2.57	2.94	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.35	93	316.67	3.81	1.20	2.97	sand	80-90	40-42	>50	UNDEFINED
28.65	94	98.30	2.18	2.22	3.00	silty sand to sandy silt	50-60	34-36	31	UNDEFINED
28.95	95	68.39	1.98	2.90	3.03	sandy silt to clayey silt	UNDFND	UNDFD	26	4.1
29.25	96	165.82	2.33	1.41	3.05	sand to silty sand	60-70	38-40	40	UNDEFINED
29.55	97	135.73	2.55	1.88	3.08	silty sand to sandy silt	50-60	36-38	43	UNDEFINED
29.85	98	150.63	2.73	1.81	3.11	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
30.15	99	46.04	1.57	3.41	3.14	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
30.45	100	27.76	0.81	2.91	3.17	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
30.75	101	27.47	0.87	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.05	102	26.69	0.76	2.86	3.22	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
31.35	103	28.13	0.89	3.16	3.25	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.65	104	30.83	0.82	2.65	3.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.00	105	58.65	1.60	2.72	3.31	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
32.30	106	36.49	1.23	3.38	3.34	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
32.60	107	124.23	2.74	2.21	3.37	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.95	108	165.71	3.35	2.02	3.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
33.25	109	266.87	3.17	1.19	3.43	sand	70-80	38-40	>50	UNDEFINED
33.55	110	150.47	4.47	2.97	3.46	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
33.85	111	260.23	3.10	1.19	3.49	sand	70-80	38-40	50	UNDEFINED
34.15	112	231.12	3.09	1.34	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	233.85	3.79	1.62	3.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.75	114	119.93	3.08	2.57	3.57	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
35.05	115	193.54	3.19	1.65	3.60	sand to silty sand	60-70	36-38	46	UNDEFINED
35.35	116	48.11	1.36	2.82	3.63	sandy silt to clayey silt	UNDFND	UNDFD	18	2.7
35.65	117	46.39	1.00	2.17	3.66	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
35.95	118	92.32	2.29	2.48	3.69	sandy silt to clayey silt	UNDFND	UNDFD	35	5.6
36.25	119	91.47	1.84	2.02	3.72	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
36.55	120	229.01	2.35	1.03	3.74	sand	70-80	38-40	44	UNDEFINED
36.85	121	95.88	1.88	1.96	3.77	silty sand to sandy silt	40-50	32-34	31	UNDEFINED
37.15	122	56.55	1.58	2.80	3.80	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-4d

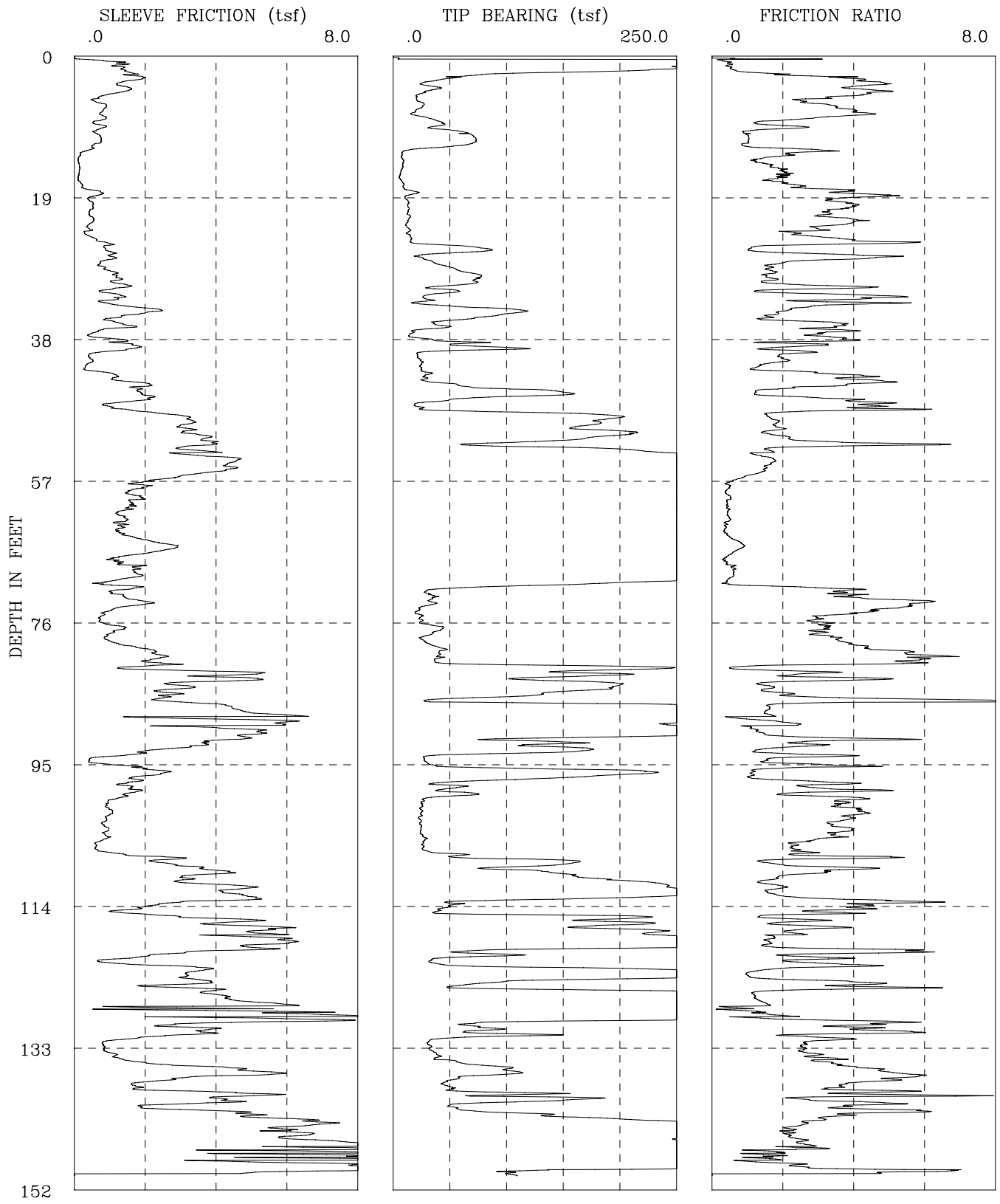
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.82	2.62	1.17	3.83	sand	70-80	38-40	43	UNDEFINED
37.75	124	76.88	3.16	4.11	3.86	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
38.05	125	168.18	2.89	1.72	3.89	sand to silty sand	60-70	36-38	40	UNDEFINED
38.40	126	217.42	3.96	1.82	3.92	sand to silty sand	60-70	38-40	>50	UNDEFINED
38.70	127	313.08	4.04	1.29	3.95	sand	70-80	40-42	>50	UNDEFINED
39.00	128	290.48	3.81	1.31	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	216.19	2.80	1.29	4.01	sand	60-70	38-40	41	UNDEFINED
39.65	130	52.30	1.29	2.48	4.04	sandy silt to clayey silt	UNDFND	UNDFD	20	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-4e



CPT-08-015	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-5a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-015
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :04/01/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	188.91	0.68	0.36	0.03	sand	>90	>48	36	UNDEFINED
0.60	2	245.14	1.33	0.54	0.09	sand	>90	>48	47	UNDEFINED
0.95	3	80.00	1.73	2.16	0.15	silty sand to sandy silt	80-90	46-48	26	UNDEFINED
1.25	4	30.23	1.34	4.43	0.22	silty clay to clay	UNDFND	UNDFD	19	2.0
1.55	5	31.90	1.39	4.35	0.28	silty clay to clay	UNDFND	UNDFD	20	2.1
1.85	6	20.96	0.64	3.07	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
2.15	7	25.59	0.84	3.29	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
2.45	8	19.04	0.78	4.09	0.45	silty clay to clay	UNDFND	UNDFD	12	1.2
2.75	9	37.50	0.71	1.89	0.51	sandy silt to clayey silt	UNDFND	UNDFD	14	2.4
3.05	10	42.04	0.75	1.78	0.57	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
3.35	11	68.39	0.67	0.99	0.61	sand to silty sand	60-70	40-42	16	UNDEFINED
3.65	12	69.52	0.68	0.97	0.64	sand to silty sand	60-70	40-42	17	UNDEFINED
3.95	13	21.50	0.39	1.83	0.67	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
4.25	14	7.98	0.13	1.66	0.69	clayey silt to silty clay	UNDFND	UNDFD	4	.4
4.55	15	8.56	0.13	1.52	0.72	clayey silt to silty clay	UNDFND	UNDFD	4	.5
4.85	16	6.84	0.14	2.04	0.75	silty clay to clay	UNDFND	UNDFD	4	.3
5.15	17	6.58	0.12	1.84	0.78	silty clay to clay	UNDFND	UNDFD	4	.3
5.45	18	9.47	0.25	2.64	0.81	silty clay to clay	UNDFND	UNDFD	6	.5
5.75	19	16.34	0.67	4.13	0.84	clay	UNDFND	UNDFD	16	1.0
6.05	20	12.53	0.46	3.65	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	13.31	0.48	3.61	0.89	silty clay to clay	UNDFND	UNDFD	9	.8
6.70	22	13.93	0.49	3.49	0.93	silty clay to clay	UNDFND	UNDFD	9	.8
7.00	23	12.17	0.43	3.53	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
7.35	24	14.05	0.37	2.67	0.98	clayey silt to silty clay	UNDFND	UNDFD	7	.8
7.65	25	16.25	0.70	4.28	1.02	clay	UNDFND	UNDFD	16	.9
7.95	26	70.30	0.91	1.30	1.04	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
8.25	27	36.15	1.09	3.00	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
8.55	28	35.95	0.79	2.20	1.10	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
8.85	29	57.12	0.96	1.68	1.13	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
9.15	30	74.57	1.22	1.63	1.16	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
9.45	31	57.77	1.32	2.29	1.19	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
9.75	32	45.23	0.98	2.17	1.21	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.05	33	27.73	1.11	3.99	1.24	silty clay to clay	UNDFND	UNDFD	18	1.7
10.35	34	60.12	1.61	2.68	1.27	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
10.65	35	101.12	1.84	1.82	1.30	silty sand to sandy silt	60-70	38-40	32	UNDEFINED
10.95	36	49.06	1.12	2.28	1.33	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
11.25	37	33.56	1.14	3.41	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	18.57	0.62	3.32	1.38	clayey silt to silty clay	UNDFND	UNDFD	9	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.41	1.51	2.63	1.41	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
12.15	40	64.46	1.18	1.84	1.44	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
12.45	41	22.56	0.45	2.01	1.47	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
12.80	42	24.89	0.35	1.40	1.50	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
13.10	43	28.76	0.97	3.37	1.53	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
13.40	44	35.14	1.50	4.27	1.56	silty clay to clay	UNDFND	UNDFD	22	2.1
13.75	45	104.77	1.87	1.78	1.59	silty sand to sandy silt	60-70	38-40	33	UNDEFINED
14.05	46	99.53	2.07	2.08	1.62	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.35	47	25.19	1.11	4.40	1.65	silty clay to clay	UNDFND	UNDFD	16	1.4
14.65	48	96.06	1.98	2.06	1.68	silty sand to sandy silt	50-60	38-40	31	UNDEFINED
14.95	49	190.00	3.26	1.72	1.70	sand to silty sand	70-80	40-42	45	UNDEFINED
15.25	50	169.05	3.14	1.86	1.73	sand to silty sand	70-80	40-42	40	UNDEFINED
15.55	51	200.67	3.40	1.69	1.76	sand to silty sand	70-80	40-42	48	UNDEFINED
15.85	52	127.34	3.82	3.00	1.79	sandy silt to clayey silt	UNDFND	UNDFD	49	8.2
16.15	53	163.46	3.32	2.03	1.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
16.45	54	262.62	3.75	1.43	1.85	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.75	55	265.52	4.41	1.66	1.87	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.05	56	287.07	4.15	1.45	1.90	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.35	57	328.80	2.71	0.83	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	402.74	1.90	0.47	1.96	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.95	59	382.21	1.58	0.41	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	368.25	1.75	0.47	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	357.14	1.59	0.45	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	286.20	1.29	0.45	2.07	gravelly sand to sand	80-90	42-44	46	UNDEFINED
19.20	63	318.32	1.35	0.43	2.10	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
19.50	64	344.13	1.28	0.37	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	319.72	1.72	0.54	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	317.79	2.67	0.84	2.19	sand	80-90	42-44	>50	UNDEFINED
20.45	67	345.99	1.91	0.55	2.22	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.75	68	311.68	1.17	0.38	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	290.11	1.74	0.60	2.28	sand	80-90	42-44	>50	UNDEFINED
21.35	70	299.59	1.72	0.57	2.31	sand	80-90	42-44	>50	UNDEFINED
21.65	71	194.12	1.06	0.54	2.34	sand	70-80	40-42	37	UNDEFINED
21.95	72	39.99	1.33	3.34	2.37	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
22.25	73	33.88	1.53	4.51	2.39	silty clay to clay	UNDFND	UNDFD	22	1.9
22.55	74	30.84	1.76	5.71	2.42	clay	UNDFND	UNDFD	30	1.7
22.85	75	22.20	0.91	4.10	2.45	silty clay to clay	UNDFND	UNDFD	14	1.1
23.15	76	24.14	0.72	2.98	2.48	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
23.45	77	38.80	1.22	3.15	2.51	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
23.75	78	31.52	0.99	3.14	2.54	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
24.05	79	28.49	1.07	3.76	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	41.83	2.01	4.80	2.59	silty clay to clay	UNDFND	UNDFD	27	2.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	40.15	2.37	5.91	2.62	clay	UNDFND	UNDFD	38	2.3
24.95	82	96.28	2.21	2.29	2.65	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
25.25	83	192.03	3.50	1.82	2.68	sand to silty sand	70-80	38-40	46	UNDEFINED
25.60	84	150.60	4.23	2.81	2.71	silty sand to sandy silt	60-70	38-40	48	UNDEFINED
25.90	85	192.89	2.94	1.52	2.74	sand to silty sand	70-80	38-40	46	UNDEFINED
26.20	86	124.28	2.62	2.11	2.77	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
26.55	87	127.55	3.23	2.53	2.80	silty sand to sandy silt	50-60	36-38	41	UNDEFINED
26.85	88	302.79	4.70	1.55	2.83	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.15	89	377.33	4.52	1.20	2.86	sand	80-90	42-44	>50	UNDEFINED
27.45	90	288.73	5.02	1.74	2.88	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.75	91	373.10	5.08	1.36	2.91	sand	80-90	42-44	>50	UNDEFINED
28.05	92	141.71	4.30	3.03	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.0
28.35	93	149.17	3.11	2.08	2.97	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
28.65	94	82.90	1.51	1.82	3.00	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
28.95	95	29.29	0.57	1.95	3.03	sandy silt to clayey silt	UNDFND	UNDFD	11	1.5
29.25	96	138.01	2.12	1.54	3.05	sand to silty sand	50-60	36-38	33	UNDEFINED
29.55	97	171.93	1.99	1.16	3.08	sand to silty sand	60-70	38-40	41	UNDEFINED
29.85	98	53.36	1.55	2.90	3.11	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
30.15	99	54.62	1.64	3.00	3.14	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
30.45	100	36.76	1.22	3.31	3.17	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
30.75	101	25.05	0.93	3.70	3.20	silty clay to clay	UNDFND	UNDFD	16	1.2
31.05	102	24.96	1.03	4.12	3.22	silty clay to clay	UNDFND	UNDFD	16	1.2
31.35	103	23.64	0.86	3.65	3.25	silty clay to clay	UNDFND	UNDFD	15	1.1
31.65	104	24.51	0.91	3.72	3.28	silty clay to clay	UNDFND	UNDFD	16	1.2
32.00	105	26.15	0.89	3.40	3.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
32.30	106	26.36	0.65	2.46	3.34	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
32.60	107	34.79	0.85	2.44	3.37	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.95	108	106.57	2.39	2.24	3.40	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
33.25	109	116.40	3.31	2.84	3.43	sandy silt to clayey silt	UNDFND	UNDFD	45	7.3
33.55	110	150.02	3.75	2.50	3.46	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
33.85	111	213.65	3.32	1.55	3.49	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.15	112	256.62	4.60	1.79	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	223.71	4.88	2.18	3.55	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
34.75	114	56.36	2.74	4.87	3.57	silty clay to clay	UNDFND	UNDFD	36	3.3
35.05	115	42.68	1.52	3.56	3.60	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
35.35	116	191.27	3.91	2.04	3.63	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.65	117	194.66	4.81	2.47	3.66	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	234.83	5.22	2.22	3.69	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.25	119	363.67	5.96	1.64	3.72	sand to silty sand	80-90	40-42	>50	UNDEFINED
36.55	120	223.36	4.94	2.21	3.74	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.85	121	73.36	2.36	3.22	3.77	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
37.15	122	37.67	1.21	3.22	3.80	clayey silt to silty clay	UNDFND	UNDFD	18	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.69	3.52	1.57	3.83	sand to silty sand	70-80	38-40	>50	UNDEFINED
37.75	124	259.10	3.23	1.25	3.86	sand	70-80	38-40	50	UNDEFINED
38.05	125	70.69	3.06	4.33	3.89	clayey silt to silty clay	UNDFND	UNDFD	34	4.2
38.40	126	262.06	3.92	1.50	3.92	sand to silty sand	70-80	38-40	>50	UNDEFINED
38.70	127	353.82	4.72	1.33	3.95	sand	80-90	40-42	>50	UNDEFINED
39.00	128	421.27	3.74	0.89	3.97	sand	80-90	40-42	>50	UNDEFINED
39.35	129	417.08	6.27	1.50	4.01	sand	80-90	40-42	>50	UNDEFINED
39.65	130	99.45	4.22	4.24	4.04	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	82.31	3.78	4.59	4.06	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
40.25	132	67.03	1.77	2.64	4.09	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
40.55	133	31.70	0.83	2.60	4.12	sandy silt to clayey silt	UNDFND	UNDFD	12	1.5
40.85	134	37.19	1.02	2.73	4.15	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
41.15	135	47.45	1.54	3.24	4.18	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
41.45	136	93.02	3.97	4.27	4.21	clayey silt to silty clay	UNDFND	UNDFD	45	5.6
41.75	137	86.19	4.64	5.38	4.23	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	47.31	2.08	4.40	4.26	silty clay to clay	UNDFND	UNDFD	30	2.6
42.35	139	62.94	2.61	4.15	4.29	clayey silt to silty clay	UNDFND	UNDFD	30	3.6
42.65	140	137.47	4.63	3.37	4.32	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.6
42.95	141	73.51	3.05	4.15	4.35	clayey silt to silty clay	UNDFND	UNDFD	35	4.3
43.25	142	89.26	4.07	4.56	4.38	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	198.93	5.95	2.99	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	268.30	6.43	2.40	4.43	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.15	145	285.73	6.27	2.19	4.46	sand to silty sand	70-80	38-40	>50	UNDEFINED
44.45	146	287.74	7.20	2.50	4.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.80	147	347.89	7.60	2.18	4.52	sand to silty sand	80-90	38-40	>50	UNDEFINED
45.10	148	492.38	7.21	1.47	4.55	sand	>90	40-42	>50	UNDEFINED
45.40	149	363.36	7.15	1.97	4.58	sand to silty sand	80-90	40-42	>50	UNDEFINED
45.75	150	140.86	5.16	3.66	4.61	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.7

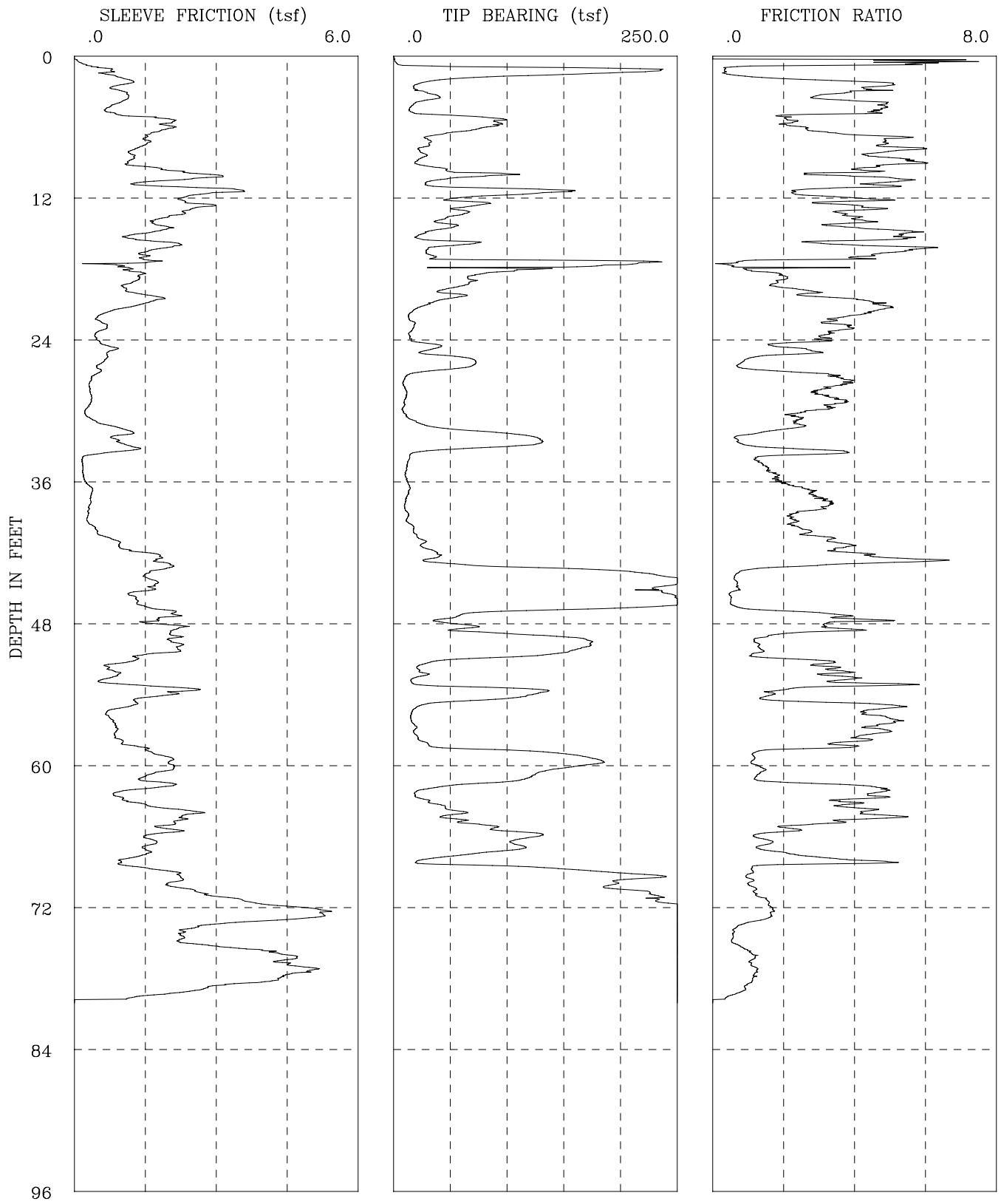
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-5e



CPT-08-018	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-6a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-018
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 24.93438

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	34.20	0.21	0.60	0.03	silty sand to sandy silt	80-90	>48	11	UNDEFINED
0.60	2	143.63	0.87	0.60	0.09	sand	>90	>48	28	UNDEFINED
0.95	3	23.57	1.01	4.29	0.15	silty clay to clay	UNDFND	UNDFD	15	1.5
1.25	4	29.47	1.03	3.50	0.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
1.55	5	27.04	0.84	3.10	0.28	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
1.85	6	90.35	2.00	2.21	0.33	silty sand to sandy silt	70-80	44-46	29	UNDEFINED
2.15	7	43.26	1.62	3.75	0.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.8
2.45	8	27.60	1.40	5.08	0.45	clay	UNDFND	UNDFD	26	1.8
2.75	9	24.03	1.20	5.01	0.51	clay	UNDFND	UNDFD	23	1.5
3.05	10	53.84	1.98	3.67	0.57	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
3.35	11	41.97	2.01	4.79	0.63	silty clay to clay	UNDFND	UNDFD	27	2.7
3.65	12	107.15	2.89	2.70	0.69	sandy silt to clayey silt	UNDFND	UNDFD	41	7.0
3.95	13	64.06	2.54	3.96	0.75	clayey silt to silty clay	UNDFND	UNDFD	31	4.2
4.25	14	52.47	2.01	3.82	0.81	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
4.55	15	42.78	1.78	4.17	0.87	silty clay to clay	UNDFND	UNDFD	27	2.7
4.85	16	40.48	1.54	3.81	0.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
5.15	17	32.34	1.67	5.16	0.98	clay	UNDFND	UNDFD	31	2.0
5.45	18	131.32	1.15	0.88	1.04	sand to silty sand	70-80	40-42	31	UNDEFINED
5.75	19	82.62	1.32	1.60	1.10	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
6.05	20	56.77	1.12	1.97	1.16	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
6.40	21	45.10	1.58	3.51	1.23	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.70	22	17.45	0.80	4.59	1.29	clay	UNDFND	UNDFD	17	1.0
7.00	23	16.61	0.59	3.56	1.35	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	15.17	0.49	3.22	1.41	silty clay to clay	UNDFND	UNDFD	10	.9
7.65	25	32.55	0.73	2.23	1.48	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
7.95	26	63.89	0.63	0.99	1.51	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
8.25	27	34.16	0.48	1.41	1.54	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
8.55	28	9.16	0.33	3.60	1.57	clay	UNDFND	UNDFD	9	.5
8.85	29	10.94	0.35	3.16	1.60	silty clay to clay	UNDFND	UNDFD	7	.6
9.15	30	8.79	0.29	3.28	1.63	clay	UNDFND	UNDFD	8	.4
9.45	31	14.47	0.34	2.35	1.66	clayey silt to silty clay	UNDFND	UNDFD	7	.8
9.75	32	63.14	1.01	1.60	1.68	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.05	33	123.84	0.96	0.77	1.71	sand to silty sand	60-70	38-40	30	UNDEFINED
10.35	34	29.30	0.72	2.46	1.74	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
10.65	35	12.23	0.17	1.39	1.77	clayey silt to silty clay	UNDFND	UNDFD	6	.6
10.95	36	10.97	0.19	1.78	1.80	clayey silt to silty clay	UNDFND	UNDFD	5	.5
11.25	37	13.57	0.34	2.48	1.83	clayey silt to silty clay	UNDFND	UNDFD	7	.7
11.55	38	11.15	0.34	3.06	1.85	silty clay to clay	UNDFND	UNDFD	7	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

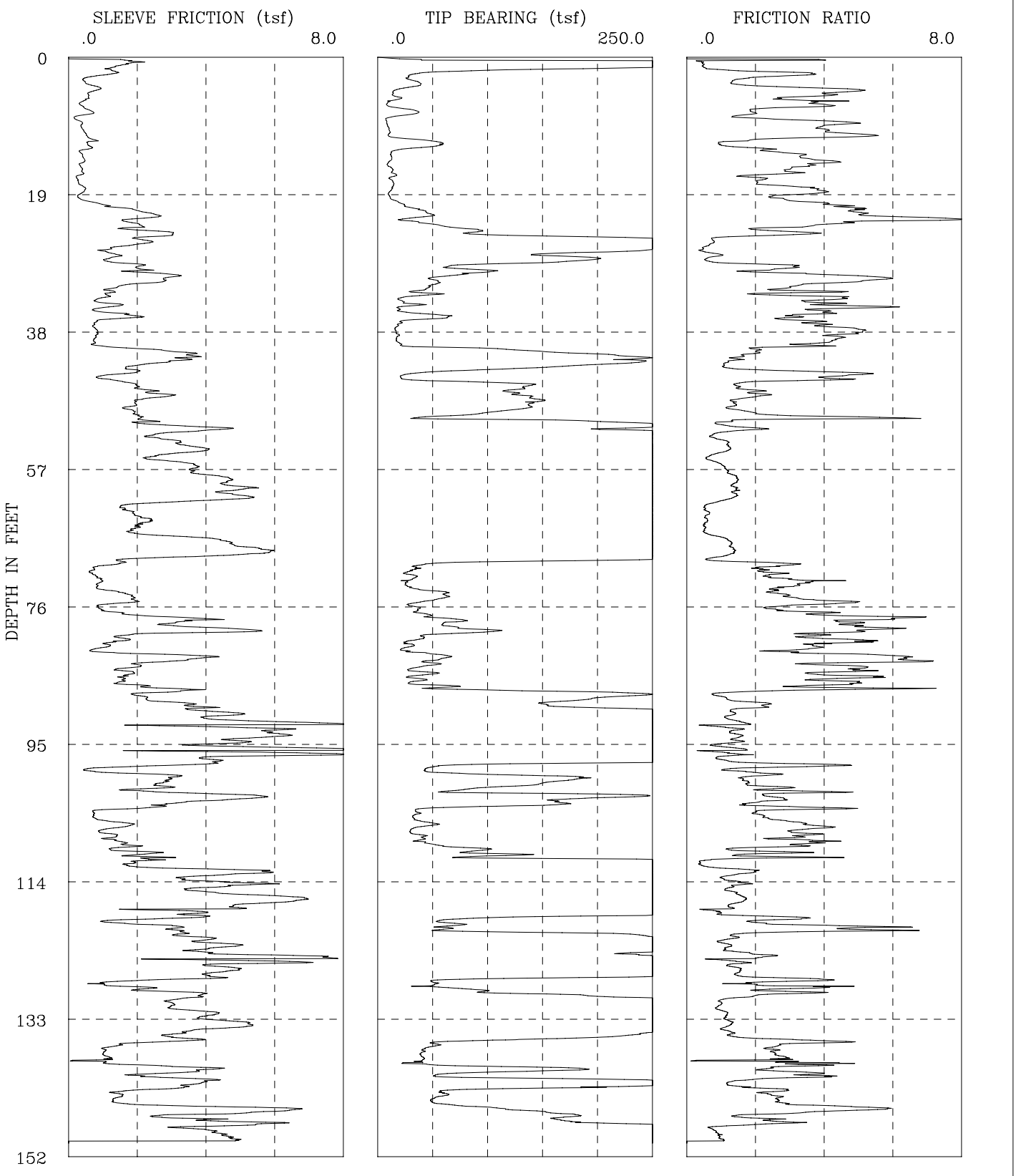
Figure A-6b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	11.41	0.30	2.59	1.88	silty clay to clay	UNDFND	UNDFD	7	.6
12.15	40	14.09	0.32	2.30	1.91	clayey silt to silty clay	UNDFND	UNDFD	7	.7
12.45	41	19.93	0.58	2.93	1.94	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
12.80	42	29.89	1.08	3.61	1.97	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	39.71	1.84	4.62	2.00	silty clay to clay	UNDFND	UNDFD	25	2.4
13.40	44	184.43	1.72	0.93	2.03	sand	70-80	40-42	35	UNDEFINED
13.75	45	246.32	1.67	0.68	2.06	sand	80-90	40-42	47	UNDEFINED
14.05	46	248.95	1.27	0.51	2.09	sand	80-90	40-42	48	UNDEFINED
14.35	47	179.26	1.70	0.95	2.12	sand	70-80	40-42	34	UNDEFINED
14.65	48	50.24	1.86	3.70	2.15	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
14.95	49	86.89	2.16	2.48	2.18	sandy silt to clayey silt	UNDFND	UNDFD	33	5.5
15.25	50	170.53	2.13	1.25	2.20	sand to silty sand	70-80	38-40	41	UNDEFINED
15.55	51	120.37	1.66	1.38	2.23	sand to silty sand	60-70	38-40	29	UNDEFINED
15.85	52	25.18	0.84	3.33	2.26	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.15	53	20.83	0.75	3.59	2.29	silty clay to clay	UNDFND	UNDFD	13	1.1
16.45	54	98.30	2.05	2.09	2.32	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
16.75	55	64.17	1.36	2.12	2.35	silty sand to sandy silt	40-50	32-34	20	UNDEFINED
17.05	56	16.41	0.75	4.58	2.37	clay	UNDFND	UNDFD	16	.8
17.35	57	17.88	0.86	4.79	2.40	clay	UNDFND	UNDFD	17	.9
17.65	58	20.50	0.90	4.41	2.43	clay	UNDFND	UNDFD	20	1.1
17.95	59	68.80	1.37	1.99	2.46	silty sand to sandy silt	40-50	34-36	22	UNDEFINED
18.25	60	174.08	1.98	1.14	2.49	sand to silty sand	60-70	38-40	42	UNDEFINED
18.55	61	137.10	1.86	1.36	2.52	sand to silty sand	60-70	38-40	33	UNDEFINED
18.85	62	81.50	1.74	2.13	2.54	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
19.20	63	23.19	1.01	4.34	2.57	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	47.92	1.98	4.12	2.61	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
19.80	65	56.83	2.24	3.93	2.63	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
20.15	66	108.78	1.79	1.64	2.66	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
20.45	67	108.99	1.60	1.46	2.69	sand to silty sand	50-60	36-38	26	UNDEFINED
20.75	68	51.06	1.30	2.55	2.72	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
21.05	69	123.78	1.54	1.24	2.75	sand to silty sand	50-60	36-38	30	UNDEFINED
21.35	70	211.00	2.16	1.02	2.78	sand	70-80	38-40	40	UNDEFINED
21.65	71	212.96	2.55	1.20	2.81	sand	70-80	38-40	41	UNDEFINED
21.95	72	251.25	3.99	1.59	2.84	sand to silty sand	70-80	40-42	>50	UNDEFINED
22.25	73	315.52	5.12	1.62	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.55	74	367.51	2.81	0.77	2.89	sand	80-90	42-44	>50	UNDEFINED
22.85	75	401.60	2.25	0.56	2.92	gravelly sand to sand	>90	42-44	>50	UNDEFINED
23.15	76	395.11	3.65	0.92	2.95	sand	>90	42-44	>50	UNDEFINED
23.45	77	408.09	4.54	1.11	2.98	sand	>90	42-44	>50	UNDEFINED
23.75	78	393.78	4.74	1.20	3.01	sand	>90	42-44	>50	UNDEFINED
24.05	79	337.28	3.40	1.01	3.03	sand	80-90	40-42	>50	UNDEFINED
24.35	80	309.14	1.42	0.46	3.06	gravelly sand to sand	80-90	40-42	49	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6c



I-436 SR-22 Phase 2	CPT-08-021
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-7a

Engineer : Nava
On Site Loc: CPT-08-021
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 9.84

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	312.43	1.49	0.48	0.03	gravelly sand to sand	>90	UNDFD	50	UNDEFINED
0.60	2	188.74	1.30	0.69	0.09	sand	>90	>48	36	UNDEFINED
0.95	3	30.90	0.83	2.70	0.15	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
1.25	4	36.20	0.61	1.68	0.22	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
1.55	5	16.48	0.74	4.47	0.28	clay	UNDFND	UNDFD	16	1.0
1.85	6	16.43	0.53	3.24	0.33	silty clay to clay	UNDFND	UNDFD	10	1.0
2.15	7	11.70	0.39	3.30	0.39	silty clay to clay	UNDFND	UNDFD	7	.7
2.45	8	32.16	0.60	1.85	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	2.1
2.75	9	9.17	0.26	2.83	0.51	silty clay to clay	UNDFND	UNDFD	6	.5
3.05	10	9.44	0.39	4.10	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	10.59	0.50	4.73	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	44.22	0.63	1.42	0.64	silty sand to sandy silt	40-50	38-40	14	UNDEFINED
3.95	13	34.87	0.54	1.55	0.67	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
4.25	14	12.36	0.40	3.22	0.69	silty clay to clay	UNDFND	UNDFD	8	.7
4.55	15	10.37	0.41	3.93	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	12.67	0.39	3.07	0.75	silty clay to clay	UNDFND	UNDFD	8	.7
5.15	17	13.77	0.30	2.17	0.78	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.45	18	14.07	0.33	2.35	0.81	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.75	19	11.59	0.44	3.82	0.84	clay	UNDFND	UNDFD	11	.6
6.05	20	12.37	0.34	2.78	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	26.20	1.19	4.53	0.89	clay	UNDFND	UNDFD	25	1.6
6.70	22	46.14	2.36	5.11	0.93	clay	UNDFND	UNDFD	44	2.9
7.00	23	31.89	1.89	5.94	0.95	clay	UNDFND	UNDFD	31	2.0
7.35	24	75.65	2.11	2.78	0.98	sandy silt to clayey silt	UNDFND	UNDFD	29	4.9
7.65	25	159.69	2.58	1.62	1.02	sand to silty sand	70-80	42-44	38	UNDEFINED
7.95	26	294.45	2.12	0.72	1.04	sand	>90	44-46	>50	UNDEFINED
8.25	27	233.07	1.16	0.50	1.07	sand	80-90	44-46	45	UNDEFINED
8.55	28	176.59	1.28	0.72	1.10	sand	80-90	42-44	34	UNDEFINED
8.85	29	105.96	1.77	1.67	1.13	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
9.15	30	88.45	2.28	2.58	1.16	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
9.45	31	54.22	2.92	5.38	1.19	clay	UNDFND	UNDFD	>50	3.4
9.75	32	49.47	1.67	3.37	1.21	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
10.05	33	41.59	1.17	2.81	1.24	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.35	34	22.05	0.92	4.16	1.27	silty clay to clay	UNDFND	UNDFD	14	1.3
10.65	35	25.65	1.13	4.42	1.30	silty clay to clay	UNDFND	UNDFD	16	1.5
10.95	36	45.23	1.57	3.47	1.33	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
11.25	37	29.83	0.95	3.19	1.36	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
11.55	38	16.84	0.78	4.62	1.38	clay	UNDFND	UNDFD	16	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.76	0.81	4.56	1.41	clay	UNDFND	UNDFD	17	1.0
12.15	40	19.31	0.75	3.87	1.44	silty clay to clay	UNDFND	UNDFD	12	1.1
12.45	41	116.15	2.44	2.10	1.47	silty sand to sandy silt	60-70	40-42	37	UNDEFINED
12.80	42	229.00	3.44	1.50	1.50	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.10	43	188.22	2.11	1.12	1.53	sand	70-80	40-42	36	UNDEFINED
13.40	44	53.23	1.70	3.20	1.56	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
13.75	45	57.04	1.31	2.30	1.59	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
14.05	46	130.58	2.12	1.62	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	130.24	2.64	2.03	1.65	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
14.65	48	143.42	1.99	1.38	1.68	sand to silty sand	60-70	40-42	34	UNDEFINED
14.95	49	125.21	1.79	1.43	1.70	sand to silty sand	60-70	38-40	30	UNDEFINED
15.25	50	67.85	2.03	2.99	1.73	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
15.55	51	235.05	2.59	1.10	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	263.32	3.81	1.45	1.79	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.15	53	316.90	2.61	0.83	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	281.50	3.42	1.22	1.85	sand	80-90	42-44	>50	UNDEFINED
16.75	55	341.06	3.51	1.03	1.87	sand	>90	42-44	>50	UNDEFINED
17.05	56	389.51	2.60	0.67	1.90	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.35	57	345.43	3.65	1.06	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	301.63	3.83	1.27	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	318.01	4.64	1.46	1.99	sand to silty sand	80-90	42-44	>50	UNDEFINED
18.25	60	354.11	4.97	1.40	2.02	sand	>90	42-44	>50	UNDEFINED
18.55	61	348.02	4.85	1.39	2.04	sand	>90	42-44	>50	UNDEFINED
18.85	62	348.19	3.28	0.94	2.07	sand	>90	42-44	>50	UNDEFINED
19.20	63	297.97	1.68	0.56	2.10	sand	80-90	42-44	>50	UNDEFINED
19.50	64	372.75	2.14	0.57	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	398.39	2.13	0.53	2.16	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.15	66	351.22	2.01	0.57	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	365.15	4.25	1.16	2.22	sand	>90	42-44	>50	UNDEFINED
20.75	68	393.56	5.19	1.32	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	402.02	5.04	1.25	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	171.99	1.64	0.96	2.31	sand	70-80	38-40	33	UNDEFINED
21.65	71	33.65	0.80	2.39	2.34	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
21.95	72	30.67	0.76	2.49	2.37	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
22.25	73	26.22	0.91	3.47	2.39	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
22.55	74	42.04	1.08	2.57	2.42	sandy silt to clayey silt	UNDFND	UNDFD	16	2.5
22.85	75	59.91	1.82	3.04	2.45	sandy silt to clayey silt	UNDFND	UNDFD	23	3.6
23.15	76	34.82	1.37	3.92	2.48	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
23.45	77	37.49	1.17	3.13	2.51	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
23.75	78	61.16	3.25	5.31	2.54	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.05	79	64.33	3.29	5.11	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	82.11	3.87	4.71	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	34.89	1.49	4.27	2.62	silty clay to clay	UNDFND	UNDFD	22	2.0
24.95	82	27.43	1.01	3.70	2.65	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
25.25	83	45.86	2.22	4.84	2.68	silty clay to clay	UNDFND	UNDFD	29	2.7
25.60	84	52.77	2.90	5.50	2.71	clay	UNDFND	UNDFD	>50	3.1
25.90	85	35.33	1.75	4.94	2.74	clay	UNDFND	UNDFD	34	2.0
26.20	86	39.81	1.68	4.21	2.77	silty clay to clay	UNDFND	UNDFD	25	2.3
26.55	87	45.07	1.79	3.98	2.80	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.85	88	160.38	2.83	1.76	2.83	sand to silty sand	60-70	38-40	38	UNDEFINED
27.15	89	196.87	2.31	1.18	2.86	sand	70-80	38-40	38	UNDEFINED
27.45	90	172.96	3.65	2.11	2.88	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.75	91	338.22	4.45	1.32	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	370.89	5.11	1.38	2.94	sand	80-90	42-44	>50	UNDEFINED
28.35	93	427.10	5.31	1.24	2.97	sand	>90	42-44	>50	UNDEFINED
28.65	94	421.84	6.02	1.43	3.00	sand	>90	42-44	>50	UNDEFINED
28.95	95	372.56	4.73	1.27	3.03	sand	80-90	40-42	>50	UNDEFINED
29.25	96	512.32	6.18	1.21	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	492.28	5.81	1.18	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	232.44	3.93	1.69	3.11	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.15	99	47.49	0.88	1.85	3.14	silty sand to sandy silt	<40	30-32	15	UNDEFINED
30.45	100	156.58	2.93	1.87	3.17	silty sand to sandy silt	60-70	36-38	50	UNDEFINED
30.75	101	141.39	2.75	1.95	3.20	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.05	102	99.35	2.76	2.78	3.22	sandy silt to clayey silt	UNDFND	UNDFD	38	6.2
31.35	103	197.21	4.98	2.53	3.25	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
31.65	104	122.94	2.71	2.21	3.28	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
32.00	105	34.69	0.79	2.26	3.31	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.30	106	40.75	1.21	2.97	3.34	sandy silt to clayey silt	UNDFND	UNDFD	16	2.2
32.60	107	36.99	1.35	3.66	3.37	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
32.95	108	37.99	1.21	3.17	3.40	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
33.25	109	46.90	1.67	3.55	3.43	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
33.55	110	90.11	1.78	1.98	3.46	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
33.85	111	198.07	2.17	1.10	3.49	sand	60-70	38-40	38	UNDEFINED
34.15	112	414.33	1.91	0.46	3.52	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
34.45	113	294.89	5.09	1.72	3.55	sand to silty sand	70-80	40-42	>50	UNDEFINED
34.75	114	310.52	3.67	1.18	3.57	sand	80-90	40-42	>50	UNDEFINED
35.05	115	324.42	4.55	1.40	3.60	sand	80-90	40-42	>50	UNDEFINED
35.35	116	327.31	4.68	1.43	3.63	sand	80-90	40-42	>50	UNDEFINED
35.65	117	399.38	6.50	1.63	3.66	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.95	118	394.07	4.01	1.02	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	293.94	3.78	1.29	3.72	sand	70-80	40-42	>50	UNDEFINED
36.55	120	66.96	1.70	2.54	3.74	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
36.85	121	65.44	3.17	4.84	3.77	silty clay to clay	UNDFND	UNDFD	42	3.8
37.15	122	253.08	3.60	1.42	3.80	sand to silty sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7d

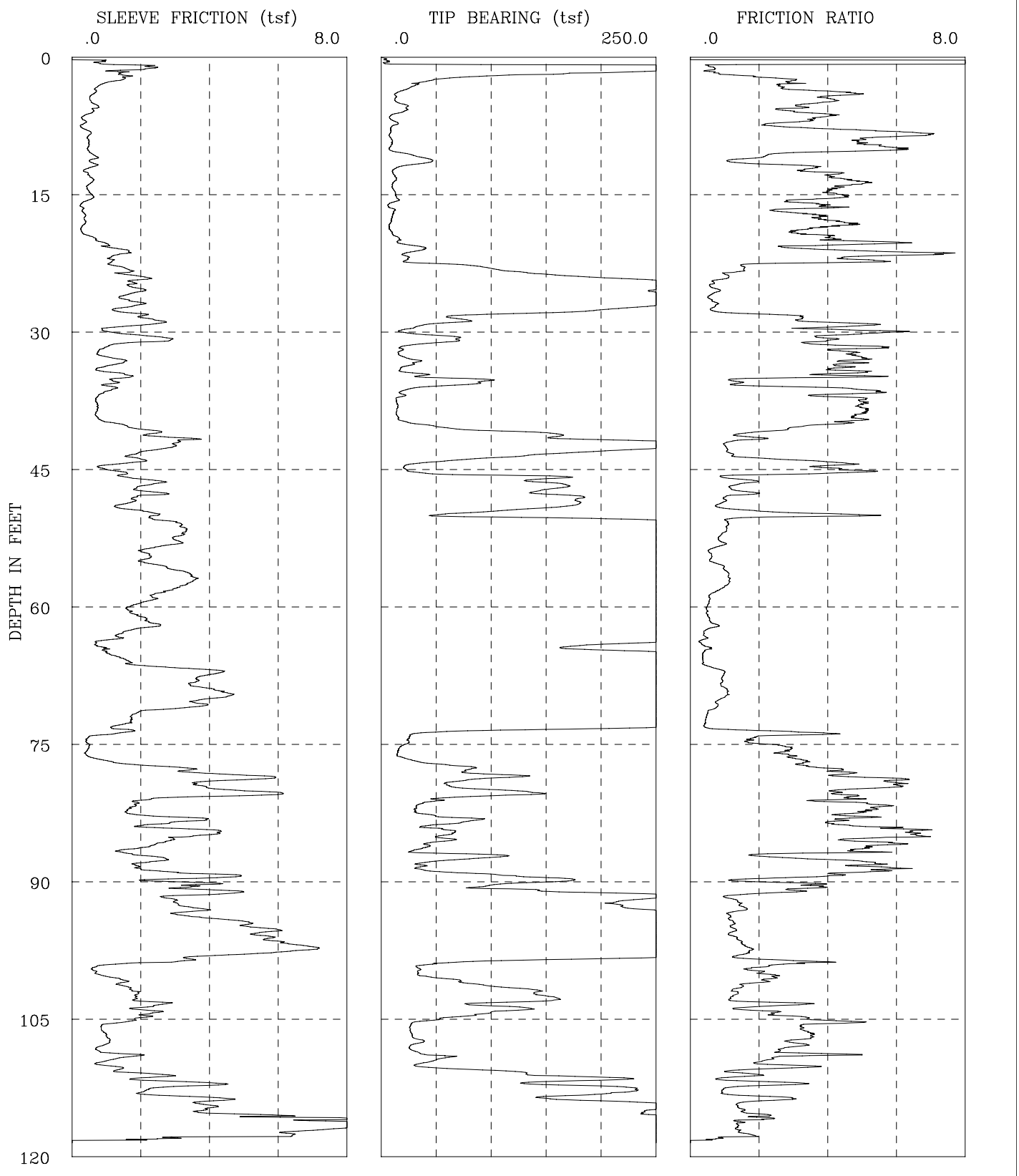
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	394.19	4.35	1.10	3.83	sand	80-90	40-42	>50	UNDEFINED
37.75	124	312.38	3.95	1.27	3.86	sand	70-80	40-42	>50	UNDEFINED
38.05	125	329.85	5.51	1.67	3.89	sand to silty sand	80-90	40-42	>50	UNDEFINED
38.40	126	354.67	5.16	1.45	3.92	sand	80-90	40-42	>50	UNDEFINED
38.70	127	289.77	4.34	1.50	3.95	sand to silty sand	70-80	38-40	>50	UNDEFINED
39.00	128	104.71	2.71	2.59	3.97	sandy silt to clayey silt	UNDFND	UNDFD	40	6.4
39.35	129	67.34	1.81	2.70	4.01	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
39.65	130	177.74	3.76	2.12	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.95	131	303.67	3.00	0.99	4.06	sand	70-80	38-40	>50	UNDEFINED
40.25	132	353.19	3.45	0.98	4.09	sand	80-90	40-42	>50	UNDEFINED
40.55	133	354.61	4.05	1.14	4.12	sand	80-90	40-42	>50	UNDEFINED
40.85	134	407.71	5.12	1.26	4.15	sand	80-90	40-42	>50	UNDEFINED
41.15	135	320.69	3.69	1.15	4.18	sand	70-80	38-40	>50	UNDEFINED
41.45	136	170.86	3.25	1.90	4.21	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
41.75	137	50.29	1.55	3.09	4.23	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
42.05	138	40.50	1.03	2.55	4.26	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.35	139	40.71	0.96	2.35	4.29	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.65	140	110.08	2.94	2.67	4.32	sandy silt to clayey silt	UNDFND	UNDFD	42	6.7
42.95	141	86.15	2.75	3.20	4.35	sandy silt to clayey silt	UNDFND	UNDFD	33	5.1
43.25	142	248.25	3.82	1.54	4.38	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.55	143	167.67	2.88	1.72	4.40	sand to silty sand	60-70	36-38	40	UNDEFINED
43.85	144	58.78	1.45	2.47	4.43	sandy silt to clayey silt	UNDFND	UNDFD	23	3.3
44.15	145	53.77	1.54	2.87	4.46	sandy silt to clayey silt	UNDFND	UNDFD	21	3.0
44.45	146	119.04	5.71	4.79	4.49	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.80	147	169.89	3.53	2.08	4.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
45.10	148	301.47	4.84	1.60	4.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
45.40	149	491.97	4.18	0.85	4.58	gravelly sand to sand	>90	40-42	>50	UNDEFINED
45.75	150	470.75	3.43	0.73	4.61	gravelly sand to sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7e



CPT-08-022	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-8a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-022
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	109.32	1.03	0.94	0.03	sand to silty sand	>90	>48	26	UNDEFINED
0.60	2	232.57	1.67	0.72	0.09	sand	>90	>48	45	UNDEFINED
0.95	3	46.61	1.18	2.53	0.15	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.25	4	18.71	0.66	3.54	0.22	silty clay to clay	UNDFND	UNDFD	12	1.2
1.55	5	14.24	0.55	3.86	0.28	silty clay to clay	UNDFND	UNDFD	9	.9
1.85	6	21.85	0.66	3.00	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.4
2.15	7	9.76	0.36	3.64	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	10.65	0.34	3.18	0.45	silty clay to clay	UNDFND	UNDFD	7	.6
2.75	9	8.31	0.49	5.91	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	8.94	0.48	5.36	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	24.24	0.61	2.50	0.61	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
3.65	12	34.31	0.60	1.75	0.64	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
3.95	13	11.27	0.43	3.81	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	12.04	0.56	4.66	0.69	clay	UNDFND	UNDFD	12	.7
4.55	15	11.67	0.48	4.11	0.72	clay	UNDFND	UNDFD	11	.7
4.85	16	13.16	0.49	3.69	0.75	silty clay to clay	UNDFND	UNDFD	8	.8
5.15	17	9.30	0.29	3.10	0.78	silty clay to clay	UNDFND	UNDFD	6	.5
5.45	18	9.84	0.37	3.81	0.81	clay	UNDFND	UNDFD	9	.5
5.75	19	7.72	0.31	4.00	0.84	clay	UNDFND	UNDFD	7	.4
6.05	20	12.55	0.47	3.77	0.86	clay	UNDFND	UNDFD	12	.7
6.40	21	27.26	1.06	3.87	0.89	silty clay to clay	UNDFND	UNDFD	17	1.7
6.70	22	24.27	1.35	5.57	0.93	clay	UNDFND	UNDFD	23	1.5
7.00	23	56.94	1.23	2.16	0.95	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
7.35	24	148.98	1.79	1.20	0.98	sand to silty sand	70-80	42-44	36	UNDEFINED
7.65	25	271.53	1.76	0.65	1.02	sand	>90	44-46	>50	UNDEFINED
7.95	26	260.22	1.81	0.70	1.04	sand	>90	44-46	50	UNDEFINED
8.25	27	262.27	1.76	0.67	1.07	sand	>90	44-46	>50	UNDEFINED
8.55	28	181.16	1.56	0.86	1.10	sand	80-90	42-44	35	UNDEFINED
8.85	29	67.04	2.34	3.49	1.13	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
9.15	30	26.50	1.27	4.81	1.16	clay	UNDFND	UNDFD	25	1.6
9.45	31	59.54	2.41	4.05	1.19	clayey silt to silty clay	UNDFND	UNDFD	29	3.8
9.75	32	26.32	1.08	4.09	1.21	silty clay to clay	UNDFND	UNDFD	17	1.6
10.05	33	19.48	0.97	4.95	1.24	clay	UNDFND	UNDFD	19	1.1
10.35	34	26.69	1.19	4.46	1.27	silty clay to clay	UNDFND	UNDFD	17	1.6
10.65	35	29.75	1.32	4.44	1.30	silty clay to clay	UNDFND	UNDFD	19	1.8
10.95	36	80.35	1.14	1.42	1.33	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
11.25	37	21.57	1.01	4.68	1.36	clay	UNDFND	UNDFD	21	1.2
11.55	38	14.50	0.71	4.88	1.38	clay	UNDFND	UNDFD	14	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	14.40	0.73	5.04	1.41	clay	UNDFND	UNDFD	14	.8
12.15	40	17.41	0.83	4.76	1.44	clay	UNDFND	UNDFD	17	1.0
12.45	41	66.93	1.88	2.81	1.47	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
12.80	42	188.85	2.83	1.50	1.50	sand to silty sand	70-80	40-42	45	UNDEFINED
13.10	43	263.77	2.72	1.03	1.53	sand	80-90	42-44	>50	UNDEFINED
13.40	44	120.80	1.87	1.55	1.56	sand to silty sand	60-70	38-40	29	UNDEFINED
13.75	45	28.42	1.21	4.26	1.59	silty clay to clay	UNDFND	UNDFD	18	1.7
14.05	46	106.26	1.65	1.56	1.62	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
14.35	47	157.73	2.24	1.42	1.65	sand to silty sand	70-80	40-42	38	UNDEFINED
14.65	48	158.03	2.20	1.40	1.68	sand to silty sand	70-80	40-42	38	UNDEFINED
14.95	49	176.04	1.58	0.90	1.70	sand	70-80	40-42	34	UNDEFINED
15.25	50	91.65	2.08	2.27	1.73	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
15.55	51	237.16	2.76	1.16	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	320.29	3.26	1.02	1.79	sand	>90	42-44	>50	UNDEFINED
16.15	53	355.17	3.07	0.87	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	338.21	2.37	0.70	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	365.14	2.17	0.60	1.87	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.05	56	291.92	2.58	0.88	1.90	sand	80-90	42-44	>50	UNDEFINED
17.35	57	311.80	3.46	1.11	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	310.82	3.32	1.07	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	386.25	2.56	0.66	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	387.99	2.10	0.54	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	352.17	1.69	0.48	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	379.90	2.19	0.58	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	350.92	1.85	0.53	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	282.08	1.05	0.37	2.13	gravelly sand to sand	80-90	42-44	45	UNDEFINED
19.80	65	200.71	0.88	0.44	2.16	sand	70-80	40-42	38	UNDEFINED
20.15	66	393.79	1.44	0.37	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	449.43	3.18	0.71	2.22	gravelly sand to sand	>90	44-46	>50	UNDEFINED
20.75	68	402.06	3.79	0.94	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	386.43	3.72	0.96	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	429.27	4.40	1.02	2.31	sand	>90	42-44	>50	UNDEFINED
21.65	71	467.40	3.60	0.77	2.34	gravelly sand to sand	>90	44-46	>50	UNDEFINED
21.95	72	377.27	1.95	0.52	2.37	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.25	73	367.80	1.58	0.43	2.39	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.55	74	102.48	1.32	1.29	2.42	sand to silty sand	50-60	36-38	25	UNDEFINED
22.85	75	24.58	0.45	1.82	2.45	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
23.15	76	16.24	0.45	2.76	2.48	clayey silt to silty clay	UNDFND	UNDFD	8	.7
23.45	77	23.09	0.74	3.19	2.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
23.75	78	72.10	2.71	3.76	2.54	clayey silt to silty clay	UNDFND	UNDFD	35	4.4
24.05	79	98.77	4.94	5.01	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	68.14	3.83	5.61	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	108.28	4.76	4.39	2.62	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.95	82	39.42	1.88	4.76	2.65	silty clay to clay	UNDFND	UNDFD	25	2.3
25.25	83	36.80	1.79	4.86	2.68	clay	UNDFND	UNDFD	35	2.1
25.60	84	66.12	2.95	4.47	2.71	clayey silt to silty clay	UNDFND	UNDFD	32	4.0
25.90	85	60.15	3.88	6.44	2.74	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
26.20	86	51.83	2.71	5.23	2.77	clay	UNDFND	UNDFD	50	3.1
26.55	87	51.63	1.76	3.40	2.80	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
26.85	88	62.88	2.37	3.76	2.83	clayey silt to silty clay	UNDFND	UNDFD	30	3.8
27.15	89	47.90	2.38	4.97	2.86	silty clay to clay	UNDFND	UNDFD	31	2.8
27.45	90	145.93	3.67	2.51	2.88	silty sand to sandy silt	60-70	36-38	47	UNDEFINED
27.75	91	113.42	3.84	3.38	2.91	sandy silt to clayey silt	UNDFND	UNDFD	43	7.2
28.05	92	244.50	3.38	1.38	2.94	sand to silty sand	70-80	40-42	>50	UNDEFINED
28.35	93	220.00	3.32	1.51	2.97	sand to silty sand	70-80	38-40	>50	UNDEFINED
28.65	94	294.49	3.45	1.17	3.00	sand	80-90	40-42	>50	UNDEFINED
28.95	95	416.11	5.06	1.21	3.03	sand	>90	42-44	>50	UNDEFINED
29.25	96	461.20	5.67	1.23	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	415.19	6.07	1.46	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	370.94	6.30	1.70	3.11	sand to silty sand	80-90	40-42	>50	UNDEFINED
30.15	99	160.48	3.05	1.90	3.14	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	34.31	0.70	2.03	3.17	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
30.75	101	52.27	1.21	2.31	3.20	sandy silt to clayey silt	UNDFND	UNDFD	20	3.0
31.05	102	110.03	1.56	1.41	3.22	sand to silty sand	50-60	34-36	26	UNDEFINED
31.35	103	150.02	1.87	1.25	3.25	sand to silty sand	60-70	36-38	36	UNDEFINED
31.65	104	113.92	2.28	2.00	3.28	silty sand to sandy silt	50-60	34-36	36	UNDEFINED
32.00	105	85.44	2.18	2.55	3.31	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
32.30	106	29.97	1.15	3.84	3.34	silty clay to clay	UNDFND	UNDFD	19	1.5
32.60	107	27.45	0.95	3.46	3.37	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
32.95	108	31.66	0.98	3.08	3.40	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
33.25	109	40.06	1.26	3.14	3.43	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
33.55	110	42.39	0.99	2.33	3.46	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
33.85	111	99.21	1.72	1.73	3.49	silty sand to sandy silt	40-50	34-36	32	UNDEFINED
34.15	112	176.22	2.89	1.64	3.52	sand to silty sand	60-70	36-38	42	UNDEFINED
34.45	113	215.92	2.57	1.19	3.55	sand	70-80	38-40	41	UNDEFINED
34.75	114	176.88	3.64	2.06	3.57	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	273.72	3.89	1.42	3.60	sand to silty sand	70-80	38-40	>50	UNDEFINED
35.35	116	308.96	6.18	2.00	3.63	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.65	117	635.31	8.78	1.38	3.66	sand	>90	42-44	>50	UNDEFINED
35.95	118	389.55	5.88	1.51	3.69	sand to silty sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-8d

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed by GDC and our laboratory subconsultants Geologic Associates of Anaheim, California, using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples were then transported to our Aliso Viejo geotechnical laboratory and to Geologic Associates for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of moisture content and dry unit weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Consolidation, and Soil Corrosivity. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The soil classifications are presented on key for soil classification and on the boring logs Figures A-1a through A-3e of Appendix A.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented on the boring logs in Figures A-2a through A-3e of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a and A-3e of Appendix A and in Figure B-1 of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided graphically in Figure B-2. The relative proportion (or percentage) by dry weight of fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a through A-3e of Appendix A.

B.6 Direct Shear Test

To determine the shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under two additional normal loads. The test results are presented in Figure B-3.

B.7 Consolidation Test

One-dimensional consolidation test was performed on selected undisturbed samples in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation tests are graphically shown in Figures B-4a to B-4b.

B.8 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included soil pH (Caltrans method 643), water-soluble chlorides (Caltrans Test Method 422), water-soluble sulfates (Caltrans Test Method 417) and electrical resistivity (Caltrans Test Method 643). The test results are summarized in Table B-1.

TABLE B-1:
SUMMARY OF CORROSION TEST RESULTS

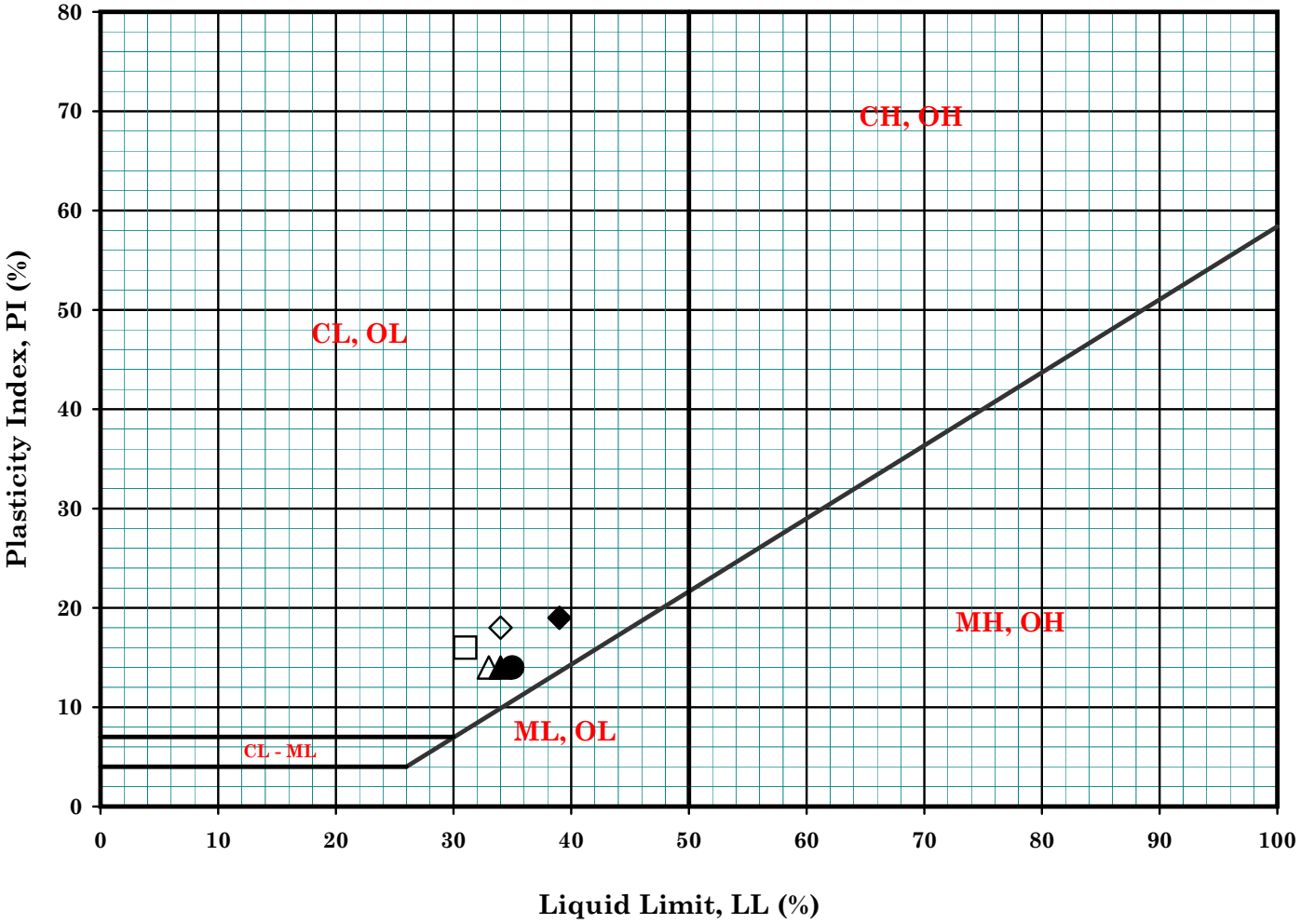
Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20-21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35-36.5	ML	NA	8.8	576	255

B.10 List of Attached Figures

The following figures are attached and complete this appendix:

Figure B-1	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figure B-3	Direct Shear Test Results
Figures B-4a and B-4b	Consolidation Test Results

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-017	R-2	11.0	11.5	3.4	3.5	32	35	21	14	0.79	Dark Brown Lean Clay with Sand (CL)
▲	R-08-017	S-3	15.0	16.5	4.6	5.0	27	34	20	14	0.50	Light Brown Sandy Lean Clay (CL)
◆	R-08-017	R-8	41.0	41.5	12.5	12.7	28	39	20	19	0.42	Gray Brown Lean Clay (CL)
△	R-08-011	S-1	5.0	6.5	1.5	2.0	19	33	19	14	0.00	Olive Brown Clayey Sand (SC)
◇	R-08-011	R-4	21.0	21.5	6.4	6.6	24	34	16	18	0.44	Olive Brown Sandy Lean Clay (CL)
□	R-08-011	R-12	71.0	71.5	21.7	21.8	17	31	15	16	0.13	Light Brown Gray Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

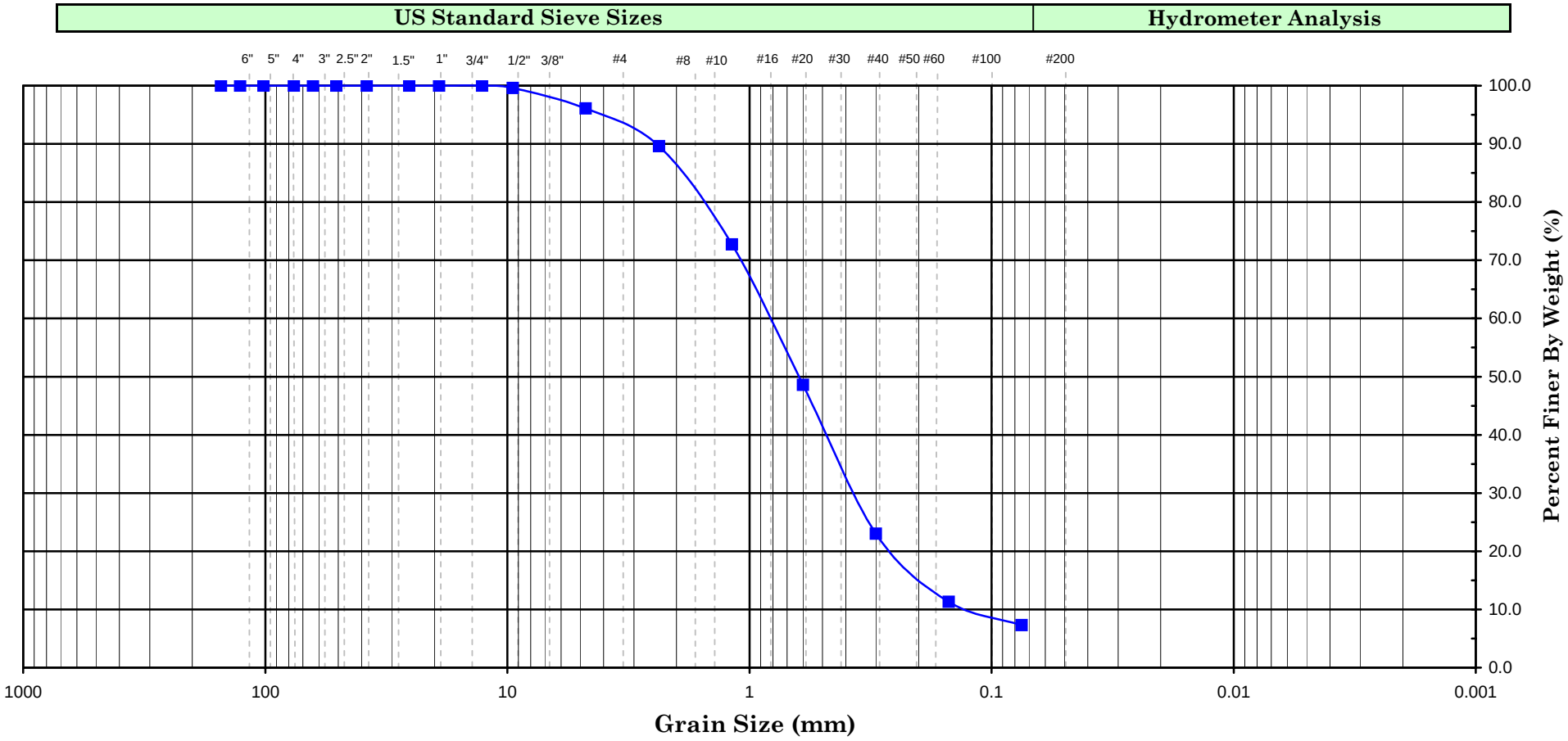
Project No. : I-436

Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
■	R-08-011	S-11	60.0	61.3	18.30	18.70	Gray Brown	Well Graded Sand with Silt (SW-SM)	SW-SM

Remark :

GROUP DELTA CONSULTANTS

SR-22

GRAIN SIZE ANALYSIS

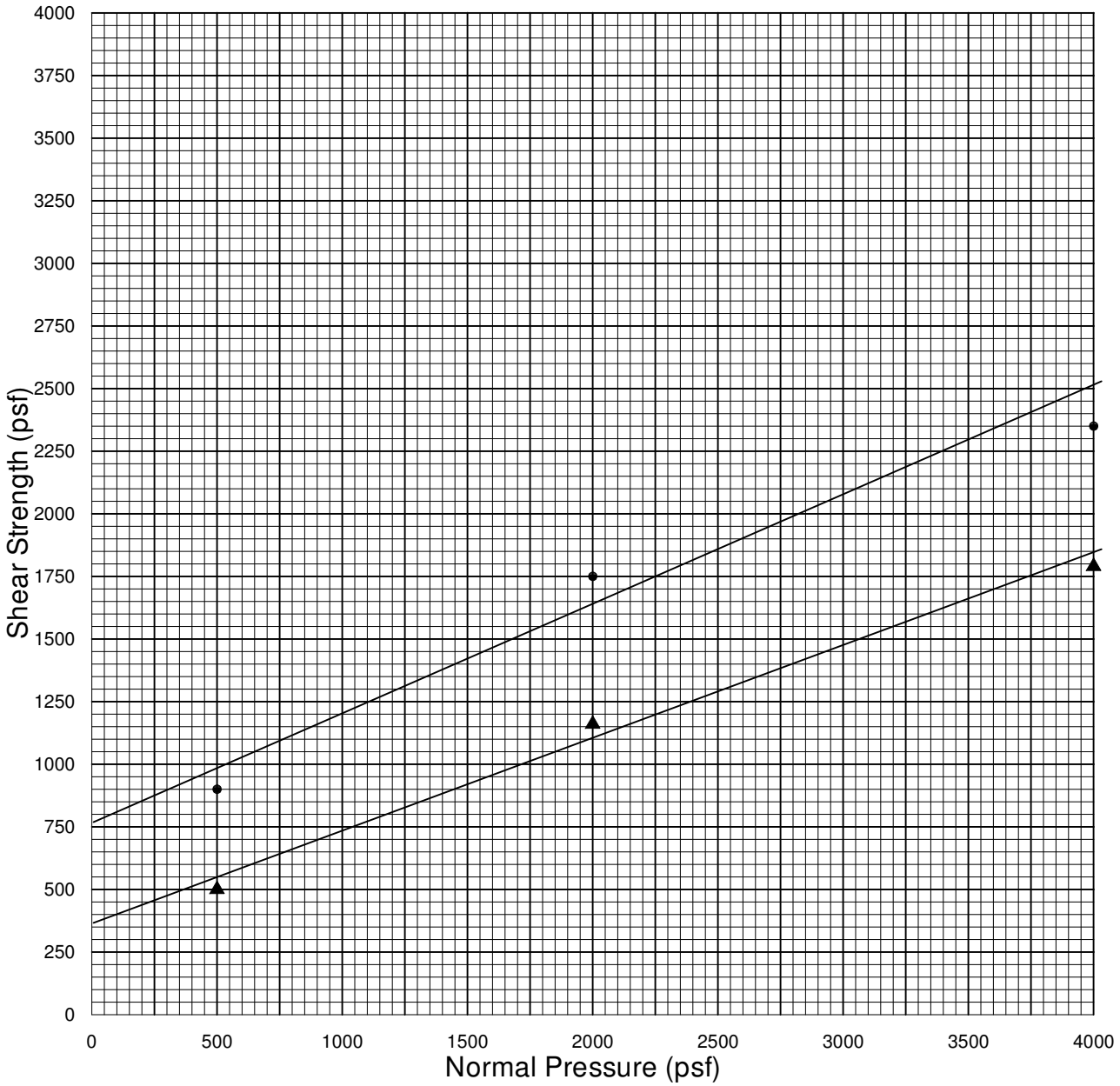
(ASTM D-422-63)

Project No. : I-436

Date : 05/28/08

Figure No. : B-2

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-017 @ 10'-11.5'	Undisturbed & Saturated	Clayey Silt	92.4	25.8

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	900 @ 0.0500"	500
2000	1750 @ 0.0550"	1160
4000	2350 @ 0.0650"	1790
	C = 750 psf	C = 350 psf
	ϕ = 24 deg.	ϕ = 20 deg.

Figure B-3

CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	R-08-011	Depth:	20' - 21.5'	Date	05-13-08

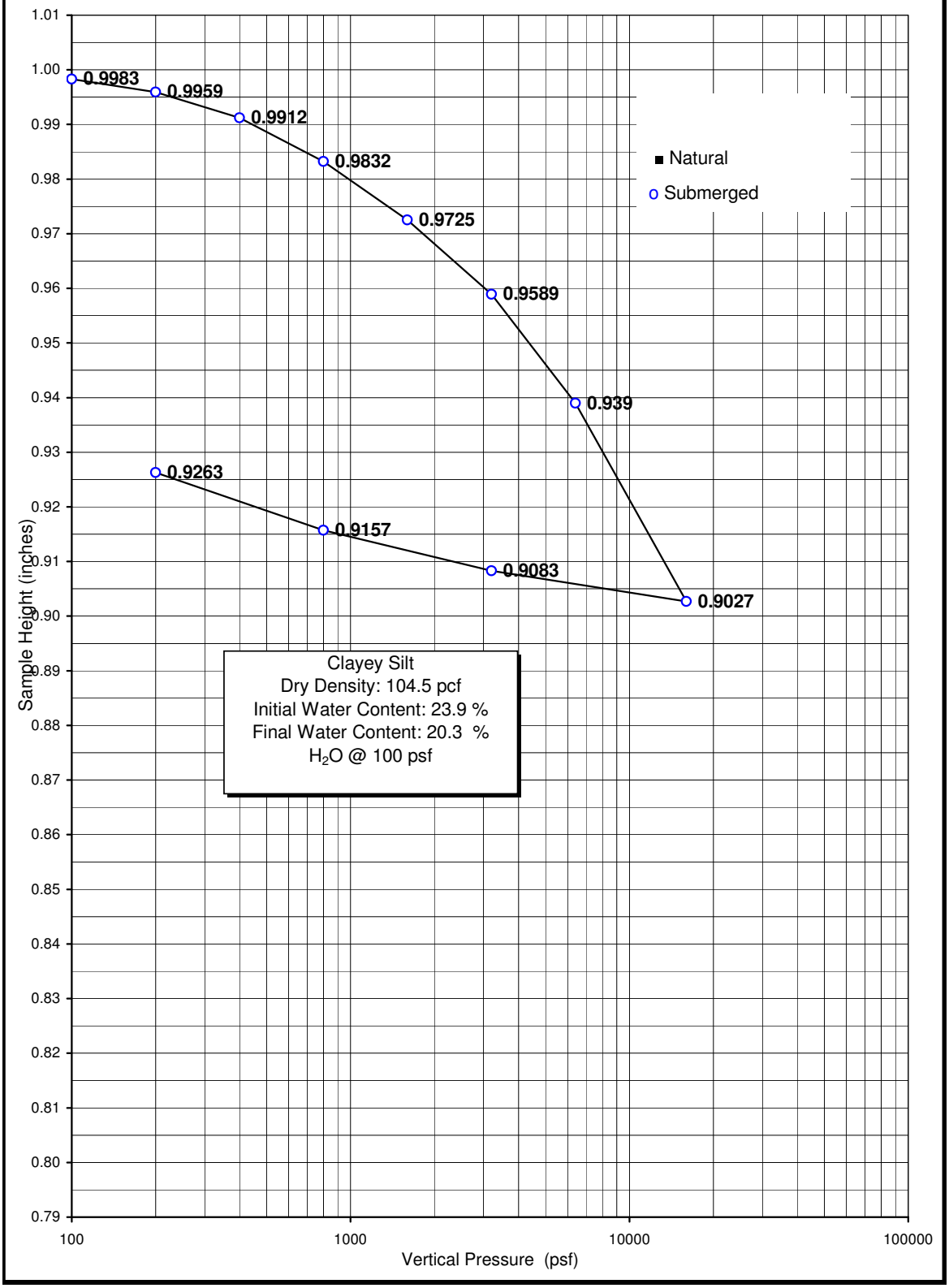


Figure B-4a

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-017	Depth:	40' - 41.5'	Date	05-13-08

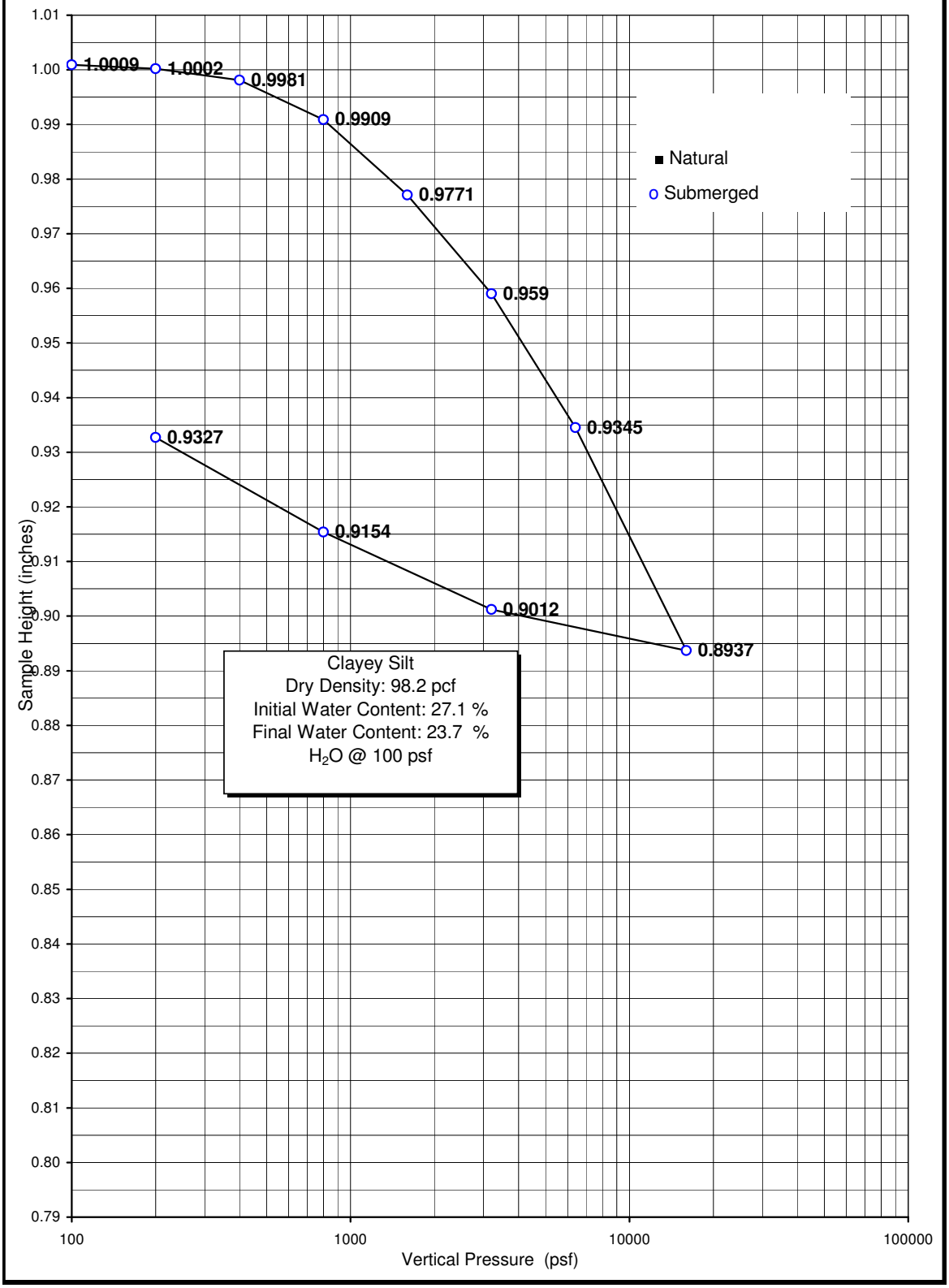


Figure B-4b

APPENDIX C
ACI GUIDE FOR CAST-IN-PLACE LOW-DENSITY CELLULAR CONCRETE

Guide for Cast-in-Place Low-Density Cellular Concrete

Reported by ACI Committee 523

Edward M. "Ned" Glysson
Chair

Ronald E. Barnett
Secretary

Felipe Babbitt
Bill T. Dye
Fouad H. Fouad
Dean M. Golden
Werner H. Gumpertz
Wenyi Hu
Keith Itzler
Richard E. Klingner
Leo A. Legatski
Daniel L. Liotti
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This guide provides information on the materials, properties, design, proper handling, *and applications of cast-in-place low-density cellular concretes* having *oven-dry densities* of *50 lb/ft³ (800 kg/m³)* or *less.* Roof deck *systems* and *geotechnical applications often incorporate these* low *density* cellular concretes.

Keywords: cellular concrete; engineered fill; foaming agent, geotechnical fill; insulating concrete; insulating concrete roof decks; Low-density cellular concrete: low-density controlled low-strength material (LD-CLSM); preformed foam.

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CHAPTER 1-GENERAL

1.1—Definition of cellular concrete

Low-density cellular concrete (Fig. 1.1) is defined as concrete made with hydraulic cement, water, and preformed foam to form a hardened material having an oven-dry density of 50 lb/ft^3 (800 kg/m^3) or less. These mixtures may include aggregate and other material components including, but not limited to, fly ash and chemical admixtures.

This guide provides data and techniques pertaining to the properties and applications of cast-in-place low-density cellular concrete. Common applications of cast-in-place low-density cellular concrete are on roof decks and geotechnical applications. On roof decks, the material provides roofing base, thermal insulation, and drainage slope for flat-roofed industrial and commercial buildings (Fig. 1.2).

In geotechnical applications, the material is applied in thick sections of cellular concrete with low compressive strengths (Fig. 1.3) for the replacement of poor soils, fills for abandoned structures (pipelines), and cellular concrete-~IS> designed, mixed, and placed to meet specific job conditions and functional requirements.

1.2—Definition of low-density, controlled low-strength material (LD-CLSM)

Controlled low-strength material (CLSM) is a cementitious material that is in a flowable state at the time of placement, and that has a specified compressive strength of 1200 psi (8.3 MPa) or less at the age of 28 days. This material is discussed further in ACI 229R. Low-density CLSM (LD-CLSM) meets this definition, and has a cast density that is controllable from 20 to 50 lb/ft^3 (320 to 800 kg/m^3). The quantity of preformed foam in the mixture determines the mixture's final density.

CHAPTER 2—MATERIALS

The basic materials in low-density cellular concrete are cement, water, and preformed foam. Because the main ingredient by volume of a low-density cellular concrete mixture is preformed foam, it is critical that all admixtures be compatible with the preformed foam within the specific mixture. Trial mixture tests are needed to determine compatibility and the resulting physical properties. Low-density cellular concrete mixtures may also include supplementary cementitious materials.

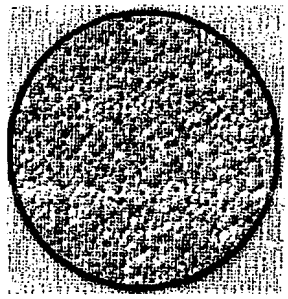


Fig. 1.1—Typical cell structure of cellular concrete.

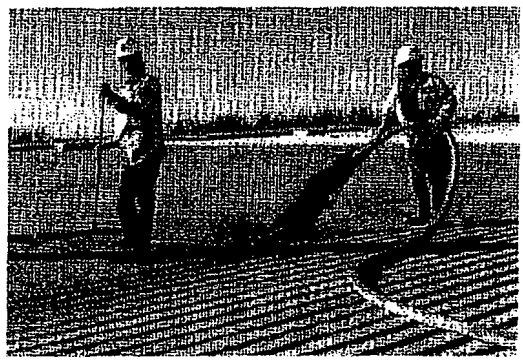


Fig. 1.2—Roof deck application (click on picture to view video).

Fig. 1.3—Geotechnical application (click on picture to view video).

2.1—Cement

The cement should meet the requirements of ASTM C 150 (portland cement), C 595 (blended-cement), or C 1157 (hydraulic cement). Blended cements include cement containing combinations of portland cement, pozzolans, slag, other hydraulic cement, or some combination of these. Blended cement may result in lower rates of early strength

development and should be tested for specific applications. High-early-strength (Type III or HE) cement produces cellular concrete with higher rates of early strength development.

2.2—Water

Mixing water for concrete should be clean and free from detrimental amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete or reinforcement. Any nonpotable water should be tested for hardness, pH, suspended solids, total salt content, and other characteristics that might affect the preformed foam, the setting time, and the strength of the low-density cellular concrete.

2.3—Preformed foam

Preformed foam is created by diluting a liquid foam concentrate with water in predetermined proportions (Fig. 2.1) and [illegible] mixture through a foam generator. Meter the preformed foam directly into the cement-waterslurry at the job site (Fig. 2.2). The density of the preformed foam is typically between 2.5 and 4.0 lb/ft^3 (40 and 65 kg/m^3).

The foam concentrate should have a chemical composition capable of producing and maintaining stable air cells within the concrete mixture. The air cells should be able to resist the physical and chemical forces imposed during mixing, pumping, placing, and setting of the cellular concrete. If the cellular (air-cell) structure is not stable, it may break down under these forces, resulting in an increased concrete density. Most common proprietary formulations of foam concentrates contain protein hydrozylates or synthetic surfactants. ASTM C 796 provides a standard method for laboratory measurement of the performance of a foaming chemical to be used in producing foam (air cells) for making cellular concrete. ASTM C 869 is a standard specification that covers foaming agents specifically formulated for making preformed foam for use in the production of cellular concrete. This specification provides the means for evaluating the performance of a specific foaming agent. Further information concerning these formulations and the procedures for using them is available from foam manufacturers.

2.4—Aggregates

Low-density cellular concrete may include lightweight r e n t & such as vermiculite or perlite meeting the requirements of ASTM C 332 Group I to lower the slump to achieve steeper roof slopes, and to maintain moisture in dry climates. Wilson (1981) provides additional information on the use of lightweight aggregates used in cellular concrete. Any proposed aggregates should be tested for physical properties, pumpability, and compatibility in trial mixtures.

2.5—Admixtures

2.5.1 Chemical admixtures—Chemical admixtures, such as water-reducing admixtures and — accelerators, are used with cellular concretes. Water-reducing admixtures can improve compressive strength for special mixtures or applications. Hot water, high-early-strength (Type III or HE) cement, and chemical accelerators can be used singly or in combination

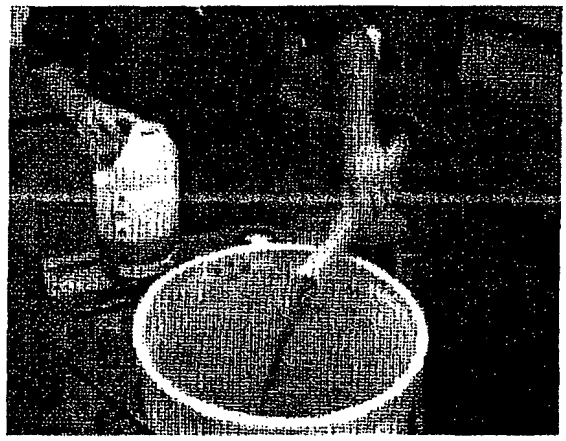


Fig. 2.1—Diluting foam concentrate in water (click on picture to view video).

Fig. 2.2—Metering preformed foam into cement-wafer slurry (click on picture to view video).

to accelerate setting. Accelerators containing chloride ions should not be used in cellular concrete placed in contact with steel. Chemical admixtures should conform to ASTM C 494 and be used at dosages recommended by the manufacturer or determined by trial mixtures.

Not all chemical admixtures are compatible for use in foamed cellular concrete. Individual manufacturers of foam concentrate should be contacted for information about the compatibility of specific admixtures with their foam concentrates, and trial batches should be used to determine the resulting mixture characteristics.

2.5.2 Supplementary cementitious materials—In the production of cellular concrete, supplementary cementitious materials such as fly ash, silica fume, high reactivity metakaolin, or ground-granulated blast-furnace slag. (slag cement) are included to reduce bleeding and segregation and to increase strength. Trial batches should be used to confirm the compatibility of the selected foam concentrate with other admixtures, and to help determine the proper admixture dosages and resulting physical properties. Various mineral admixtures may differ considerably in composition, fineness, and other properties. The user should review major fly ash properties—loss on ignition (LOI), cementing activity, and

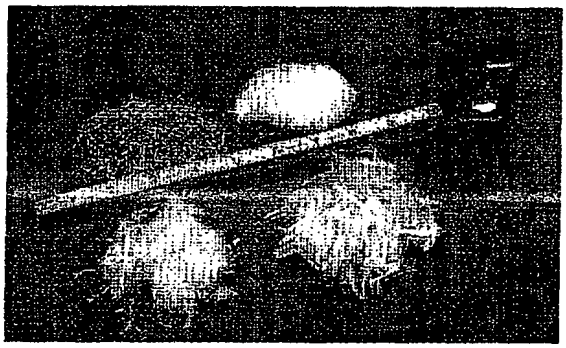


Fig. 2.3—Typical fiber types.

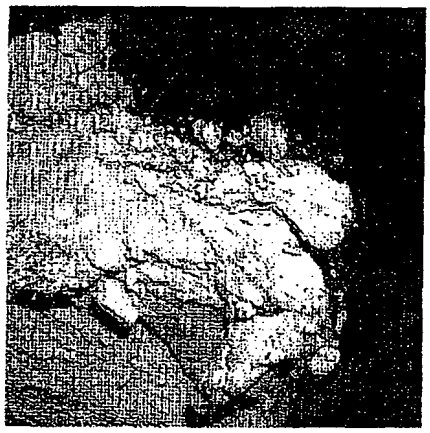


Fig. 2.4—Fibers in cellular concrete.

water demand of the fly ash—before including fly ash in a low-density cellular concrete mixture. The first of these properties (LOI) is addressed in ASTM C 618. A fly ash with a high LOI (carbon content) may adversely affect the preformed foam by causing an increase in density and loss of yield. If cementing activity is low, the concrete may set too slowly, resulting in a lower strength and a higher density. High water demand may require that the water-cementitious material ratio (*w/cm*) be adjusted to achieve the desired strength.

2.6 — Nonstandard materials

Special cements, supplementary cementitious materials, and aggregates may be included as nonstandard materials. Some mine-fill applications may use local materials as aggregates or fillers in low-density cellular concrete to extend the mixture when transportation of materials to remote areas is difficult. The user should pretest nonstandard mixtures for proper development of the desired fill properties.

2.7—Fiber reinforcement

Low-density cellular concrete may include commercially available fibers, such as nylon, polypropylene, polyester, and alkali-resistant glass, as reinforcing materials (Fig. 2.3). The choice of fiber type depends on performance requirements. Cellular concrete's flexural and tensile strength,

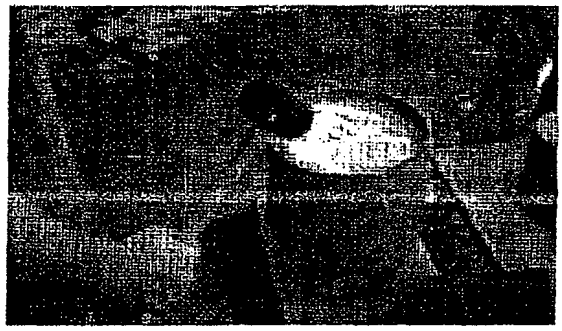


Fig. 3.1—Measuring as-cast density (click on *picture to view* video).

impact resistance, fatigue limit, energy absorption, and spalling resistance can be enhanced through the use of fibers that are known to be sufficiently durable under the expected service conditions. Zollo and Hays (1998) address the material and engineering properties of fiber-reinforced cellular concrete. Fibers can also help control plastic shrinkage cracking (Fig. 2.4).

CHAPTER 3--PHYSICAL PROPERTIES

3.1—As-cast density

The as-cast density at the point of placement should be determined by calculating the density of samples using a container of known volume and empty weight, as prescribed in applicable sections of ASTM C 796 (Fig. 3.1). Monitoring the as-cast density of the cellular concrete is an important job-site quality-assurance tool for controlling the uniformity and density of the mixture at the point of placement. Procedures for sampling and testing hardened insulating cellular concrete are given in ASTM C 513.

3.2—Oven-dry density

Oven-dry density, evaluated using ASTM C 796 and C 495, determines the unit weight used to define low-density cellular concrete, which by definition has a maximum oven-dry density of 50 lb/ft^3 (800 kg/m^3).

3.3--Compressive strength

The relationship between compressive strength and as-cast density is an important indicator of the quality of cellular concrete (Kearsley and Wainwright 2002b). The compressive strength of cellular concrete should be evaluated in accordance with ASTM C 796 and C 495. Compressive strength specimens should not be oven-dried. When it is necessary to determine oven-dry density, it is necessary to make companion specimens for this test in addition to those specimens for compressive strength testing. The user should relate compressive strength to the oven-dry density of cellular concrete as indicated in Table 3.1. Table 3.1 is a guideline only, based on Type I cement, no cement substitution, and using local materials. The user should test specific local materials to determine these properties.

For geotechnical applications, the cast density of the material is usually the most significant property and is more important than bearing capacity (unconfined compressive

Table 3.1—Possible ranges of compressive strength and modulus of elasticity versus oven-dry density for cellular concrete in roof deck applications

Oven-dry density		Usual range of compressive strength at 28 days		Modulus of elasticity	
lb/ft^3	kg/m^3	psi	MPa	10^3 psi	GPa
20 to 25	320 to 400	70 to 125	0.48 to 0.86	30 to 52	0.21 to 0.36
25 to 30	400 to 480	125 to 225	0.86 to 1.55	52 to 89	0.36 to 0.61
30 to 35	480 to 560	225 to 350	1.55 to 2.41	89 to 135	0.61 to 0.93
35 to 40	560 to 640	350 to 450	2.41 to 3.10	135 to 183	0.93 to 1.26
40 to 50	640 to 800	450 to 750	3.10 to 5.17	183 to 320	1.26 to 2.21

Table 3.2—Physical properties for geotechnical (Engineered Fill 2001)

Maximum cast density		Minimum compressive strength		Bearing capacity	
lb/ft^3	kg/m^3	lb/in.^{2}	MPa	ton/ft^2	MPa
24	385	10	0.07	0.7	0.07
30	480	40	0.28	2.9	0.28
36	575	80	0.55	5.8	0.56
42	675	120	0.83	8.6	0.82
50	800	160	1.10	11.5	1.10

strength). As a result, these densities and compressive strengths are lower than those for roof deck applications (Table 3.2). If standard materials are used, the density of the low-density cellular concrete has properties that fall within ranges specified by the manufacturer of the foam concentrate. If nonstandard materials are used, special test batches may be required to confirm specific properties. To define the general relationship between cast density and compressive strength for specific applications, one manufacturer has divided the cast density into convenient ranges.

Because the need for controlled low-density fill is usually the main reason for using lowdensity cellular concrete, compressive strengths and ultimate bearing capacities require only minimum values. For specialized low-density cellular concrete geotechnical applications, other physical properties may be required.

Cellular concrete with a compressive strength below 70 psi (0.48 MPa) has proven satisfactory for special application. such as pipe and wall insulation, tunnel and mine fills, energy absorption or shock mitigation, and backfills in sewer and highway construction per ACI SP-29 (ACI Committees 213 and 523 1971).

3.4--Drying shrinkage

Drying shrinkage is not usually critical in cellular concrete used for roof deck insulation or geotechnical applications. The reason for this is that when cellular concrete is used to insulate roof decks, it is not considered to contribute structurally; and when it is used in geotechnical applications, any shrinkage cracking that it might undergo does not significantly reduce bearing capacity. Drying shrinkage is typically 0.30 to 0.60% after 6 months at 50% relative humidity and 73 °F (23 °C), and increases with decreasing density. Some of the effects of drying shrinkage can be mitigated by adding fibers to the mixture (Section 2.7). Figure 3.2 relates drying shrinkage at 56 days to the air-dry density of cellular concrete (ASTM C 157).

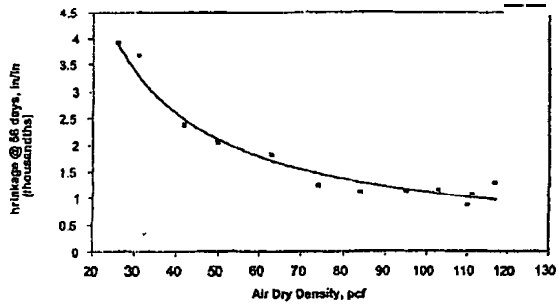


Fig. 3.2—Drying shrinkage versus air-dry shrinkage (1 in = 25.4 mm; 1 lb/ft^3 = 16.0 kg/m^3).

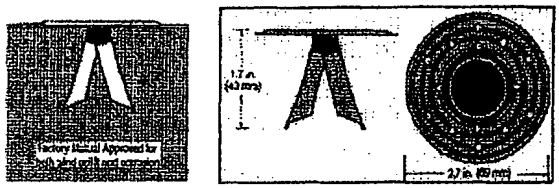


Fig. 3.3—Typical base-sheet nail.

3.5—Thermal expansion

The coefficient of thermal expansion for cellular concrete varies directly with density, and is typically 5.0 to 7.0 x 10^{-6} per °F (9.0 to 12.6 x 10^{-6} per °C) as evaluated using a linear thermal expansion test with strain gauges. The designer should consider thermal expansion in applications with significant variation in placing temperatures, operating temperatures, or bath. These conditions could occur in applicationssuch as roof decks, power plants, ovens, and steam lines.

3.6—Walkability

Walkability, a term developed to describe the ability of low-density concrete to sustain normal construction-foot trafficwithoutdamage, is best judged by examining surface distress. Walkability improves with increased density. When heavy construction traffic is expected (such as from wheelbarrows, scaffolds, material storage, or pathways), the surface of the roof deck should be protected with wooden boards or by a similar method.

3.7—Mechanical attachment

For roof deck applications, the roofing base sheet should be mechanically attached to the low-density cellular concrete roof deck using specifically designed nails or screws (Fig. 3.3). Fastening within 2 to 7 days of concrete placement is possible if the fastener can be installed without shattering or spalling the cellular concrete and if an installed fastener has a minimum specified withdrawal resistance of 40 lb (180 N), which is consistent with required wind-uplift resistance and typical nailing patterns (such as three rows,

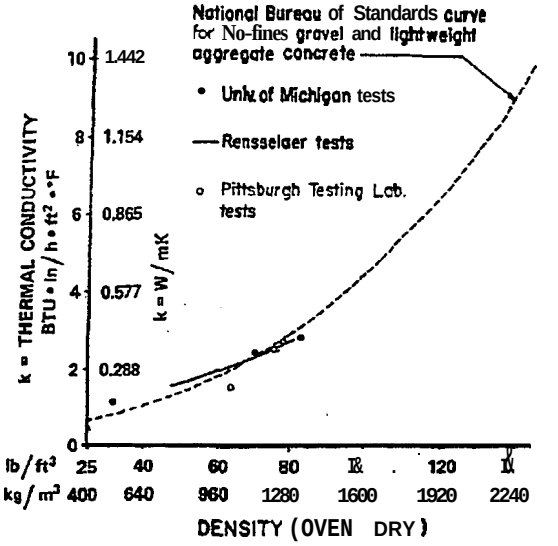


Fig. 3.4—Thermal conductivity versus oven-dry density *(National* Bureuu *of Standards 1955).*

uniformly spaced over the width of each base sheer, and using a nail spacing of 7-1/2 in. [190 mm] in each row). Because no consensus standard exists, nailing patterns are generally qualified by product- and pattern-specific testing, and are published in evaluation-service reports (ANSI/SPRI FX-1-2001 2001).

3.8—Thermal conductivity

The thermal conductivity of cellular concrete should be measured using the guarded hot plate (ASTM C 177) or the heat flow meter (ASTM C 518) methods. A full-scale assembly is measured by a hot box apparatus (ASTM C 1363). Table 3.3 lists typical thermal conductivity values. These values follow the curve of Fig. 3.4, originally produced by the National Bureau of Standards (1955).

3.9—Fire resistance

The fire resistance of cellular concrete in a building system is determined by a fire test, during which the cellular concrete element must support its design load, remain within the temperature increase specified by the test standard, and withstand the transmission of flame or hot gasses per ASTM E 119. Information on the demonstrated fire resistance of slabs with cellular concrete and charts for estimating the fire resistance of various two-course roofs is available (Abrams and Gustaferro 1969; Gustaferro et al. 1970).

Fire-resistancetests have been conducted on wall, floor, and roof assemblies of cellular concrete cast over concrete (precast or cast-in-place), galvanized steel, and wood substrates. Some of these assemblies contain expanded polystyrene insulation board sandwiched within the cellular concrete. Recognized laboratories, such as Underwriters Laboratories, Inc., publish construction details for the tested assemblies, including fire ratings in hours evaluated using ASTM E 119.

Table 3.3—Typical thermal conductivity values for oven-dry cellular concrete

Oven-dry density		Thermal conductivity, K	
lb/ft³	kg/m³	BTU × in. (h × ft² × °F)	w/(m × K)
20	320	0.75	0.11
30	480	0.91	0.13
40	640	1.11	0.16
50	800	1.36	0.20

3.10—Permeability

Generally, low-density cellular concrete has a low coefficient of permeability k that is constant throughout the lower-density ranges (Kearsley and Wainwright 2001a). The coefficient of permeability is inversely related to the effective confining pressure on the sample. Because lowdensity cellular concrete is a rigid material rather than a yielding soil. its permeability is measured using a modified triaxial-type test including a confining pressure to prevent direct passage of water (short-circuiting) along the interface between the specimen and the confining membrane. A constant head should be-maintainedduring the test. Reported values range from 1×10^{-4} to 1×10^{-5} mm/s (4×10^{-6} to 4×10^{-7} in./s) (ASTM D 2434).

3.11—Freezing-and-thawing resistance

Freezing-and-thawing resistance of low-density cellular concrete is evaluated using Procedure B (rapid freezing and thawing) of ASTM C 666, with a modified cycling protocol involving a longer thawing period. This modification is necessary because the insulating properties of low-density cellular concrete prevent rapid lowering and raising of the temperatures at the interior of the specimen, and thus prevent completion of a freezing-and-thawing cycle in the originally prescribed maximum 4-hour time period.* Lowdensity cellular concrete intended for exterior exposure should have a relativedynamic modulus of elasticity E at least 70% of its original value after 120 cycles when tested according to Procedure B of the modified ASTM C 666. Because the freezing-and-thawing resistance of low-density cellular concrete increases with increasing density, cellular concrete within 2 to 3 ft (0.6 to 1 m) of a surface subjected to cycles of freezing and thawing while exposed to water must have a density of at least 36 lb/ft³ (575 kg/m³). MacDonald et al. (2004) provide an evaluation of the freezing-and-thawing performance and testing of cellular concrete.

CHAPTER 4—PROPORTIONING AND TESTING

4.1—Proportioning

Guidance for mixture proportioning is generally available from the manufacturer of foam concentrates. The mixture proportion specifies the range of proportions of the various ingredients needed to attain the desired physical properties (density and compressive strength). The user should test mixture proportions when nonstandard materials or special applications are involved.

*Personal correspondence from E. L. Bidwell, University of Illinois, to Elastizell Corp. of America, and report, "Freeze Thaw Testing of Low Density," *Elastizell Lightweight Concrete*, Apr. 2, 1975.

4.2—Ingredient compatibility

Each ingredient that does not meet standard specifications for mixture compatibility should have the cellular concrete physical properties checked in actual mixtures according to ASTM C 796 and C 869. Cements may have significant strength variations within standard specification limits. Mill reports and test batches are useful for reviewing the product differences between cement and fly ash sources. Kearsley and Wainwright (2002a) demonstrate how to optimize fly ash content for strength.

4.3—Cast density

Measuring the cast density at the point of placement is the simplest and most convenient test for monitoring the quality of the placed material. Cylinder specimens for compressive strength tests, usually measuring 3 x 6 in. (76 x 150 mm), should be cast at the same time that periodic density tests are performed. These samples should be covered and stored in a protected area for at least 24 hours before they are transported to the testing laboratory for testing in accordance with ASTM C 796.

4.4—Physical properties

For standard mixtures made from standard materials, cast density determines the physical properties of the cellular concrete. It is not necessary to repeat the specialized tests of materials for each project. These specialized tests include permeability and freezing-and-thawing resistance; they may require up to 3 months to complete. Strength and density determinations are often sufficient. If unique applications or nonstandard materials are used, special tests may be required. A special test is one related to the performance of the material in the specialized application. Legatski (1994) provides a detailed review of testing the properties of cellular concrete.

CHAPTER 5—BATCHING, MIXING, PLACING, FINISHING, AND CURING

5.1—Storage of materials

All materials should be stored in a manner to prevent deterioration and contamination by foreign matter.

5.2—Batching

Materials for low-density cellular concrete are typically proportioned and batched on site, directly into a specialized mixer. The cement, fly ash, and other dry materials are weighed on a calibrated scale, and the mixing water is metered. The preformed foam is metered into the mixture through a calibrated nozzle. The accuracy of each batching device is critical to the final mixture density and its subsequent reproducibility. Each batching device (scales, water meter, foam-generating nozzle) should be calibrated before starting a project, and during a project if there is a reason to believe it is necessary.

5.3—Mixing

Mechanically mixing cellular concrete produces a uniform distribution of materials with a suitable consistency at the specified as-cast density. Excessive mixing should be avoided, as it may cause changes in density and consistency.

In batch mixing, the mixer should be charged with mixture water and dry ingredients, followed by special admixtures and the preformed foam. The as-cast density should be monitored at the point of placement every 30 to 60 minutes based on consistency of results. Allowance should be made for any density changes that result from placing methods or conditions, such as pumping distances and extreme weather conditions. Ingredients should be added in the proper proportions and sequence during continuous mixing operations. This is necessary to ensure reasonable uniformity and achieve the required as-cast density at the point of placement.

Standard concrete mixing equipment is normally not acceptable for low-density cellular concrete mixtures because the action of the mixer does not combine the ingredients with the correct speed and miring action. A high-speed addle mixer is preferable because it properly combines the ingredients and blends the preformed foam rapidly and efficiently to produce a uniformly consistent lowdensity cellular concrete mixture. Other mixers and processes that produce uniform mixtures include high-shear mixers.

5.4—Placing

Cellular concrete should be placed by a progressive-cavity pump or a peristaltic pump. The pump hose should be large enough in diameter (usually 2 to 2.5 in. [51 to 64 mm]) to ensure uniform delivery of cellular concrete at the point of placement without damage to the structure–or substrate. Low-density cellular concrete can be pumped over long distances (over 1500 ft [460 m]). This is a major advantage for low-density cellular concrete over other materials and placing methods, and is important on large, congested projects with difficult access.

5.5—Finishing

For roof deck applications, cellular concrete should be finished to the slope and thickness specified on the project drawings. A minimum slope for proper roof drainage is 2% (equivalent to 1/4 in./ft [21 mm/m]). It is possible to place this material on steeper slopes. The cellular concrete surface is usually finished with a darby or screeded to the specified slope (Fig. 5.1). The surface should be smooth and free from ridges, projections, and depressions that might adversely affect the roofing membrane.

For geotechnical applications, lift thicknesses ranging from 2 to 4 ft (0.6 to 1.2 m) are typical. The lift thickness is job-specific and related to the project layout and casting procedure. A greater lift thickness is acceptable for specific job conditions. The heat of hydration developed within the mass, the material density, the cement content, and the ambient temperature also influence the lift thickness. Thinner castings reduce the heat buildup from hydration of the cement. It is desirable to cast material in a formed area within 1 or 2 hours to permit an undisturbed setting. In general, lowdensity cellular concrete should be cast to final grade with a tolerance of 0.1 ft (0.03 m). It is not necessary to scarify intermediate lift surfaces. A darby finish is acceptable for the final lift.

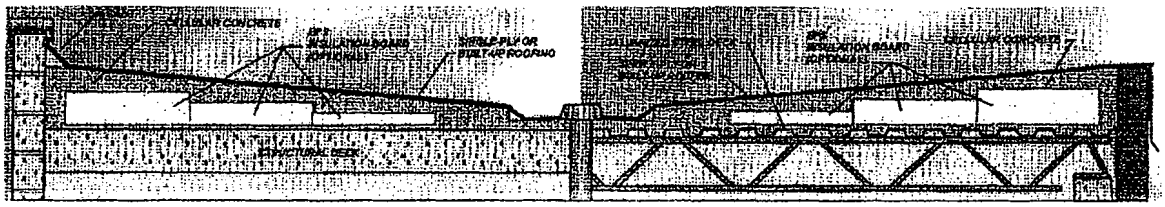


Fig. 5.1—Typical *roof* deck cmss sections.

5.6—Curing

Water curing or use of a curing compound is advisable for roof deck applications when rapid drying is anticipated. Curing compounds should be compatible with the final roofing system. Traffic shonld not be permitted on freshly placed cellular concrete roof decks until adequate walkability (Section 3.6) is demonstrated. Check with the manufacturer of foaming agent for specific recommendations to ensure compatibility with subsequent roofing membrane material.

5.7—Placement in cold weather conditions

When ambient temperatures below 32 °F (0 °C) are predicted within 8 hours after placement cial precautions should be taken, including the use of Type III (high early-strength) cement or Type I cement with heated mixing water to increase the initial internal temperature of the concrete and accelerate the setting time. Because of the relatively high cement content and insulation properties of cellular concrete, these precautions are usually adequate. Cellular concrete should not be mixed or placed during freezing weather, rain, or snow, or when standing water, snow, or ice is present on the deck. The foaming agent manufacturer should be consulted for specific cold weather placement recommendations.

5.8—Placement in hot weather conditions

When expecting ambient temperatures above 100 °F (38 °C) during casting, the following special precautions should be considered:

- Casting before dawn will avoid the heat of the day;
- Vermiculite or perlite aggregate may be used as an additive to maintain moisture in the mixture;
- Fiber reinforcement may be incorporated in the mixture to minimize plastic-shrinkagecracking;
- The roof deck may be moist-cured by fogging after casting; and
- The roofing membrane may be installed as soon as the moisture content is deemed acceptable for the roofing application. The installation may begin as soon as 2 days after casting.

The foaming agent manufacturer should be consulted for specific hot weather application recommendations.

CHAPTER 6—DESIGN CONSIDERATIONS FOR ROOF DECKS

6.1—Form systems

A common application of cellular concrete is as insulation for concrete roof deck fills. The cellular concrete is cast over the structural deck system of the building. Typical deck types include corrugated or fluted steel, structural concrete, and wood.

6.1.1 Steel--Casting cellular concrete against permanent. uncoated structural metal formwork is not good concrete construction practice. Steel embedded in cellular concrete should be protected from corrosion in a manner consistent with its service environment (refer to ACI 222R).

Corrugated or fluted steel deck should be galvanized, coated, or both to meet the requirements of ASTM A 653. Steel decks are designed for gravity loads by selecting an appropriate steel gauge and deck profile, depending on the load and the span. The deck should be attached to the framing by welds or mechanical fasteners according to the deck manufacturer's recommendations and as required to resist the specified loadings, as determined by the designer with due consideration to diaphragm strength, uplift, and other structural design requirements. The steel sheets should be vented, with bottom slots having an open area of at least 0.5% of the plan area (Fig. 6.1). Side-lap embossments improve bond, which is important under seismic loading and wind uplift.

6.1.2 *Structural* concrete—A structural concrete base for cellular concrete (Fig. 6.2), whether cast-in-place or precast, may require venting for moisture relief that can be achieved with unsealed joints between precast structural concrete elements or by venting (refer to Fig. 6.3).

6.1.3 Wood—Cellular concrete is cast over structural wood roof decks to produce the proper slope for drainage and for thermal insulation (Fig. 6.4). A waterproof membrane, such as an asphalt-saturated felt, should be securely fastened to the wooden deck with the edges sealed before the cellular concrete fill is placed.

6.2—Roofing readiness

A roof membrane can generally be installed 2 to 5 days after a cellular concrete roof deck has been cast if the moisturc content is deemed to be acceptable for roofing membrane application. The surface hardness of the cellular concrete should be adequate to withstand foot traffic and other light roofing operations without damage. The screeded surface of the cellular concrete should be smooth and free from ridges or depressions that would adversely affect the integrity of the roofing membrane. Ridges should be scraped flat. Roofing base sheets are commonly attached to the roof deck by nailing. The roofing membrane is commonly attached to the base sheet by mopping or torch-heating. Other roofing-attachmentsystems should be compatible with

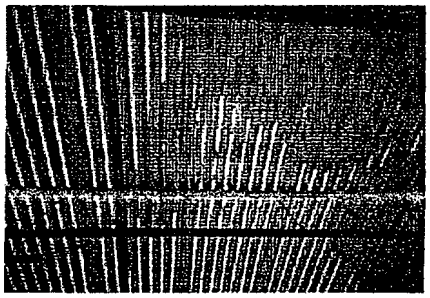


Fig. 6.1—Casting cellular concrete over vented steel deck.

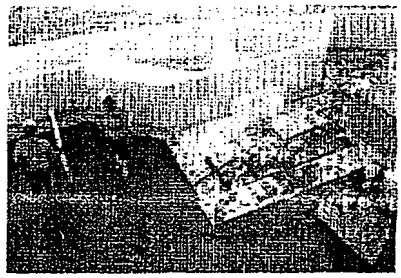


Fig. 6.2—EPS insulation board placed in cellular concrete slurry over structural concrete deck.

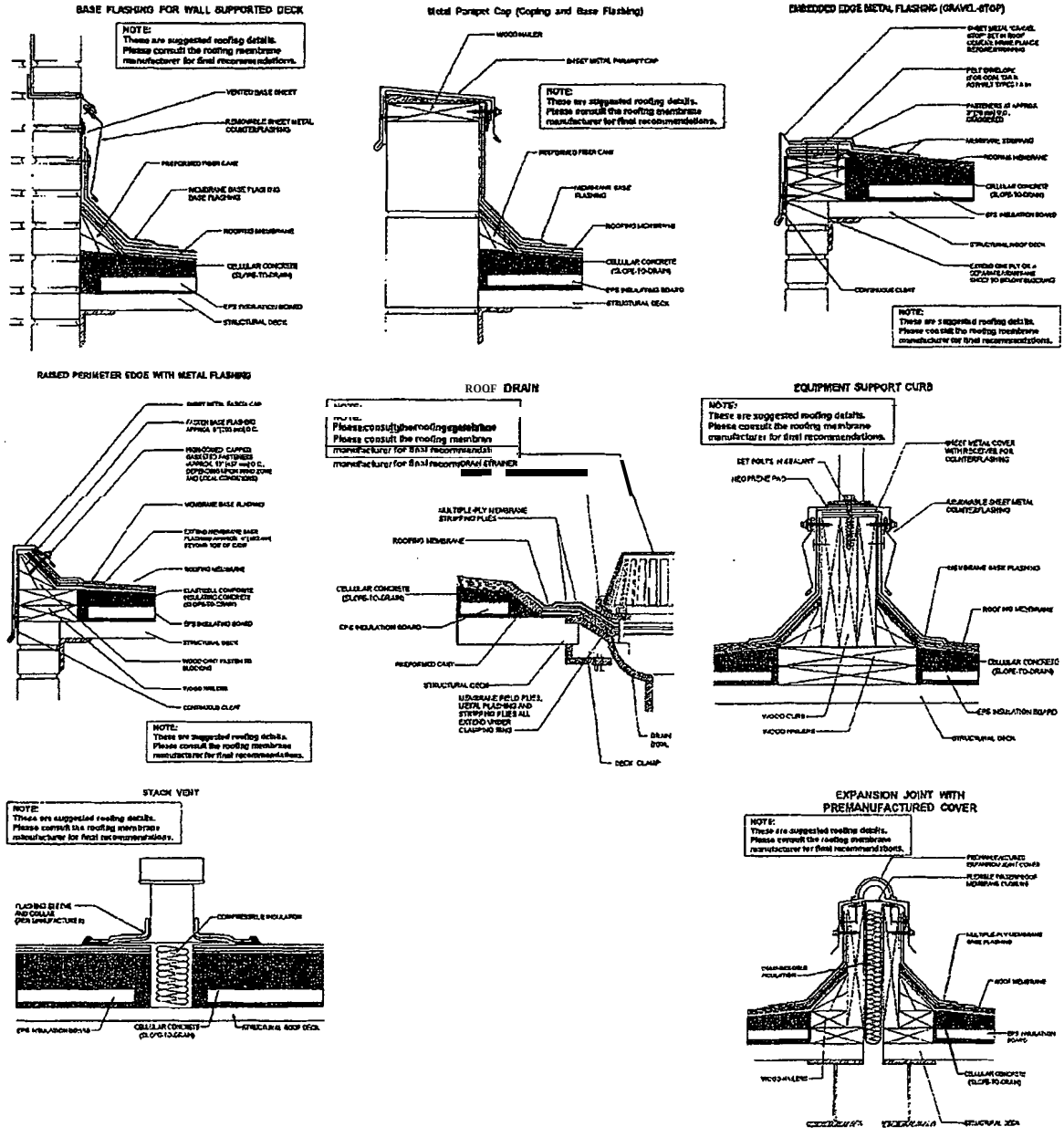


Fig. 6.3—Typical roofing details for cellular concrete roof decks.

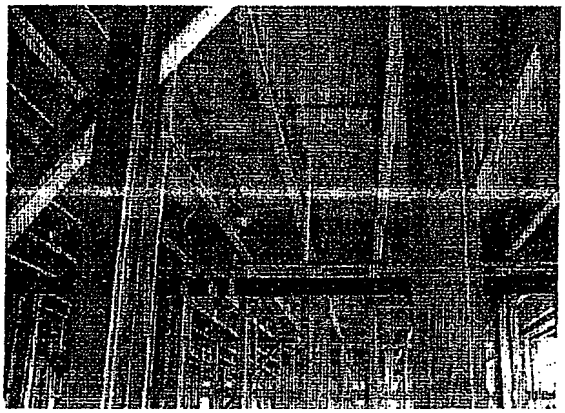


Fig. 6.4—Wood frame roof deck substrate from below.

the cellular concrete and with the substrate (the structure that provides the required wind uplift resistance).

6.3—Load-carrying capacity

Specific structural design requirements for cellular concrete depend on the type of substrate used. The most common substrates are galvanized steel and precast or cast-in-place concrete. Although cellular concrete is not designed for composite action with the substrate, it provides additional stiffness. Designers should obtain information from substrate manufacturers regarding the ultimate flexural capacities and in-plane stiffness and strength characteristics of various systems.

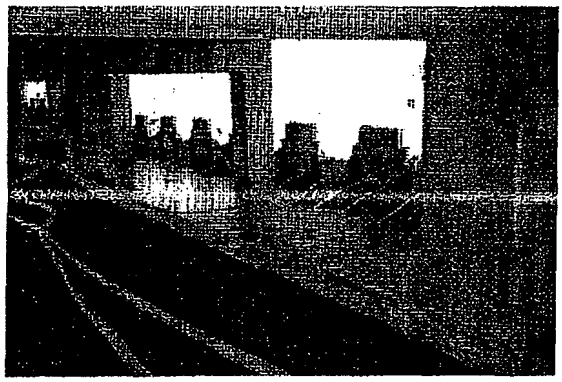
6.4—Expansion and contraction joints

Cellular concrete exhibits drying shrinkage when placed in large monolithic placements such as roof decks. Because shrinkage of cellular concrete is much greater than its thermal expansion, expansion joints are generally not necessary. Expansion joints are required, however, in a cellular-concrete roof deck at expansion joints in the structural system, and at changes in the direction or type of substrate material.

6.5—Relief of vapor pressure

Under certain temperature conditions, moisture in cellular concrete or moisture intruding from external sources may cause undesirably high vapor pressure under roofing membranes covering a roof deck system. The vapor pressure can be reduced by postponing the application of the roofing membrane until the cellular concrete moisture content is at an acceptable level. A nailed base sheet, combined with perimeter venting at the intersection detail between the edge flashing and the counter-flashing, also helps reduce the vapor pressure.

The rate of drying of cellular concrete is a function of placing conditions, density and thickness, substrate, venting, and environmental conditions. The overall roof deck system, building use, and climatic conditions should be evaluated before specific recommendations regarding venting are made. This evaluation is especially important in re-roofing applications where dry portions of the existing roof membrane and insulation can be left in place and the cellular concrete cast over it.



Fig, 7.1—Geotechnical application under a bridge structure with mechanically stabilized earth (MSE) containment walls.

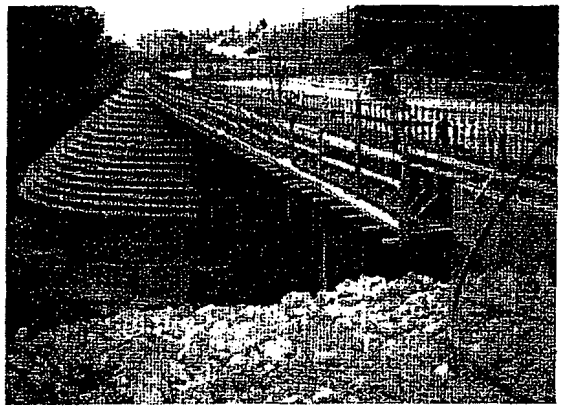


Fig. 7.2—Geotechnical application at bridge widening approach.

6.6—Standard roofing details

For information on generally accepted roofing details (Fig. 6.3), refer to NRCA *Roofing and Waterproofing Manual* (The National Roofing Contractors Association 2001).

CHAPTER 7—GEOTECHNICAL APPLICATIONS

In most applications, the major advantage of cellular concrete is its low density. Other advantages include ease of excavation (a requirement in some applications) and more controllable strength as compared with standard CLSM.

7.1—Backfill

Lowdensity cellular concrete placed around and next to structures such as bridge abutment and retaining and building walls significantly reduces the dead load over poor soils (Fig. 7.1 and 7.2).

Once low-density cellular concrete sets, it does not exert active lateral pressure against the wall structure, as does standard granular backfill. Because lowdensity cellular

concrete is cementitious, it does not require compaction, and because it has low density, settlement is minimal.

Bridge approach applications may often be from 10 to 40 ft (3.0 to 12 m) or more in height. A low-density fill that does not require compaction is often a preferred alternative to heavy, compacted fill.

Most of the fill thickness of cellular concrete should be cast at a density of 30 lb/ft^3 (480 kg/m^3). The top 2 to 3 ft (610 to 910 mm) is usually 42 lb/ft^3 (675 kg/m^3) cellular concrete, which has excellent resistance to freezing and thawing and provides a solid base for an approach slab or pavement structure.

7.2—Roadway bases

Low-dcnsitv cellular concrete is often used for a roadway base over poor soil. The use of the material becomes even more important when raising or widening the roadway over poor soil, and added weight and settlement are concerns for the designer (Fig. 7.3). These designs often involve load-balancing and buoyancy calculations. Specific site conditions may require the development of special drainage details.

When constructing a roadway over poor soil, a geotextile fabric should be placed after the excavation is complete. The low-density cellular concrete should be cast directly onto the geotextile fabric. This fabric acts as a tension skin and, in conjunction with the low-density cellular concrete, can span localized settlements up to 3.2 ft (1 m).

7.3—Pipeline and culvert fills

Low-density cellular concrete is often a supporting fill in pipeline applications over poor soils or a containment fill cast around these drainage structures to provide support and stability. Compaction is not necessary as it would be with a granular fill.

Culvert applications include concrete box culverts, segmented or pipe sections, and metal culvert systems including multi-plate culverts of significant size (Fig. 7.4).

Low-density cellular concrete reduces the dead weight on the culvert. The cemcntitious nature of all CLSM mixtures provides erosion control which is an advantage over standard granular fills (hat erode when subjected to moving water. These mixtures may need to be evaluated for freezing-and-thawing resistance.

Placing low-density cellular concrete on both sides of the culvert simultaneously minimizes eccentric loading. In addition to supporting the culvert from below, the low density cellular concrete cast around these drainage structures provides lateral support because compaction is not necessary.

7.4—Void fills

Low-density cellular concrete is commonly used as a void fill when the reduction of dead load is critical. It is also applicable to mass structures where access may be limited and flowability is important. Void-fill applications include pipeline abandonment, filling around excavations, annular space fills between slip-lined pipes, and structures that are to be abandoned rather than demolished (Fig. 7.5).

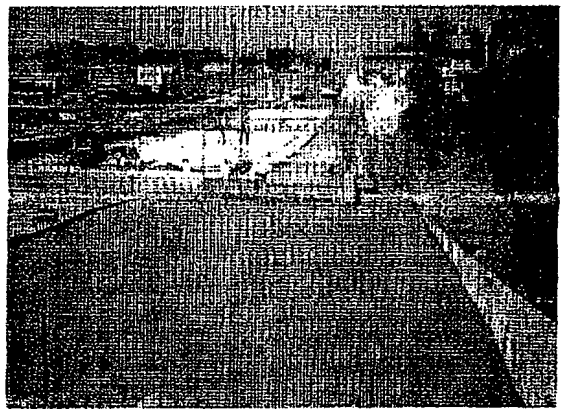


Fig. 7.3—Geotechnical roadway base at bridge approach.

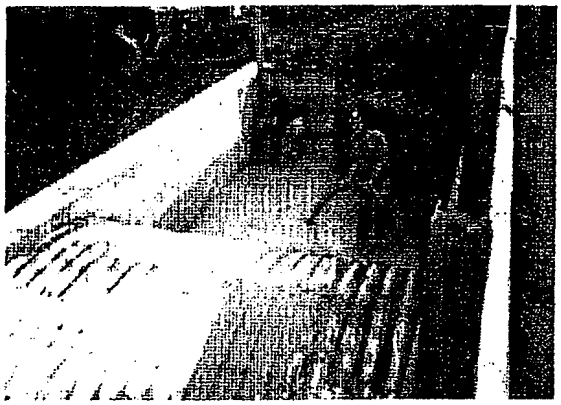


Fig. 7.4—Geotechnical fill around steel culvert under existing bridge.

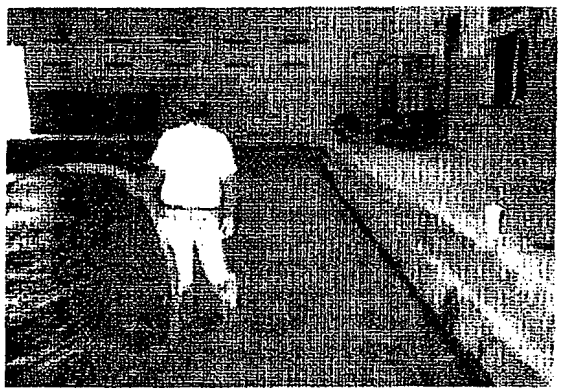


Fig. 7.5—Filling abandoned swimming pool with low-density concrete.

Because every void-fill application is unique, each one should be examined for special conditions. To contain the easy-flowing low-density cellular concrete, the entire fill area should be sealed, including pipes, drains, and structural discontinuities such as holes in walls or under footings. Lift heights for void fills may be greater than normal if the low-

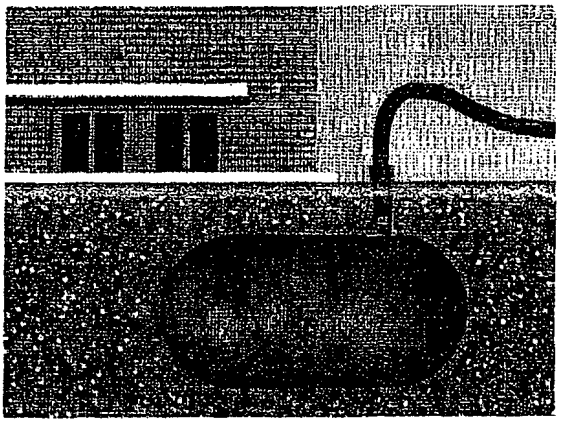


Fig. 7.6—Elllling abandoned underground fuel- or oil-storaxe tank with cellular concrete(click on picture to view video).

fig. 7.7--Cellular concrete as wall fill with stay-in-place forms.

density cellular concrete can be reasonably contained by earth, forms, or a structure.

7.5—Tank fills

An acceptable abandonment alternative to the excavation and removal of underground fuel- or oil-storage tanks required by many agencies is a lowdensity cellular concrete tank fill (Fig. 7.6). Federal regulations refer to lowdensity cellular concrete fills as an "inert substance."

7.6—Insulation and Isolation fills

The discrete air-cell structure within the cementitious matrix of low-density cellular concrete provides thermal-insulation and physical shock-mitigation properties to this material for applications such as walls (Fig. 7.7). roofs. and other similar structures. Giannakou and Jones (2004) describe the use of cellular concrete to thermally insulate foundations and slabs.

CHAPTER 8—REFERENCES

8.1—Referenced standards and reports

The standards and reports listed below were the latest editions at the time this document was prepared. Since frequent revisions occur with some of these documents, the reader is advised to contact the appropriate sponsoring group for reference to the latest version.

American Concrete Institute

222R Protection of Metals in Concrete Against Corrosion

229R Conholled Low-Strength Materials

ASTM International

A 653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C 150 Specification for Portland Cement

C 157 Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus

C 332 Specification for Lightweight Aggregates for Insulating Concrete

C 494 Specification for Chemical Admixtures for Concrete

C 495 Test Method for Compressive Strength of Lightweight Insulating Concrete

C 513 Test Method for Securing, Preparing, Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength

C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C 595 Specification for Blended Hydraulic Cements

C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C 666 Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C 796 Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam

C 869 Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete

C 989 Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

C 1157 Performance Specification for Hydraulic Cement

C 1240 Specification for Silica Fume Used in Cementitious Mixtures

C 1363 Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

D 2434 Test Method for Permeability of Granular Soils (Constant Head)

E 119 Test Methods for Fire Tests of Building Construction and Materials

The above publications may be obtained from:

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
www.concrete.org

ASTM International
100 Barr Harbor Drive
West Conshohocken. PA 19428-2959
www.astm.org

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APPENDIX D
ANALYSES AND CALCULATIONS
(SUBMITTED IN SEPARATE PACKAGE)

APPENDIX E

RESPONSE TO CALTRANS REVIEW COMMENTS

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

April 17, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: Response to Caltrans Comments dated March 26, 2009
(2nd Submittal)
Foundation Report
Retaining Walls RW 1300 (PM R0.917-1.12) and
RW 1299 (PM R1.11-1.12)
Precast Walls with Lightweight Fill
West County Connector Project
I-405/SR22 HOV Connector Segment
12-ORA-22, EA: 071621
ORANGE COUNTY, CALIFORNIA
Report Dated November 12, 2008 (revised February 18, 2009)
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. **Include calculations and/or text referring to overturning and sliding in appendix D-4.**

As discussed with Sharid Amiri, since this is a large embankment rather than a prismatic wall, static and seismic stability was analyzed using a slope stability analysis.

2. Explain why settlement monitoring is not shown on the plans?

A note will be indicated on the plan that settlement monitoring is required, and station and offset of each settlement monument and other details are included in the SSPs, and have been tabulated in the report.

3. **LOTB must have the name of Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th, 2009)**

The requested change has been made in the revised logs.

4. LOTBs must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009)

The requested change has been made in the revised logs.

5. Reconfigure Appendix C, D, and E. They are placed upside down as the hard copies.

This has been corrected in the revised report.

6. Is settlement calculation based on direct (consolidation test) or indirect (correlation) method? Explain and justify your response.

C_c and C_r were obtained from consolidation tests (direct method) applying Schmertmann's correction; Cr was approximated by C_e (unloading). C_v, coefficient of consolidation, was based on correlations (Navfac, 1987) Figure 3-6, 7-3-15.

7. Explain in detail and provide backup information as to how the strength parameters were found for the lightweight fill and the native materials for slope stability?

Drained shear strength parameters are primarily obtained from the Consolidated Drained (CD, slow) direct shear test results using peak and ultimate values of cohesion intercept and friction angle. Laboratory test results are included in Appendix B. Undrained shear strengths were obtained from the interpreted CPT data which uses $S_u = Q_c / N_k$ in which:

S_u = undrained shear strength, ksf
Q_c = cone tip resistance, tsf, and
N_k = 15.

Interpreted S_u values are shown in the interpreted CPT data in Appendix A. Penetration resistance and pocket penetrometer / torvane data were used to confirm reasonableness of CPT S_u data. For granular soils below water table, correlations with penetration resistance (SPT, CPT) were used for drained friction angles.

For the lightweight fill, we analyzed as a cohesive material using undrained shear strength equal to ½ of the compressive strength of the material. Per

ACI 523.1R-06 (report Appendix C), minimum compressive strength is 40 psi for cellular concrete with 30 pcf unit weight, giving a cohesion of 20 psi or about 3 ksf for the 30 pcf unit weight lightweight fill. Actual specified minimum compressive strength is 60 pci for the 30 pcf material, and 125 psi for the upper 42 pcf material, so our shear strength values for slope stability are conservative.

8. Explain why and how the cohesion intercept has been modified for seismic stability for the native material CL layer and not the other CL layers? Elaborate.

For the very stiff native clays (Layer 1) we used ultimate (post-peak) shear strength from drained direct shear tests, which is the worst case for static (long term) loads.

For dynamic (rapid) loading drained conditions do not strictly apply, and shear strengths are likely to fall between the peak drained values and the undrained shear strength. For dynamic loading, we used peak value of drained strength since it gives a lower factor of safety than using the undrained strength for the very stiff clays.

For the medium stiff to stiff (Layer 2) clays, undrained shear strength was determined to be more critical for both static and dynamic cases than using the drained shear strength parameters derived from direct shear tests, so we used undrained shear strength for both static and seismic analysis.

9. Define all acronyms in the CPT liquefaction spreadsheet.

Each column in the table has the description of acronyms. The acronyms are listed as follows:

- NCEER=National Council for Earthquake Engineering Research
- NSF=National Science Foundation
- GWT=Ground Water Table
- γ_t=total unit weight
- M_{eq}=earthquake magnitude
- A_{max}=peak ground acceleration
- Z_w=groundwater depth during test
- Z_{wd}=groundwater depth for design
- CSR=Cyclic Stress Ration
- σ_v=total overburden stress
- σ'_v=total overburden stress
- r_d=Shear Stress Reduction coefficient

- FS=factor of safety against liquefaction
- $CRR_{7.5}$=Cyclic resistance ratio for Magnitude 7.5
- MSF=Magnitude Scaling Factor
- K_σ=Correction for high overburden stress
- K_α=Correction factor for sloping ground
- CPT=Cone Penetration Test
- SPT=Standard Penetration Test
- $q_{t\text{-}avg}$=Average CPT tip resistance
- $f_{s\text{-}avg}$=Average CPT sleeve friction
- $R_{f\text{-}avg}$=Average CPT friction ratio
- N_{60}=Equivalent SPT blowcount for 60% efficient hammer
- I_c=CPT soil behavior type index
- K_c=Fines correction factor
- q_{c1Ncs}=Fines and overburden corrected CPT tip resistance
- N_{corr}=SPT blowcount correction for residual strength
- $(N_1)_{60CS}$=Fines and overburden corrected SPT blowcount
- S_r=Residual undrained shear strength
- γ_c=cyclic shear strain
- ε_v=Volumetric Strain
- S_i=Layer settlement

10. Provide a summary both in text and tabulated form the magnitude of immediate and consolidation settlement and time duration, location, and how it will impact the performance of the subject wall.

The tabulated summary is provided as Table 5 and addressed in the text.

11. Settlement of the pavement does not belong to the subject report and ought to be discussed in the Geotechnical Design Report (GDR).

This is removed and referenced to the GDR.

12 Section 4.4.9.9 belongs to the GDR and not the subject report.

This is removed and referenced to the GDR.

13. How are you planning to incorporate Section 4.4.9.9 into project plans, as related to the over-excavation depth, etc…?

The overexcavation is indicated in the construction details, Sheet C-57.

14. Plans do not show areas associated with the subject wall (areas 1 through 4), explain?

The areas are "geotechnical" areas, where different depths of foundation are required. The required depth is reflected in the top of leveling pad elevations for the walls.

15. Why the info in section 4.4.8 is not incorporated into the project plans? Explain.

The key width is reflected in the typical sections on the retaining wall plans.

16. Explain the impact of the anticipated settlement on the buried utilities if any.

No significant utilities have been identified below the wall. The civil / structural engineer may utilize our settlement estimates to evaluate any potential impacts to utilities.

The following attachment completes our response:

Attachment 1 Caltrans Comments dated March 26, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 450-2100.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

ATTACHMENT 1
CALTRANS COMMENTS DATED March 26, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 R1.11
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc

DATED: February 18, 2009 Retaining Wall 1299
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: N.A.

12-071621 55E0073
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW1300 (PM R.0917-1.12) and RW1299 (PM R1.11-1.12) Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 18, 2009, submitted to our office on February 26, 2009.

In our review, we made reference to the following:

- "Foundation Report, Retaining Walls RW1300 and RW1299, Precast Walls With Light Weight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment,12-ORA-22-PM20.91, EA 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated November 12, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 23, 2009."

We have the following comments:

1. Include calculation and/or text referring to the overturning and sliding in Appendix D-4.
2. Explain why the settlement monitoring information is not shown on the project plans?
3. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
4. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).
5. Reconfigure Appendix C, D and E. They are placed upside down as hard copies.
6. Is the settlement calculated based on direct (Consolidation test) or indirect (correlation) method? Explain and justify your response.
7. Explain in detail and provide backup information as to how the strength parameters were found for the light weight fill and the native materials for the slope stability?
8. Explain why and how the cohesion intercept has been modified for seismic stability for the native material CL layer and not for the other CL layers? Elaborate.
9. Define all acronyms in the CPT liquefaction spread sheet.

10. Provide a summary both in text and tabulated form of the magnitude of immediate and consolidation settlement and time duration, location and how it will impact the performance of the subject wall.
11. Settlement of the pavement does not belong to the subject report and ought to be discussed in the Geotechnical Design Report. (GDR)
12. Section 4.4.9.9 belongs to the GDR and not the subject report.
13. How are you planning to incorporate Section 4.4.9.9 into project plans, as related to the over-excavation depth, etc…?
14. Plans do not show areas associated with the subject wall (areas 1 through 4), explain.
15. Why the info in section 4.4.8 is not incorporated into the project plans? Explain.
16. Explain the impact of the anticipated settlement on the buried utilities if any.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 R0.917
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc

DATED: February 18, 2009 Retaining Wall 1300
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: N.A.

12-071621 55E0074
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW1300 (PM R.0917-1.12) and RW1299 (PM R1.11-1.12) Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 18, 2009, submitted to our office on February 26, 2009.

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16. Explain the impact of the anticipated settlement on the buried utilities if any.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

February 18, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments**
Foundation Report
Retaining Walls R1300 and RW1299
Precast Walls with Lightweight Fill
West County Connector Project
12-ORA-22PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 23, 2008
GDC Project No. I-36

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Check the post mile for the subject structures and confirm its accuracy.

Checked per GP.

2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.

The requested change has been made in the revised report Section 1.3.1.

3. Include a Figure describing Site Location Map in Section 1.

The site vicinity map (Figure 1) is included in Figures at the end of report, and is referenced in Section 1.0.

4. Revise section 2 title "Field and Laboratory Investigations" to "Field Investigation and Laboratory Testing"

The requested change has been made in the revised report.

5. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).

The requested table is included in Appendix A, Table A-1. We have added a sentence in the revised report directing the reader to this table.

6. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).

We have modified the Table in Section 2.2. A complete description of the tests, their purpose, and ASTM / CT test numbers are included in Appendix B. The reader is also referred to Appendix B in Section 2.2.

7. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.

The Exploration Location Plan (Figure 2) is included in Figures at the end of report, and is referenced in Section 2.1.

8. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.

The borings and CPTs were surveyed and the locations and elevations have been updated in Appendix A and in the LOTB in the revised report and plans.

9. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per previous comment.

Refer to our response to Comment 8.

10. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

The requested change has been made in the revised report.

11. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

The requested information is included in Section 3.4. The high historical groundwater contour map is included in Figure 6 at the end of the report, and is consistent with our recent data at the site. The text of the report has been revised to Reference CDC.

12. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion, and friction angle.

The tabulated idealized soil profile containing the requested information is included in Table 1 at the end of the report, and is referenced in Section 3.5.

13. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.

The graphic soil profile is included in Figure 5 at 11x17" size at the end of the report and is referenced in Section 3.3.

14. Include backup data for the Corrosion in the Appendix.

Corrosion test results are presented in Section B.9 of Appendix B (Table B-2).

15. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.

The requested items are submitted along with the revised report.

16. Provide the slope stability using SLIDE program, provide the input and output files.

GDC does not currently possess the SLIDE software. We have used PCSTABL5M, which is well documented and widely used software for slope stability analysis. We have ordered the SLIDE program for future projects, to meet Caltrans requirements.

17. Appendix D-4 is left blank and does not contain any information. Please explain.

The appropriate calculations are provided.

18. Calculations are not performed specific to each wall structure, revise accordingly.

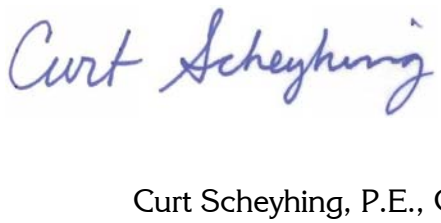
Calculations are included in the new package.

The following is attached and completes our response:

Attachment 1 Caltrans Comments dated January 23, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.



Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

ATTACHMENT 1
CALTRANS COMMENTS DATED JANUARY 23, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 23, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: November 12, 2008 Retaining Wall 1299
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 RW 1299
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW1300 and RW1299 Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM20.91, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated November 12, 2008.

We have the following comments:

1. Check the post mile for the subject structures and confirm its accuracy.
2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.
3. Include a Figure describing Project Location Map in Section 1
4. Revise section 2 title " Field and Laboratory Investigations" to " Field Investigation and Laboratory Testing"
5. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).
6. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).
7. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.
8. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.
9. Revise the Log of Test Borings (LOTB) sheets in the Wall Plan accordingly, per previous comment.
10. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.
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18. Calculations are not performed specific to each wall structure, revise accordingly.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 23, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: November 12, 2008 Retaining Wall 1300
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 RW 1300
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

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14. Include backup data for the Corrosion in the Appendix.
15. Provide the calculations in a separate volume. Include a CD that provides a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.
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17. Appendix D-4 is left blank and does not contain any information, explain.
18. Calculations are not performed specific to each wall structure, revise accordingly.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

FOUNDATION REPORT
RETAINING WALLS RW1325 AND RW1326
PRECAST WALLS WITH LIGHTWEIGHT FILL
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-22-PM 20.91 – 21.03, EA 12-071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Prepared By:

Group Delta Consultants, Inc.
32 Mauchly, Suite B
Irvine, CA 92618

GDC Project No. I-436
October 31, 2008
Revised February 18, 2009
Revised April 17, 2009

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

October 31, 2008
(Revised February 18, 2009 and April 17, 2009)

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: Foundation Report
Retaining Walls RW1325 and RW1326
Precast Walls with Lightweight Fill
West County Connector Project
I-405/SR-22 HOV Connector Segment
12-ORA-22-PM 20.91 – 21.03, EA 12-071621
Orange County, California
GDC Project No. I-436

Dear Mohsen:

We are transmitting with this letter eight copies of our Foundation Report for the proposed Precast Walls RW1325 and RW1326 with Lightweight Fill (Cellular Concrete). This report presents the results of our field and laboratory investigations, and provides recommendations for the foundation design of the proposed retaining walls. This report has been revised to incorporate additional comments from Caltrans dated March 26, 2009 (Appendix E).

We appreciate the opportunity to work with you on this important and challenging project. Should you have any questions, please give us a call at (949) 450-2100.

Very truly yours,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

Kul Bhushan, Ph.D., G.E.
Sr. Consulting Principal

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Sinniah K. Navaratnarajah
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
SINNIAH K. NAVARATNARAJAH
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Exp. 6/30/09
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FOUNDATION REPORT
RETAINING WALLS RW1325 AND RW1326
PRECAST WALLS WITH LIGHTWEIGHT FILL
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-22-PM 20.91 – 21.03, EA 12-071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

1.1 General

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The overall project name is "West County Connector Project" and the proposed project has been divided into 2 segments. The easterly segment, "I-405/SR-22 HOV Connector Segment," extends from Valley View Street to just east of Seal Beach Boulevard, and the westerly segment, "I-405/I-605 HOV Connector Segment," extends from just east of Seal Beach Boulevard to the I-605 interchange. Precast Walls with Lightweight Fill RW1325 and RW1326 are part of the easterly segment. The walls are proposed in the median of I-405 just west of the I-405/SR-22 interchange. The site location is shown on the Vicinity Map in Figure 1.

1.2 Purpose and Scope of Work

The purpose of our study is to investigate and document site geotechnical conditions and provide site specific geotechnical recommendations for design and construction of the proposed walls. Our scope of work for this study included:

- Review existing data;
- Perform subsurface investigation along the proposed wall alignment;
- Perform laboratory testing on selected samples of the subsurface soils;
- Develop geologic profiles and engineering parameters for foundation design;
- Perform geotechnical analyses;
- Develop geotechnical recommendations for design and construction of the walls; and
- Present the results of our investigations and our recommendations in this report.

The design and construction of the project will be performed in accordance with current Caltrans Standard Plans and Specifications. This report is structured in

general accordance with "Caltrans Guidelines for Foundation Investigation and Reports, Version 1.2 (dated June, 2002)."

1.3 Project Description

1.3.1 General

The length of main portion of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405, from just east of Valley View Street to just east of Seal Beach Boulevard (see Figure 1). In addition, from just east of Valley View Street to just east of Springdale Street, several signs are proposed which are outside the main project area. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges (Bolsa Chica Road OC over SR-22 and 22/405 Connector Separation [to be renamed S405-E22 Connector Separation]), and construct a new HOV Connector bridge (405-22 HOV Connector Separation);
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls (RW3311+3312 at east abutment of S405-E22 HOV Connector Separation);
- Pre-cast Lightweight Fill (PCLW) Retaining Walls (RW1325+1326 at west abutment of 405-22 HOV Connector Separation, RW1299+1300 at east abutment of 405-22 HOV Connector Separation, and RW3319+3320 at west abutment of S405-E22 HOV Connector Separation);
- Drainage improvements; and
- Lighting, roadside signs, and overhead signs.

This report presents the Retaining Walls RW1325 and RW1326 foundation recommendations.

1.3.2 RW 1325 and RW 1326

Retaining walls RW1325 and RW1326 will create the west abutment approach to Abutment 6 of the proposed new 405-22 HOV Connector Separation (Bridge No. 55-1103E), which provides a direct High Occupancy Vehicle (HOV) connection between the eastbound/westbound Garden Grove Freeway (SR-22) and northbound/southbound San Diego Freeway (I-405). A site plan is shown in Figure 2.

Due to moderately weak and compressible soils in the near surface and shallow groundwater, lightweight cellular concrete fill was selected for the walls and embankment to eliminate long-term settlements and avoid need for ground improvements due to low bearing capacity.

The approach embankment will be 59 feet wide with vertical walls on both sides (RW1325 on the south and RW1326 on the north). Wall heights increase from about 5 feet on the west to a maximum of about 27 feet at the HOV Connector abutment. The walls and embankment consist of lightweight cellular concrete fill with precast concrete facing panels anchored into the cellular concrete with threaded studs. Wall limits with respect to the HOV Connector "H" Line and dimensions are as follows:

- **RW1325**: "H"1324+22 to 1331+57, Length=750 feet, Max Ht.=27 ft;
- **RW1326**: "H"1324+22 to 1330+57, Length=635 feet, Max Ht.=27 ft.

The wall General Plans are shown in Figures 3A through 3G. A typical section across the freeway illustrating existing and proposed grades and general soil layering is shown in Figure 4. The section location is shown in Figure 2.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

The subsurface conditions at the wall site were investigated by performing four (4) soil borings and five (5) Cone Penetration Tests (CPTs) during the period of March 26th to April 24th, 2008. The CPT and boring locations were selected such that representative soil profiles could be developed along the wall alignment. Boring locations are shown in Figure 2, and a detailed description of the exploration and the boring / CPT logs are presented in Appendix A. The location and depth of borings and CPTs is summarized in Table A-1 of Appendix A. The Log of Test Boring Sheets (LOTBs) are presented in Plates 1 through 7.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, engineering, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

Test	ASTM Designation	Purpose
• Moisture Content and Dry Density	ASTM D 2216	Soil Classification
• Grain Size Distribution (Sieve Analysis)	ASTM D 422	Soil Classification
• Percent Passing #200 Sieve	ASTM D 1140	Soil Classification
• Atterberg Limits	ASTM D 4318	Soil Classification
• Direct Shear	ASTM D 3080	Shear Strength
• Pocket Penetrometer		Undrained Shear Strength
• Soil Corrosivity (pH, sulfate, and chloride)	CT 422. 443 417, and 643	Corrosion Potential
• Consolidation	ASTM D 2435	Compressibility

Moisture content, dry density, percentage passing a No. 200 sieve, and the pocket penetrometer readings are shown on the boring logs in Appendix A. Detailed descriptions of the other tests performed and their results are presented in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The wall site is located within existing freeway travel lanes. Freeway elevations are nearly level near El. +24 to +26 feet. Drainage is by sheet flow to existing storm drains.

3.2 Geologic Conditions

3.2.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange County coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

3.2.2 Stratigraphy

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County coastal plain of the southern portion of the Central Block of the Los Angeles Basin. The basin is in filled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of poorly consolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Stratigraphy consists of alternating layers of sands, silts, and clays (Figure 5B).

Shallow compacted roadway fills and abutment approach fills up to about 30 feet high have been placed in the area over the natural alluvial deposits. Relative density and stiffness of the alluvial soils generally increases with depth.

3.2.3 Geologic Structure

Since the bedrock is more than 4,000 ft deep, geologic structure at the site is not a design issue.

3.2.4 Geologic Hazards

Geologic hazards include landslides, expansive or collapsible soils, and seismic hazards include liquefaction, lateral spreading, seismic slope stability, fault rupture, tsunamis, and seismic shaking. The site is not located in landslide prone area and no natural slopes are present. Expansive soils are present and recommendations regarding expansive soils with 4 ft of the finished grade are provided in the GDR and in expansive soil exclusion zone in the Bridge Foundation Reports.

3.3 Subsurface Soil Conditions

CPTs were used to accurately determine stratigraphy and correlate with data from borings. Cross-sections were developed and an idealized profile was adopted for design. The soils profile and general engineering characteristics of the subsurface soils are illustrated in the Soil Profile in Figure 5, and summarized in Table 1. The soil profile is divided into 5 general layers. Layer descriptions and layer boundary elevations selected for design are described below.

3.3.1 Layer 1 – Fill and Stiff Native CL (El.+24' to +19')

The existing freeway grades are near El. 24 to 26 feet at the wall locations. The upper soil layer consists of shallow road fills and stiff native alluvium. These soils consist primarily of very stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent layers of medium dense silty sands (SM) and clayey sands (SC).

3.3.2 Layer 2 – Firm to Stiff CL (El. +19' to +7')

This top of this layer is near the water table. In the overall project area it is typically about 11 to 14 feet thick (average 12) and is present generally between El. +3 and +20 feet (average El. +5 to +17 feet). The material classifies as locally firm but predominantly stiff lean clay or lean sandy clay (CL) with typical undrained shear strengths of 1.0 to 1.4 ksf based on CPT correlations and pocket penetrometer

readings. Thin seams of medium dense sand to silty sand to sandy silt, as well as stiffer clays, are present in this layer. Layer 2 is generally overconsolidated with respect to the freeway grades. Since it is fairly shallow below the freeway grades and is moderately weak and compressible, it controls the magnitude and time rate of settlement, bearing capacity, and global stability of the walls.

3.3.3 Layer 3 – Very Stiff CL, ML (El. +7' to -13')

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with thin interbeds of medium dense to dense silty sands (SM) and sandy silts (ML), and layers of stiff clay. Pocket penetrometer readings in the fine grained materials typically range from 2.0 to 4.5 ksf, and CPT correlations indicate average undrained shear strengths in this layer generally more than 3.0 ksf. These clays are overconsolidated.

3.3.4 Layer 4 – Dense to V. Dense SM/ML/SP (El. -13' to -25')

Layer 4 is a predominantly granular layer of variable thickness consisting of interbedded Sand (SP), Silty Sand (SM), and Sandy Silt (ML), with less frequent interbeds of clayey silt and clay (ML, CL). The granular materials are generally dense with SPT N-values of 30 to 45 blows per foot, and cohesive materials are typically very stiff to hard based on pocket penetrometer and CPT correlations. Thin layers of medium dense sandy and silty soils are also present.

3.3.5 Layer 5 – V. Dense SP & Hard CL/ML (Below El. -25')

This layer is older alluvium composed of alternating beds of dense to very dense sands (SP), silty sands (SM), and sandy silts (ML), interbedded with very stiff to hard clays and clayey silts. The cleaner sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 600 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf. The upper 15 to 20 feet of this layer (Layer 5-1) is typically very stiff to hard clay and silt.

3.4 Groundwater

Groundwater was observed within the native alluvium at depths of 7 to 16.5 feet below freeway grades (roughly El. +13 to El. +18 feet) in borings and CPTs for the subject wall alignments (see Table A-1 of Appendix A). In the Caltrans 1959 As-Built LOTB for the Route 22/405 Separation (Bridge No. 55-1101F), groundwater was reported near El. +7 feet. Based on California Geological Survey (CGS) (previously known as California Department of Conservation (CDC) Division of

Mines and Geology) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater is at a depth of about 10 to 15 feet (see Figure 6). The exact reference elevation is not known. If the depth is taken below freeway grade (El. +26 ft) then the groundwater would be near El. 16 feet, which is generally consistent with our investigation data. Based on the above data, we recommend the highest observed groundwater elevation of +18 feet for design. The top of leveling pad elevations for the walls are at or above El. +21 ft and not expected to be below the permanent groundwater table. However, due to capillarity, zones of moist or wet soils could be encountered in the foundation excavations.

3.5 Engineering Parameters

Recommended design engineering properties for the soil layers shown in Figure 5 were developed from the field and laboratory data from our investigation, and are summarized in Table 1. Index properties of soils were based on testing for natural moisture content and dry density, percent passing No. 200 sieve, grain size distribution, and Atterberg Limits. Drained strength parameters for c-ϕ soils were taken from results of direct shear tests. Undrained shear strengths of clays were taken from conservative interpretation of CPT test results, pocket penetrometer readings, and torvane readings. Friction angles of sandy soils below the water table were based on CPT and SPT penetration resistance correlations. Consolidation parameters for poorly consolidated clays were developed based on consolidation testing in combination with correlations of natural moisture content, ratio of undrained shear strength to effective overburden stress, and Atterberg Limits. Compressibility of sands and very stiff overconsolidated clays were based on published CPT and SPT penetration resistance correlations. Boring and CPT data are presented in Appendix A, and laboratory test results are presented in Appendix B.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Seismic Evaluation

The project is located in a seismically active area. Seismic shaking should be anticipated during the life of the project. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding.

4.1.1 Ground Surface Rupture

The site is not located in an Alquist-Priolo Earthquake Fault Zone, and the closest known active fault is the Los Alamitos Fault at a distance of about 1.7 km. Due to the distance from the closest faults ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed.

4.1.2 Ground Motion

4.1.2.1 Site Coordinates

The wall site latitude and longitude are approximately as follows:

- **West End**: 33.7745 North, 118.0475 West
- **East End**: 33.7748 North, 118.0451 West

A map showing the site coordinates is presented in Appendix D-1.

4.1.2.2 Faulting and Seismicity

The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 7, and the closest regional faults are summarized in Table 2. The closest faults to the site are Los Alamitos (reverse fault, maximum credible earthquake (MCE) magnitude Mw=6.0, distance=1.2 to 1.4 km), Newport Inglewood (strike slip fault, Mw=7.0, distance=4.8 to 5.0 km), San Joaquin Hills (blind thrust fault, Mw=6.0, distance =13.8 km), and Puente Hills (blind thrust, Mw=7.25, distance=18.1 km).

4.1.2.3 Deterministic Analysis

We performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base. Los Alamitos is not in the EQFAULT CGS 2002 data base, so for this fault we estimated fault to site distance from the Caltrans 1996 map (see Figure 7). We used the mean value of attenuation relationships presented by Sadigh et. al. (1997) to estimate peak bedrock and ground accelerations based on the MCE magnitude and distance from the site. Results of the deterministic analyses are presented in Appendix D-1, and summarized in Table 2.

The largest deterministic site acceleration comes from a Mw=6.0 event on Los Alamitos fault, with calculated peak ground acceleration (PGA) of 0.52g. The computed PGA from a magnitude 7.0 event on Newport Inglewood gives peak ground acceleration (PGA) of 0.43g.

4.1.2.4 Design Accelerations

For pseudo-static slope stability calculations we recommend a design horizontal acceleration of 1/3 of the maximum PGA, or Kh=0.52/3=0.17. For liquefaction evaluation, it was determined that a Mw=7.0 event on Newport Inglewood was more critical than Mw=6.0 on Los Alamitos. Therefore, we used Mw=7.0 and PGA=0.45g for liquefaction analysis. For sliding and overturning evaluation of the precast lightweight cellular concrete fills we recommend using a PGA of 0.5g.

4.1.3 Seismic Compaction

Vibration such as seismic shaking can cause settlement of loose to medium dense dry clean granular soils. No zones of clean loose sand are present above the water table at the site, and therefore seismic compaction is not considered a hazard. Calculations in Appendix D-6 and the results in Table 3 show negligible settlement from seismic compaction.

4.1.4 Liquefaction Evalauation

The site is located within a State Liquefaction Hazard Zone (CDMG, 1999).. Groundwater level is near the high historical levels of 10 to 15 feet below freeway grades, and El. +18 feet was selected for analysis. Sediments below the groundwater at the site are primarily stiff to very stiff clays and dense to very dense sands, but contain localized thin interbeds of loose to medium dense sands, silty sands, and silts that may be prone to liquefaction.

We performed liquefaction calculations for CPT-08-001, CPT-08-002, CPT-08-003, CPT-08-007, and CPT-08-121. Triggering evaluation was based on the CPT method from the NCEER 1996/1998 Workshops (Youd and Idriss, 2001). Settlements were calculated using the method of Tokimatsu and Seed (1987), and residual strengths were based on the method of Seed and Harder (1990). Calculations were carried to a depth of 60 feet below existing grades. We determined that use of Magnitude 7.0 and PGA of 0.45g was more critical than using Magnitude 6.0 and PGA of 0.5g, and therefore used the higher magnitude case in our analyses.

The resulting analyses show that limited layers of silty and sandy soils below groundwater may liquefy in the design earthquake. Potentially liquefiable layers are shown on the cross-section in Figure 5. Estimated liquefaction-induced ground settlements for all CPTs range between 0 and 0.9 inches with an average value of 0.4 inch. A summary of the liquefaction settlements is included in Table 3, and calculations are presented in Appendix D-6.

Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1,500 psf. The N1-60cs for liquefiable layers adjusted in accordance with Seed and Harder (1990) range from 17 to more than 30 blows per foot (average 27), and estimated residual shear strengths range from a minimum of 875 psf up to a limiting value of 1,500 psf (average 1400 psf). Residual undrained shear strengths of liquefied soils generally exceed the undrained shear strength of Layer 2 clays, and therefore the clay layer controls the bearing capacity and slope stability.

Due to the relatively isolated thin liquefied layers, depth of liquefiable layers, small ground settlements, and relatively high residual shear strengths, it is our conclusion that liquefaction does not have a significant adverse impact on the walls.

4.1.5 Other Seismic Hazards

The site has no known history of subsidence. Static and seismic stability of the walls and embankments is evaluated later in this report.

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the 100-yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These

values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

4.2 Corrosion Evaluation

Based on Caltrans Memo to Designers 3-1 (July, 2008) and Caltrans Corrosion Guidelines (2003) a corrosive area is defined as "an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates, has a minimum resistivity of less than 1000 ohm-cm, or has a pH of less than 5.5."

Representative samples of the fill and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests performed for the subject walls are summarized as:

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-122	B-1	1.2-5	SC	2750	8.3	132	163
R-08-004	B-1	1.5-3.5	CL	1350	9.1	465	604

Based on these test data the site soils classify as corrosive due to high chlorides in accordance with Caltrans Corrosion Guidelines (2003). Based on testing elsewhere in the overall site, high sulfates (between 2,000 and 15,000 ppm) are also present locally in the site area.

Design of reinforced concrete should consider the site corrosion potential in accordance with Bridge Design Specifications (BDS) Section 8.22 (July 2000):

- For 500 to 5000 ppm Chlorides in soil the minimum concrete cover and mix design for protection of reinforcement against corrosion due to chlorides shall be as provided in BDS Table 8.22.1:
    - The maximum water to cementitious material ratio shall not exceed 0.40;
    - Minimum concrete cover for footings and pile caps is 3 inches;
    - Minimum concrete cover for walls and columns is 3 inches;

  - Minimum concrete cover for precast piles is 2 inches, and Mineral admixtures conforming to ASTM Designation C1240 and/or ASTM Designation C618 Type F and/or N, may be required.;
- For 2000 to 15,000 ppm Sulfates in soil the minimum requirements for protection of concrete against sulfate exposure shall conform to the requirements in BDS Table 8.22.2:
  - Cement shall be Type II modified or Type V;
  - The minimum cementitious material content shall be 658 pounds per cubic yard with a 25% mineral admixture replacement by weight. Maximum water to cementitious material ratio shall not exceed 0.40.

For cellular concrete in contact with native soils (first lift, or at least 1 ft), we recommend use of Type V cement.

4.3 Scour Evaluation

The walls are not located in or adjacent to a significant flood/drainage or river channel. Surface runoff is by sheet flow and will be collected and conveyed off-site with storm drains, and the surrounding area will be paved. Therefore, scour potential is not significant.

4.4 Foundation Recommendations

4.4.1 Cellular Concrete Embankment and Walls

4.4.1.1 General

The subsurface soils have inadequate bearing capacity to support conventional Mechanically Stabilized Embankment (MSE) walls of this height (up to 27 feet), and significant long-term settlements would be expected for conventional embankment. To mitigate the bearing capacity and settlement problem, the walls and embankments will be constructed using low density cellular concrete, a mixture of hydraulic cement, water, and preformed foam, with cast unit weights typically ranging from 30 to 40 pcf, and compressive strengths typically ranging from 40 to 120 psi. The ACI guide for this material (ACI 523.1R-06) is included in Appendix C for reference. The materials are batched on site and poured in lifts. Vertical facing consisting of precast panels may be used as the temporary formwork and permanent facing for vertical walls, with aesthetic treatment identical to MSE walls.

Lightweight cellular concrete fills have the following advantages:

- Greatly reduced foundation pressures (about 1 ksf versus more than 4 ksf for conventional MSE walls 27 feet high), allowing construction on soils with lower bearing capacity without ground improvement;
- Greatly reduced settlement magnitude, especially in lightly overconsolidated soils like those at the project site, since the lightweight fill loading is maintained in the overconsolidated range;
- Greatly reduced time rate of consolidation at this site, since the lightweight fill loading is maintained in the overconsolidated range;
- No lateral earth pressures are exerted by the lightweight fills, other than the temporary fluid pressure during placement and prior to set of each lift;
- The low weight of the fill decreases the gravitational forces and improves the global (slope) stability of the embankment;
- The material is batched on truck mounted plants on site, and can be pumped to the point of placement rather than hauled in trucks like conventional backfill, and no compaction of backfill is required; and
- The fill can be readily poured around utilities or other elements in the backfill, or placed behind bridge abutments.

The wall facing will be 5 ft square precast concrete panels similar to Mechanically Stabilized Embankment (MSE) walls, anchored into the cellular concrete with threaded steel studs. Panels will be placed on leveling pads, and backfilled with cellular concrete in lifts of about 2.5 feet. Each lift will be allowed to set at least 24 hours, or until adequate strength is achieved, before proceeding the next lift. The panels will be temporarily braced to resist the fluid pressure of each lift. After setting, the cellular concrete exerts no earth pressure. Additional panels, cellular concrete and threaded studs will be placed as the wall / embankment is built from the bottom up creating a continuous monolithic mass of lightweight cellular concrete. The typical section is shown on the General Plans in Figures 3 (A-G).

4.4.1.2 Loads

The finished embankment will have 3 basic layers. Foundation loads were based on these layers and unit weights as follows:

- **Layer 1**: 2 feet of Concrete (paving/slab, etc.), unit weight=150 pcf;
- **Layer 2**: 3 feet of Cellular Concrete, 42 pcf, 120 psi strength;
- **Layer 3**: Cellular Concrete, Wall Height minus 5 ft, 30 pcf, 60 psi strength.

Summing layer weights, the dead load at the base of the embankment (for walls higher than 5 feet) may be estimated by:

Q_{total} (psf) = 2(150) + 3(42) + 30 (H-5)
=276+30H, where H= wall height in feet

For the maximum height of 27 feet, gross foundation pressure is 1086 psf, or about 8.7 feet of equivalent soil. The wall foundation will be excavated to depth D of 2 to 3 feet below existing grades. The removal of soil will cause unloading at the foundation level, and the net load at foundation level is the pressure due to lightweight fill minus the overburden pressure of the soil removed. Existing soil unit weight is taken as 125 pcf, so net pressure for settlement analysis is:

Q_{net} (psf) = Q_{total} – 125D

For the 27 foot wall with 3 feet embedment depth the net loading at foundation level will be 1086-125(3) = 711 psf, or the equivalent of about 5.7 feet of soil.

For dynamic seismic lateral loads, the inertia force is the design acceleration coefficient times the weight, applied at the vertical center of gravity of the embankment.

4.4.2 Allowable Net Bearing Pressure and Minimum Embedment

Foundation level is within about 3 to 5 feet of Layer No. 2 (Table 1) which is saturated clay with recommended design undrained shear strength of 1 ksf. Due to large width of the embankment, bearing capacity is controlled by Layer No. 2. Ultimate bearing capacity (using Brinch-Hansen's method) is about 5 times the undrained shear strength, or 5 ksf. Calculations are provided in Appendix D-2. Allowable bearing capacity with a factor of safety of 3 for static conditions is 1.7 ksf. For seismic loading, the bearing capacity factor of safety may be taken as 75% of the static value, or 2.25, resulting in a seismic allowable bearing capacity of 2.2 ksf.

The walls are supported on level ground, and we recommend a minimum wall embedment of 2 feet or 0.1 times wall height (whichever is greater) below the lowest adjacent grade.

4.4.3 Settlement Magnitude

4.4.3.1 Overconsolidation Ratio

Construction of the lightweight fill embankment will cause settlements of the underlying fill / alluvium. The existing overburden pressure (σ'_p) at the center of Layer No. 2 is about 1 ksf, and the design undrained shear strength (S_u) is 1 ksf. Therefore, the (S_u/σ'_p) ratio is about 1. The ratio for a normally consolidated clay [$(S_u/\sigma'_p)_{NC}$] may be estimated using Plasticity Index (PI). Using the correlation of Skempton (1957), and a PI of 20 for Layer No. 2 soils, we compute:

$$[(S_u/\sigma'_p)_{NC}] = 0.11+0.0037*PI = 0.11 + .0037*20 =0.18$$

For estimating overconsolidation ratio (OCR), we conservatively selected $(S_u/\sigma'_p)_{NC}$ of 0.3. Therefore, $(S_u/\sigma'_p)_{OC} / (S_u/\sigma'_p)_{NC} = 1 / 0.3$ or about 3. Based on the correlation of Ladd and Foot (1974) this ratio predicts a minimum OCR of about 3.5. We assumed OCR=3 for analysis, or a pre-consolidation pressure of about 3 ksf. For stress increases up to about 2 ksf, the stresses in the clay layer will be less than the pre-consolidation pressure and the material will behave as overconsolidated. The stress increase in Layer No. 2 from the highest embankment will be on the order of 710 psf, so the clay will behave as overconsolidated under the embankment loads.

4.4.3.2 Settlements under the Embankment

We performed settlement analyses using the net embankment loads described in Section 4.1.5.2 and subsurface profile listed in Table 1, with stress distribution versus depth computed by Boussinesq theory (see calculations in Appendix D-3). The calculated total settlements (δ) are summarized for various wall heights as follows:

H (ft)	8	12	17	22	27
δ (inch)	0.4-0.7	0.4-0.7	0.6-1.0	0.75-1.25	1.0-1.5

Based on variation of wall height with distance along the alignment, the estimated differential settlements along the length of embankment and along wall panels, assuming perfectly uniform soil conditions, is less than 1/5000. To account for soil variability, we estimate this could be 1/2500. Based on FHWA, 1/500 is generally tolerable for MSE wall panels.

4.4.3.3 Settlements at the Bridge Abutment

Settlements at the back of the bridge abutment footing are estimated at ½ to ¾ inches. Estimated downdrag loads of about 30 kips could occur on the back row of piles, but these piles are driven into dense sand, and should have adequate reserve capacity to resist the small downdrag loads.

Since the pile supported footing will settle less than the adjacent embankment, it is recommended that a continuous vertical joint in the lightweight fill be provided at the back edge of the bridge footing.

4.4.4 Time Rate of Settlement

Other than Layer No. 2, all other soils are very stiff and will complete most of the settlements within 15 to 30 days after completion of embankment. Based on correlations with Liquid Limit, considering the average LL of 36 for Layer No. 2, we estimated the overconsolidated Coefficient of Consolidation (Cv) for Layer 2 as 2.1 ft^2/day (NAVFAC DM7.01). Assuming single drainage condition for Layer 2 (due to stiff clay layer below) and drainage height of 12 feet, we estimate that at 15 days after completion of the embankment, remaining settlements will be less than ½ inch. After 30 and 45 days, remaining settlements are estimated to be less than ¼ and one-tenth of an inch, respectively.

The settlements should be monitored by installing a minimum of 5 settlement plates. We recommend installing 3 settlement plates along the MSE panel alignment at wall heights of 25, 20, and 15 feet, one plate in the center of embankment 5 feet behind the bridge footing, and one plate in the center of embankment 50 feet behind the bridge footing. Suggested locations and a typical detail for a settlement plate are shown in Figures 8A and 8B. The plates should be placed on sand bedding and the plate elevation surveyed after subgrade is prepared and before any fill is placed. Incremental sections of steel rods and PVC sleeve should be placed as the fill is being raised. The top of the plate or existing section of rod should be surveyed immediately prior to installing a new section of rod, and the top of the new rod should be surveyed immediately after it is attached. In addition, each time the plate is surveyed the elevation of the surrounding fill should be surveyed. The plate should be surveyed daily as the fill is placed and twice weekly thereafter for 30-days. GDC should review settlement data to confirm settlement has leveled off prior to construction of pavement and approach slab.

If lightweight cellular concrete fill is placed after the abutment and pile foundations, potential downdrag loads on the back row of piles should be considered. These

downdrag loads are relatively small and the piles can easily be designed to accommodate these loads.

4.4.5 Lateral Resistance

In general, resistance to lateral loads is provided by a combination of frictional or adhesive sliding resistance at the cellular concrete-soil interface and passive soil resistance on the side of the embedded portion of the panels. For the cellular concrete embankment passive resistance will be much smaller than base resistance and should be ignored for design. Soils along the base of the cellular concrete are very stiff to hard clays. Based on NAVFAC DM7.02, the adhesion at the soil/cellular concrete interface for sliding resistance may be taken as 0.9 ksf. We performed sliding stability calculations for the highest walls (Appendix D-4) and determined that the sliding factor of safety under 0.5g horizontal acceleration is greater than 1, and therefore is adequate.

4.4.6 Seismic Overturning and Bearing Capacity

For seismic overturning analysis of the 59 ft wide embankment, we recommend using a horizontal acceleration coefficient of 0.5. The horizontal inertia force equal to 0.5 times the weight should be applied at the center of gravity of the mass. Overturning stability is considered adequate if the base resultant falls within the middle 1/3 of the embankment. Applying weight, inertia, and base resultant forces, then summing moments about the toe of embankment, the following are required to satisfy resultant within the middle 1/3:

$$B \geq 6 * K_h * Y_{cg}$$

Where
B= embankment base width
K_h = horizontal seismic coefficient (0.5)
Y_{cg} = vertical distance from toe to center of gravity

We performed overturning calculations (Appendix D-4) and determined that for the highest embankment and 0.5g horizontal acceleration the resultant falls in the middle 1/3 and is therefore adequate.

The maximum toe pressure under seismic overturning is 2.0 ksf, which has a factor of safety of 2.5 on the ultimate bearing capacity and is therefore adequate.

4.4.7 Subgrade Preparation

Prior to wall construction, the entire footprint of the embankment should be cleared of existing pavements and excavated to foundation level. Since the foundation excavation will be within several feet of the water table, zones of capillary moisture or softened soils may be encountered. The foundation area should be proof-rolled with loaded heavy non-vibratory equipment under geotechnical observation by GDC. Vibratory equipment should not be allowed as it may disturb the subgrade and bring up the groundwater. Any areas of soft, wet, or other unsuitable materials should be removed replaced or stabilized to the limits and in a manner recommended by GDC. Soft or wet subgrade may require overexcavation of 12 inches and placement of biaxial geogrid (Tensar BX1200 or equal) and 12 inches of crushed rock.

After successful proof-rolling, the base of excavation should be scarified, brought to near optimum moisture content, and recompacted to 90% as determined by ASTM D 1557-91. We recommend that all foundation excavations be observed by GDC to confirm foundation conditions and proper subgrade preparation prior to placing the first lift of cellular concrete backfill. Any soils disturbed by construction activities or weather should be excavated and recompacted as directed by GDC. Cellular concrete may be placed directly on the approved subgrade.

4.4.8 Cellular Concrete Backfill

Cellular concrete shall be placed in lifts not to exceed 2.5 feet, and subsequent lifts shall not be placed for at least 24 hours or until the specified strength has been obtained, in accordance with the plans and specifications.

4.4.9 Wall Drainage

The surface of the cellular concrete will be waterproofed with an impervious membrane. A layer of treated permeable material will be placed below the pavement and above the waterproofing layer to collect any water permeating the joints in concrete pavements, and conveyed to drains discharging to the base of the wall. Since the wall is above the water table and the adjacent areas will be paved, no underdrain system is necessary for collection of groundwater.

4.5 Slope Stability Analyses

We analyzed the static and seismic global embankment stability using the computer program PCSTABL5M (Purdue University). The soil profile used in our analysis is shown in Table 1. Since the residual undrained shear strength of any shallow liquefiable layers is higher than the undrained shear strength of Layer No. 2, the

Layer 2 undrained shear strength controls the stability. For cellular concrete fill, we modeled the embankment material as a cohesive soil with unconfined compressive strength of 40 psi, or undrained shear strength of 20 psi (2.8 ksf).

For pseudo-static analyses we used an acceleration coefficient of Kh = 1/3 of the PGA, or Kh=0.17. Block, random, and circular failure surfaces were evaluated. The results (Appendix D-5) indicate static and seismic factors of safety in excess of 1.5 and 1.1, respectively. Therefore, the static and seismic stability are considered adequate.

4.6 Construction Considerations

4.6.1 Construction Advisories

- Construction of the wall is in the median of an active freeway, and numerous transportation facilities, utilities, and other improvements are present;
- Limited space is available for ingress/egress of equipment and construction operations;
- The foundation subgrade is near the water table and soils with elevated moisture may be encountered, requiring stabilization with geogrid and rock;
- The foundation area must be proof-rolled with heavy equipment, but vibratory equipment should not be allowed due to shallow groundwater;
- Wall construction will need to be coordinated with Abutment 6 construction for the HOV connector.

4.6.2 Excavation

All earthwork and grading should be performed in accordance with Section 19 of Caltrans Standard Specifications. Excavated soils will consist mainly of shallow existing fill and native alluvium. Soils should be excavatable with moderate effort using heavy-duty grading equipment. During earthwork operations, the contractor should control the flow of water through the work area and maintain a dry excavation. No surcharge loads, such as the weight of heavy equipment should be placed within 1.5 m (or height of excavation, whichever is greater) of the top of unsupported excavations. Care should be taken during excavation to avoid removing support for any existing improvements, such as foundations, pavements, or buried utilities. Excavation safety is the responsibility of the contractor, and should comply with applicable OSHA guidelines.

4.6.3 Buried Utilities

Buried and overhead utilities are present in the project area. The contractor should research utility locations and take the necessary precautions to protect-in-place or relocate utilities prior to grading. If any utilities conflict with the wall construction, they should be shown on the plans and protected or relocated as necessary.

4.6.4 Remnants of Previous Construction

Construction of this improvement project will require the removal of existing facilities, including structures, v-ditches, pavements, fencing, walls, asphalt, concrete, buried utilities, and other improvements.

4.6.5 Hazardous Waste Considerations

Environmental investigation was not within the scope of our work; however, we did not observe any evidence of contamination of subsurface materials in our borings and along the alignment. Nonetheless, contaminated soils and / or groundwater may be present at the site. If encountered during construction, the owner should be notified and appropriate methods of handling and disposal should be used.

4.6.6 Differing Site Conditions

Our characterization of the site is based on the results of our field explorations, geologic analyses of cross-sections, and interpolation between exploration locations. All cuts, excavations, and foundation areas should be observed continuously during construction are consistent with the recommendations used in the design. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations.

5.0 LIMITATIONS

This report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report is provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report. This report is subject to revision.

6.0 REFERENCES

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TABLES

TABLE 1
GENNERALIZED SOIL PROFILE
SUMMARY OF ENGINEERING PROPERTIES
RW1325 RW1326

Layer No.	Soil Type*	El. (feet)**	Index Properties*	SPT N-Value* (blow/ft)	Drained Shear Strength Parameters*				Undrained Shear Strength* (psf)	Compressibility Parameters*				
					Peak Cohesion c' (psf)	Peak Friction Angle ϕ' (deg)	Ultimate Cohesion c' (psf)	Ultimate Friction Angle ϕ' (deg)		Modulus E (ksf)	$Cc/(1+e_0)$	$Cr/(1+e_0)$	OCR	Cv (ft^2/day)
1	Very Stiff to Hard Sandy Clay / Silt (CL, ML)	Above +19	**(-)#200**=8 to 86% (avg 51%) **LL**=26 to 47 (avg 33) **PL**=14 to 20 (avg 19) **PI**=11 to 27 (avg 15) ω_N=4 to 32% (avg 19%) γ=125 pcf (average)	**Borings:** 9 to 43 (avg 25) **CPT:** 16 to 30#	400	30	250	30	2,500	-	-	0.018	7	**Over Consolidated:** 2.3
2	Firm to Stiff Sandy Clay (CL)	+19 to +7	**(-)#200**=26 to 86% (avg 58%) **LL**=33 to 39 (avg 36) **PL**=19 to 21 (avg 20) **PI**=12 to 19 (avg 16) ω_N=18 to 46% (avg 28%) γ=121 pcf (average)	**Borings:** 3 to 50 (avg 15)	250	28	100	28	1,000	-	0.17	0.016	3.3	**Normally Consolidated:** 0.33 **Over Consolidated:** 2.1
3	Very Stiff Clay, Sandy Clay, Silty Clay and Sandy to Clayey Silt (CL, ML)	+7 to -13	**(-)#200**=11 to 97% (avg 63%) **LL**=29 **PL**=19 **PI**=10 ω_N=19 to 44% (avg 29%) γ=122 pcf (average)	**Borings:** 12 to 50+ (avg 32) **CPT:** Avg 18#	-	-	-	-	2,000	-	-	0.019	>3	**Over Consolidated:** 3.3
4	Dense to Very dense Silty Sand, Sandy Silt, Sand and Stiff to Hard Clayey Silt and Clay (SM, ML, SP & CL, ML)	-13 to -25	**(-)#200**=2 to 86% (avg 35%) ω_N=15 to 40% (avg 25%) γ=126 pcf (average)	**Borings:** 19 to 50+ (avg 50+) **CPT:** Avg 30#	-	-	-	-	-	1,000	-	-	-	-
5 clay	Very Stiff to Hard Clay and Silt (CL, ML)	-25 to -100	**(-200)**=27 to 96% (avg 60%) **LL**=31 **PL**=15 **PI**=16 w_N=17 to 45% (avg 28%) **g**=124 pcf (average)	**Borings:** 21 to 50+ (Avg 44)	-	-	-	-	3,000	-	-	0.017	>2	**Over Consolidated:** 3.3
5 sand	Dense to Very Dense Sand and Silty Sand (SP, SM)			**Borings:** 21 to 50+ (Avg 44) **CPT:** (Avg 42)#	0	38	-	-	-	3,000	-	-	-	-

* Average values from the overall project were used

** Average values based on CPT-08-001, 002, 003, 007 and 121 (For detailed layer elevations from each CPT refer Page 2 of 2 of Table 1).

CPT N-Values are based on available correlations (Robertson et al., 1983) -see Appendix A

TABLE 1
GENERALIZED SOIL PROFILE
(Layer Elevations)

Layer No.	Top/ Bot	Exploration														
		CPT-08-001			CPT-08-002			CPT-08-003			CPT-08-007			CPT-08-121		
		24.5			25			27.9			27			28		
		Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick
1	Top	0	24.5	6.0	0	25	6.0	0	28	9.0	0	27.0	7.0	0	28.0	11.0
	Bot	6	18.5		6	19		9	19		7	20.0		11	17.0	
2	Top	6	18.5	15.0	6	19	11.0	9	19	11.0	7	20.0	12.0	11	17.0	14.0
	Bot	21	3.5		17	8		20	8		19	8.0		25	3.0	
3	Top	21	3.5	17.0	17	8	21.0	20	8	21.0	19	8.0	21.0	25	3.0	
	Bot	38	-13.5		38	-13		41	-13		40	-13.0				
4	Top	38	-13.5	11.0	38	-13	12.0	41	-13	9.0	40	-13.0	16.0			
	Bot	49	-24.5		50	-25		50	-22		56	-29.0				
5-1	Top	49	-24.5	19.0	50	-25	18.0	50	-22	24.0	56	-29.0	19.0			
	Bot	68	-43.5		68	-43		74	-46		75	-48.0				
5-2	Top	68	-43.5		68	-43		74	-46		75	-48.0				
	Bot															

TABLE 2
SUMMARY OF NEARBY FAULTS AND SEISMICITY

Fault Name	Fault Type	Mw	LOCATION					
			W. End RW1325 & 1326			E. End RW1325 & 1326		
			Lat. 33.7745 Lon. 118.0475			Lat. 33.7748 Lon. 118.0451		
			Dist (km)	PBA	PGA	Dist (km)	PBA	PGA
Newport-Inglewood	Strike Slip	7.00	4.80	0.53	0.43	5.00	0.52	0.42
Los Alamitos	Reverse	6.00	1.20	0.63	0.52	1.40	0.62	0.51
San Joaquin Hills	Blind Thrust	7.00	13.90	0.36	0.34	13.80	0.36	0.34
Puente Hills	Blind Thrust	7.25	18.20	0.32	0.32	18.10	0.32	0.32

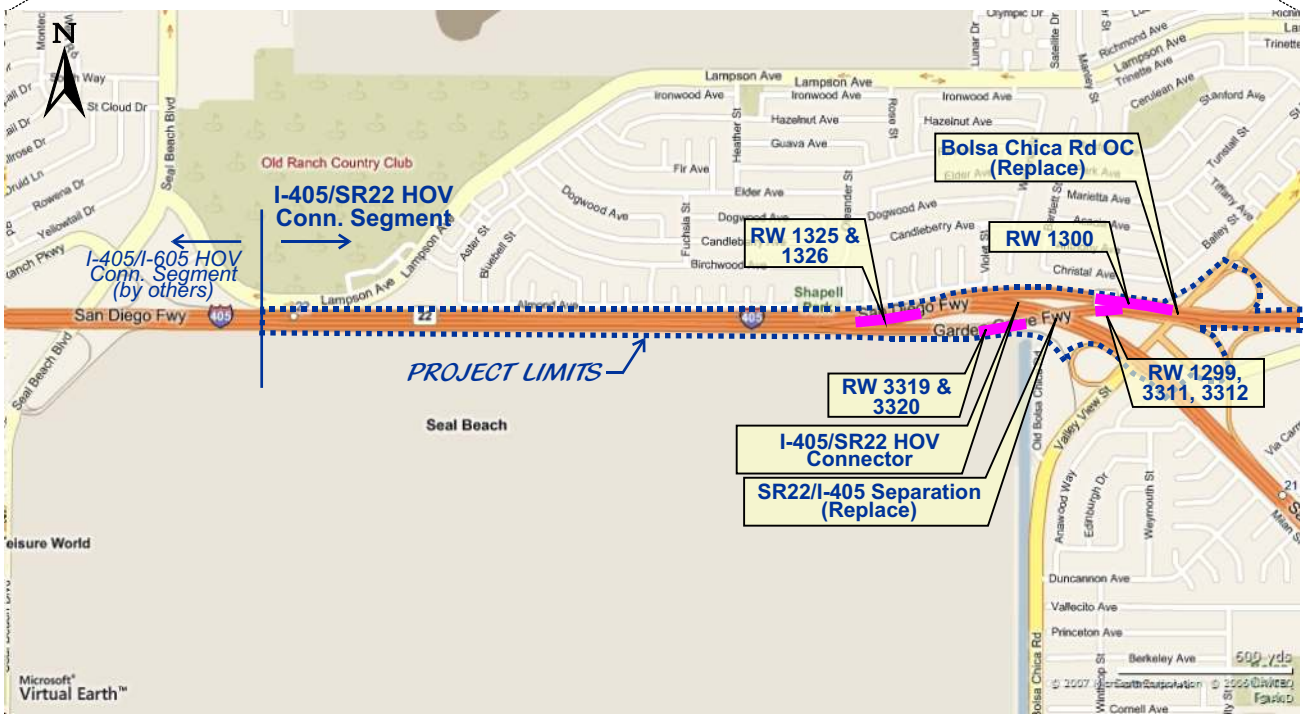
TABLE 3
SUMMARY OF LIQUEFACTION ANALYSES
RW1325 RW1326

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Design Ground Water Elevation (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-001	18	0.17	0.00	0.17
CPT-08-002	18	0.92	0.00	0.92
CPT-08-003	18	0.26	0.00	0.26
CPT-08-007	18	0.27	0.00	0.27

Min	**0.17**
Max	**0.92**
Average	**0.41**

FIGURES



The base maps are from Microsoft's Virtual Earth

GROUP DELTA CONSULTANTS

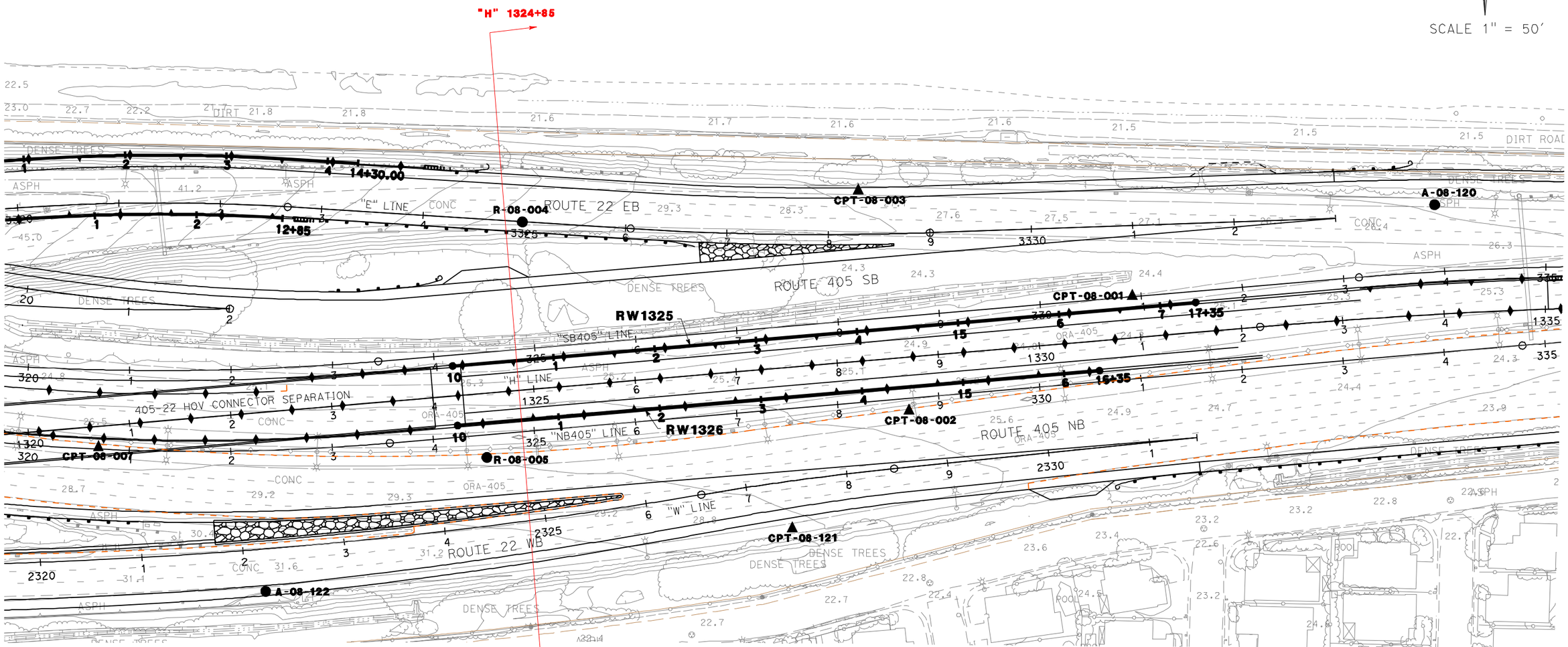
GDC Project No. I-436

West County Connector Project
I-405/SR22 HOV Conn. Segment
Orange County, California

Vicinity Map

Figure 1

SCALE 1" = 50'

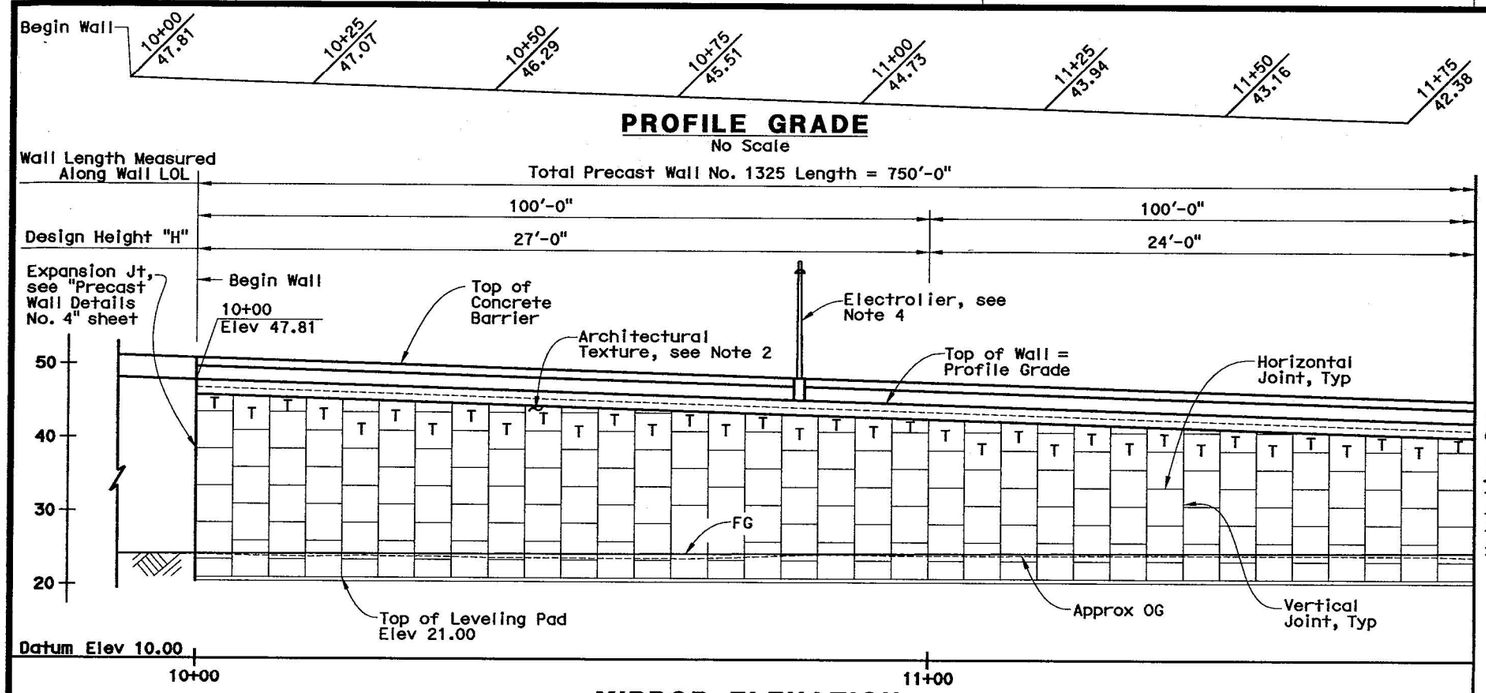


RELATIVE BORDER SCALE
IS IN INCHES

0 1 2 3

FIGURE 2

RW 1325 AND RW 1326
EXPLORATION LOCATION PLAN



NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" Sheet.
2. For Architectural Details, see "Architectural Panels" sheet.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Details, see "Precast Wall Details No. 6" sheet.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

NOTE:
The Con shall verify all controlling field dimensi ore ordering or fabricating any material

Figure 3A

Figure 3A

Sudhakar DESIGN OVERS	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD		
SIGN OFF DAT	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY	CHECKED	
	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI PROJECT ENGINEER

CU 12235 EA 071621

BRIDGE NO. 55-XXX POST MILES 20.91

PRECAST WALL No. 1325 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
GENERAL PLAN No. 1

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) 10/21/08

SHEET 2 OF 25

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

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PLANS APPROVAL DATE

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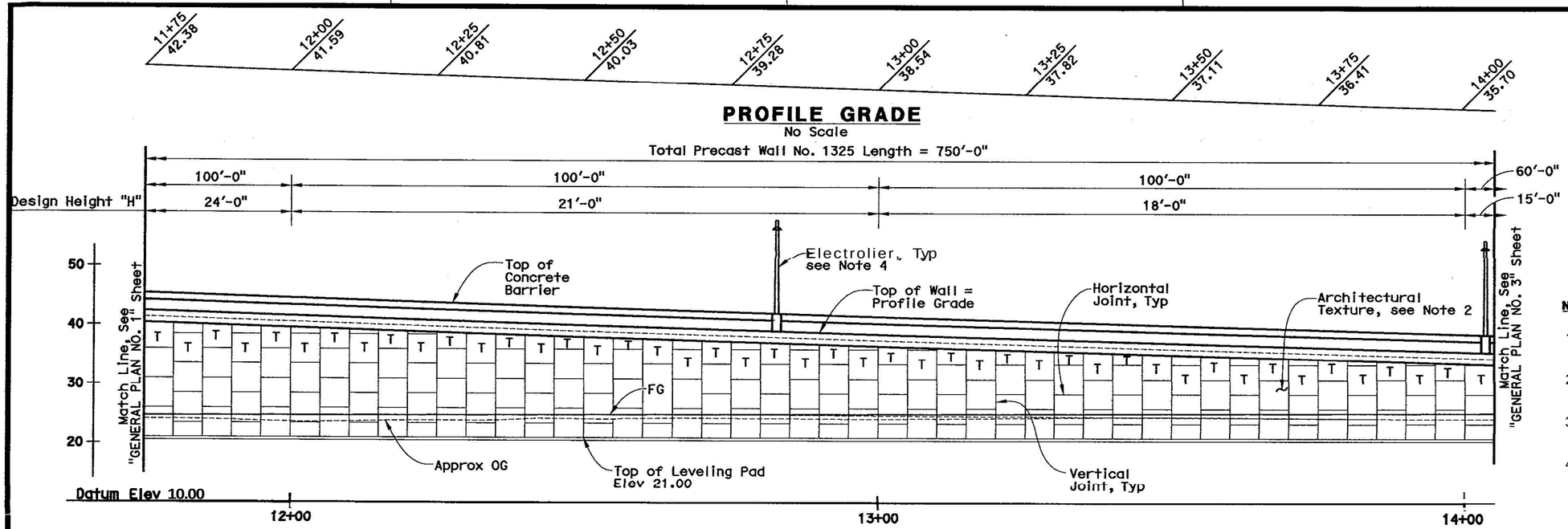
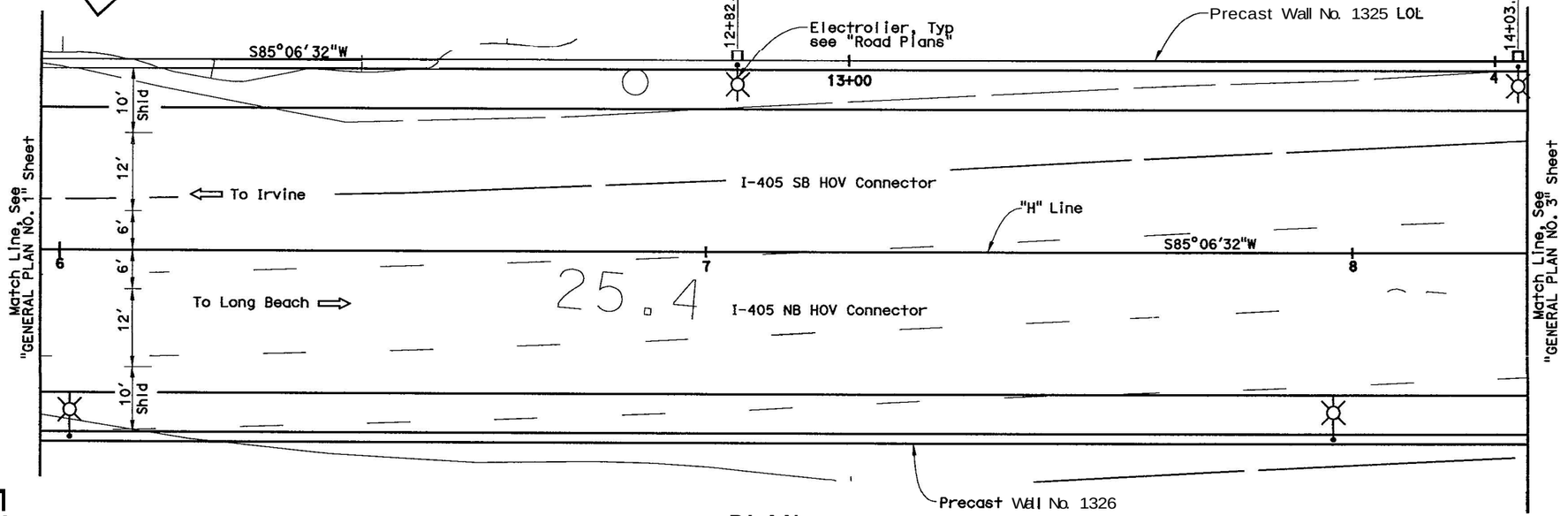


PROFILE GRADE
No Scale

MIRROR ELEVATION
1" = 10'



PLAN
1" = 10'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see "Architectural Panels" sheet.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier pedestal Detail, see "Precast Wall Details No. 6" sheet.

Figure 3B

NOTE:
The Co shall verify all controlling field dimensi ore ordering or fabricating any material

Figure 3B

Sudhakar DESIGN OVER SIGN OFF DA	DESIGN	BY M. Ruvalcaba	CHECKED M. Ruvalcaba	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-XXX	PRECAST WALL No. 1325 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY CHECKED			POST MILES 20.91	GENERAL PLAN No. 2
	QUANTITIES	BY M. Ruvalcaba	CHECKED M. Ruvalcaba	SPECIFICATIONS	PLANS AND SPECS COMPARED		CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	SHEET 3 OF 25

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE I" INCHES FOR REDUCED PLANS 0 1 2 3

FILE =>$REQUEST

REVISION DATES (PRELIMINARY STAGE ONLY) 10/27/08

TIME PLOTTED => $TIME
PLOTTED => $DATE
USERNAME => $USER

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

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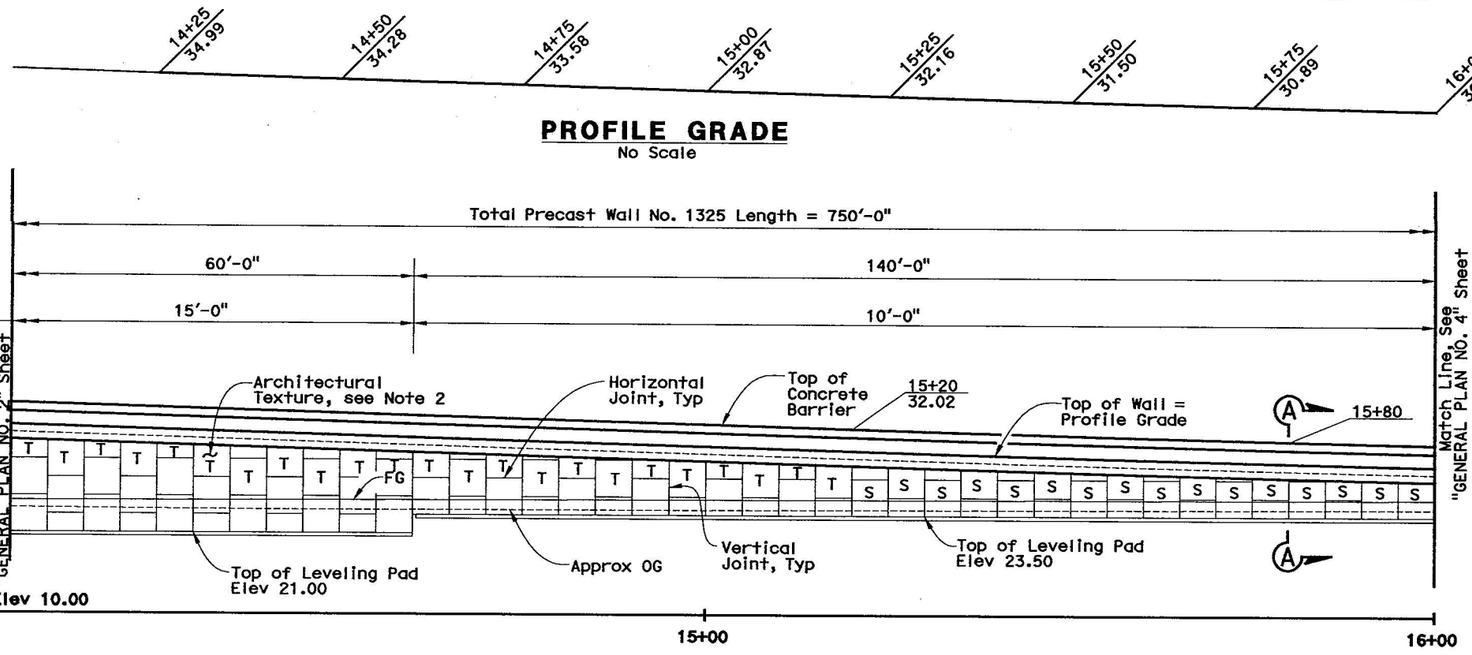
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

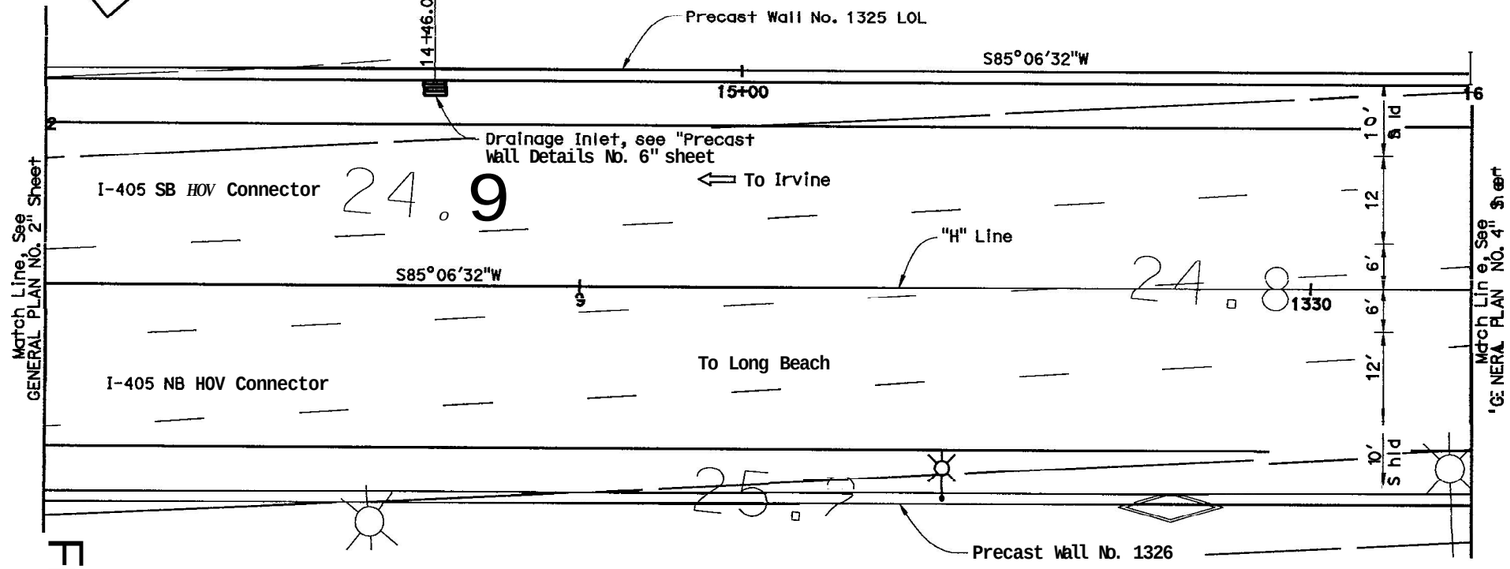
PROFILE GRADE

No Scale



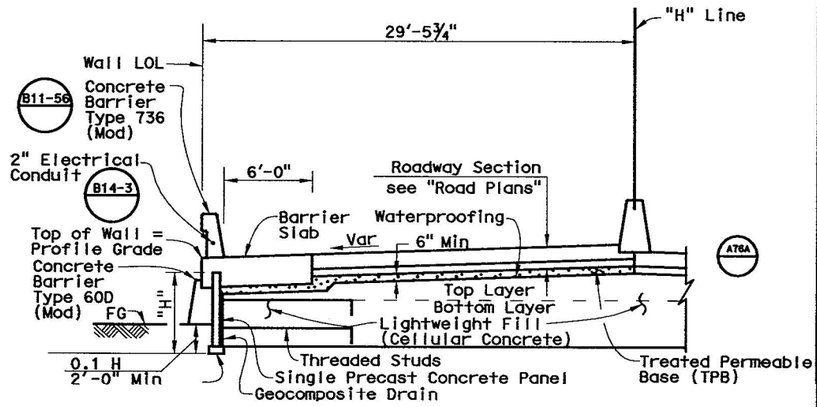
MIRROR ELEVATION

1" = 10'



PLAN

1" = 10'



TYPICAL SECTION (Sta 15+30 to 16+35)

1" = 5'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see "Arcitectural Panels" sheet.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Section A-A see "Precast Wall Details No.7" sheet.

Figure 3C

NOTE: The Con[illegible] shall verify all controlling field dimensi[illegible] ore ordering or fabricating any material

Figure 3C

Sudhakar	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER
DESIGN OVER	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY / CHECKED		
SIGN OFF OA	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY / PLANS AND SPECS COMPARED		

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/05/08)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

BRIDGE NO.	POST MILES
55-XXX	20.91

PRECAST WALL No. 1325 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)

GENERAL PLAN No. 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/21/08

SHEET 4 OF 25

FILE => $REQUEST

USERNAME => $USER

PLOTTED => $TIME

PLOTTED => $A-$B

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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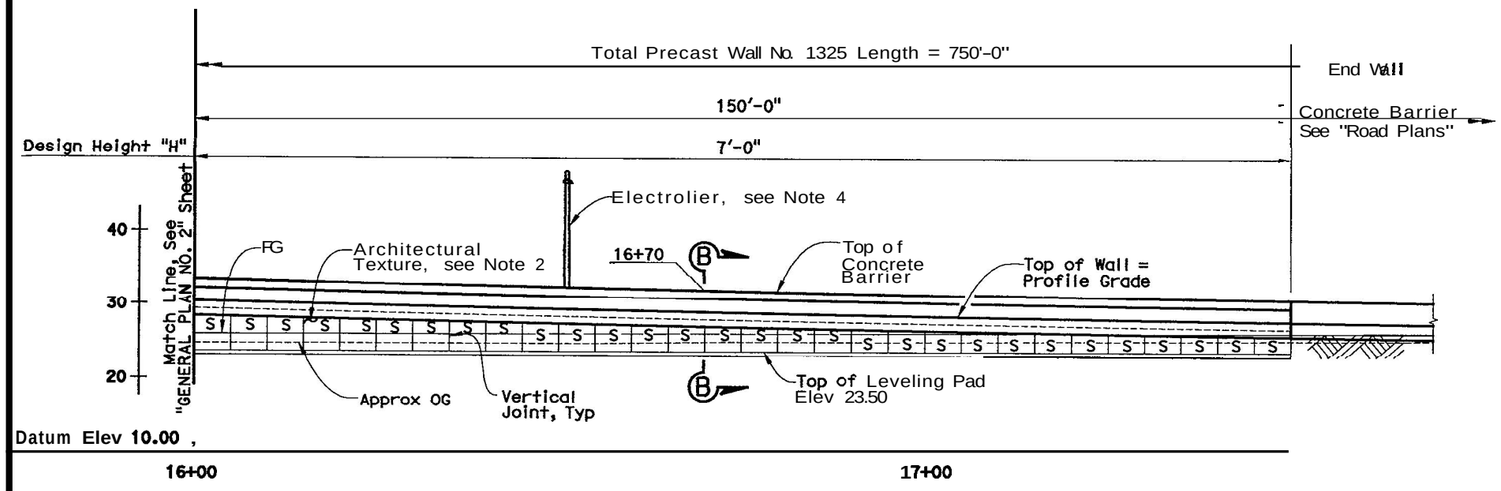
REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

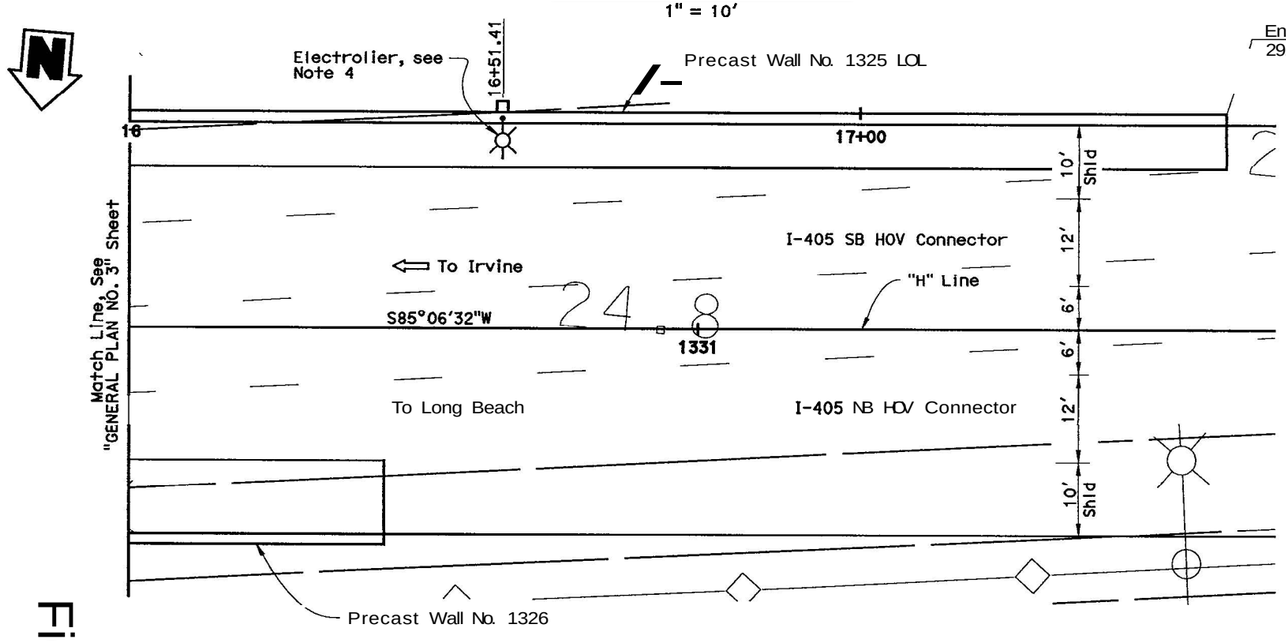
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

16+00 30.32 | 16+25 29.79 | 16+50 29.30 | 16+75 28.83 | 17+00 28.41 | 17+25 28.02 | 17+50 27.66

PROFILE GRADE
No Scale

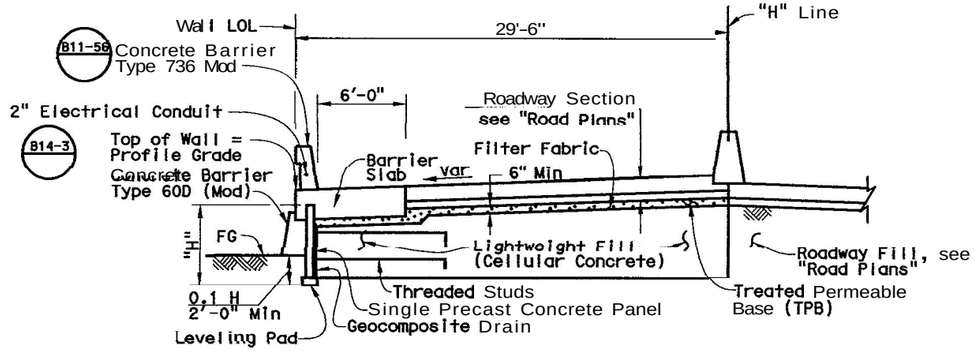


MIRROR ELEVATION
1" = 10'



PLAN
1" = 10'

End Precast Wall No. 1325 LOL 17+50.00
29.50' Lt "H" Line 1331+57.00



TYPICAL SECTION (Sta 16+35 to 17+50)
1" = 5'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details **No.1**" sheet.
2. For Architectural Details, see Architectural Panels sheet.
3. For Joint and Groove Details, see "Precast Wall Details **No.2**" sheet.
4. For **Electrolier** Pedestal Details, see "Precast Wall Details No. 6" sheet.
5. For Section B-B see "Precast Wall Details **No.7**" sheet.

NOTE:
The Con shall verify all controlling field dimensi ore ordering or fabricating any material

Figure 3D

Figure 3D

Sudhakar DESIGN OVER	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LON-BOV" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER
SIGN OFF DA	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY CHECKED		
	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY PLANS AND SPECS COMPARED		

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

FILE => $REQUEST

BRIDGE NO. 55-XXX
POST MILES 20.91

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 10/21/08

PRECAST WALL No. 1325 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)

GENERAL PLAN No. 4

SHEET 5 OF 25

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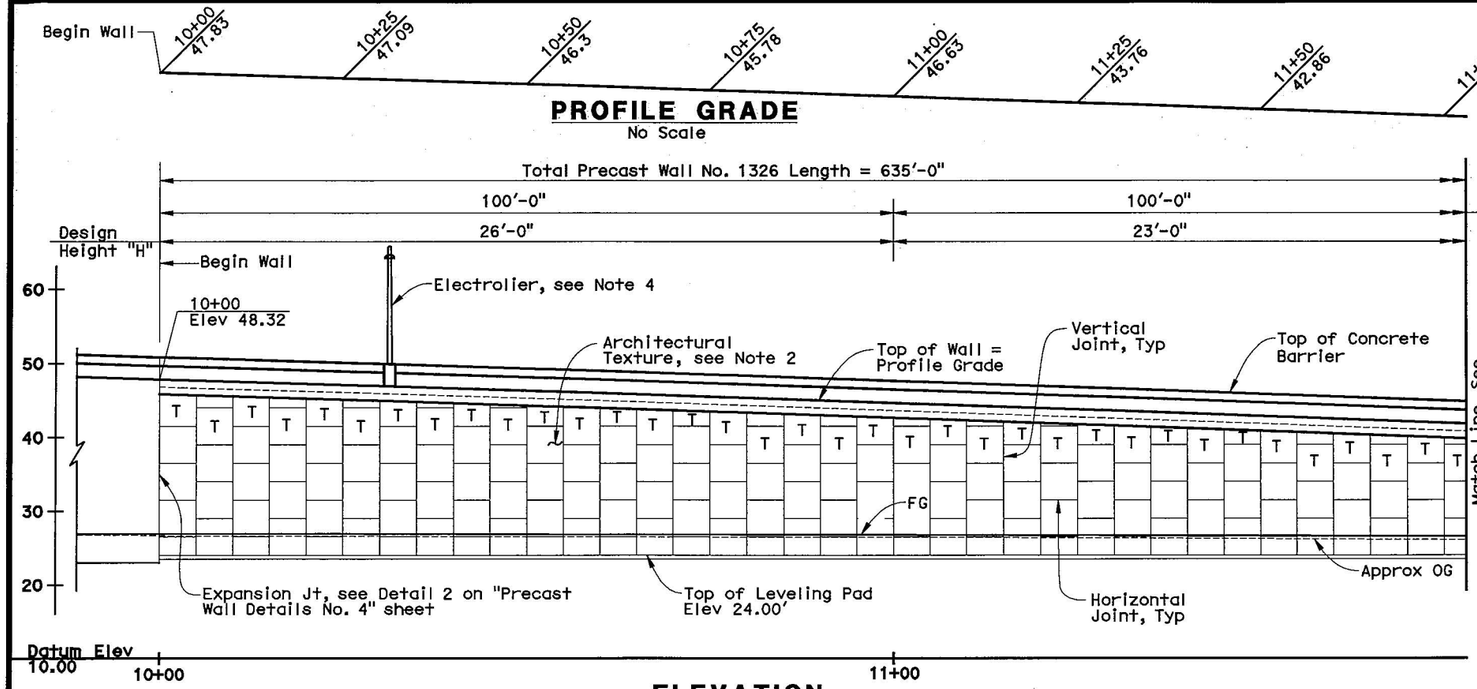
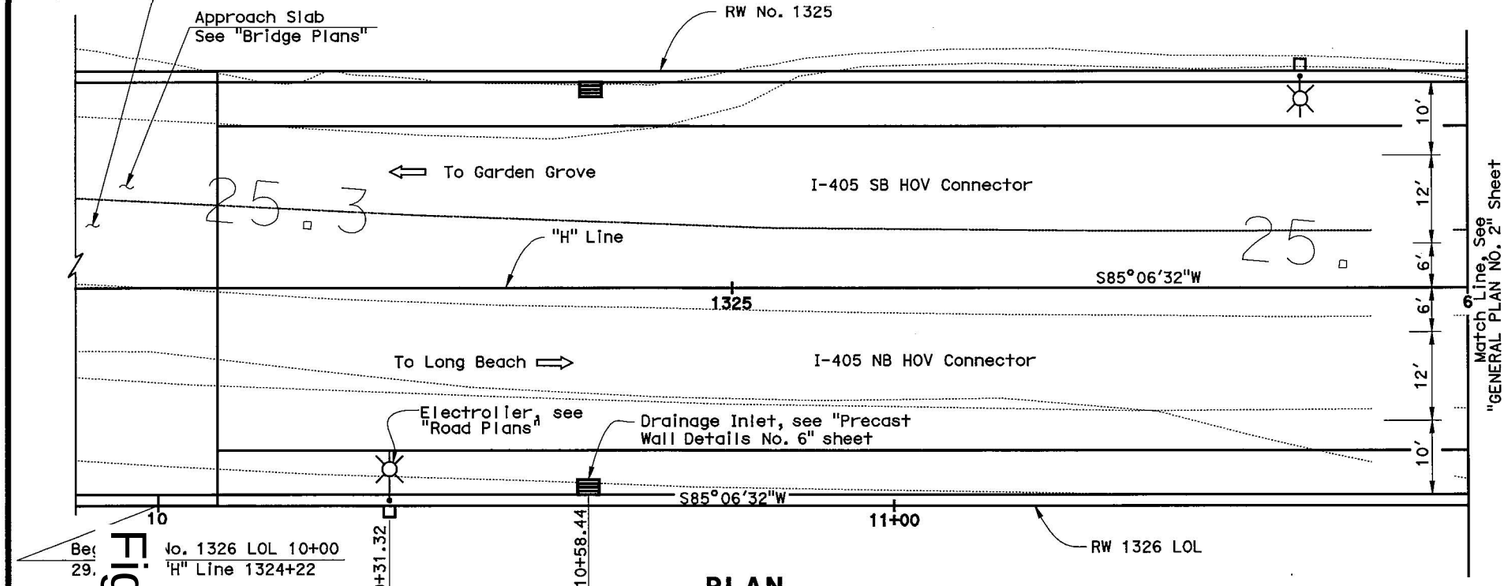
DATE PLOTTED => $DATE
USERNAME => $USER

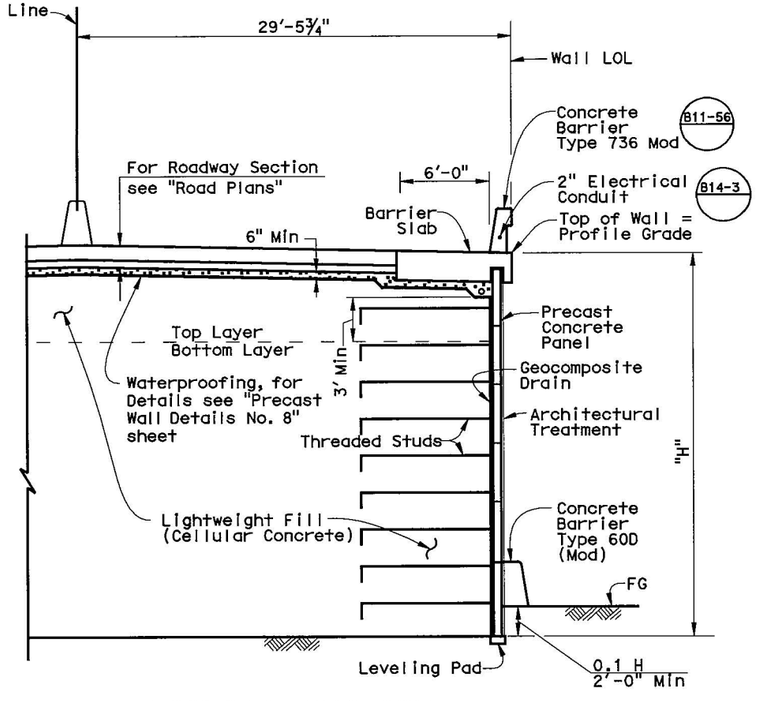


PROFILE GRADE
No Scale

ELEVATION
1" = 10'



PLAN
1" = 10'



TYPICAL SECTION
1" = 5'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER X DATE

MOHSEN MOHSENI No. C45999 Exp. 12/31/08 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Detail, see "Precast Wall Details No. 6" sheet.

NOTE:
The Cont shall verify all controlling field dimensio re ordering or fabricating any material

Sudhakar M. Ravikumba
DESIGN OVERS
SIGN OFF DAT
DESIGN GENERAL (ENGLISH) (REV. 2/25/05)

DESIGN	BY	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	
QUANTITIES	BY P. Johnson	CHECKED	LAYOUT	BY	CHECKED
	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

CU 12235
EA 071621

BRIDGE NO. 55-XXX
POST MILES 20.91

PRECAST WALL No. 1326 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
GENERAL PLAN No. 1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) 10/21/08

SHEET 2 OF 24

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USERNAME => p0038016 DATE PLOTTED => 10/24/2008 TIME PLOTTED => 9:48:27 AM

Figure 3E

Figure 3E

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER _____ X DATE _____

PLANS APPROVAL DATE _____

MOHSEN MOHSENI
No. C45999
Exp. 12/31/08
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

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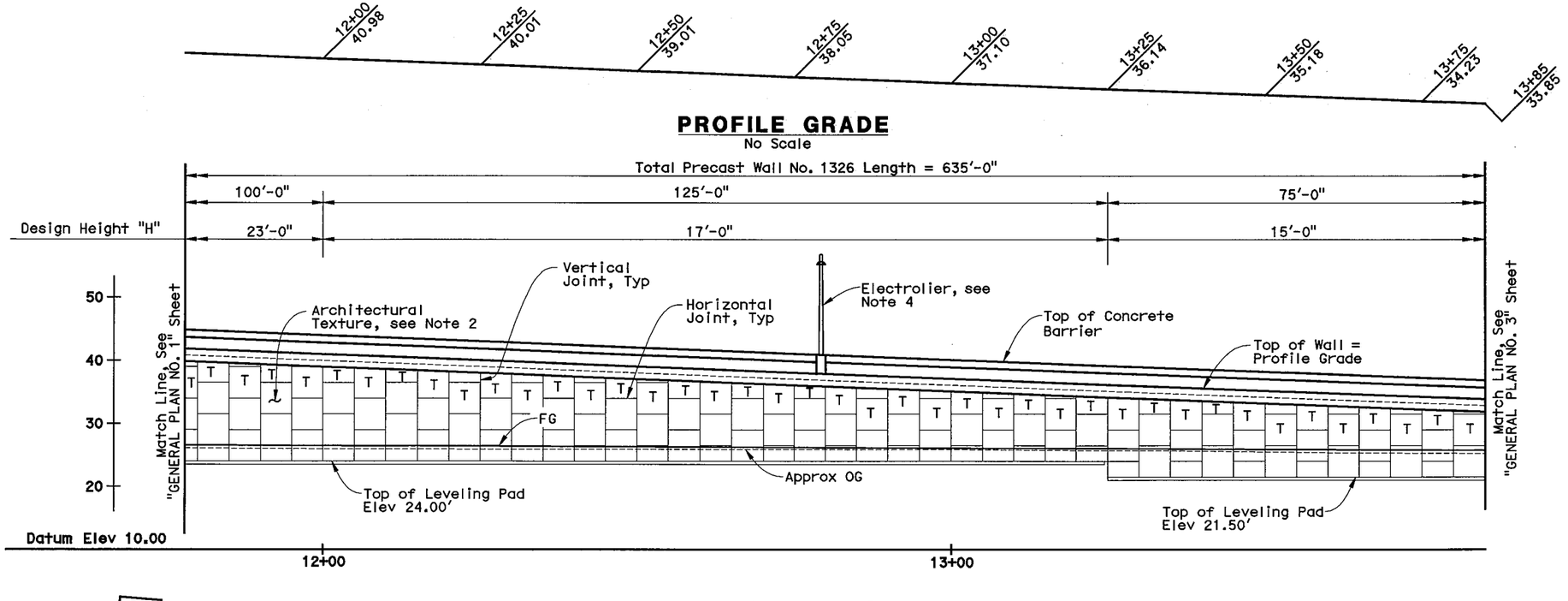
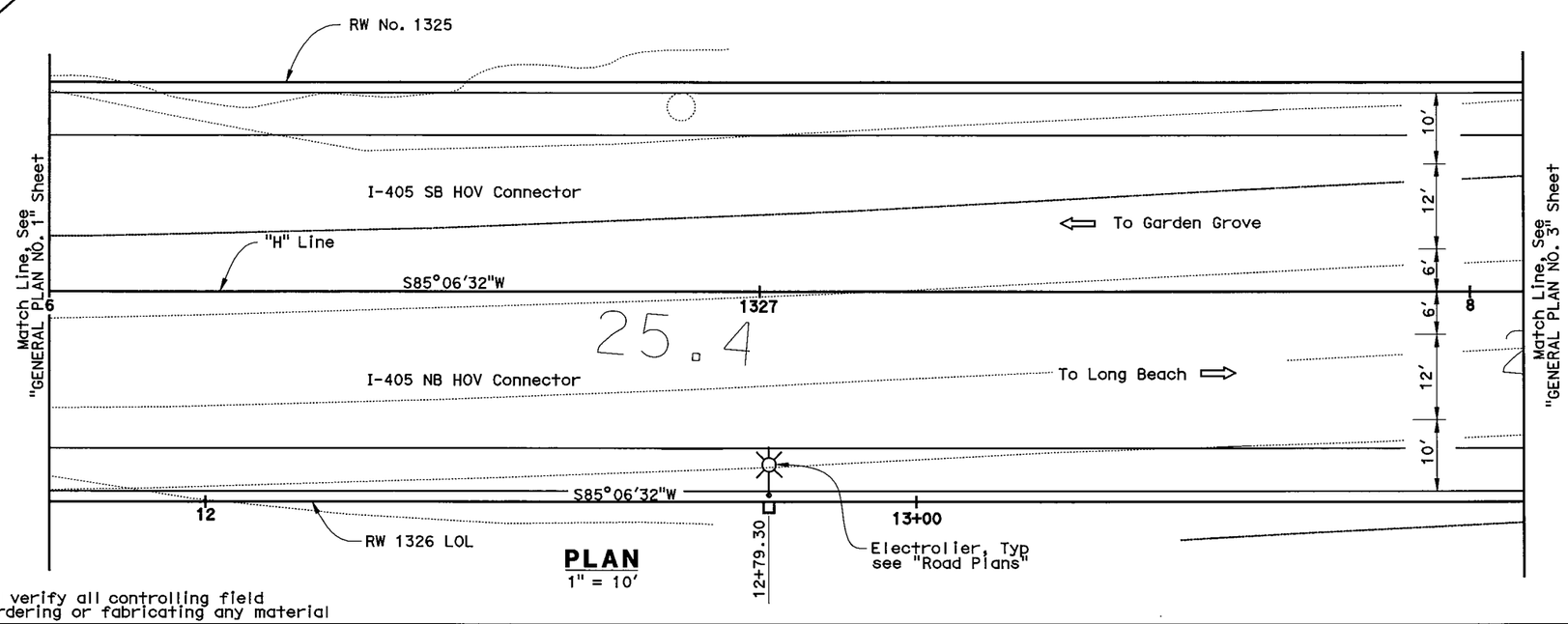
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863





NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Detail, see "Precast Wall Details No. 6" sheet.

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 3F

Sudhakar Vattl DESIGN OVERSIGHT SIGN OFF DATE	DESIGN	BY N. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER
	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY / CHECKED		
	QUANTITIES	BY N. Ruvalcaba	CHECKED	SPECIFICATIONS	BY / PLANS AND SPECS COMPARED		

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

BRIDGE NO.	PRECAST WALL No. 1326 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
55-XXX	GENERAL PLAN No. 2
POST MILES 20.91	

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/08

SHEET 3 OF 24

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

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PARSONS — 2201 DUPONT DRIVE, SUITE 200, IRVINE, CA 92612

OCTA — 550 SOUTH MAIN STREET, ORANGE, CA 92863

PROFILE GRADE

No Scale

13+85 33.85 | 14+00 33.29 | 14+25 33.40 | 14+50 31.55 | 14+75 30.75 | 15+00 30.00 | 15+25 29.28 | 15+50 28.62 | 15+75 28.00 | 16+00 27.43 | 16+25 26.91 | 16+35 26.71

ELEVATION

1" = 10'

Total Precast Wall No. 1326 Length = 635'-0"
Wall Length Measured Along Wall LOL

75'-0" | 100'-0" | 135'-0"

Design Height "H": 15'-0" | 12'-0" | 9'-0"

50 / 40 / 30 / 20

Match Line, See "GENERAL PLAN NO. 2" Sheet

Architectural Texture, see Note 2

Top of Concrete Barrier

Vertical Joint, Typ

14+90 30.00

15+15 (A)

Electrolier, see Note 4

Top of Wall = Profile Grade

16+05 (B)

End Wall

Concrete Barrier See "Road Plans"

Approx OG

Top of Leveling Pad Elev 21.50'

Horizontal Joint, Typ

Groove, Typ

Datum Elev 10.00

14+00 | 15+00 | 16+00

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Detail, see "Precast Wall Details No. 6" sheet.
5. For Section A-A and Section B-B see "Precast Wall Details No.7" sheet.

PLAN

1" = 10'

RW No. 1325 LOL

24.9

"H" Line

9

⇐ To Garden Grove

I-405 SB HOV Connector

S85°06'32"W

21.8

1330

24

25.1

To Long Beach ⇒

I-405 NB HOV Connector

10' / 12' / 6' / 6' / 12' / 10'

S85°06'32"W

RW No.1326 LOL

25.2

15+00

15+27.41

Electrolier, see "Road Plans"

16

End RW No. 1326 LOL 16+35
29.55' Rt "H" Line 1330+57

Match Line, See "GENERAL PLAN NO. 2" Sheet

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 3G

Figure 3G

Sudhakar Vatti DESIGN OVERSIGHT	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER
SIGN OFF DATE	DETAILS	BY N. Morcillo	CHECKED	LAYOUT	BY CHECKED		
DESIGN GENERAL PLAN SHEET (V. 2/26/06)	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY PLANS AND SPECS COMPARED		

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

CU 122392235
EA 07162071621

BRIDGE NO. 55-XXX
POST-MILES 20.91

PRECAST WALL No. 1326 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
GENERAL PLAN No. 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/08

SHEET 4 OF 24

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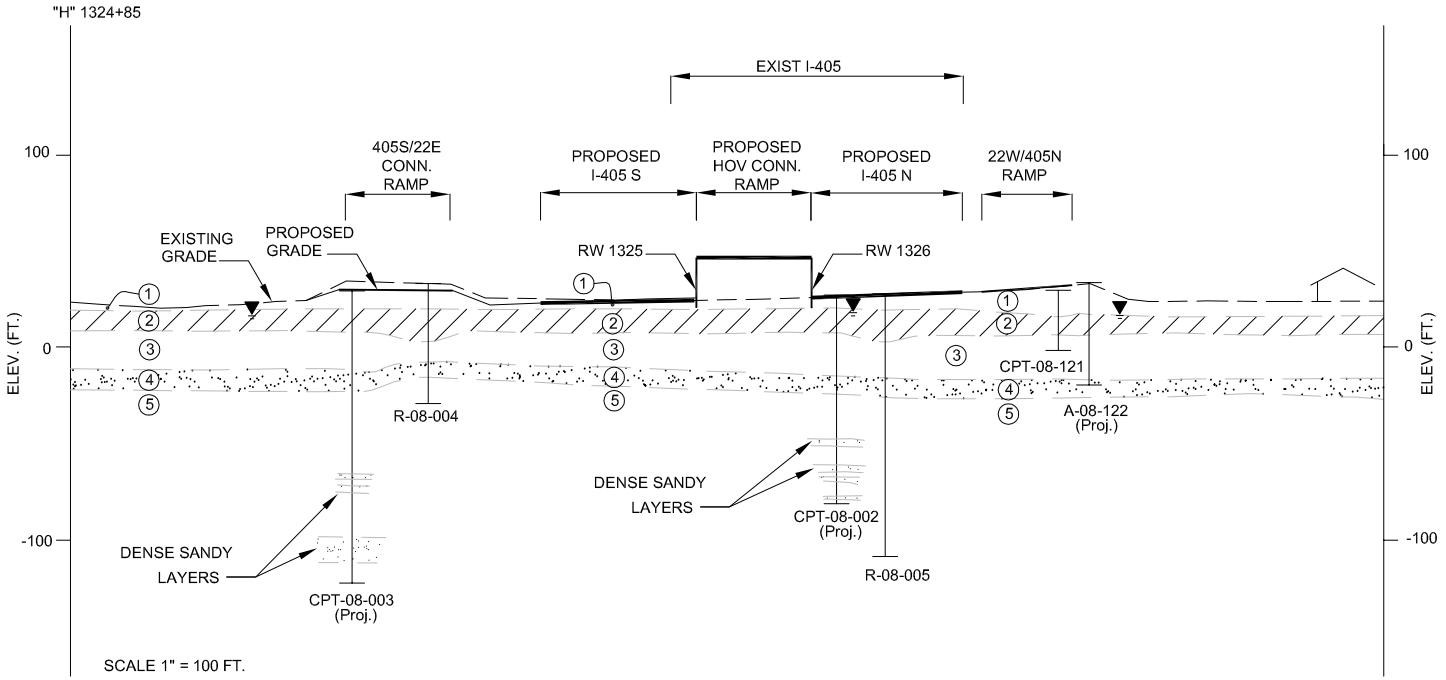


SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER 4

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER I-436

CROSS SECTION - "H" 1324+85

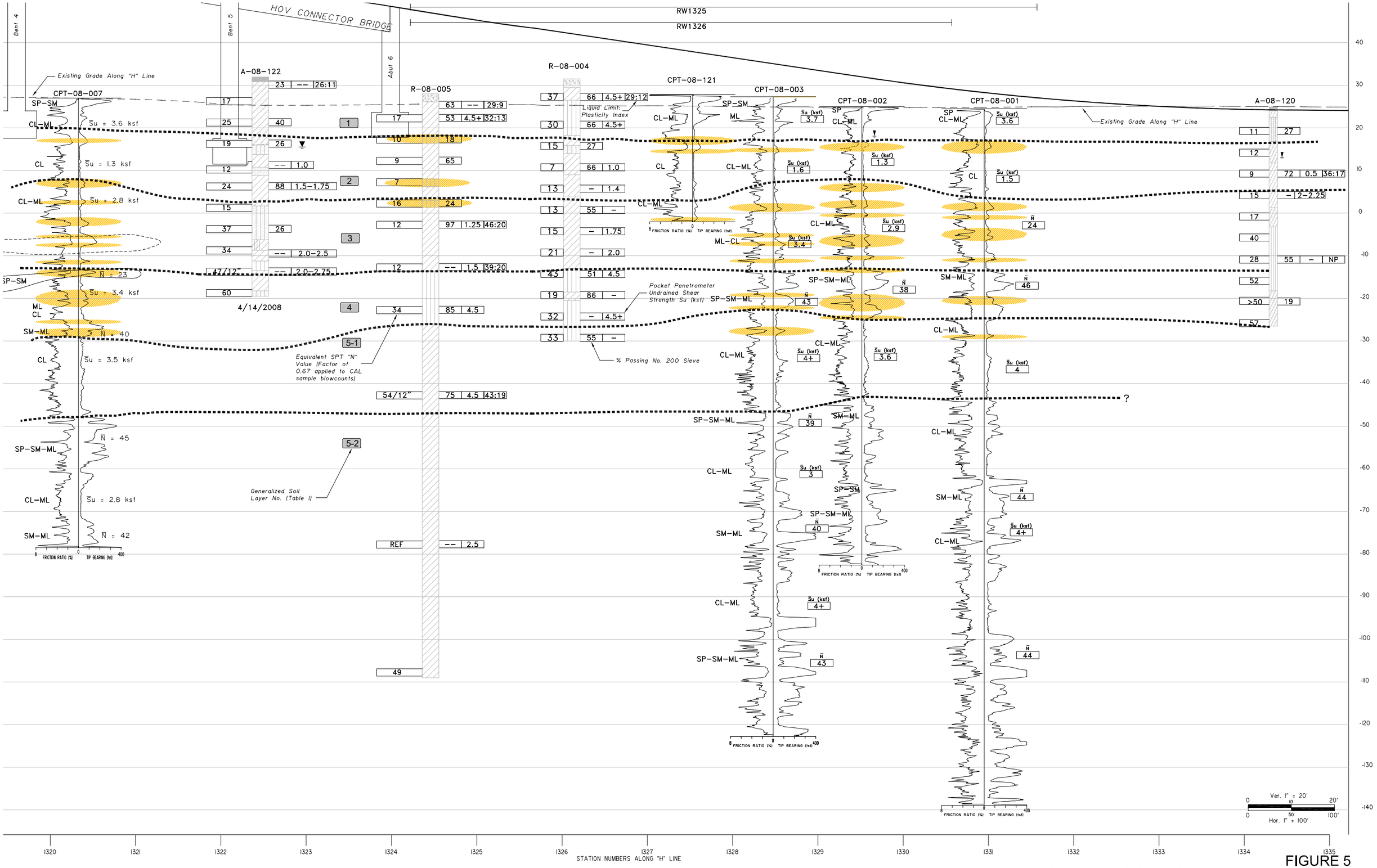


FIGURE 5
Geotechnical Cross Section RW1325 & RW1326

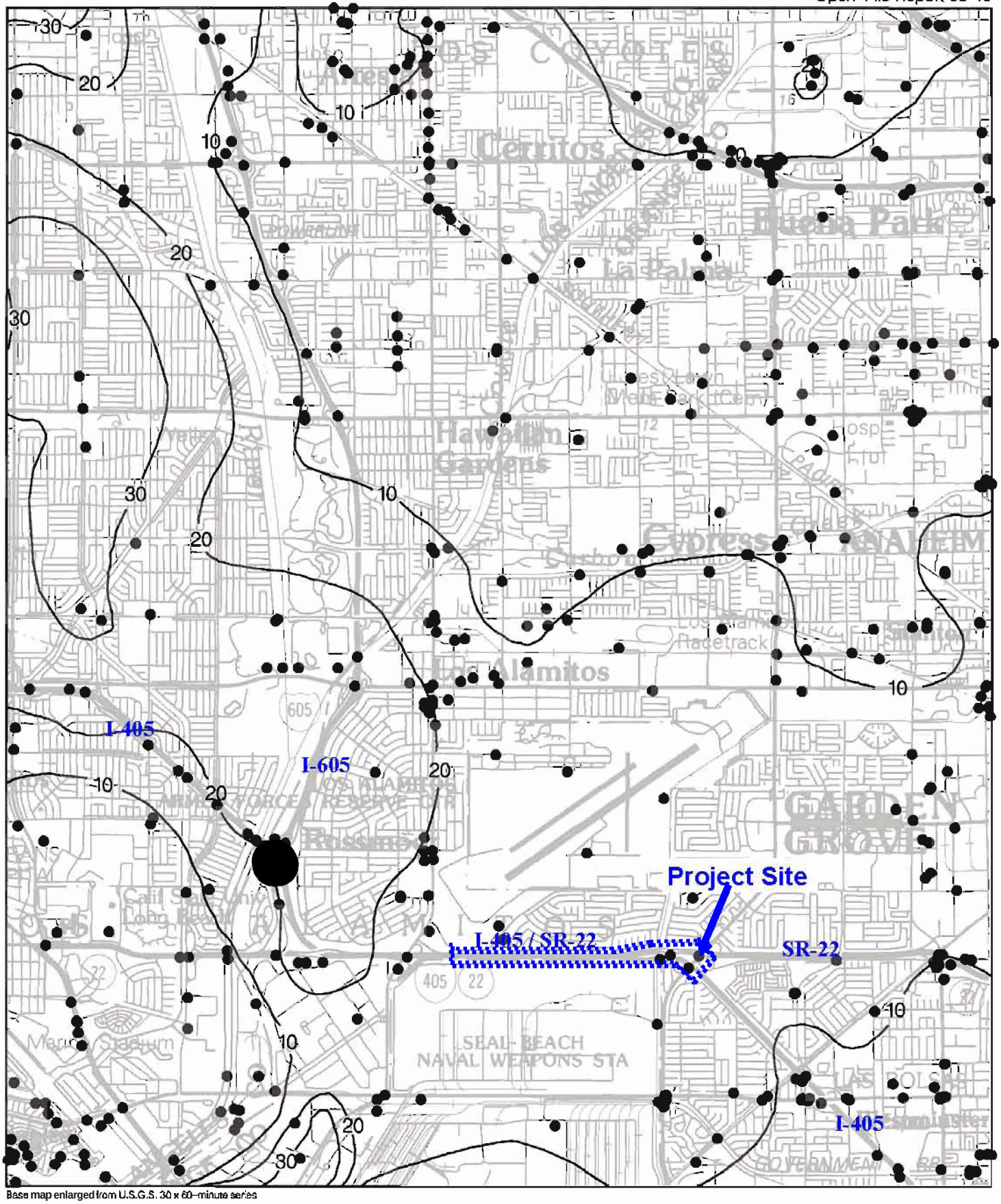


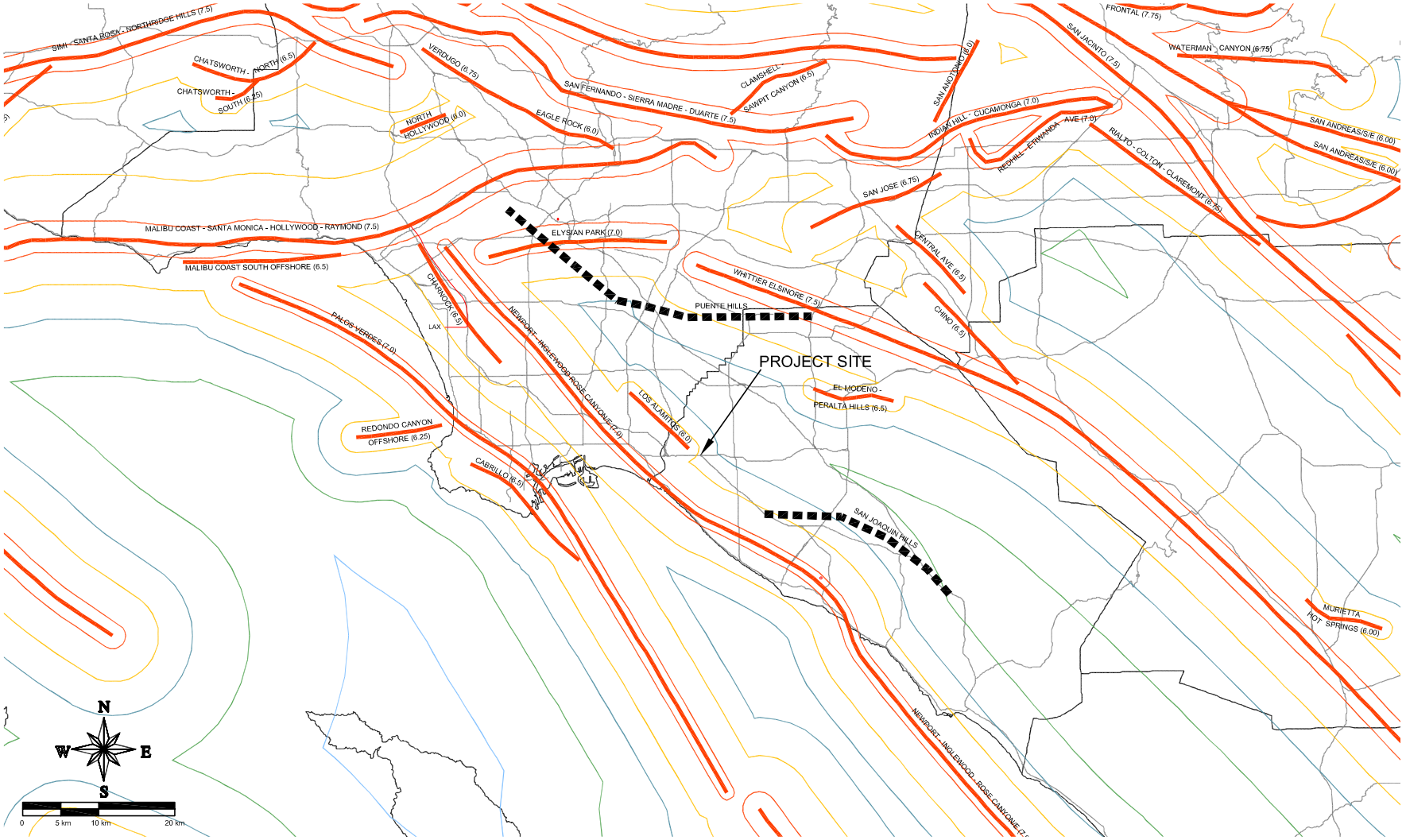
Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

● Borehole Site

30 Depth to ground water in feet

Figure 6: Historically Highest Groundwater Map

ONE MILE



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills fault in Orange County is currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

GROUP DELTA

GDC PROJECT NO. I-436

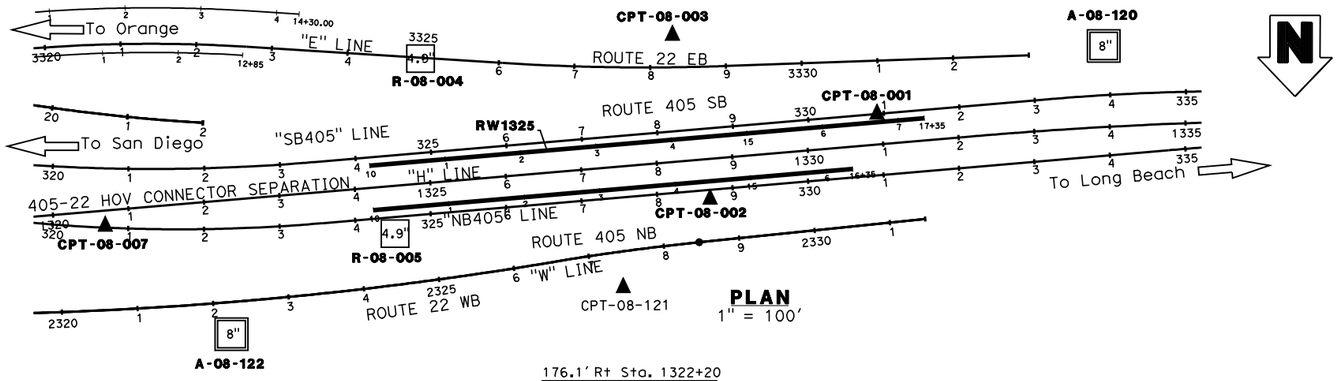
PRECAST WALLS NOS. RW1325 AND RW1326
SR 22 Improvements - Phase 2

Caltrans Fault and PBA Map

Figure 7

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:
1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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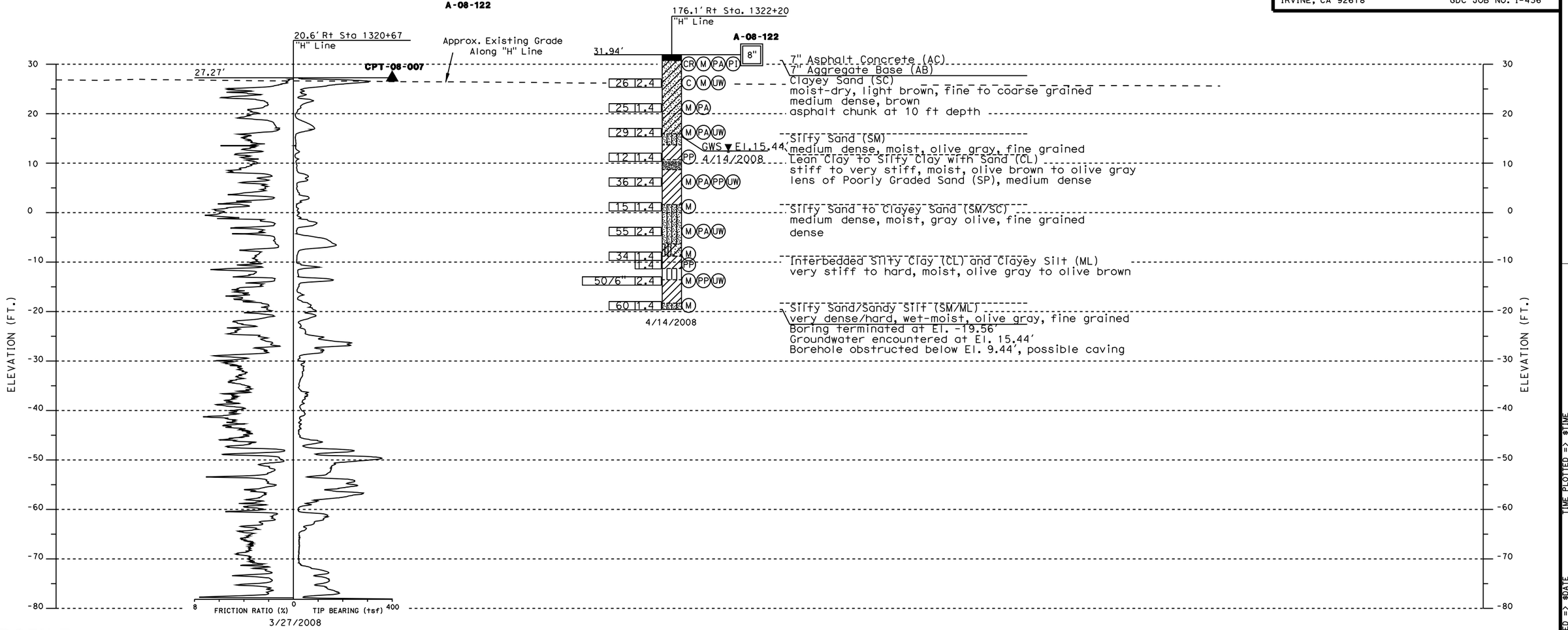
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

1320+00 1321+00 1322+00 1323+00 1324+00 See LOTB 2
STATION NO. ALONG "H" LINE

PLATE 1

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0075 POST MILES 20.91-21.03	PRECAST WALL NO. RW1325 LOG OF TEST BORINGS 1 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES: 10/23/08, 02/27/09, 05/18/09; SHEET 21 OF 26

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing — CERTIFIED GEOTECHNICAL ENGINEER — 05/18/09

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET, ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE, SUITE 200, IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 — GDC JOB NO. I-436

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

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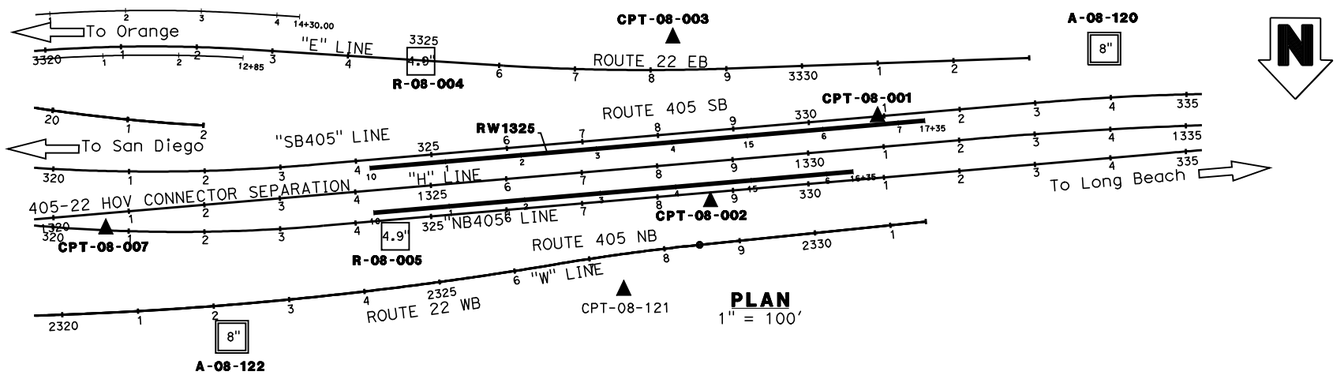
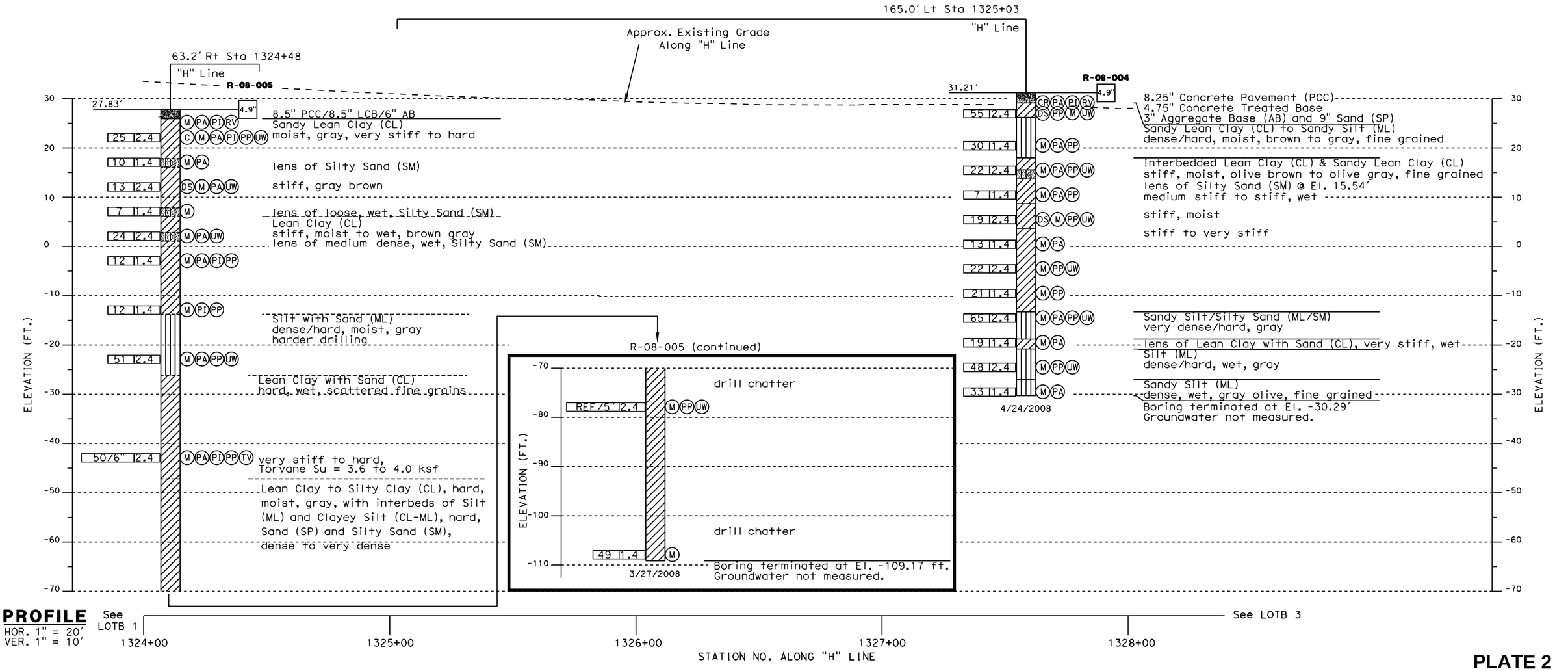
2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.



PLAN 1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1

1324+00 1325+00 1326+00 1327+00 1328+00

See LOTB 3

STATION NO. ALONG "H" LINE

PLATE 2

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0075 POST MILES 20.91-21.03	PRECAST WALL NO. RW1325 LOG OF TEST BORINGS 2 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU 12235, EA 071621 — DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 10/23/08 02/27/09 05/18/09 — SHEET 22 OF 26

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing — CERTIFIED GEOTECHNICAL ENGINEER — 05/18/09

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

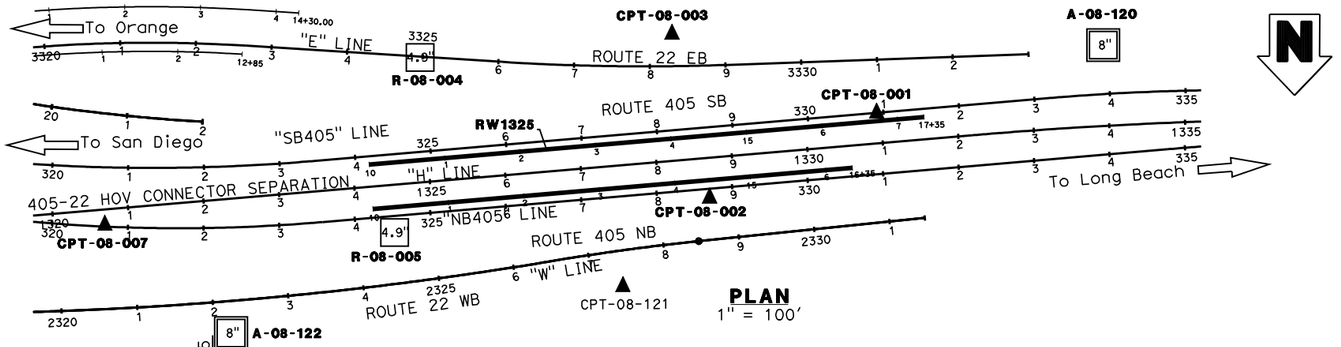
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



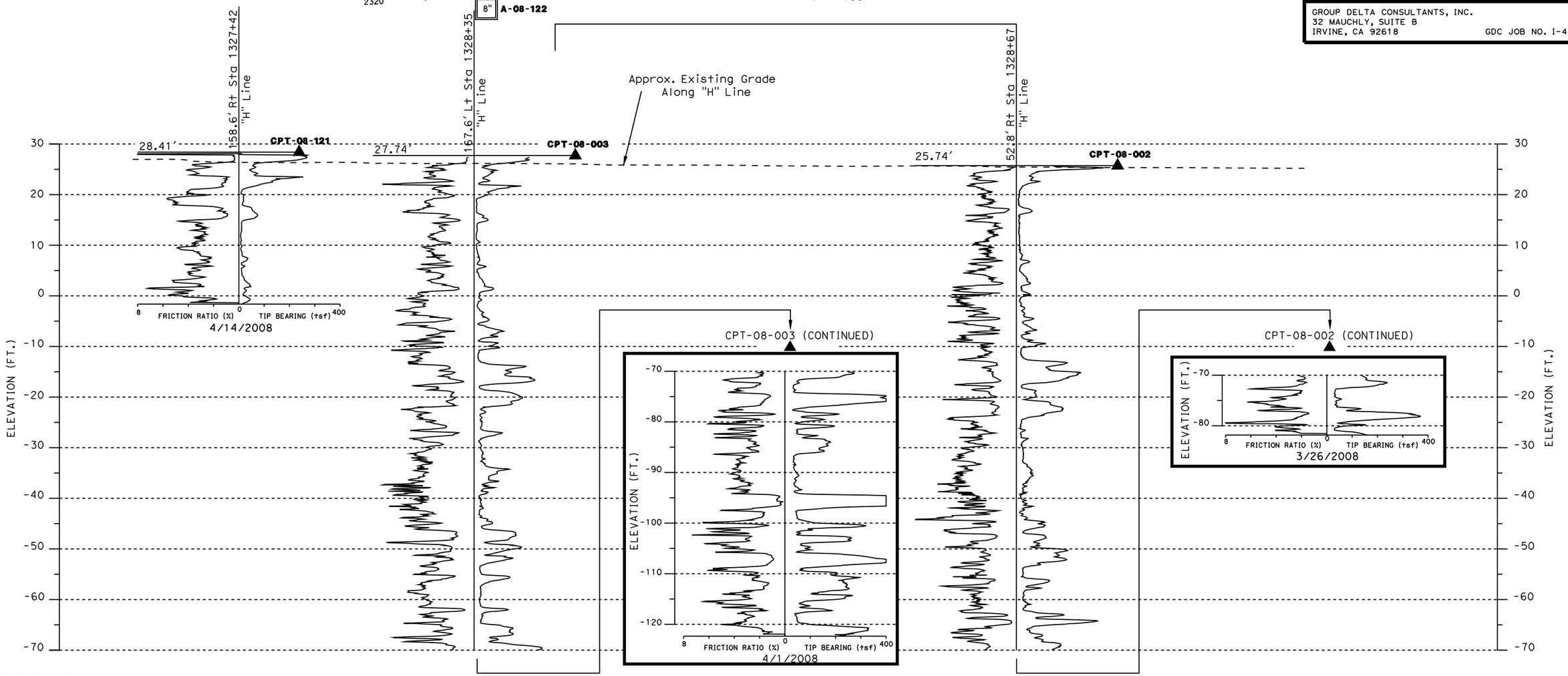


PLATE 3

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0075 POST MILES 20.91-21.03

PRECAST WALL NO. RW1325
LOG OF TEST BORINGS 3 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 | 02/27/09 | 05/18/09

SHEET 23 OF 26

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:
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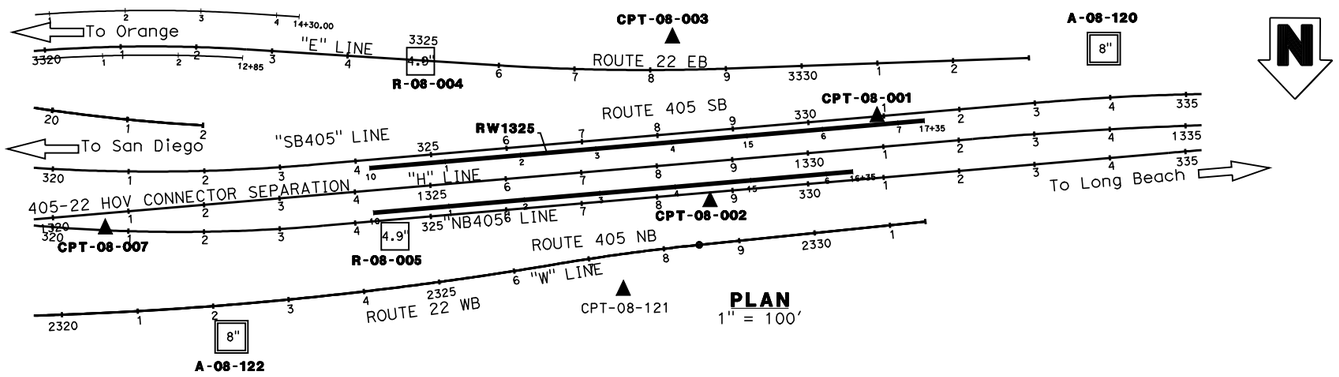
Notes:
1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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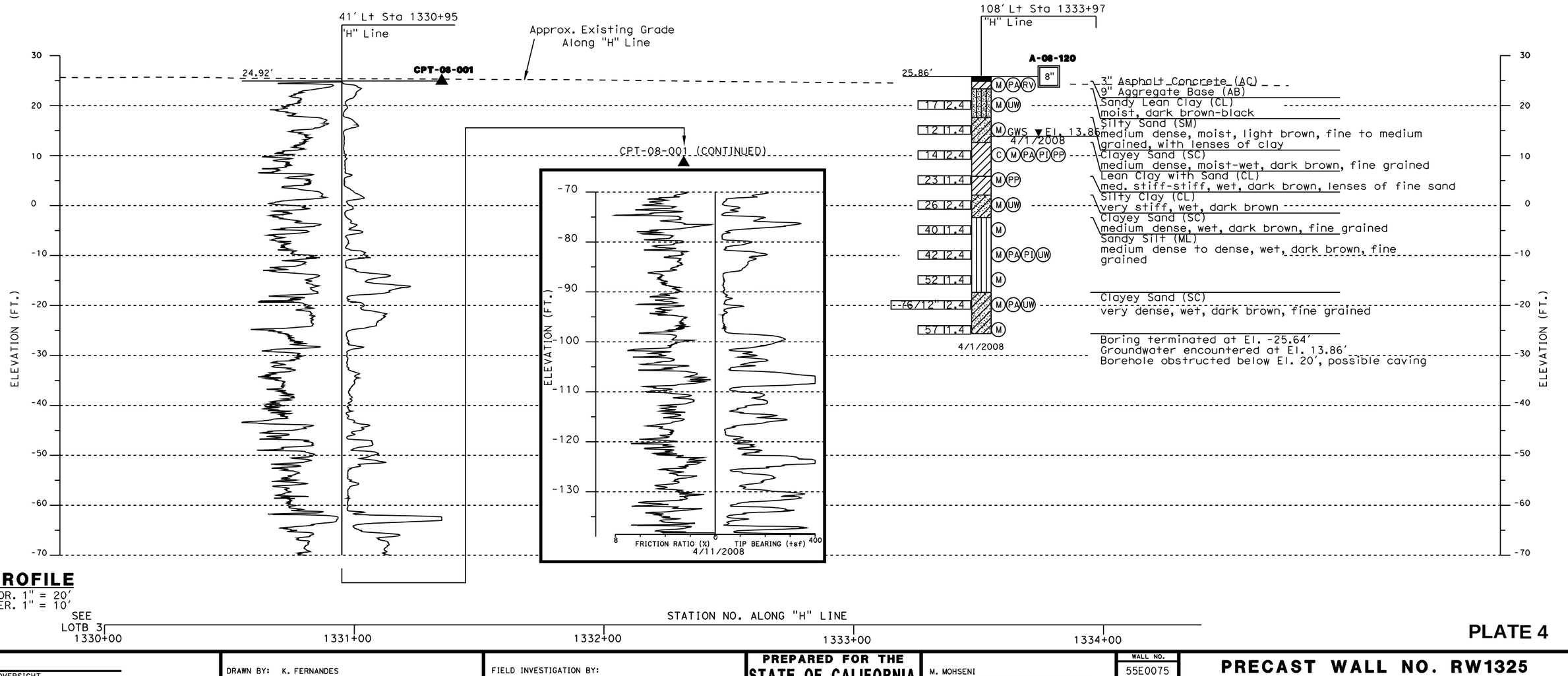
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 4

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0075 POST MILES 20.91-21.03

PRECAST WALL NO. RW1325
LOG OF TEST BORINGS 4 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
CU 12235
EA 071621
FILE => $REQUEST
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES: 10/23/08 02/20/09 05/18/09
SHEET 24 OF 26

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

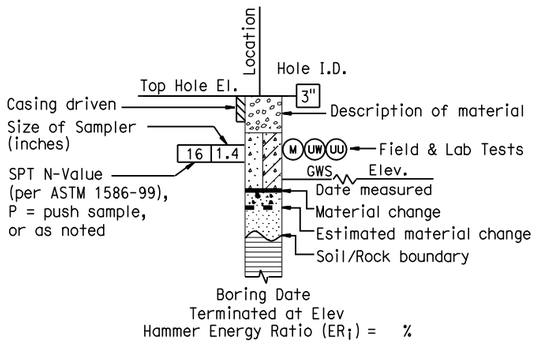
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes :

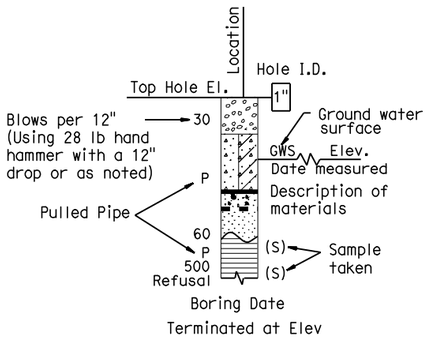
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers in rotary borings. A 140 lbs. automatic hammer with a drop height of 30" was used to advance the drive samplers in hollow-stem auger borings.

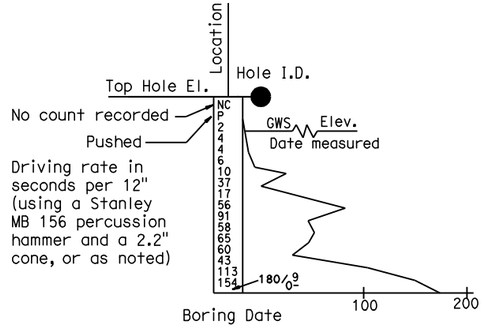
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



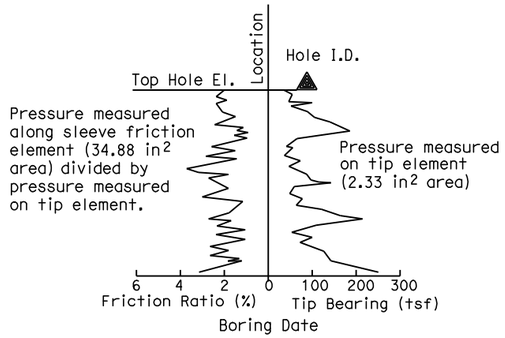
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 5

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55E0075 POST MILES 20.91-21.03	SOIL LEGEND LOG OF TEST BORINGS 5 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES								SHEET	OF
10/23/08	02/27/09	05/18/09						25	26

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 6

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55E0075
POST MILES 20.91-21.03

SOIL LEGEND
LOG OF TEST BORINGS 6 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 26 OF 26

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USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
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Curt Scheyhing — CERTIFIED GEOTECHNICAL ENGINEER — 05/18/09

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PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

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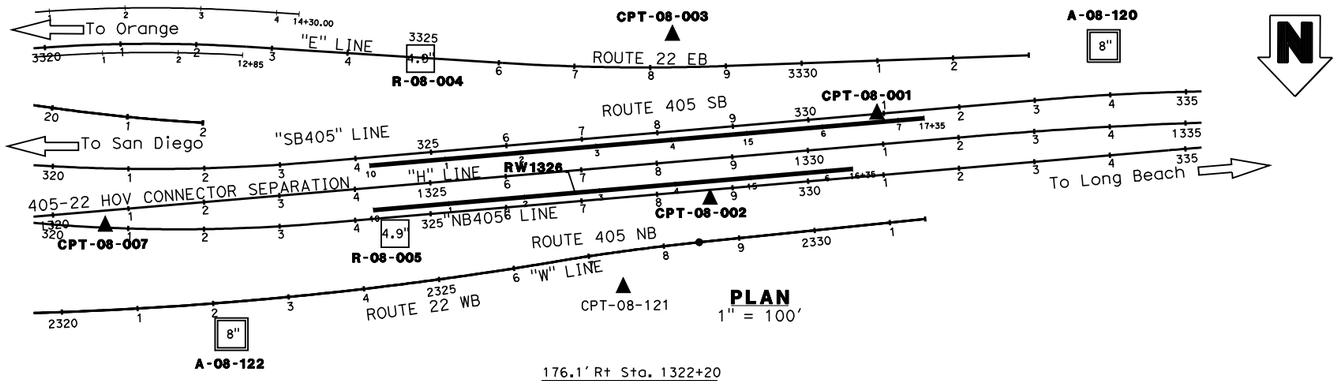

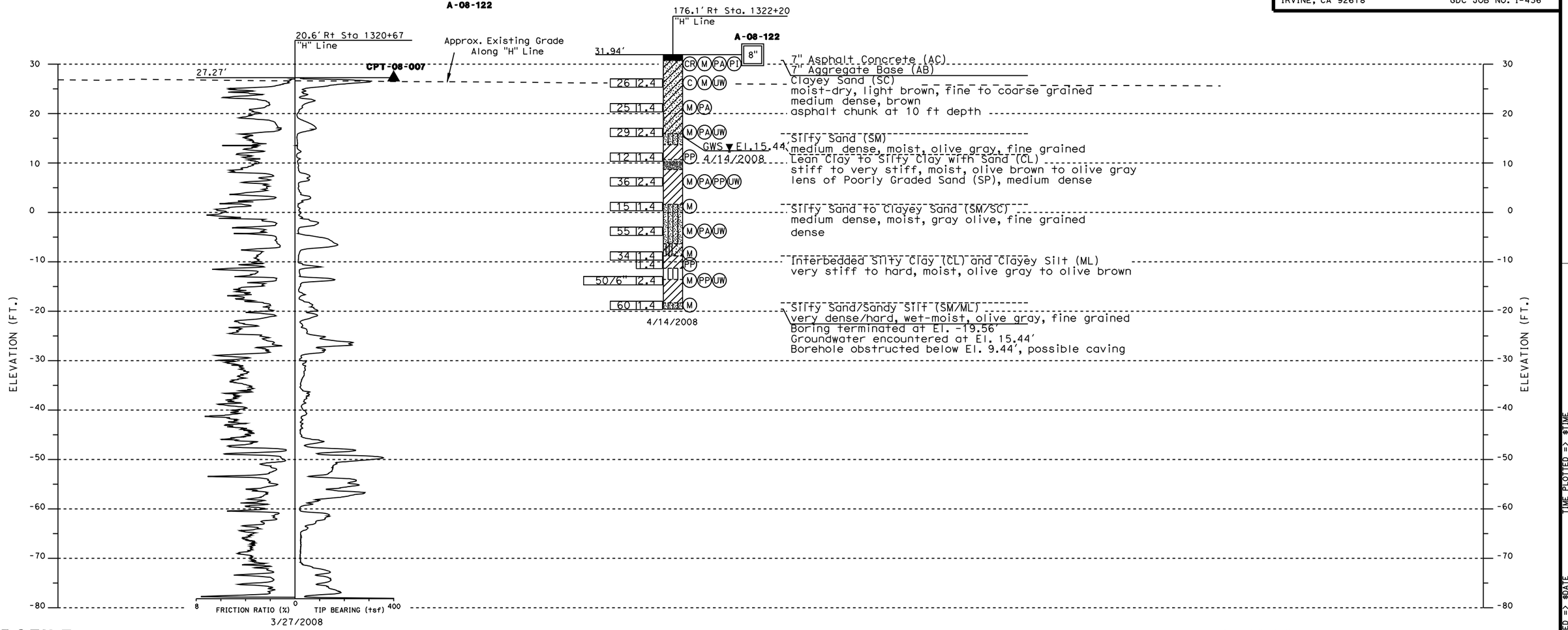

PROFILE
HOR. 1" = 20'
VER. 1" = 10'

1320+00 1321+00 1322+00 1323+00 1324+00 See LOTB 2

STATION NO. ALONG "H" LINE

PLATE 7

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0076 POST MILES 20.91-21.03	PRECAST WALL NO. RW1326 LOG OF TEST BORINGS 1 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU 12235 EA 071621 — DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES 10/23/08 02/27/09 05/18/09 — SHEET 18 OF 23

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
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Curt Scheyhing — CERTIFIED GEOTECHNICAL ENGINEER — 05/18/09

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
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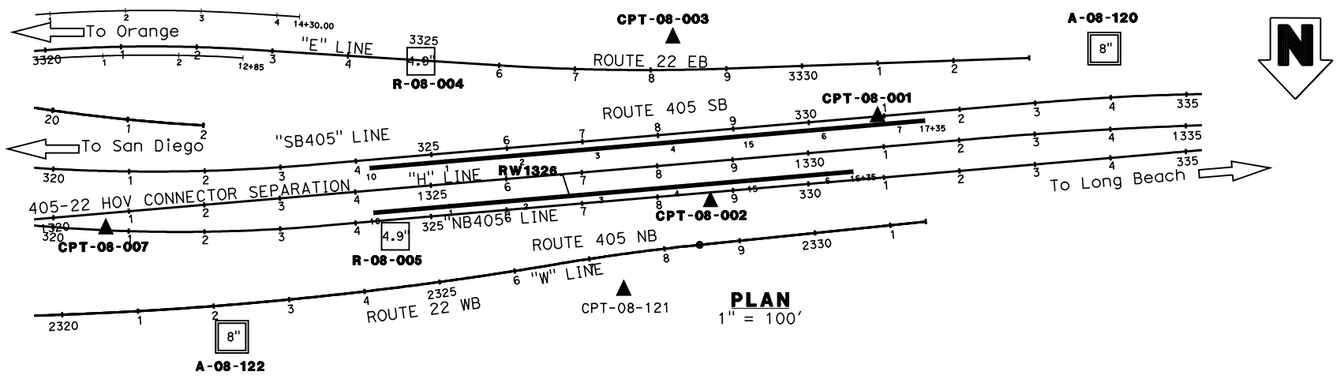

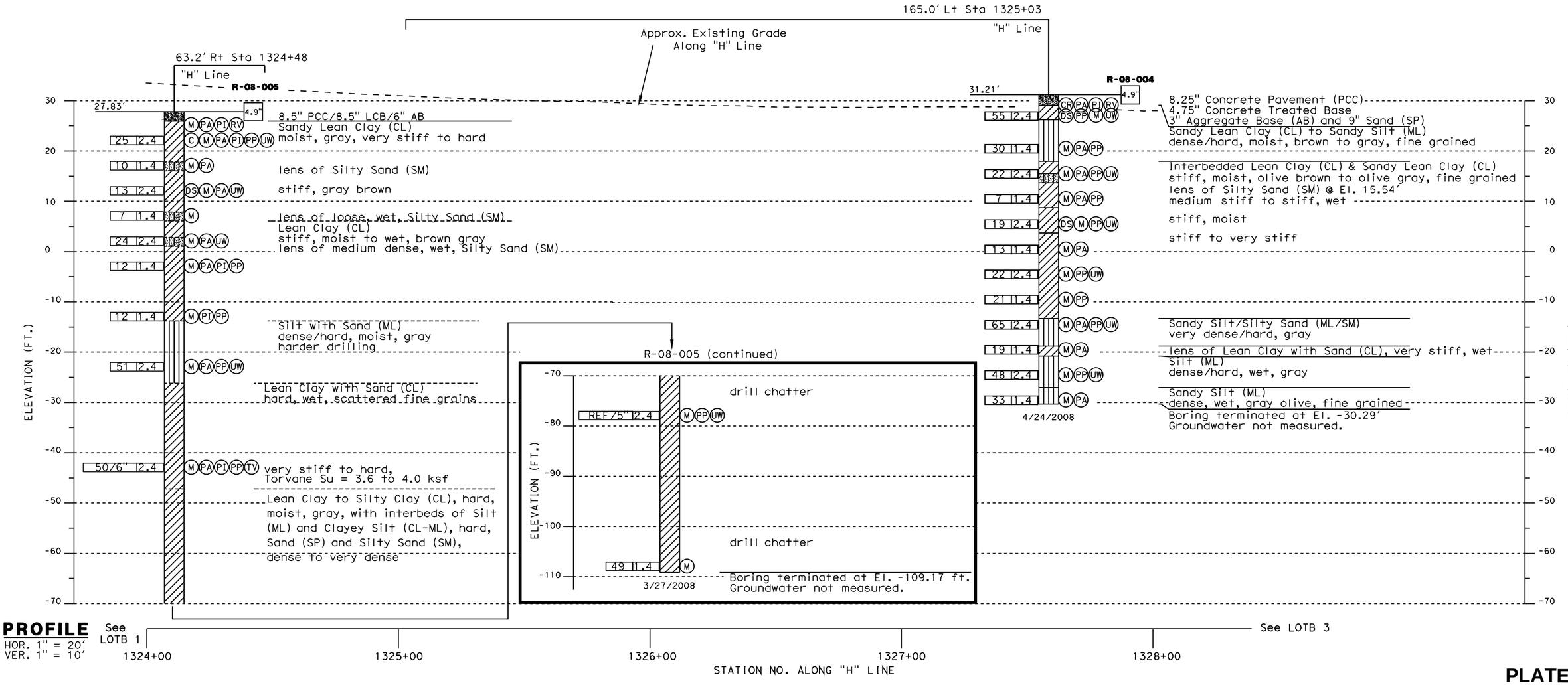

PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1

1324+00 1325+00 1326+00 1327+00 1328+00

See LOTB 3

STATION NO. ALONG "H" LINE

PLATE 8

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0076 POST MILES 20.91-21.03	PRECAST WALL NO. RW1326 LOG OF TEST BORINGS 2 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES: 10/23/08, 02/27/09, 05/18/09; SHEET 19 OF 23

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing — CERTIFIED GEOTECHNICAL ENGINEER — 05/18/09

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

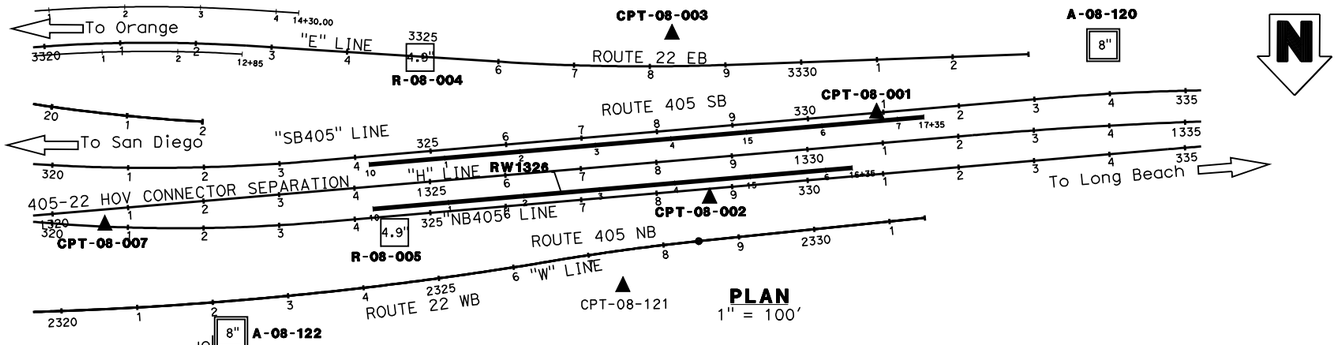
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



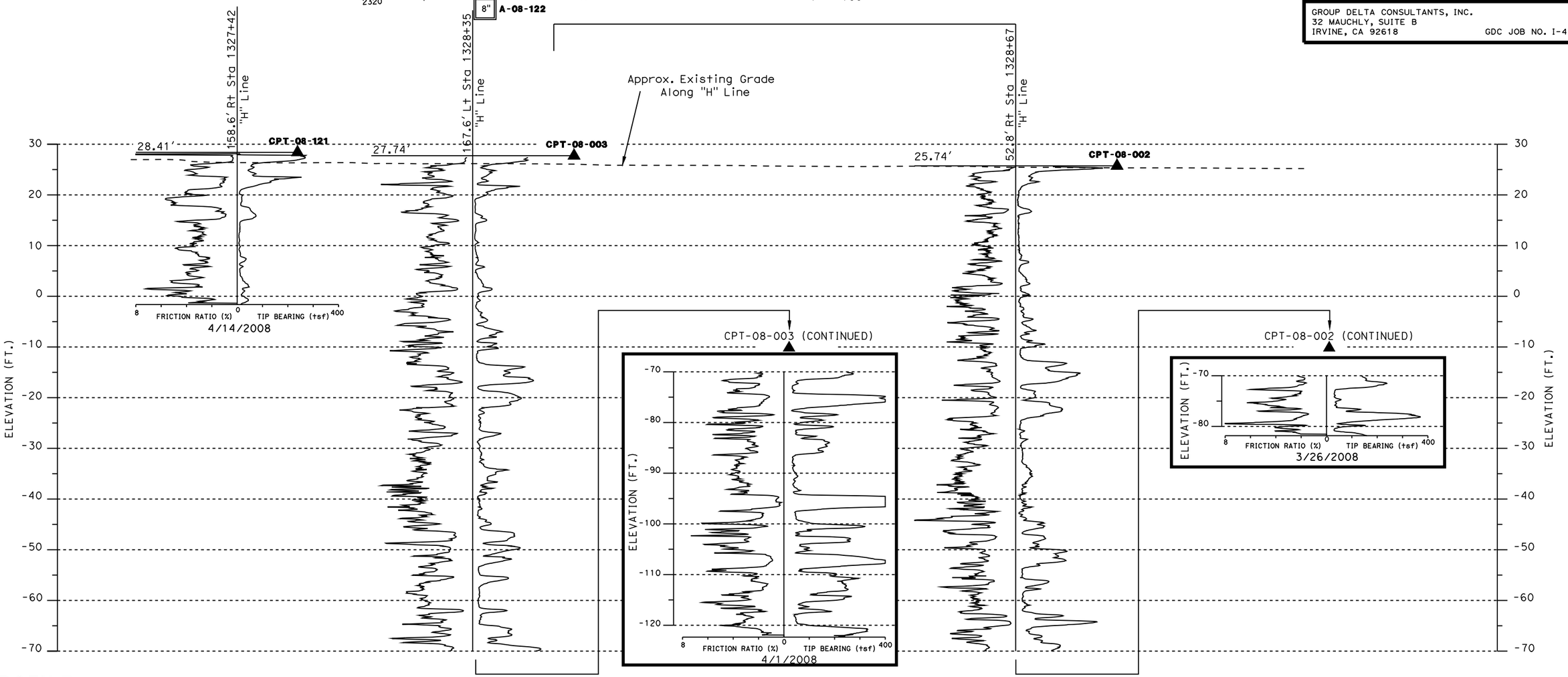


PLATE 9

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0076 POST MILES 20.91-21.03

PRECAST WALL NO. RW1326
LOG OF TEST BORINGS 3 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 | 02/27/09 | 05/18/09

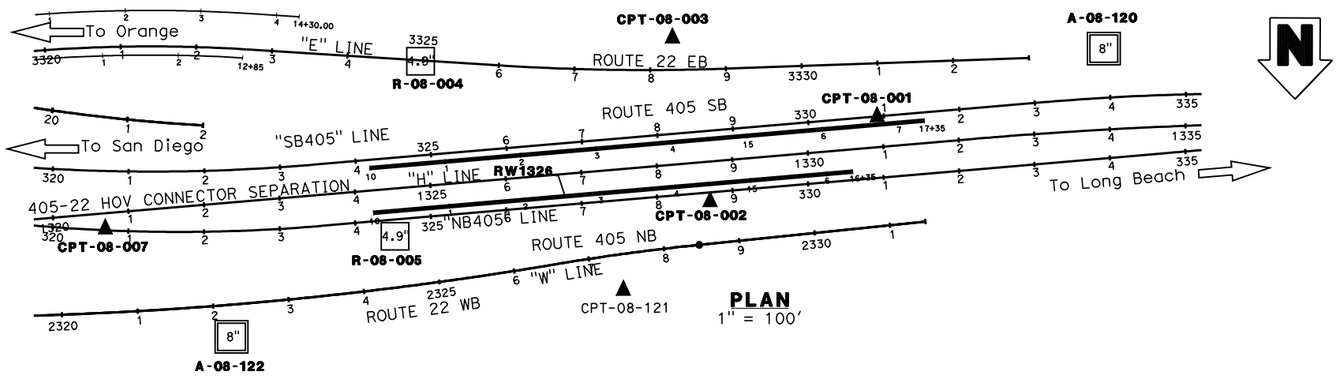
SHEET 20 OF 23

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:
1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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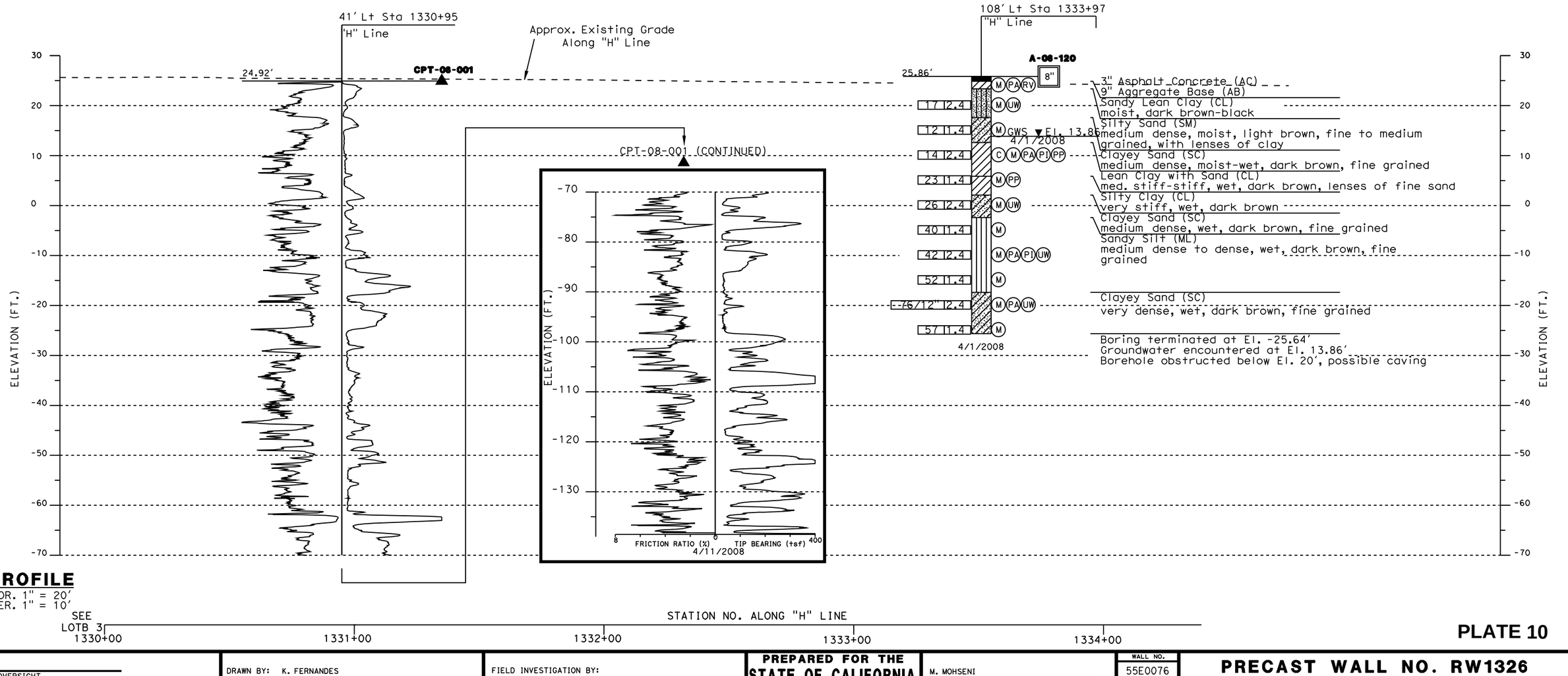
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 10

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0076 POST MILES 20.91-21.03

PRECAST WALL NO. RW1326
LOG OF TEST BORINGS 4 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621
FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES								SHEET	OF
10/23/08	02/20/09	05/18/09						21	23

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REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

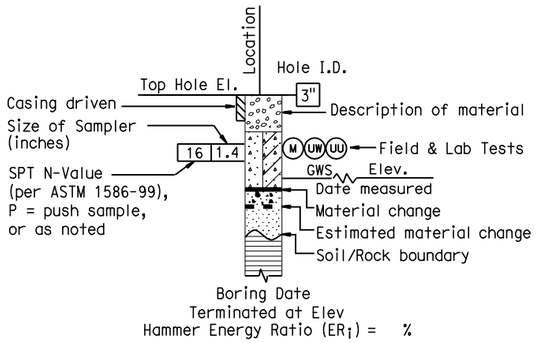
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes :

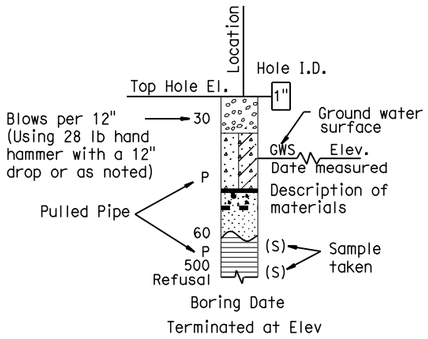
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers in rotary borings. A 140 lbs. automatic hammer with a drop height of 30" was used to advance the drive samplers in hollow-stem auger borings.

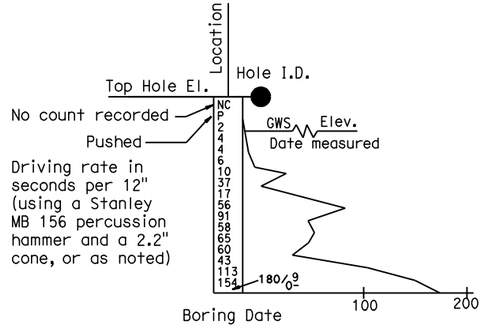
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



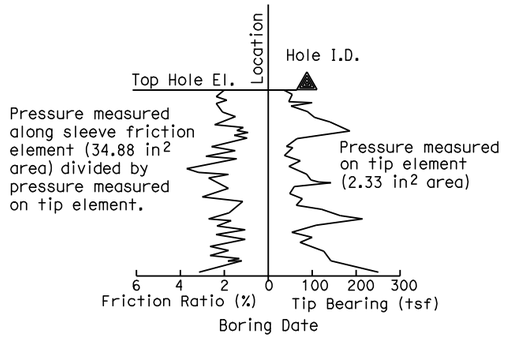
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 11

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55E0076
POST MILES 20.91-21.03

SOIL LEGEND
LOG OF TEST BORINGS 5 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES								SHEET	OF
10/23/08	02/27/09	05/18/09						22	23

FILE => $REQUEST

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REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 12

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55E0076
POST MILES 20.91-21.03

SOIL LEGEND
LOG OF TEST BORINGS 6 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 23 OF 23

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APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the project site were investigated by Group Delta Consultants, Inc. (GDC) by performing four (4) soil borings (2 hollow-stem auger borings, and 2 rotary wash borings), and five (5) Cone Penetration Tests (CPTs) during the period of March 26th to April 24th, 2008. The borings were performed to depths of 51.5 feet to 137 feet below ground surface (bgs) and the CPTs were performed to depths of 105.5 to 163.5 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at the subject retaining wall locations. Locations of the borings and CPTs are presented in Figures 2a through 2c of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1.

The soil borings and CPTs were performed from the freeway lanes and shoulders of SR-22/I-405. All of the exploration locations were within the Caltrans Right-of-Way (ROW).

Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night.

The exploration methods are described in the following sections. Hollow stem auger and rotary wash boring and CPT logs from the current exploration program are presented in Figures A-2a through A-5f and A-6a through A-10b, respectively.

A.2 Soil Drilling and Sampling

A total of four (4) soil borings; two (2) rotary wash borings (R-08-004 and R-05-005), and two (2) hollow-stem auger borings (A-08-120 and A-08-122), were drilled and sampled during this project. C & L Drilling, Inc. of La Habra, California drilled and sampled the rotary wash borings. R & C Drilling, Inc. of Van Nuys, California drilled and sampled the hollow stem auger borings. All drilling companies acted as subcontractors to GDC. All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS) and were assigned a

group name and group symbol, as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The soil boring logs are presented in Figures A-2a through A-5f.

The rotary wash borings were drilled using a Mayhew 1000 drill rig. The hollow-stem auger borings were drilled using a Mobile B-61 drill rig. All drill rigs were truck mounted. The Mayhew 1000 used a 4.875-inch drill bit in conjunction with bentonite slurry to drill to desired depths. The Mobile B-61 used an 8-inch auger to bore to desired depths.

Bulk samples of the near-surface soils were collected along the project alignment. Drive samples were collected from the borings generally at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using either an automatic or downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured using a well sounder.

The hollow stem auger and hand auger borings were abandoned by backfilling the borehole with drill cuttings and cement grout mix as needed to the ground surface. The rotary wash borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with either asphalt patch or quickset cement.

Rotary wash boring drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California. for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of five (5) CPT soundings (CPT-08-001 through CPT-08-003, CPT-08-007 and CPT-08-121) were performed during this project to depths ranging from 105.5 to 163.5 feet below ground surface. Kehoe Testing and Engineering, Inc. of Long Beach, California performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D3441 test standard using an electronic cone penetrometer. A 2.32-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in Appendix A on Figures A-6a through A-10b. Soil behavior type and other interpretations of the CPT data provided by Kehoe are in our files.

At the completion of the sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned following each test by backfilling bentonite into the hole, to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1 Summary of Field Explorations

List of Figures

Figure A-1a Key for Soil Classification
Figure A-1b Boring Legend
Figures A-2a to A-5f Soil Boring Logs
Figures A-6a to A-10b Cone Penetration Test Results

TABLE A-1
SUMMARY OF TEST EXPLORATIONS
RW1325 RW1326
SR-22 WEST ORANGE COUNTY CONNECTORS PROJECT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Plan Figure No.	Appendix Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
A-08-120	1333+97 108 L	4/1/2008	A	25.86	51.5	L-8	A-2a to A-2c	12	13.86	
A-08-122	1322+20 76 R	4/14/2008	A	31.94	51.5	L-7	A-3a to A-3c	16.5	15.44	
CPT-08-001	1330+95 41 L	4/11/2008	CPT	24.92	163.5	L-7	A-6a to A-6e	Hole obstructed at 10' (dry)	NA	GW is below Elev. 14.5 feet
CPT-08-002	1328+67 53 R	3/26/2008	CPT	25.74	107.6	L-7	A-7a to A-7d	7	18.74	Inclination Refusal at 107.6'
CPT-08-003	1328+35 168 L	4/1/2008	CPT	27.74	150.0	L-7	A-8a to A-8e	Hole obstructed at 10' (dry)	NA	GW is below Elev. 17.9 feet
CPT-08-007	1320+67 21 R	3/27/2008	CPT	27.27	105.5	L-6	A-9a to A-9d	Hole obstructed at 7' (dry)	NA	GW is below Elev. 20 feet
CPT-08-121	1327+42 159 R	4/14/2008	CPT	28.41	30.1	L-7	A-10a to A-10b	Hole obstructed at 9' (dry)	NA	GW is below Elev. 19 feet
R-08-004	1325+03 165 L	4/24/2008	R	31.21	61.5	L-7	A-4a to A-4c	NA	NA	
R-08-005	1324+48 63 R	3/27/2008	R	27.83	137.0	L-7	A-5a to A-5f	NA	NA	

Notes:
1. Stationing relative to SR-22 "H" line, except where noted otherwise. Right and left offsets defined by looking along SR-22 centerline in direction of increasing station.
2. Elevations based upon January 2009 Survey

NA = Not Available
NE = Not encountered

A = Auger Boring
CPT = Cone Penetration Test
R = Rotary Wash Boring

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

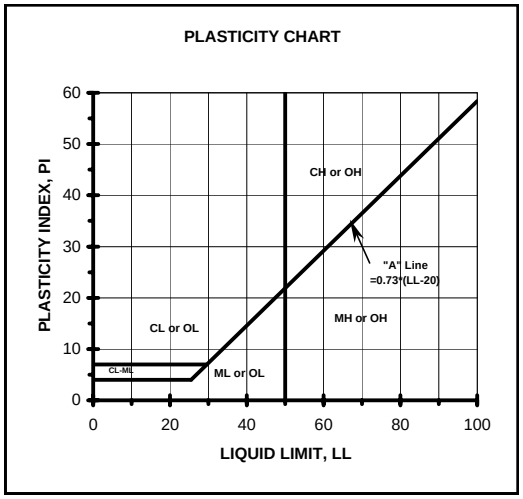
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375-inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** A-08-120
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/1/2008	**FINISH** 4/1/2008	**SHEET NO.** 1 of 3
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** S. Navaratnarajah	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 25.86
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** Surveyed 01/09		**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ 12.0 / *13.9*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	25											**3" Asphalt Concrete (AC)** **9" Aggregate Base (AB)**
												Sandy Lean Clay (CL) moist, dark brown-black
			B1			9	RV	27				**Silty Sand (SM)** moist, light brown, fine to medium grained, with lenses of clay
5												
	20		R2	4 6 11	103.7	11						medium dense
												Clayey Sand (SC) medium dense, moist-wet, dark brown, fine grained
10												
	15		S3	2 4 8		21						
												Lean Clay with Sand (CL) firm-stiff, wet, dark brown, with lenses of fine grained sand
15												
	10		R4	4 6 8		29	CN	72	36:17	0.5		
20												
	5		S5	9 8 15		26				2.0-2.25		**Silty Clay (CL)** very stiff, wet, dark brown
												Clayey Sand (SC) medium dense, wet, dark brown, fine grained

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** **A-08-120**
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/1/2008	**FINISH** 4/1/2008	**SHEET NO.** 2 of 3
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** S. Navaratnarajah	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 25.86
DEPTH/*ELEV.* GROUND WATER (ft) ▼ 12.0 / *13.9*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** Surveyed 01/09		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0		R6	7 13 13	99.2	25						**Clayey Sand (SC)** medium dense, wet, dark brown, fine grained
30	-5		S7	6 17 23		24						**Sandy Silt (ML)** medium dense to dense, wet, dark brown, fine grained
35	-10		R8	9 20 22	100.3	25		55	NP			
40	-15		S9	20 22 30		21						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
45	-20		R10	26 50/6"	97.1	27		19				

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-120**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	S. Navaratnarajah	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	25.86	▼ 12.0 / *13.9*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-25	X	S11	20 27 30		28						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
55	-30											*Boring terminated at 51.5 feet below ground surface (bgs).* *Groundwater encountered at 12 feet bgs.* *Borehole obstructed below 5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
60	-35											
65	-40											
70	-45											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-2 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** A-08-122
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/14/2008	**FINISH** 4/14/2008	**SHEET NO.** 1 of 3
DRILLING COMPANY R & C Drilling Inc.	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mobile B-61	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 31.94
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ 16.5 / *15.4*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **7" Aggregate Base (AB)**
	30		B1			7	CR	23	26:11			**Clayey Sand (SC)** moist-dry, light brown, fine to coarse grained with pieces of hard brown clay up to 3/4"
5			R2	5 7 19	107.6	18	CN					medium dense, becomes brown, finer, with scattered gravel up to 1/2"
	25											
10			S3	5 11 14		13		40				with chunk of asphalt at 10 feet depth
	20											
15			R4	11 13 16	100	23		26				▼ **Silty Sand (SM)** medium dense, moist, olive gray, fine grained
	15											**Lean Clay (CL)** stiff, moist, olive brown
20			S5	3 4 8						1.0		
	10											**Poorly Graded Sand (SP)** medium dense, moist, orange brown
												Silty Clay with Sand (CL) stiff to very stiff, moist, olive gray

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	31.94	▼ 16.5 / *15.4*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R6	9 16 20	87.2	31		88		1.5-1.75		**Silty Clay (CL)** stiff to very stiff, moist, olive gray
	5											
30			S7	5 6 9		26						**Silty Sand (SM)** medium dense, moist, gray olive, fine grained
	0											
35			R8	11 20 35	96.8	28		26				dense, some clay
	-5											**Silty to Clayey Sand (SC/SM)** dense, wet, olive gray, fine grained
40			S9a	13 14 20		30						
			S9b							2.0-2.5		**Silty Clay (CL)** very stiff to hard, moist, olive gray
	-10											**Clayey Silt (ML)** very stiff to hard, moist, olive brown
45			R10	20 50/6"	86.4	35				2.0-2.75		**Silty Clay (CL)** very stiff to hard, wet-moist, olive gray
	-15											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	31.94	▼ 16.5 / *15.4*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S11	20 30 30		27						**Silty Sand/Sandy Silt (SM/ML)** very dense/hard, wet-moist, olive gray, fine grained
	-20											*Boring terminated at 51.5 feet below ground surface (bgs).* *Groundwater encountered at 16.5 feet bgs.* *Borehole obstructed below 22.5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
55												
	-25											
60												
	-30											
65												
	-35											
70												
	-40											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-3 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.

NOTES: Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	30											**8.25" Concrete Pavement (PCC)** **4.75" Concrete Treated Base** **3" Aggregate Base (AB)**
												9" Poorly Graded Sand (SP) moist, red-yellow, fine grained
			B1			16	CR RV	66	29:12			**Sandy Lean Clay (CL)** firm, moist, dark brown, in chunks up to 1.5"
			R2	13 25 30	117.1	16	DS			4.5+		hard, dry, dark gray, fine grained
5	25											**Sandy Silt (ML)** dense/hard, dry-moist, brown, fine grained, trace of clay
10	20		S3	6 12 18		22		66		4.5+		
												Lean Clay (CL) stiff, moist, olive brown
15	15		R4	5 9 13	100.5	24		27				pocket penetrometer = 1.0-1.25
												Silty Sand (SM) medium dense, wet, light brown gray, fine grained with occasional coarse grains and few fine gravel, with clay
												Sandy Lean Clay (CL) firm to stiff, wet, olive light brown, very fine grains barely visible with some to trace of silt
20	10		S5	2 3 4		31		66		1.0		
												Lean Clay (CL) stiff, moist, gray olive brown

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-004

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	5		R6	5 7 12	91.1	31	DS			1.25-1.5		**Lean Clay (CL)** stiff, moist, gray olive brown, no visible sand grains, with fine to 3/4" angular light gray fine grained sandstone gravel in sampler shoe
												Sandy Lean Clay (CL) stiff, moist, olive gray, trace fine grains, with some silt
30	0		S7	2 5 8		29		55				
35	-5		R8	8 8 14	92.3	30				1.5-2.2		stiff to very stiff, less silt, occasional fine grain
40	-10		S9	2 7 14		32				2.0		
45	-15		R10	20 27 38	105.2	22		51		4.5		**Sandy Silt/Silty Sand (ML/SM)** very dense/hard, gray, trace of clay

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-20		S11	10 8 11		32		86				**Lean Clay with Sand (CL)** very stiff, wet, olive gray, little to no silt, rolls very good thread
55	-25		R12	12 23 25	109.6	19				4.5+		**Silt (ML)** dense/hard, wet, gray,with some fine grains and clay
60	-30		S13	9 13 20		26		56				**Sandy Silt (ML)** dense, wet, gray olive, fine grains barely visible
65	-35											*Boring terminated at 61.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
70	-40											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-4 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 1 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												8.5" Concrete Pavement (PCC) **8.5" Lean Concrete/slurry** **6" Aggregate Base (AB)**
	25		B1			16	RV	63	29:9			**Sandy Lean Clay (CL)** moist, gray, very fine grains and few coarse grains, rolls very good thread
5			R1	3 9 16	108.3	19	CN PA	53	32:13	4.5+		dark gray, very stiff to hard, with silt
	20											
10			S2	3 5 5		26	PA	18				**Silty Sand (SM)** loose to medium dense, moist-wet, gray brown, fine grained
	15											**Sandy Silty Clay (CL)** stiff, moist, brown gray, fine grained
15			R3	5 6 7	98	27	DS	65				
	10											
20			S4	3 3 4		29						**Silty Sand (SM)** loose, wet, gray brown, fine grained with scattered coarse grains
	5											**Silty Clay with Sand (CL)** stiff, moist, brown gray, fine grained

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-005

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	2 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.

NOTES: Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	7 12 12	97.6	26		24				**Silty Sand (SM)** medium dense, wet, gray brown, fine grained with scattered coarse grains and fine gravel of clay cemented coarse sand
	0											**Lean Clay (CL)** stiff, wet-moist, gray brown
30			S6	3 4 8		41		97	46:20	1.25		
	-5											
35												
	-10											
40			S7	4 4 8		31			39:20	1.5		with very fine to coarse sand grains and some silt
	-15											**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay harder drilling
45												
	-20											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-005

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	3 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R8	18 28 23	103	23		85		4.5		**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay, slight to no plasticity
	-25											
55												**Lean Clay with Sand (CL)** hard, wet, scattered fine grains
	-30											
60												
	-35											
65												
	-40											
70			R9	30 50/6"		45		75	43:19	4.5		very stiff to hard Torvane = 3.6 to 4.0 ksf
	-45											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 4 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-50											**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)**hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
85	-55											
90	-60											
95	-65											
	-70											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	5 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
105	-75	⋈	R10	50/5"	82.4	39				2.5		**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)**hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray, drill chatter at 100'
110	-80											
115	-85											
120	-90											
	-95											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 e

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 6 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
	-100											
130												drill chatter
	-105											
135			S11	12 17 32		27						
	-110											*Boring terminated at 137 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
140												
	-115											
145												
	-120											

GDC_LOG_BORING_1A I-436 RW 1325_1326 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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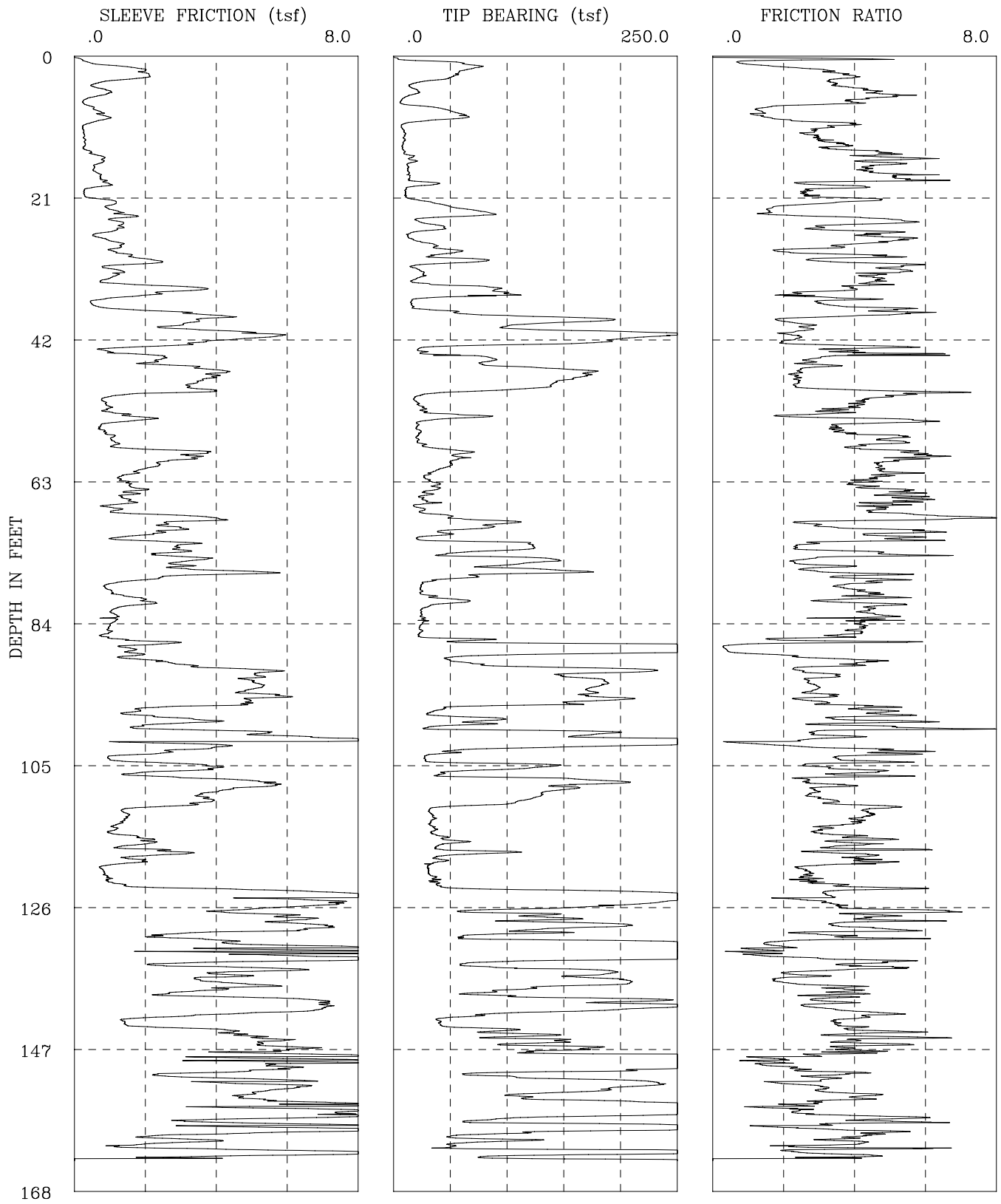
FIGURE A-5 f



CPT-08-001	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-6a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	23.76	0.23	0.98	0.03	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
0.60	2	70.09	1.38	1.97	0.09	silty sand to sandy silt	>90	>48	22	UNDEFINED
0.95	3	55.67	2.02	3.63	0.15	clayey silt to silty clay	UNDFND	UNDFD	27	3.7
1.25	4	30.61	1.05	3.43	0.22	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
1.55	5	16.82	0.69	4.07	0.28	silty clay to clay	UNDFND	UNDFD	11	1.1
1.85	6	16.90	0.81	4.80	0.33	clay	UNDFND	UNDFD	16	1.1
2.15	7	6.99	0.28	3.98	0.39	clay	UNDFND	UNDFD	7	.4
2.45	8	35.18	0.51	1.45	0.45	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
2.75	9	60.31	0.80	1.32	0.51	silty sand to sandy silt	60-70	40-42	19	UNDEFINED
3.05	10	29.62	0.66	2.22	0.57	sandy silt to clayey silt	UNDFND	UNDFD	11	1.9
3.35	11	7.61	0.24	3.20	0.61	clay	UNDFND	UNDFD	7	.4
3.65	12	9.66	0.27	2.79	0.64	silty clay to clay	UNDFND	UNDFD	6	.5
3.95	13	9.17	0.29	3.19	0.67	silty clay to clay	UNDFND	UNDFD	6	.5
4.25	14	8.03	0.29	3.61	0.69	clay	UNDFND	UNDFD	8	.4
4.55	15	12.89	0.61	4.71	0.72	clay	UNDFND	UNDFD	12	.8
4.85	16	15.75	0.78	4.98	0.75	clay	UNDFND	UNDFD	15	.9
5.15	17	12.55	0.55	4.40	0.78	clay	UNDFND	UNDFD	12	.7
5.45	18	13.48	0.69	5.10	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	23.21	0.84	3.60	0.84	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
6.05	20	17.10	0.59	3.47	0.86	silty clay to clay	UNDFND	UNDFD	11	1.0
6.40	21	10.89	0.31	2.89	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	31.02	1.07	3.46	0.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.9
7.00	23	61.58	1.01	1.64	0.95	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
7.35	24	60.46	1.37	2.27	0.98	sandy silt to clayey silt	UNDFND	UNDFD	23	3.9
7.65	25	29.05	1.28	4.39	1.02	silty clay to clay	UNDFND	UNDFD	19	1.8
7.95	26	34.53	1.17	3.38	1.04	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
8.25	27	13.57	0.66	4.84	1.07	clay	UNDFND	UNDFD	13	.7
8.55	28	28.88	1.22	4.21	1.10	silty clay to clay	UNDFND	UNDFD	18	1.8
8.85	29	48.40	1.15	2.37	1.13	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
9.15	30	46.72	1.67	3.58	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.45	31	52.32	1.94	3.71	1.19	clayey silt to silty clay	UNDFND	UNDFD	25	3.3
9.75	32	21.37	1.12	5.26	1.21	clay	UNDFND	UNDFD	20	1.2
10.05	33	24.45	1.10	4.51	1.24	clay	UNDFND	UNDFD	23	1.5
10.35	34	29.00	1.26	4.35	1.27	silty clay to clay	UNDFND	UNDFD	19	1.8
10.65	35	91.00	3.20	3.52	1.30	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
10.95	36	63.93	1.66	2.59	1.33	sandy silt to clayey silt	UNDFND	UNDFD	24	4.1
11.25	37	15.91	0.51	3.17	1.36	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	33.67	1.72	5.12	1.38	clay	UNDFND	UNDFD	32	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6b

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	121.13	3.82	3.16	1.41	sandy silt to clayey silt	UNDFND	UNDFD	46	7.9
12.15	40	144.57	3.24	2.24	1.44	silty sand to sandy silt	70-80	40-42	46	UNDEFINED
12.45	41	141.02	3.52	2.50	1.47	silty sand to sandy silt	70-80	40-42	45	UNDEFINED
12.80	42	229.65	5.19	2.26	1.50	silty sand to sandy silt	80-90	42-44	>50	UNDEFINED
13.10	43	127.54	3.09	2.43	1.53	silty sand to sandy silt	60-70	40-42	41	UNDEFINED
13.40	44	23.79	0.99	4.18	1.56	silty clay to clay	UNDFND	UNDFD	15	1.4
13.75	45	75.82	2.38	3.14	1.59	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
14.05	46	91.79	2.70	2.95	1.62	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
14.35	47	167.68	3.99	2.38	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	158.43	3.79	2.39	1.68	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.95	49	138.54	3.28	2.37	1.70	silty sand to sandy silt	60-70	40-42	44	UNDEFINED
15.25	50	66.77	3.07	4.60	1.73	silty clay to clay	UNDFND	UNDFD	43	4.2
15.55	51	19.58	0.89	4.57	1.76	clay	UNDFND	UNDFD	19	1.1
15.85	52	22.88	0.93	4.07	1.79	silty clay to clay	UNDFND	UNDFD	15	1.3
16.15	53	32.38	1.06	3.27	1.82	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
16.45	54	56.17	1.84	3.27	1.85	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
16.75	55	21.04	0.86	4.08	1.87	silty clay to clay	UNDFND	UNDFD	13	1.1
17.05	56	22.57	0.82	3.65	1.90	silty clay to clay	UNDFND	UNDFD	14	1.2
17.35	57	20.99	1.08	5.14	1.93	clay	UNDFND	UNDFD	20	1.1
17.65	58	25.85	1.16	4.47	1.96	clay	UNDFND	UNDFD	25	1.4
17.95	59	57.41	3.08	5.36	1.99	clay	UNDFND	UNDFD	>50	3.5
18.25	60	55.25	3.20	5.79	2.02	clay	UNDFND	UNDFD	>50	3.4
18.55	61	49.82	2.33	4.68	2.04	silty clay to clay	UNDFND	UNDFD	32	3.0
18.85	62	36.09	1.79	4.96	2.07	clay	UNDFND	UNDFD	35	2.1
19.20	63	29.36	1.34	4.55	2.10	silty clay to clay	UNDFND	UNDFD	19	1.7
19.50	64	38.47	1.62	4.21	2.13	silty clay to clay	UNDFND	UNDFD	25	2.3
19.80	65	31.34	1.65	5.27	2.16	clay	UNDFND	UNDFD	30	1.8
20.15	66	28.11	1.50	5.35	2.19	clay	UNDFND	UNDFD	27	1.6
20.45	67	22.82	1.11	4.85	2.22	clay	UNDFND	UNDFD	22	1.2
20.75	68	34.59	1.95	5.63	2.25	clay	UNDFND	UNDFD	33	2.0
21.05	69	80.79	3.53	4.37	2.28	clayey silt to silty clay	UNDFND	UNDFD	39	5.1
21.35	70	80.36	2.80	3.48	2.31	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
21.65	71	41.92	2.17	5.17	2.34	clay	UNDFND	UNDFD	40	2.5
21.95	72	50.66	1.91	3.76	2.37	clayey silt to silty clay	UNDFND	UNDFD	24	3.0
22.25	73	121.34	2.96	2.44	2.39	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
22.55	74	59.23	2.71	4.58	2.42	silty clay to clay	UNDFND	UNDFD	38	3.6
22.85	75	132.79	3.35	2.52	2.45	silty sand to sandy silt	60-70	38-40	42	UNDEFINED
23.15	76	103.02	2.99	2.90	2.48	sandy silt to clayey silt	UNDFND	UNDFD	39	6.5
23.45	77	120.24	4.37	3.64	2.51	sandy silt to clayey silt	UNDFND	UNDFD	46	7.7
23.75	78	43.59	1.86	4.27	2.54	silty clay to clay	UNDFND	UNDFD	28	2.5
24.05	79	24.18	0.89	3.69	2.56	silty clay to clay	UNDFND	UNDFD	15	1.2
24.35	80	27.45	1.17	4.25	2.59	silty clay to clay	UNDFND	UNDFD	18	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6c

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	53.30	1.98	3.72	2.62	clayey silt to silty clay	UNDFND	UNDFD	26	3.2
24.95	82	31.15	1.49	4.79	2.65	clay	UNDFND	UNDFD	30	1.7
25.25	83	24.27	1.10	4.54	2.68	clay	UNDFND	UNDFD	23	1.2
25.60	84	25.74	1.09	4.23	2.71	silty clay to clay	UNDFND	UNDFD	16	1.3
25.90	85	23.57	0.97	4.10	2.74	silty clay to clay	UNDFND	UNDFD	15	1.2
26.20	86	23.16	0.90	3.91	2.77	silty clay to clay	UNDFND	UNDFD	15	1.2
26.55	87	122.93	2.02	1.64	2.80	sand to silty sand	50-60	36-38	29	UNDEFINED
26.85	88	422.67	1.51	0.36	2.83	gravelly sand to sand	>90	42-44	>50	UNDEFINED
27.15	89	114.10	1.60	1.40	2.86	sand to silty sand	50-60	36-38	27	UNDEFINED
27.45	90	60.32	2.53	4.20	2.88	clayey silt to silty clay	UNDFND	UNDFD	29	3.6
27.75	91	179.66	4.58	2.55	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.05	92	161.47	5.13	3.18	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	186.46	5.06	2.71	2.97	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.65	94	174.18	5.06	2.91	3.00	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.95	95	179.71	5.40	3.00	3.03	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.25	96	169.41	4.89	2.89	3.05	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.55	97	48.71	2.24	4.59	3.08	silty clay to clay	UNDFND	UNDFD	31	2.8
29.85	98	48.37	1.99	4.11	3.11	clayey silt to silty clay	UNDFND	UNDFD	23	2.8
30.15	99	81.26	3.27	4.03	3.14	clayey silt to silty clay	UNDFND	UNDFD	39	5.0
30.45	100	69.91	2.77	3.97	3.17	clayey silt to silty clay	UNDFND	UNDFD	33	4.2
30.75	101	181.80	5.91	3.25	3.20	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.7
31.05	102	305.75	5.58	1.83	3.22	sand to silty sand	80-90	40-42	>50	UNDEFINED
31.35	103	108.82	3.55	3.26	3.25	sandy silt to clayey silt	UNDFND	UNDFD	42	6.8
31.65	104	36.31	1.64	4.53	3.28	silty clay to clay	UNDFND	UNDFD	23	2.0
32.00	105	71.87	2.24	3.12	3.31	sandy silt to clayey silt	UNDFND	UNDFD	28	4.3
32.30	106	89.69	3.35	3.73	3.34	clayey silt to silty clay	UNDFND	UNDFD	43	5.5
32.60	107	78.77	2.48	3.15	3.37	sandy silt to clayey silt	UNDFND	UNDFD	30	4.8
32.95	108	175.05	5.42	3.09	3.40	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.2
33.25	109	144.13	4.11	2.85	3.43	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
33.55	110	124.86	3.67	2.94	3.46	sandy silt to clayey silt	UNDFND	UNDFD	48	7.8
33.85	111	88.12	3.30	3.74	3.49	clayey silt to silty clay	UNDFND	UNDFD	42	5.4
34.15	112	32.09	1.44	4.49	3.52	silty clay to clay	UNDFND	UNDFD	20	1.6
34.45	113	34.81	1.48	4.25	3.55	silty clay to clay	UNDFND	UNDFD	22	1.8
34.75	114	33.04	1.23	3.71	3.57	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
35.05	115	35.14	1.08	3.07	3.60	clayey silt to silty clay	UNDFND	UNDFD	17	1.8
35.35	116	43.18	1.80	4.17	3.63	silty clay to clay	UNDFND	UNDFD	28	2.4
35.65	117	49.14	1.84	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	24	2.8
35.95	118	67.87	2.38	3.51	3.69	clayey silt to silty clay	UNDFND	UNDFD	33	4.0
36.25	119	44.43	1.89	4.25	3.72	silty clay to clay	UNDFND	UNDFD	28	2.4
36.55	120	35.62	1.35	3.79	3.74	clayey silt to silty clay	UNDFND	UNDFD	17	1.8
36.85	121	30.52	0.80	2.62	3.77	sandy silt to clayey silt	UNDFND	UNDFD	12	1.5
37.15	122	35.28	0.92	2.60	3.80	sandy silt to clayey silt	UNDFND	UNDFD	14	1.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure 18d

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-001
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 4/4/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	36.96	1.21	3.29	3.83	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
37.75	124	150.61	5.46	3.63	3.86	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
38.05	125	270.44	8.08	2.99	3.89	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	205.07	6.96	3.39	3.92	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
38.70	127	97.89	4.71	4.81	3.95	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.00	128	130.35	6.23	4.78	3.97	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.35	129	175.35	6.62	3.78	4.01	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
39.65	130	109.82	4.12	3.75	4.04	sandy silt to clayey silt	UNDFND	UNDFD	42	6.8
39.95	131	129.69	3.49	2.69	4.06	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
40.25	132	366.81	5.92	1.61	4.09	sand to silty sand	80-90	40-42	>50	UNDEFINED
40.55	133	473.19	6.06	1.28	4.12	sand	>90	40-42	>50	UNDEFINED
40.85	134	255.01	7.59	2.98	4.15	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
41.15	135	76.82	3.57	4.65	4.18	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
41.45	136	186.41	4.87	2.61	4.21	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
41.75	137	187.40	3.81	2.03	4.23	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.05	138	162.63	4.87	2.99	4.26	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.2
42.35	139	83.37	3.06	3.67	4.29	clayey silt to silty clay	UNDFND	UNDFD	40	5.0
42.65	140	184.30	5.91	3.20	4.32	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.7
42.95	141	240.31	7.08	2.95	4.35	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
43.25	142	130.74	5.43	4.16	4.38	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	47.20	1.86	3.94	4.40	clayey silt to silty clay	UNDFND	UNDFD	23	2.5
43.85	144	51.48	1.93	3.76	4.43	clayey silt to silty clay	UNDFND	UNDFD	25	2.8
44.15	145	107.78	4.44	4.12	4.46	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.45	146	125.67	5.45	4.33	4.49	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.80	147	144.19	5.78	4.01	4.52	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
45.10	148	193.49	6.58	3.40	4.55	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
45.40	149	392.69	5.95	1.51	4.58	sand to silty sand	80-90	40-42	>50	UNDEFINED
45.75	150	304.00	5.69	1.87	4.61	sand to silty sand	70-80	38-40	>50	UNDEFINED
46.05	151	93.69	3.11	3.32	4.64	sandy silt to clayey silt	UNDFND	UNDFD	36	5.6
46.35	152	201.95	4.94	2.44	4.67	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
46.65	153	203.37	6.12	3.01	4.70	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
46.95	154	125.92	4.89	3.89	4.73	sandy silt to clayey silt	UNDFND	UNDFD	48	7.7
47.25	155	196.18	6.34	3.23	4.75	sandy silt to clayey silt	UNDFND	UNDFD	>50	12.4
47.55	156	324.05	7.05	2.18	4.78	sand to silty sand	70-80	38-40	>50	UNDEFINED
47.85	157	253.66	7.80	3.07	4.81	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
48.15	158	96.21	4.37	4.55	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
48.45	159	273.04	7.06	2.58	4.87	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
48.75	160	85.04	3.99	4.70	4.90	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
49.05	161	83.24	3.12	3.74	4.92	clayey silt to silty clay	UNDFND	UNDFD	40	4.9
49.35	162	103.25	2.75	2.67	4.95	sandy silt to clayey silt	UNDFND	UNDFD	40	6.2
49.65	163	218.69	6.58	3.01	4.98	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED

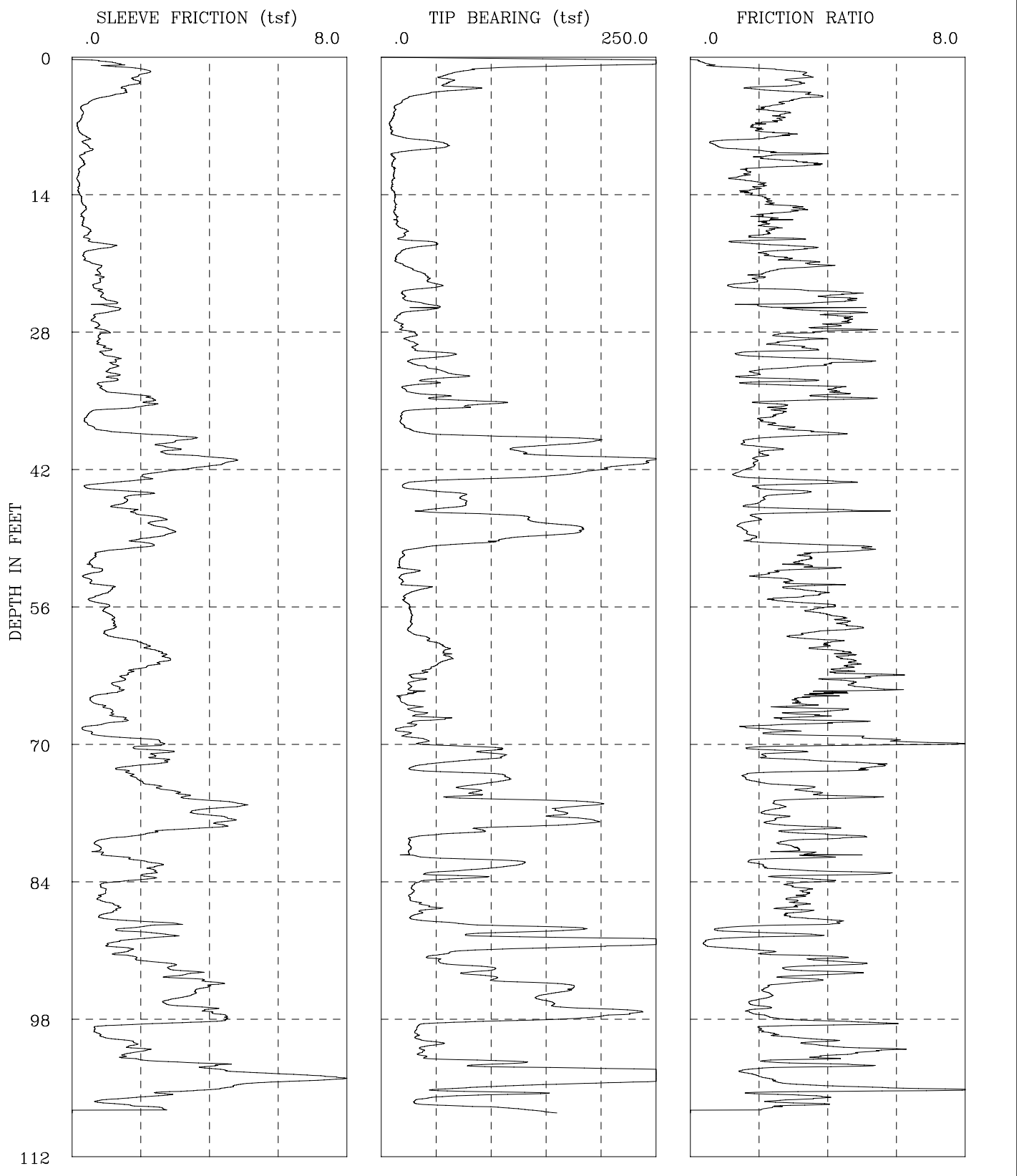
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemente

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-6e



CPT−08−002	I−436 SR−22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-7a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-002
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :03/27/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	231.31	0.96	0.42	0.03	sand	>90	>48	44	UNDEFINED
0.60	2	69.54	2.07	2.98	0.09	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
0.95	3	64.39	1.75	2.71	0.15	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.25	4	45.22	1.32	2.91	0.22	sandy silt to clayey silt	UNDFND	UNDFD	17	3.0
1.55	5	16.76	0.45	2.67	0.28	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
1.85	6	11.81	0.30	2.53	0.33	clayey silt to silty clay	UNDFND	UNDFD	6	.7
2.15	7	8.57	0.19	2.23	0.39	silty clay to clay	UNDFND	UNDFD	5	.5
2.45	8	10.44	0.25	2.38	0.45	silty clay to clay	UNDFND	UNDFD	7	.6
2.75	9	46.68	0.42	0.90	0.51	silty sand to sandy silt	50-60	40-42	15	UNDEFINED
3.05	10	26.63	0.43	1.63	0.57	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
3.35	11	10.94	0.31	2.86	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	11.63	0.21	1.79	0.64	clayey silt to silty clay	UNDFND	UNDFD	6	.7
3.95	13	10.59	0.18	1.66	0.67	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.25	14	10.68	0.19	1.79	0.69	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.55	15	12.42	0.28	2.23	0.72	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.85	16	12.42	0.36	2.91	0.75	silty clay to clay	UNDFND	UNDFD	8	.7
5.15	17	14.15	0.31	2.22	0.78	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.45	18	19.31	0.44	2.30	0.81	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
5.75	19	26.81	0.48	1.79	0.84	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
6.05	20	30.90	0.85	2.75	0.86	sandy silt to clayey silt	UNDFND	UNDFD	12	1.9
6.40	21	14.37	0.41	2.83	0.89	clayey silt to silty clay	UNDFND	UNDFD	7	.8
6.70	22	28.43	0.79	2.78	0.93	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
7.00	23	42.74	0.81	1.90	0.95	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
7.35	24	35.12	0.75	2.13	0.98	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
7.65	25	26.22	1.05	3.99	1.02	silty clay to clay	UNDFND	UNDFD	17	1.6
7.95	26	39.16	1.14	2.92	1.04	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
8.25	27	14.42	0.64	4.46	1.07	clay	UNDFND	UNDFD	14	.8
8.55	28	21.73	0.87	4.01	1.10	silty clay to clay	UNDFND	UNDFD	14	1.3
8.85	29	27.31	0.78	2.85	1.13	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
9.15	30	34.04	0.92	2.72	1.16	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
9.45	31	45.67	1.16	2.54	1.19	sandy silt to clayey silt	UNDFND	UNDFD	17	2.9
9.75	32	42.09	1.15	2.74	1.21	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.05	33	57.64	1.22	2.11	1.24	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
10.35	34	29.58	0.84	2.84	1.27	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
10.65	35	48.52	1.96	4.04	1.30	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
10.95	36	77.30	1.84	2.38	1.33	sandy silt to clayey silt	UNDFND	UNDFD	30	5.0
11.25	37	18.72	0.45	2.40	1.36	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
11.55	38	20.65	0.53	2.55	1.38	clayey silt to silty clay	UNDFND	UNDFD	10	1.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	91.54	2.45	2.68	1.41	sandy silt to clayey silt	UNDFND	UNDFD	35	5.9
12.15	40	159.48	2.82	1.77	1.44	sand to silty sand	70-80	40-42	38	UNDEFINED
12.45	41	161.83	3.30	2.04	1.47	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
12.80	42	225.22	4.12	1.83	1.50	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.10	43	149.98	2.29	1.53	1.53	sand to silty sand	70-80	40-42	36	UNDEFINED
13.40	44	25.63	0.82	3.20	1.56	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
13.75	45	67.71	1.74	2.57	1.59	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
14.05	46	66.77	1.48	2.21	1.62	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
14.35	47	101.54	2.22	2.19	1.65	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.65	48	164.51	2.49	1.51	1.68	sand to silty sand	70-80	40-42	39	UNDEFINED
14.95	49	152.04	2.63	1.73	1.70	sand to silty sand	70-80	40-42	36	UNDEFINED
15.25	50	69.46	2.04	2.94	1.73	sandy silt to clayey silt	UNDFND	UNDFD	27	4.4
15.55	51	20.03	0.77	3.86	1.76	silty clay to clay	UNDFND	UNDFD	13	1.1
15.85	52	16.37	0.56	3.40	1.79	silty clay to clay	UNDFND	UNDFD	10	.8
16.15	53	24.11	0.59	2.45	1.82	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
16.45	54	24.86	0.74	3.00	1.85	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.75	55	27.84	0.96	3.45	1.87	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
17.05	56	23.07	0.77	3.32	1.90	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
17.35	57	26.92	1.02	3.77	1.93	silty clay to clay	UNDFND	UNDFD	17	1.5
17.65	58	27.28	1.22	4.46	1.96	silty clay to clay	UNDFND	UNDFD	17	1.5
17.95	59	27.34	1.06	3.87	1.99	silty clay to clay	UNDFND	UNDFD	17	1.5
18.25	60	47.30	1.78	3.76	2.02	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
18.55	61	58.08	2.45	4.22	2.04	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
18.85	62	57.96	2.67	4.60	2.07	silty clay to clay	UNDFND	UNDFD	37	3.6
19.20	63	38.89	1.81	4.65	2.10	silty clay to clay	UNDFND	UNDFD	25	2.3
19.50	64	29.78	1.36	4.55	2.13	silty clay to clay	UNDFND	UNDFD	19	1.7
19.80	65	26.42	1.23	4.64	2.16	clay	UNDFND	UNDFD	25	1.5
20.15	66	20.99	0.66	3.12	2.19	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
20.45	67	31.74	1.13	3.55	2.22	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
20.75	68	38.61	1.23	3.19	2.25	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
21.05	69	19.40	0.48	2.46	2.28	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
21.35	70	37.11	2.24	6.05	2.31	clay	UNDFND	UNDFD	36	2.1
21.65	71	99.90	2.31	2.31	2.34	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
21.95	72	79.22	2.53	3.20	2.37	sandy silt to clayey silt	UNDFND	UNDFD	30	4.9
22.25	73	48.77	1.57	3.22	2.39	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
22.55	74	109.19	1.92	1.76	2.42	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
22.85	75	80.46	2.73	3.40	2.45	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
23.15	76	121.99	3.79	3.11	2.48	sandy silt to clayey silt	UNDFND	UNDFD	47	7.8
23.45	77	171.79	4.17	2.43	2.51	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
23.75	78	177.61	4.33	2.44	2.54	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.05	79	118.99	3.60	3.03	2.56	sandy silt to clayey silt	UNDFND	UNDFD	46	7.6
24.35	80	36.24	1.39	3.84	2.59	clayey silt to silty clay	UNDFND	UNDFD	17	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

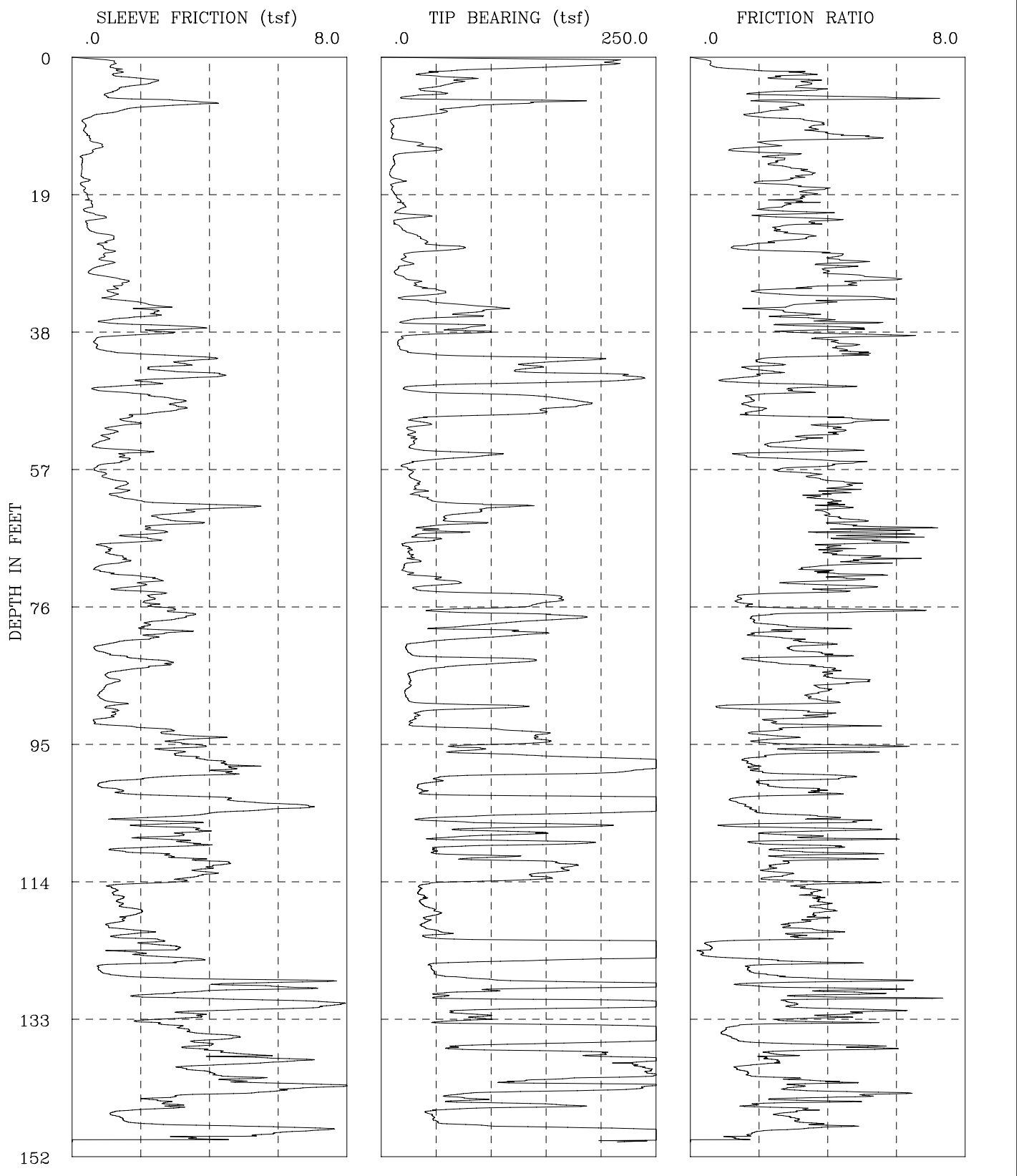
Figure A-7c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	25.95	0.75	2.91	2.62	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
24.95	82	55.24	1.38	2.50	2.65	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
25.25	83	108.52	2.42	2.23	2.68	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
25.60	84	56.21	2.06	3.67	2.71	clayey silt to silty clay	UNDFND	UNDFD	27	3.4
25.90	85	28.97	0.91	3.13	2.74	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
26.20	86	26.68	0.84	3.15	2.77	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
26.55	87	40.87	1.25	3.05	2.80	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
26.85	88	34.62	1.24	3.57	2.83	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
27.15	89	137.54	2.00	1.45	2.86	sand to silty sand	60-70	36-38	33	UNDEFINED
27.45	90	184.69	2.24	1.21	2.88	sand to silty sand	60-70	38-40	44	UNDEFINED
27.75	91	179.26	1.36	0.76	2.91	sand	60-70	38-40	34	UNDEFINED
28.05	92	51.73	1.67	3.23	2.94	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
28.35	93	82.15	2.86	3.48	2.97	sandy silt to clayey silt	UNDFND	UNDFD	31	5.1
28.65	94	92.36	3.38	3.65	3.00	sandy silt to clayey silt	UNDFND	UNDFD	35	5.7
28.95	95	160.64	3.96	2.46	3.03	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
29.25	96	150.37	3.35	2.23	3.05	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
29.55	97	165.04	3.19	1.93	3.08	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
29.85	98	211.39	4.25	2.01	3.11	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.15	99	59.70	2.26	3.79	3.14	clayey silt to silty clay	UNDFND	UNDFD	29	3.5
30.45	100	31.52	0.78	2.48	3.17	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
30.75	101	44.12	1.69	3.83	3.20	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
31.05	102	37.28	1.77	4.76	3.22	silty clay to clay	UNDFND	UNDFD	24	2.0
31.35	103	95.97	3.26	3.39	3.25	sandy silt to clayey silt	UNDFND	UNDFD	37	5.9
31.65	104	317.74	5.55	1.75	3.28	sand to silty sand	80-90	40-42	>50	UNDEFINED
32.00	105	207.20	5.86	2.83	3.31	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
32.30	106	81.40	2.84	3.49	3.34	sandy silt to clayey silt	UNDFND	UNDFD	31	5.0
32.60	107	49.13	1.37	2.80	3.37	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7d



CPT-08-003	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-8a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-003
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	194.33	1.07	0.55	0.03	sand	>90	>48	37	UNDEFINED
0.60	2	113.82	1.27	1.11	0.09	sand to silty sand	>90	>48	27	UNDEFINED
0.95	3	56.03	1.63	2.91	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	61.88	2.07	3.34	0.22	sandy silt to clayey silt	UNDFND	UNDFD	24	4.1
1.55	5	46.25	1.21	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.85	6	67.11	1.84	2.74	0.33	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
2.15	7	97.86	2.93	3.00	0.39	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.45	8	52.21	1.11	2.12	0.45	sandy silt to clayey silt	UNDFND	UNDFD	20	3.4
2.75	9	14.50	0.39	2.69	0.51	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.05	10	10.33	0.38	3.63	0.57	clay	UNDFND	UNDFD	10	.6
3.35	11	9.85	0.42	4.30	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	23.30	0.62	2.64	0.64	clayey silt to silty clay	UNDFND	UNDFD	11	1.5
3.95	13	45.75	0.75	1.65	0.67	silty sand to sandy silt	50-60	38-40	15	UNDEFINED
4.25	14	16.32	0.39	2.42	0.69	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
4.55	15	11.85	0.29	2.48	0.72	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.85	16	9.10	0.29	3.14	0.75	silty clay to clay	UNDFND	UNDFD	6	.5
5.15	17	10.43	0.33	3.14	0.78	silty clay to clay	UNDFND	UNDFD	7	.6
5.45	18	13.44	0.33	2.43	0.81	clayey silt to silty clay	UNDFND	UNDFD	6	.8
5.75	19	10.57	0.38	3.60	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	15.08	0.48	3.15	0.86	silty clay to clay	UNDFND	UNDFD	10	.9
6.40	21	19.81	0.53	2.66	0.89	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
6.70	22	24.65	0.60	2.44	0.93	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
7.00	23	17.45	0.62	3.57	0.95	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	18.51	0.48	2.60	0.98	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
7.65	25	32.58	1.08	3.31	1.02	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
7.95	26	46.32	0.94	2.02	1.04	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
8.25	27	54.56	1.04	1.91	1.07	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
8.55	28	20.67	0.88	4.27	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	22.71	0.99	4.35	1.13	clay	UNDFND	UNDFD	22	1.4
9.15	30	13.39	0.54	4.05	1.16	clay	UNDFND	UNDFD	13	.7
9.45	31	24.92	1.31	5.25	1.19	clay	UNDFND	UNDFD	24	1.5
9.75	32	35.11	1.37	3.91	1.21	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
10.05	33	50.18	1.17	2.33	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
10.35	34	32.32	1.44	4.45	1.27	silty clay to clay	UNDFND	UNDFD	21	2.0
10.65	35	95.00	2.33	2.45	1.30	silty sand to sandy silt	60-70	38-40	30	UNDEFINED
10.95	36	79.01	2.32	2.94	1.33	sandy silt to clayey silt	UNDFND	UNDFD	30	5.1
11.25	37	32.63	1.17	3.57	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	81.49	3.02	3.70	1.38	clayey silt to silty clay	UNDFND	UNDFD	39	5.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	40.60	1.68	4.13	1.41	silty clay to clay	UNDFND	UNDFD	26	2.5
12.15	40	15.50	0.68	4.39	1.44	clay	UNDFND	UNDFD	15	.8
12.45	41	20.46	0.93	4.55	1.47	clay	UNDFND	UNDFD	20	1.2
12.80	42	130.77	3.33	2.55	1.50	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
13.10	43	138.62	2.87	2.07	1.53	silty sand to sandy silt	60-70	40-42	44	UNDEFINED
13.40	44	161.68	3.47	2.14	1.56	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
13.75	45	199.32	2.77	1.39	1.59	sand to silty sand	70-80	40-42	48	UNDEFINED
14.05	46	29.23	1.06	3.62	1.62	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.35	47	109.13	2.12	1.94	1.65	silty sand to sandy silt	60-70	38-40	35	UNDEFINED
14.65	48	181.84	3.07	1.69	1.68	sand to silty sand	70-80	40-42	44	UNDEFINED
14.95	49	156.24	3.03	1.94	1.70	silty sand to sandy silt	70-80	40-42	50	UNDEFINED
15.25	50	75.12	1.78	2.37	1.73	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
15.55	51	36.79	1.63	4.43	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	26.68	1.15	4.30	1.79	silty clay to clay	UNDFND	UNDFD	17	1.5
16.15	53	28.65	0.98	3.42	1.82	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
16.45	54	27.87	0.68	2.45	1.85	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
16.75	55	68.67	1.68	2.45	1.87	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
17.05	56	58.30	1.53	2.63	1.90	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
17.35	57	22.31	0.82	3.68	1.93	silty clay to clay	UNDFND	UNDFD	14	1.2
17.65	58	27.15	0.86	3.16	1.96	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
17.95	59	31.09	1.29	4.15	1.99	silty clay to clay	UNDFND	UNDFD	20	1.8
18.25	60	33.00	1.47	4.45	2.02	silty clay to clay	UNDFND	UNDFD	21	1.9
18.55	61	34.39	1.32	3.85	2.04	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
18.85	62	59.32	2.49	4.20	2.07	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
19.20	63	100.08	4.10	4.09	2.10	clayey silt to silty clay	UNDFND	UNDFD	48	6.4
19.50	64	60.03	2.58	4.30	2.13	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
19.80	65	62.52	2.93	4.69	2.16	silty clay to clay	UNDFND	UNDFD	40	3.9
20.15	66	45.80	2.27	4.96	2.19	silty clay to clay	UNDFND	UNDFD	29	2.7
20.45	67	39.51	2.08	5.25	2.22	clay	UNDFND	UNDFD	38	2.3
20.75	68	23.35	0.97	4.15	2.25	silty clay to clay	UNDFND	UNDFD	15	1.2
21.05	69	26.37	1.19	4.52	2.28	clay	UNDFND	UNDFD	25	1.4
21.35	70	29.19	1.47	5.02	2.31	clay	UNDFND	UNDFD	28	1.6
21.65	71	20.43	0.75	3.65	2.34	silty clay to clay	UNDFND	UNDFD	13	1.0
21.95	72	37.47	1.67	4.46	2.37	silty clay to clay	UNDFND	UNDFD	24	2.2
22.25	73	61.04	2.26	3.70	2.39	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
22.55	74	40.74	1.78	4.36	2.42	silty clay to clay	UNDFND	UNDFD	26	2.4
22.85	75	153.95	2.38	1.55	2.45	sand to silty sand	60-70	38-40	37	UNDEFINED
23.15	76	145.43	2.26	1.55	2.48	sand to silty sand	60-70	38-40	35	UNDEFINED
23.45	77	79.79	3.08	3.86	2.51	clayey silt to silty clay	UNDFND	UNDFD	38	5.0
23.75	78	166.37	3.12	1.87	2.54	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.05	79	86.63	2.13	2.46	2.56	sandy silt to clayey silt	UNDFND	UNDFD	33	5.4
24.35	80	121.85	2.70	2.22	2.59	silty sand to sandy silt	50-60	36-38	39	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	70.56	1.96	2.77	2.62	sandy silt to clayey silt	UNDFND	UNDFD	27	4.3
24.95	82	23.48	0.79	3.36	2.65	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
25.25	83	27.90	1.08	3.87	2.68	silty clay to clay	UNDFND	UNDFD	18	1.5
25.60	84	116.37	2.50	2.15	2.71	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
25.90	85	45.45	1.79	3.94	2.74	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.20	86	25.31	1.05	4.16	2.77	silty clay to clay	UNDFND	UNDFD	16	1.3
26.55	87	26.18	1.15	4.37	2.80	silty clay to clay	UNDFND	UNDFD	17	1.3
26.85	88	22.08	0.84	3.82	2.83	silty clay to clay	UNDFND	UNDFD	14	1.1
27.15	89	23.95	0.88	3.68	2.86	silty clay to clay	UNDFND	UNDFD	15	1.2
27.45	90	91.50	1.23	1.35	2.88	sand to silty sand	40-50	34-36	22	UNDEFINED
27.75	91	36.80	1.25	3.38	2.91	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
28.05	92	28.62	0.79	2.77	2.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
28.35	93	63.32	1.89	2.99	2.97	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
28.65	94	143.01	3.21	2.24	3.00	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
28.95	95	139.64	3.26	2.33	3.03	silty sand to sandy silt	60-70	36-38	45	UNDEFINED
29.25	96	77.29	3.22	4.16	3.05	clayey silt to silty clay	UNDFND	UNDFD	37	4.7
29.55	97	144.11	3.30	2.29	3.08	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
29.85	98	260.92	4.43	1.70	3.11	sand to silty sand	70-80	40-42	>50	UNDEFINED
30.15	99	239.29	4.51	1.89	3.14	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.45	100	76.41	2.91	3.81	3.17	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
30.75	101	39.98	0.85	2.13	3.20	sandy silt to clayey silt	UNDFND	UNDFD	15	2.2
31.05	102	36.80	1.41	3.83	3.22	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
31.35	103	302.36	4.13	1.37	3.25	sand	80-90	40-42	>50	UNDEFINED
31.65	104	401.48	6.37	1.59	3.28	sand to silty sand	80-90	40-42	>50	UNDEFINED
32.00	105	187.48	4.19	2.24	3.31	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
32.30	106	69.33	2.47	3.56	3.34	clayey silt to silty clay	UNDFND	UNDFD	33	4.2
32.60	107	131.64	3.09	2.35	3.37	silty sand to sandy silt	50-60	36-38	42	UNDEFINED
32.95	108	94.61	2.82	2.98	3.40	sandy silt to clayey silt	UNDFND	UNDFD	36	5.8
33.25	109	138.97	3.40	2.45	3.43	silty sand to sandy silt	50-60	36-38	44	UNDEFINED
33.55	110	48.16	1.68	3.48	3.46	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
33.85	111	96.45	3.23	3.35	3.49	sandy silt to clayey silt	UNDFND	UNDFD	37	5.9
34.15	112	167.98	4.29	2.56	3.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	154.78	3.87	2.50	3.55	silty sand to sandy silt	60-70	36-38	49	UNDEFINED
34.75	114	125.68	3.30	2.63	3.57	silty sand to sandy silt	50-60	34-36	40	UNDEFINED
35.05	115	37.68	1.39	3.70	3.60	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.35	116	35.49	1.27	3.57	3.63	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
35.65	117	37.17	1.41	3.78	3.66	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.95	118	43.23	1.66	3.84	3.69	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
36.25	119	48.24	1.79	3.72	3.72	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
36.55	120	40.35	1.31	3.23	3.74	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
36.85	121	44.49	1.56	3.52	3.77	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
37.15	122	49.84	1.64	3.29	3.80	clayey silt to silty clay	UNDFND	UNDFD	24	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	405.25	2.48	0.61	3.83	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
37.75	124	522.17	2.37	0.45	3.86	gravelly sand to sand	>90	42-44	>50	UNDEFINED
38.05	125	366.03	2.89	0.79	3.89	sand	80-90	40-42	>50	UNDEFINED
38.40	126	56.03	1.57	2.80	3.92	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
38.70	127	49.16	0.98	1.99	3.95	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
39.00	128	128.27	4.85	3.78	3.97	sandy silt to clayey silt	UNDFND	UNDFD	49	8.0
39.35	129	207.98	5.28	2.54	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.65	130	54.46	2.58	4.74	4.04	silty clay to clay	UNDFND	UNDFD	35	3.1
39.95	131	236.15	6.99	2.96	4.06	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.25	132	135.01	5.24	3.88	4.09	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
40.55	133	89.44	3.39	3.79	4.12	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
40.85	134	133.31	2.54	1.91	4.15	silty sand to sandy silt	50-60	34-36	43	UNDEFINED
41.15	135	356.55	3.44	0.97	4.18	sand	80-90	40-42	>50	UNDEFINED
41.45	136	364.45	4.41	1.21	4.21	sand	80-90	40-42	>50	UNDEFINED
41.75	137	111.47	3.66	3.28	4.23	sandy silt to clayey silt	UNDFND	UNDFD	43	6.8
42.05	138	163.59	4.57	2.80	4.26	silty sand to sandy silt	50-60	36-38	>50	UNDEFINED
42.35	139	249.43	5.82	2.33	4.29	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
42.65	140	236.17	3.79	1.60	4.32	sand to silty sand	70-80	38-40	>50	UNDEFINED
42.95	141	244.78	4.13	1.69	4.35	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.25	142	151.12	5.28	3.49	4.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
43.55	143	230.25	6.98	3.03	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	77.11	3.85	4.99	4.43	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.15	145	106.06	2.68	2.53	4.46	silty sand to sandy silt	40-50	32-34	34	UNDEFINED
44.45	146	89.20	2.17	2.44	4.49	silty sand to sandy silt	40-50	30-32	28	UNDEFINED
44.80	147	46.72	1.33	2.85	4.52	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
45.10	148	90.27	3.53	3.91	4.55	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
45.40	149	304.28	6.52	2.14	4.58	sand to silty sand	70-80	38-40	>50	UNDEFINED

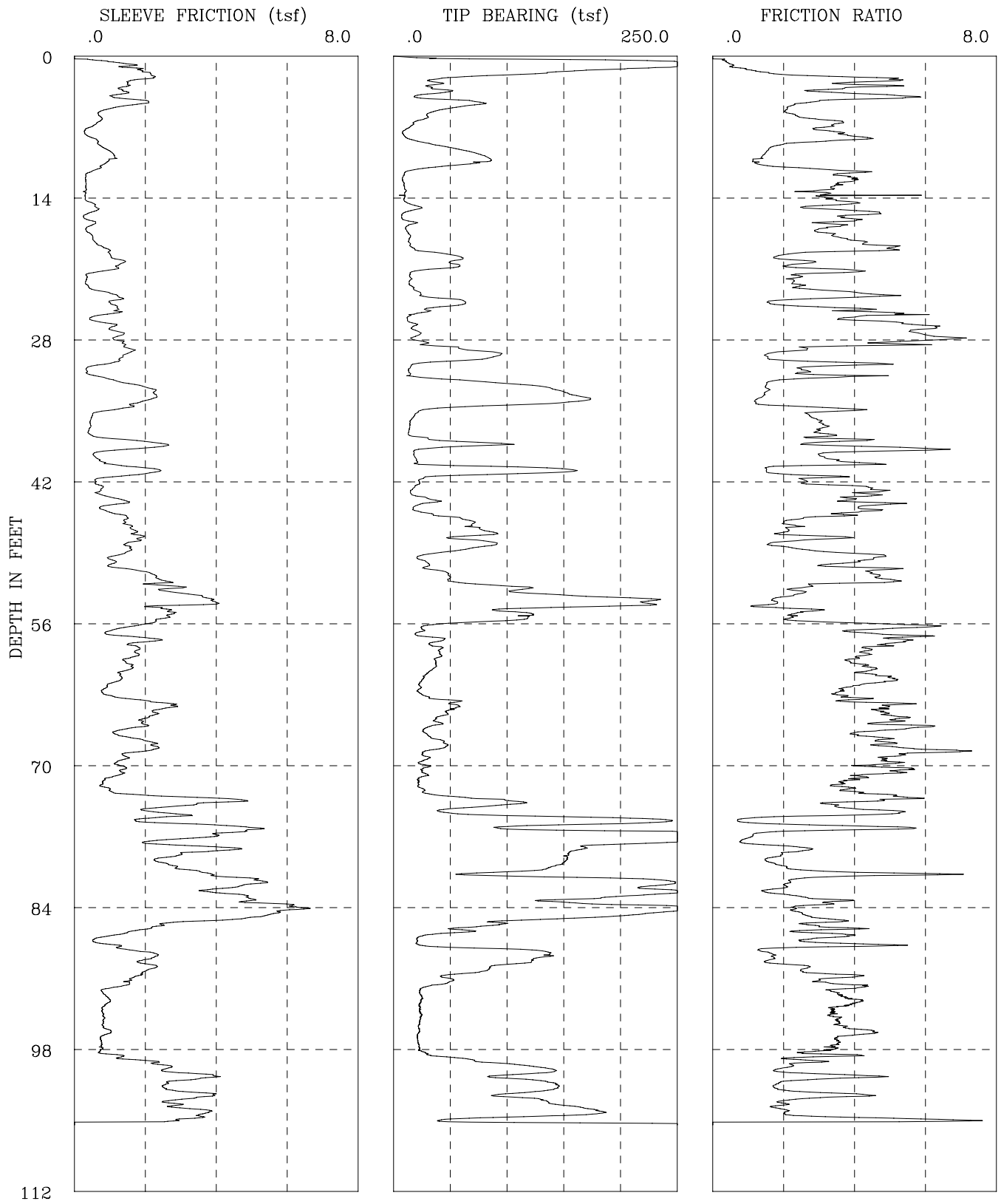
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-8d



CPT-08-007	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-9a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-007
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :03/28/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	216.40	0.96	0.45	0.03	sand	>90	>48	41	UNDEFINED
0.60	2	148.05	1.98	1.34	0.09	sand to silty sand	>90	>48	35	UNDEFINED
0.95	3	36.63	1.61	4.41	0.15	silty clay to clay	UNDFND	UNDFD	23	2.4
1.25	4	33.72	1.28	3.79	0.22	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
1.55	5	64.49	1.68	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.85	6	33.60	0.75	2.22	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.15	7	18.31	0.61	3.34	0.39	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
2.45	8	9.44	0.34	3.64	0.45	clay	UNDFND	UNDFD	9	.5
2.75	9	31.55	0.69	2.20	0.51	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
3.05	10	72.20	1.06	1.46	0.57	silty sand to sandy silt	60-70	42-44	23	UNDEFINED
3.35	11	64.99	0.86	1.32	0.61	silty sand to sandy silt	60-70	40-42	21	UNDEFINED
3.65	12	11.54	0.42	3.62	0.64	clay	UNDFND	UNDFD	11	.7
3.95	13	8.86	0.32	3.62	0.67	clay	UNDFND	UNDFD	8	.5
4.25	14	10.13	0.32	3.12	0.69	silty clay to clay	UNDFND	UNDFD	6	.6
4.55	15	15.04	0.48	3.21	0.72	silty clay to clay	UNDFND	UNDFD	10	.9
4.85	16	11.13	0.43	3.88	0.75	clay	UNDFND	UNDFD	11	.6
5.15	17	13.23	0.46	3.47	0.78	silty clay to clay	UNDFND	UNDFD	8	.8
5.45	18	13.02	0.42	3.24	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	14.38	0.64	4.45	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	39.97	1.00	2.49	0.86	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
6.40	21	52.08	1.27	2.44	0.89	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
6.70	22	15.80	0.47	2.97	0.93	clayey silt to silty clay	UNDFND	UNDFD	8	.9
7.00	23	15.40	0.37	2.40	0.95	clayey silt to silty clay	UNDFND	UNDFD	7	.9
7.35	24	33.74	1.09	3.22	0.98	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
7.65	25	46.17	1.13	2.44	1.02	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
7.95	26	16.16	0.72	4.48	1.04	clay	UNDFND	UNDFD	15	.9
8.25	27	17.66	1.02	5.79	1.07	clay	UNDFND	UNDFD	17	1.0
8.55	28	20.56	1.25	6.08	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	45.96	1.48	3.22	1.13	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.15	30	84.14	1.39	1.65	1.16	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
9.45	31	18.11	0.61	3.39	1.19	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
9.75	32	28.07	0.69	2.46	1.21	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
10.05	33	121.53	1.87	1.54	1.24	sand to silty sand	60-70	40-42	29	UNDEFINED
10.35	34	162.61	2.22	1.37	1.27	sand to silty sand	70-80	42-44	39	UNDEFINED
10.65	35	82.46	1.50	1.82	1.30	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
10.95	36	18.02	0.51	2.83	1.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
11.25	37	14.18	0.44	3.09	1.36	silty clay to clay	UNDFND	UNDFD	9	.7
11.55	38	22.16	0.78	3.51	1.38	clayey silt to silty clay	UNDFND	UNDFD	11	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-9b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.90	2.08	3.59	1.41	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
12.15	40	18.74	0.61	3.27	1.44	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
12.45	41	82.92	1.54	1.86	1.47	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
12.80	42	60.95	1.26	2.07	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	18.19	0.72	3.96	1.53	silty clay to clay	UNDFND	UNDFD	12	1.0
13.40	44	27.22	1.09	4.01	1.56	silty clay to clay	UNDFND	UNDFD	17	1.6
13.75	45	22.13	0.96	4.33	1.59	clay	UNDFND	UNDFD	21	1.2
14.05	46	58.74	1.44	2.45	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.35	47	77.98	1.64	2.11	1.65	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
14.65	48	72.15	1.76	2.43	1.68	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
14.95	49	62.49	1.51	2.42	1.70	sandy silt to clayey silt	UNDFND	UNDFD	24	3.9
15.25	50	25.22	1.09	4.32	1.73	silty clay to clay	UNDFND	UNDFD	16	1.4
15.55	51	36.25	1.53	4.22	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	51.84	2.38	4.59	1.79	silty clay to clay	UNDFND	UNDFD	33	3.2
16.15	53	107.86	2.72	2.52	1.82	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
16.45	54	202.76	3.78	1.87	1.85	sand to silty sand	70-80	40-42	49	UNDEFINED
16.75	55	138.33	2.65	1.92	1.87	silty sand to sandy silt	60-70	38-40	44	UNDEFINED
17.05	56	100.37	2.43	2.42	1.90	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
17.35	57	25.59	1.26	4.94	1.93	clay	UNDFND	UNDFD	25	1.4
17.65	58	34.30	1.82	5.31	1.96	clay	UNDFND	UNDFD	33	2.0
17.95	59	39.10	1.73	4.42	1.99	silty clay to clay	UNDFND	UNDFD	25	2.3
18.25	60	38.65	1.56	4.03	2.02	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
18.55	61	34.27	1.50	4.37	2.04	silty clay to clay	UNDFND	UNDFD	22	2.0
18.85	62	25.51	1.25	4.89	2.07	clay	UNDFND	UNDFD	24	1.4
19.20	63	23.04	0.85	3.71	2.10	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	44.90	1.96	4.37	2.13	silty clay to clay	UNDFND	UNDFD	29	2.7
19.80	65	50.87	2.44	4.79	2.16	silty clay to clay	UNDFND	UNDFD	32	3.1
20.15	66	37.85	1.98	5.22	2.19	clay	UNDFND	UNDFD	36	2.2
20.45	67	28.16	1.29	4.58	2.22	clay	UNDFND	UNDFD	27	1.6
20.75	68	42.73	2.05	4.80	2.25	silty clay to clay	UNDFND	UNDFD	27	2.5
21.05	69	31.04	1.80	5.81	2.28	clay	UNDFND	UNDFD	30	1.7
21.35	70	27.73	1.31	4.73	2.31	clay	UNDFND	UNDFD	27	1.5
21.65	71	26.57	1.33	4.99	2.34	clay	UNDFND	UNDFD	25	1.4
21.95	72	21.70	0.81	3.75	2.37	silty clay to clay	UNDFND	UNDFD	14	1.1
22.25	73	30.80	1.36	4.41	2.39	silty clay to clay	UNDFND	UNDFD	20	1.7
22.55	74	95.42	3.88	4.06	2.42	clayey silt to silty clay	UNDFND	UNDFD	46	6.0
22.85	75	63.37	2.47	3.90	2.45	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
23.15	76	196.07	2.70	1.38	2.48	sand to silty sand	70-80	40-42	47	UNDEFINED
23.45	77	239.29	4.55	1.90	2.51	sand to silty sand	70-80	40-42	>50	UNDEFINED
23.75	78	255.20	2.71	1.06	2.54	sand	80-90	40-42	49	UNDEFINED
24.05	79	158.51	3.65	2.30	2.56	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	149.73	2.50	1.67	2.59	sand to silty sand	60-70	38-40	36	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-9c

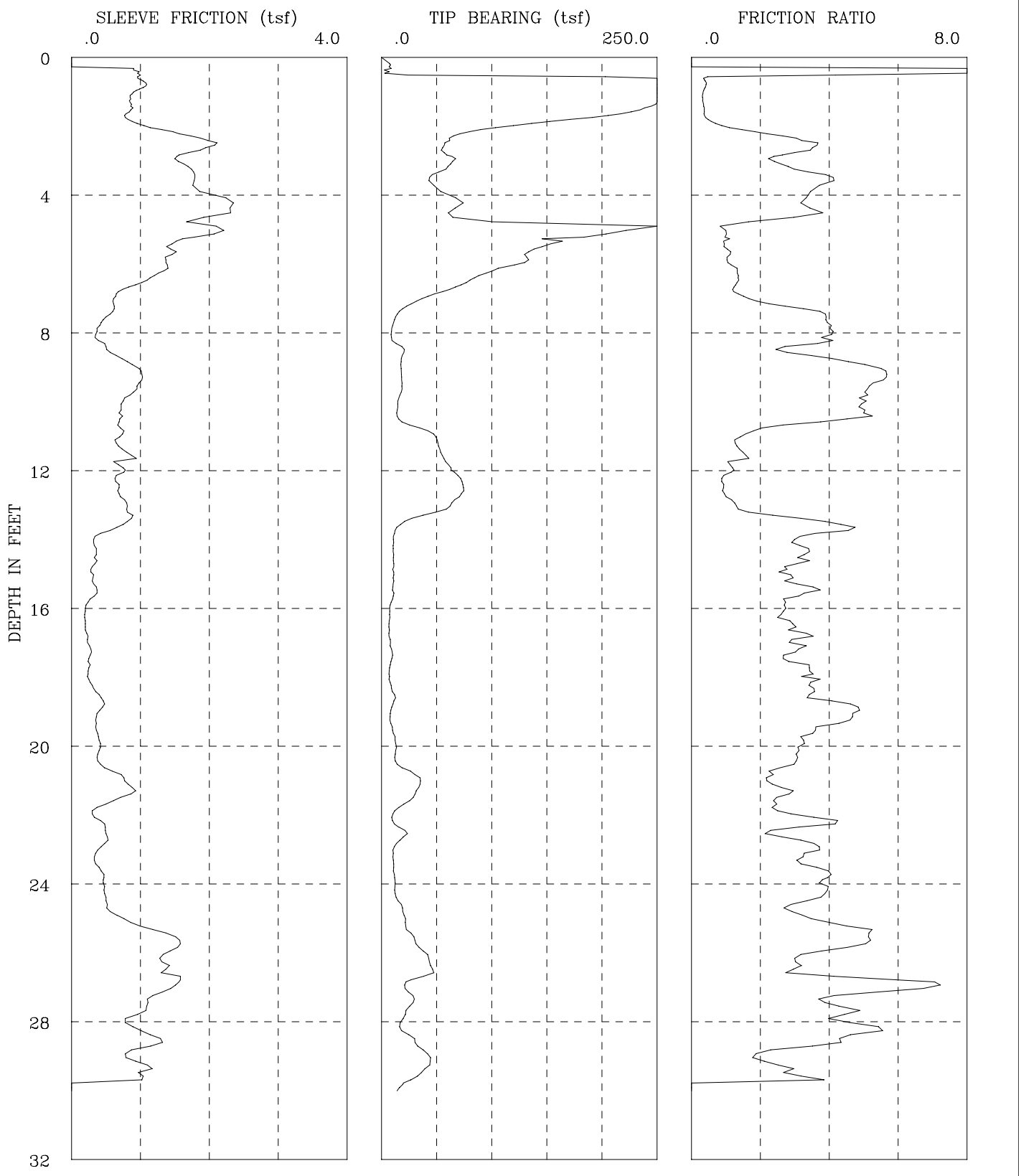
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	103.90	3.48	3.35	2.62	sandy silt to clayey silt	UNDFND	UNDFD	40	6.6
24.95	82	226.47	5.02	2.22	2.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
25.25	83	233.29	4.22	1.81	2.68	sand to silty sand	70-80	40-42	>50	UNDEFINED
25.60	84	190.99	5.45	2.86	2.71	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
25.90	85	225.64	5.62	2.49	2.74	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
26.20	86	93.86	3.01	3.20	2.77	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
26.55	87	40.37	1.25	3.11	2.80	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
26.85	88	41.22	0.99	2.41	2.83	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
27.15	89	133.06	2.15	1.62	2.86	sand to silty sand	50-60	36-38	32	UNDEFINED
27.45	90	100.53	2.07	2.06	2.88	silty sand to sandy silt	50-60	34-36	32	UNDEFINED
27.75	91	57.92	1.80	3.11	2.91	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
28.05	92	37.83	1.33	3.52	2.94	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
28.35	93	23.96	0.86	3.60	2.97	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
28.65	94	23.41	0.89	3.79	3.00	silty clay to clay	UNDFND	UNDFD	15	1.1
28.95	95	23.63	0.81	3.44	3.03	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
29.25	96	22.55	0.82	3.64	3.05	silty clay to clay	UNDFND	UNDFD	14	1.1
29.55	97	21.59	0.88	4.06	3.08	silty clay to clay	UNDFND	UNDFD	14	1.0
29.85	98	22.18	0.77	3.45	3.11	clayey silt to silty clay	UNDFND	UNDFD	11	1.0
30.15	99	37.59	1.04	2.77	3.14	sandy silt to clayey silt	UNDFND	UNDFD	14	2.1
30.45	100	106.00	2.43	2.29	3.17	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
30.75	101	114.31	3.36	2.94	3.20	sandy silt to clayey silt	UNDFND	UNDFD	44	7.2
31.05	102	139.99	2.63	1.88	3.22	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.35	103	112.41	3.46	3.08	3.25	sandy silt to clayey silt	UNDFND	UNDFD	43	7.0
31.65	104	148.84	2.83	1.90	3.28	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
32.00	105	128.25	3.49	2.72	3.31	silty sand to sandy silt	50-60	36-38	41	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-9d



CPT-08-121	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-10a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-121
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	137.74	0.82	0.59	0.03	sand	>90	>48	26	UNDEFINED
0.60	2	211.26	0.87	0.41	0.09	sand	>90	>48	40	UNDEFINED
0.95	3	64.09	1.71	2.67	0.15	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.25	4	53.29	1.89	3.54	0.22	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
1.55	5	125.87	2.11	1.68	0.28	silty sand to sandy silt	>90	46-48	40	UNDEFINED
1.85	6	138.02	1.46	1.06	0.33	sand to silty sand	>90	46-48	33	UNDEFINED
2.15	7	66.57	0.90	1.36	0.39	silty sand to sandy silt	60-70	42-44	21	UNDEFINED
2.45	8	13.36	0.48	3.56	0.45	silty clay to clay	UNDFND	UNDFD	9	.8
2.75	9	16.74	0.65	3.89	0.51	silty clay to clay	UNDFND	UNDFD	11	1.0
3.05	10	17.31	0.91	5.27	0.57	clay	UNDFND	UNDFD	17	1.1
3.35	11	26.34	0.71	2.69	0.61	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
3.65	12	56.16	0.76	1.34	0.64	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.95	13	70.37	0.70	0.99	0.67	sand to silty sand	60-70	40-42	17	UNDEFINED
4.25	14	26.09	0.67	2.57	0.69	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
4.55	15	10.86	0.33	3.06	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	10.00	0.30	3.03	0.75	silty clay to clay	UNDFND	UNDFD	6	.6
5.15	17	7.20	0.21	2.88	0.78	clay	UNDFND	UNDFD	7	.4
5.45	18	8.28	0.26	3.09	0.81	clay	UNDFND	UNDFD	8	.4
5.75	19	9.55	0.37	3.85	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	9.74	0.37	3.84	0.86	clay	UNDFND	UNDFD	9	.5
6.40	21	20.01	0.52	2.58	0.89	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
6.70	22	23.31	0.61	2.61	0.93	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
7.00	23	15.08	0.47	3.10	0.95	silty clay to clay	UNDFND	UNDFD	10	.9
7.35	24	11.32	0.41	3.64	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	17.72	0.60	3.36	1.02	silty clay to clay	UNDFND	UNDFD	11	1.0
7.95	26	31.58	1.39	4.40	1.04	silty clay to clay	UNDFND	UNDFD	20	2.0
8.25	27	35.23	1.42	4.03	1.07	silty clay to clay	UNDFND	UNDFD	23	2.2
8.55	28	23.55	1.00	4.27	1.10	silty clay to clay	UNDFND	UNDFD	15	1.4
8.85	29	31.56	1.03	3.26	1.13	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-10b

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed by GDC and laboratory subconsultants Geologic Associates of Anaheim, California, using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples were then transported to our Aliso Viejo geotechnical laboratory and to Geologic Associates for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of moisture content and dry unit weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Consolidation, R-Value, and Soil Corrosivity. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The soil classifications are presented on key for soil classification and on the boring logs Figures A-1a through A-5f of Appendix A.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented on the boring logs in Figures A-2a through A-5f of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a and A-5f of Appendix A and in Figures B-1a to B-1b of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided graphically in Figure B-2. The relative proportion (or percentage) by dry weight of fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a through A-5f of Appendix A.

B.6 Direct Shear Test

To determine the shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under two additional normal loads. The test results are presented in Figures B-3a to B-3b.

B.7 Consolidation Test

One-dimensional consolidation test was performed on selected undisturbed samples in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation tests are graphically shown in Figures B-4a through B-4c.

B.8 R-Value

A Resistance or R-Value test was performed on selected bulk samples of the subgrade soils encountered under proposed pavement locations. The test was conducted in general accordance with CTM 301. The test results are summarized in Table B-1.

TABLE B-1:
SUMMARY OF R-VALUE TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	R-Value
A-08-120	B-1	1 - 5	SM	54
R-08-004	B-1	1.5 – 3.5	CL	39
R-08-005	B-1	2 - 5	CL	25

B.9 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included soil pH (Caltrans method 643), water-soluble chlorides (Caltrans Test Method 422), water-soluble sulfates (Caltrans Test Method 417) and electrical resistivity (Caltrans Test Method 643). The test results are summarized in Table B-2.

TABLE B-2:
SUMMARY OF CORROSION TEST RESULTS

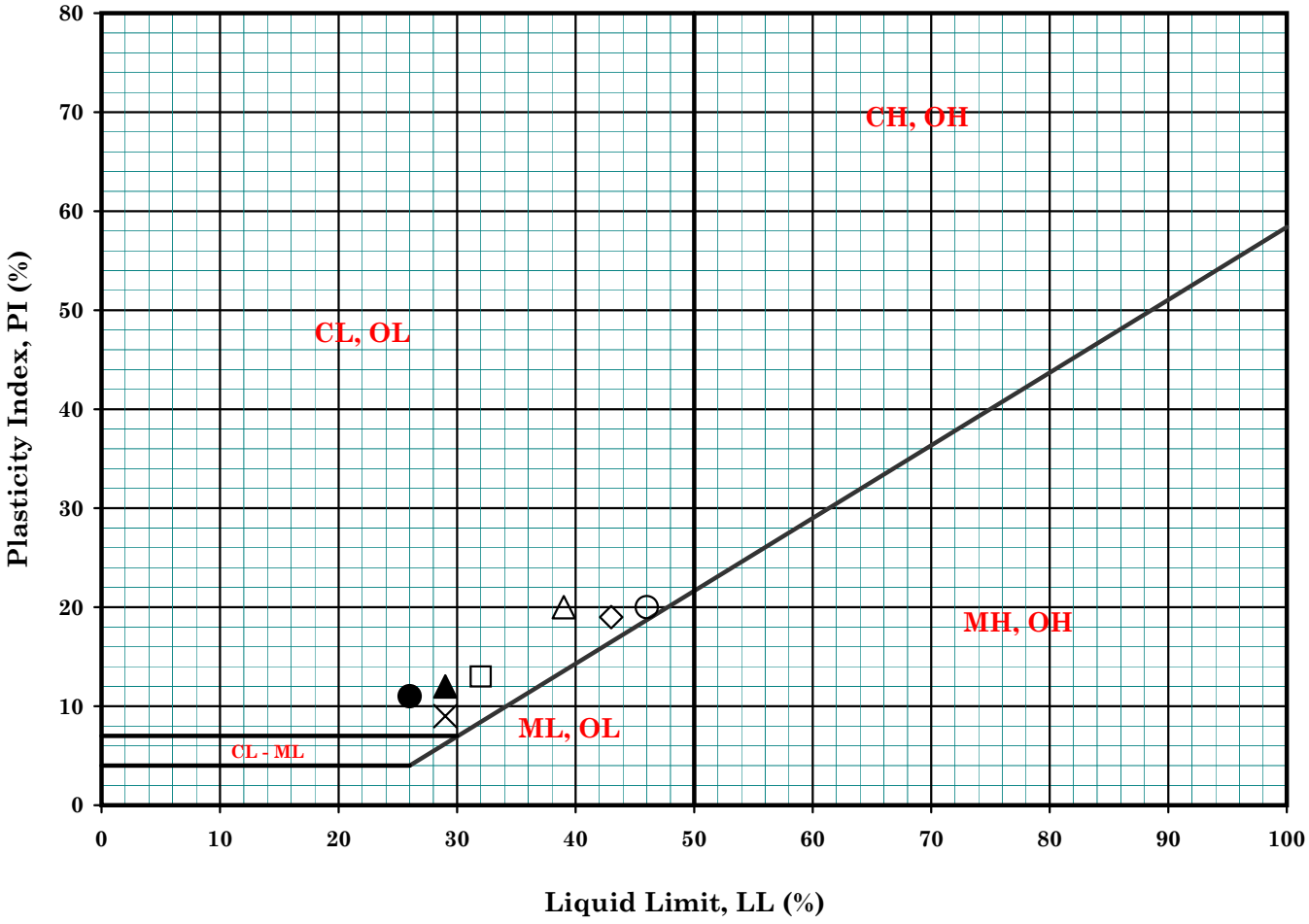
Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-122	B-1	1.2-5	SC	2750	8.3	132	163
R-08-004	B-1	1.5-3.5	CL	1350	9.1	465	604

B.10 List of Attached Figures

The following figures are attached and complete this appendix:

Figures B-1a, b	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figures B-3a, b	Direct Shear Test Results
Figures B-4a through B-4c	Consolidation Test Results

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-122	B-1	1.0	5.0	0.3	1.5	7	26	15	11	-0.73	Light Brown Clayey Sand (SC)
▲	R-08-004	B-1	1.3	3.5	0.4	1.1	16	29	17	12	-0.08	Dark Brown Sandy Lean Clay (CL)
X	R-08-005	B-1	2.0	5.0	0.6	1.5	16	29	20	9	-0.44	Gray Sandy Lean Clay (CL)
□	R-08-005	R-1	6.0	6.5	1.8	2.0	19	32	19	13	0.00	Dark Gray Sandy Lean Clay (CL)
○	R-08-005	S-6	30.0	32.0	9.2	9.8	41	46	26	20	0.75	Gray Brown Lean Clay (CL)
△	R-08-005	S-7	40.0	41.5	12.2	12.7	31	39	19	20	0.60	Gray Brown Lean Clay (CL)
◇	R-08-005	R-9	71.0	71.5	21.7	21.8	45	43	24	19	1.11	Lean Clay with Sand (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

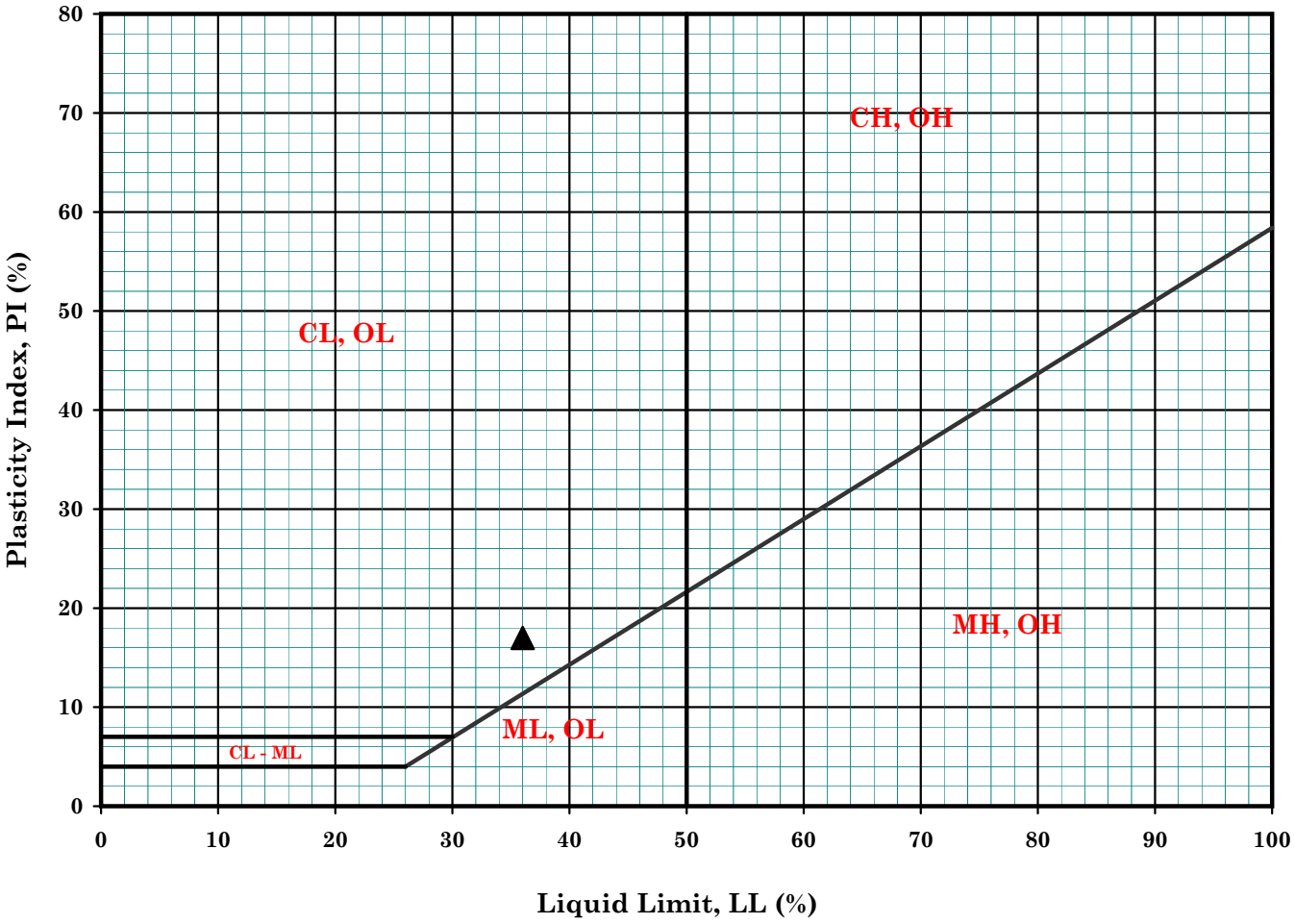
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1a

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
▲	A-08-120	R-4	16.0	16.5	4.9	5.0	29	36	19	17	0.59	Dark Brown Lean Clay with Sand (CL)
◆	A-08-120	R-8	36.0	36.5	11.0	11.1	25	Non-Plastic			-	Dark Brown Sandy Silt (ML)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

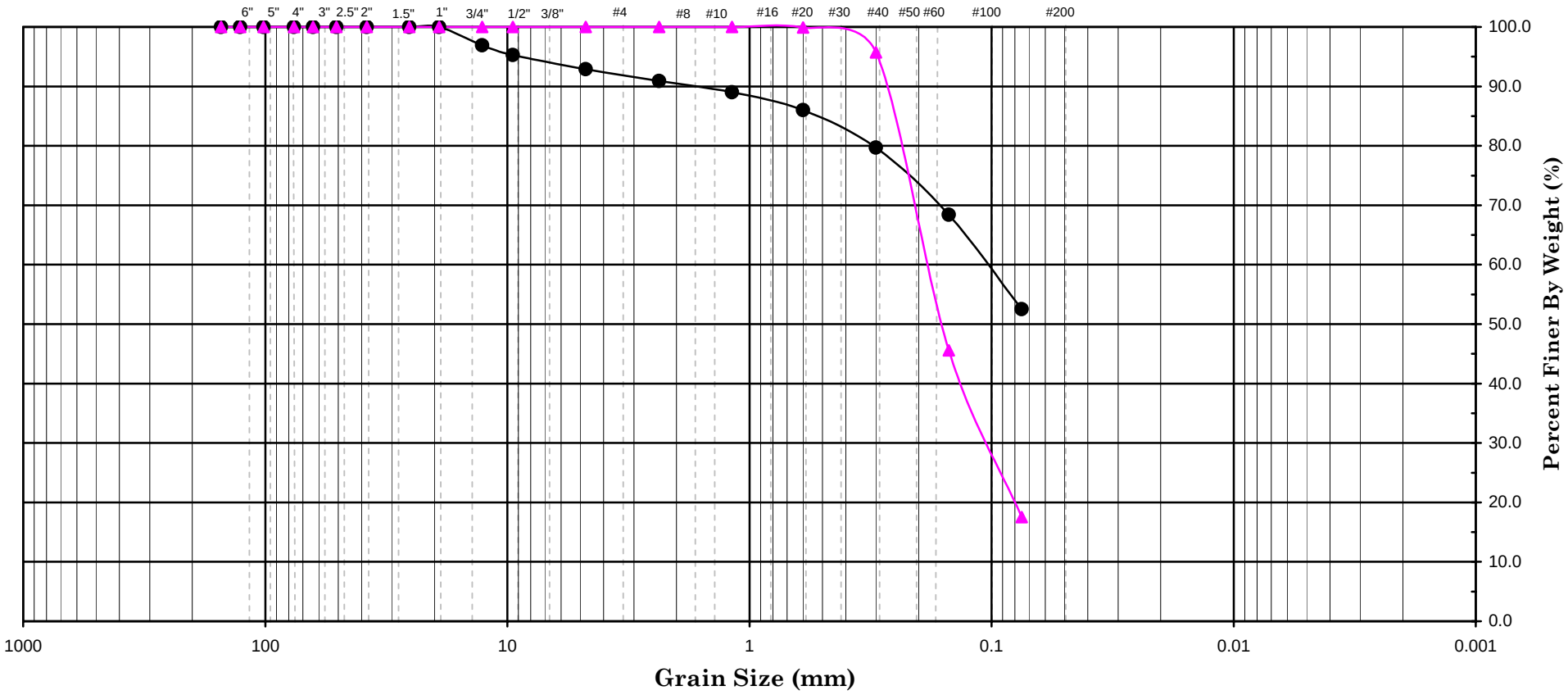
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1b

US Standard Sieve Sizes	Hydrometer Analysis



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	R-08-005	R-1	5.0	6.5	1.53	1.98	Gray	Sandy Lean Clay (CL)	CL
▲	R-08-005	S-2	10.0	11.5	3.05	3.51	Gray Brown	Silty Sand (SM)	SM

Remark :

GROUP DELTA CONSULTANTS

SR-22

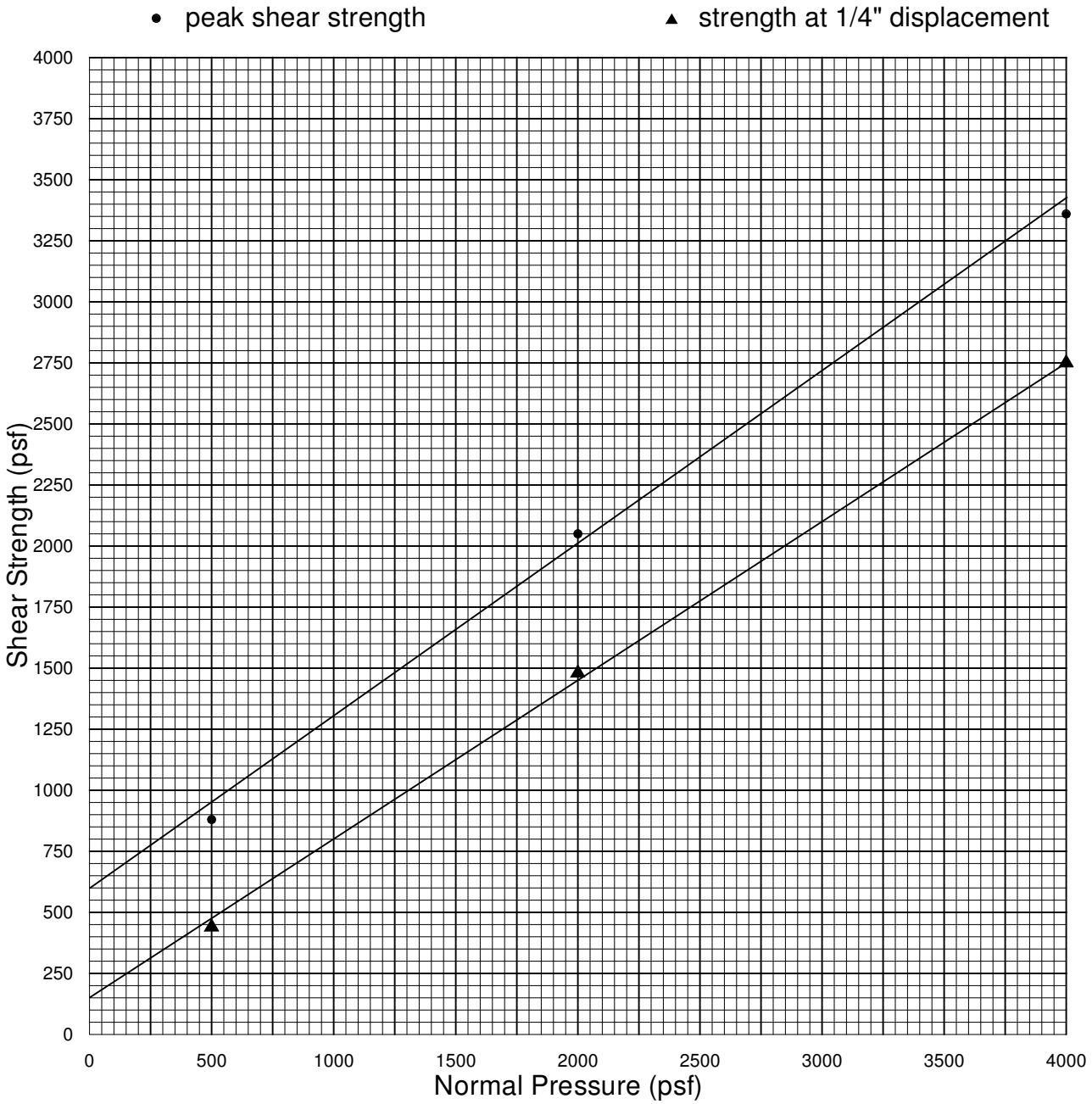
GRAIN SIZE ANALYSIS

(ASTM D-422-63)

Project No. : *I-436* **Date :** *05/28/08*

Figure No. : **B-2**

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-004 @ 3'-5'	Undisturbed & Saturated	Clayey Silt / Clayey Sand	120.4	10.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	880 @ 0.0750"	440
2000	2050 @ 0.1000"	1480
4000	3360 @ 0.1050"	2750
	C = 600 psf	C = 150 psf
	ϕ = 35 deg.	ϕ = 33 deg.

Figure B-3a

Geo**L**ogic **A**ssociates

DIRECT SHEARS

GLA JOB NO. : **2002-017**
CLIENT: **Group Delta # I-436**
JOB NAME:

DATE: 6/12/2008

BY: LD

SAMPLE	DESCRIPTION	DRY DENSITY (PCF)	WATER CONTENT (%)	SHEAR RATE (IN/MIN.)	NORMAL STRESS (PSF)	PEAK SHEAR STRESS (PSF)	SHEAR STRESS (PSF) @ 0.25 IN.
R-08-004 / R-6	Clayey Silt w. Siltstone	96.4	26.7	0.0042	1500	1200 @ 0.095	1100
R-08-005 / R-3	Silty Clay	99.3	25.3	0.0042	800	780 @ 0.11	700
R-08-005 / R-3	Silty Clay	99.0	25.3	0.0042	5000	3350 @ 0.185	3320

Figure B-3b

CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	A-08-120	Depth:	15' - 16.5'	Date	05-13-08

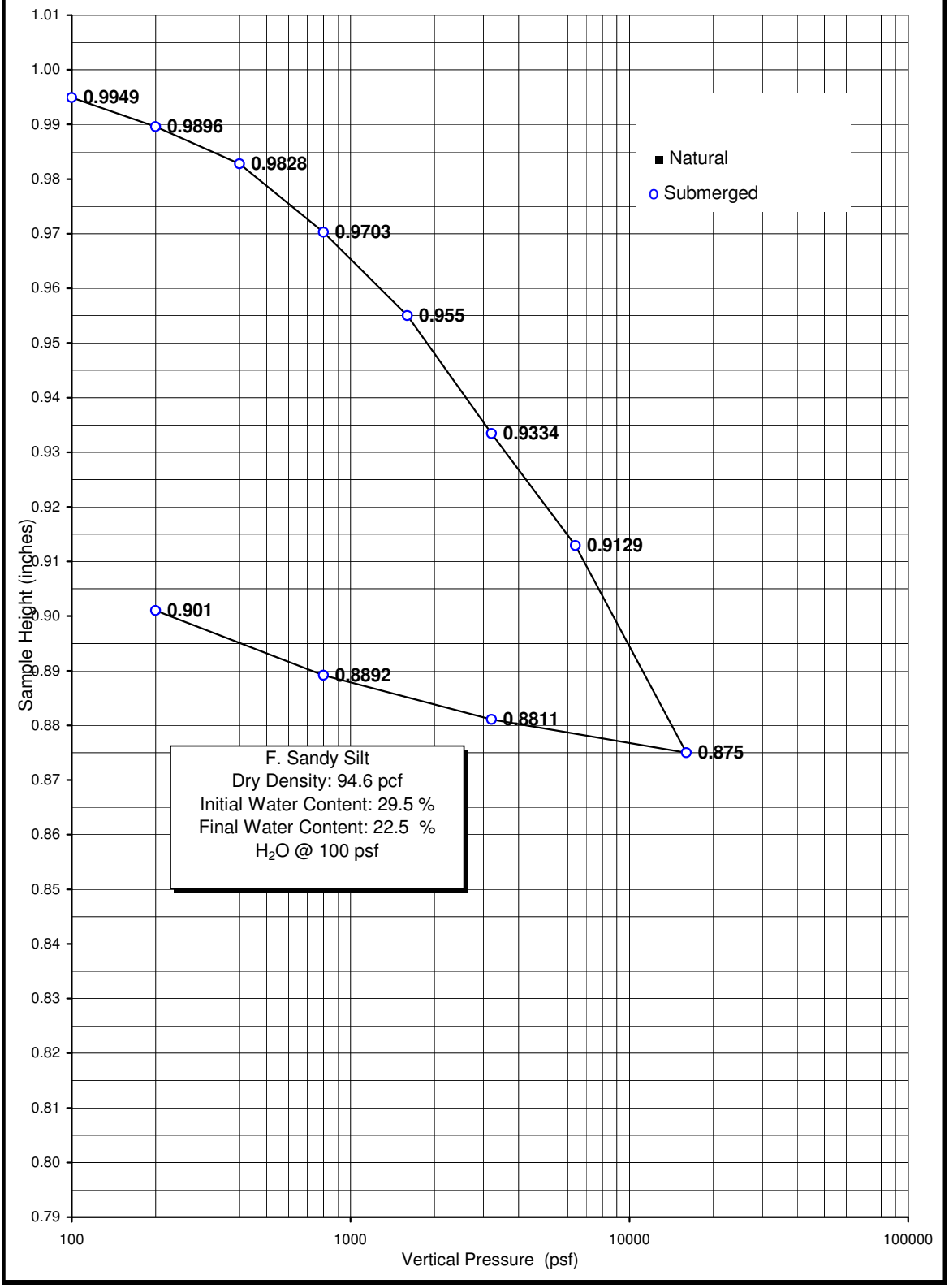


Figure No. B-4a

CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	A-08-122	Depth:	5' - 6.5'	Date	05-13-08

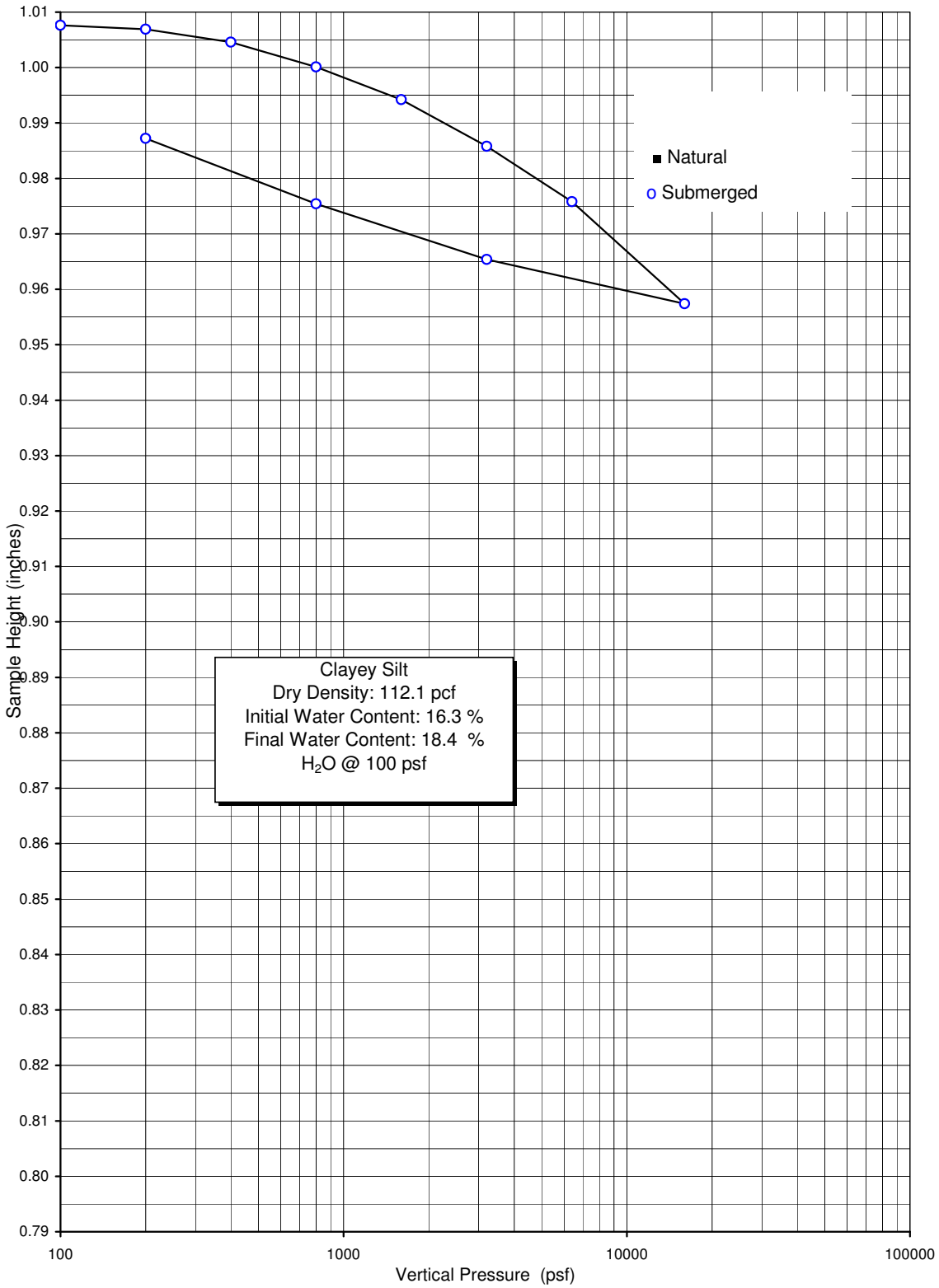


Figure No. B-4b

CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	R-08-005	Depth:	5' - 6.5'	Date	05-13-08

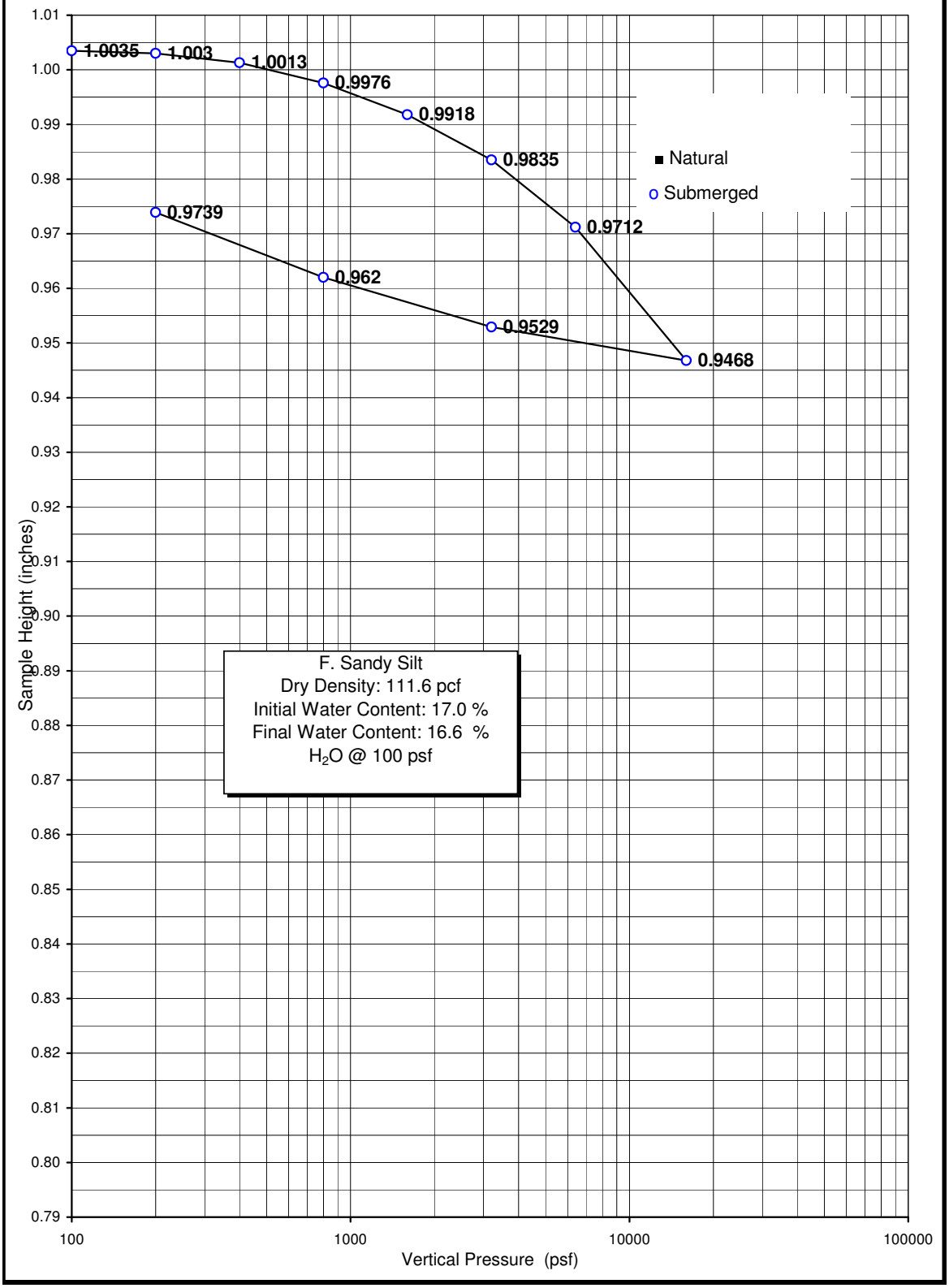


Figure No. B-4c

APPENDIX C
ACI GUIDE FOR CAST-IN-PLACE LOW-DENSITY CELLULAR CONCRETE

Guide for Cast-in-Place Low-Density Cellular Concrete

Reported by ACI Committee 523

Edward M. "Ned" Glysson
Chair

Ronald E. Barnett
Secretary

Felipe Babbitt
Bill T. Dye
Fouad H. Fouad
Dean M. Golden
Werner H. Gumpertz
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Frances A. McNeal-Page
Ali M. Memari
Edgar Nunez
Caijun Shi
Konstantin Sobolev
Jennifer E. Tanner
Peter T. Yen
Ronald F. Zollo

This guide provides information on the materials, properties, design, proper handling, and applications of cast-in-place low-density cellular concretes having oven-dry densities of 50 lb/ft^3 (800 kg/m^3) or less. Roof deck systems and geotechnical applications often incorporate these low density cellular concretes.

Keywords: cellular concrete; engineered fill; foaming agent, geotechnical fill; insulating concrete; insulating concrete roof decks: low-density cellular concrete; low-density controlled low-strength material (LD-CLSM); preformed foam.

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Reference to this document shall not be made in contract documents. If items found in this document are desired by the Architect/Engineer to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the Architect/Engineer.

ACI 523.1R-06 supersedes ACI 523.1R-92 and became effective August 15, 2006.
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CHAPTER 1-GENERAL

1.1—Definition of cellular concrete

Low-density cellular concrete (Fig. 1.1) is defined as concrete made with hydraulic cement, water, and preformed foam to form a hardened material having an oven-dry density of 50 lb/ft^3 (800 kg/m^3) or less. These mixtures may include aggregate and other material components including, but not limited to, fly ash and chemical admixtures.

This guide provides data and techniques pertaining to the properties and applications of cast-in-place low-density cellular concrete. Common applications of cast-in-place low-density cellular concrete are on roof decks and geotechnical applications. On roof decks, the material provides roofing base, thermal insulation, and drainage slope for flat-roofed industrial and commercial buildings (Fig. 1.2).

In geotechnical applications, the material is applied in thick sections of cellular concrete with low compressive strengths (Fig. 1.3) for the replacement of poor soils, fills for abandoned structures (pipelines), and cellular concrete fills designed, mixed, and placed to meet specific job conditions and functional requirements.

1.2—Definition of low-density, controlled low-strength material (LD-CLSM)

Controlled low-strength material (CLSM) is a cementitious material that is in a flowable state at the time of placement, and that has a specified compressive strength of 1200 psi (8.3 MPa) or less at the age of 28 days. This material is discussed further in ACI 229R. Low-density CLSM (LD-CLSM) meets this definition, and has a cast density that is controllable from 20 to 50 lb/ft^3 (320 to 800 kg/m^3). The quantity of preformed foam in the mixture determines the mixture's final density.

CHAPTER 2—MATERIALS

The basic materials in low-density cellular concrete are cement, water, and preformed foam. Because the main ingredient by volume of a low-density cellular concrete mixture is preformed foam, it is critical that all admixtures be compatible with the preformed foam within the specific mixture. Trial mixture tests are needed to determine compatibility and the resulting physical properties. Low-density cellular concrete mixtures may also include supplementary cementitious materials.

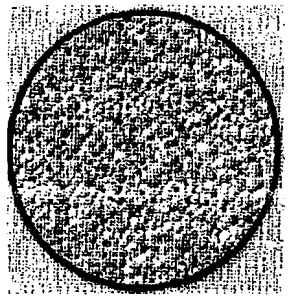


Fig. 1.1—Typical cell structure of cellular concrete.

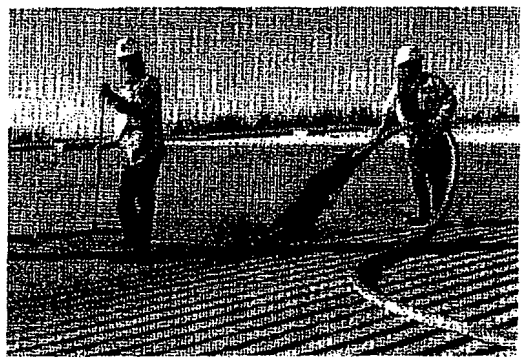


Fig. 1.2—Roof deck application (click on picture to view video).

Fig. 1.3—Geotechnical application (click on picture to view video).

2.1—Cement

The cement should meet the requirements of ASTM C 150 (portland cement), C 595 (blended cement), or C 1157 (hydraulic cement). Blended cements include cement containing combinations of portland cement, pozzolans, slag, other hydraulic cement, or some combination of these. Blended cement may result in lower rates of early strength

development and should be tested for specific applications. High-early-strength (Type III or HE) cement produces cellular concrete with higher rates of early strength development.

2.2—Water

Mixing water for concrete should be clean and free from detrimental amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete or reinforcement. Any nonpotable water should be tested for hardness, pH, suspended solids, total salt content, and other characteristics that might affect the preformed foam. the setting time, and the strength of the low-density cellular concrete.

2.3—Preformed foam

Preformed foam is created by diluting a liquid foam concentrate with water in predetermined proportions (Fig. 2.1) and passing this mixture through a foam generator. Meter the preformed foam directly into the cement-water slurry at the job site (Fig. 2.2). The density of the preformed foam is typically between 25 and 4.0 lb/ft^3 (40 and 65 kg/m^3).

The foam concentrate should have a chemical composition capable of producing and maintaining stable air cells within the concrete mixture. The air cells should be able to resist the physical and chemical forces imposed during mixing, pumping, placing, and setting of the cellular concrete. If the cellular (air-cell) structure is not stable, it may break down under these forces, resulting in an increased concrete density. Most common proprietary formulations of foam concentrates contain. protein hydrozylates or synthetic surfactants. ASTM C 796 provides a standard method for laboratory measurement of the performance of a foaming chemical to be used in producing foam (air cells) for making cellular concrete. ASTM C 869 is a standard specification that covers foaming agents specifically formulated for making preformed foam for use in the production of cellular concrete. This specification provides the means for evaluating the performance of a specific foaming agent. Further information concerning these formulations and the procedures for using them is available from foam manufacturers.

2.4—Aggregates

Low-density cellular concrete may include lightweight aggregates such as vermiculite or perlite meeting the requirements of ASTM C 332 Group 1 to lower the slump to achieve steeper roof slopes, and to maintain moisture in dry climates. Wilson (1981) provides additional information on the use of lightweight aggregates used in cellular concrete. Any proposed aggregates should be tested for physical properties, pumpability, and compatibility in trial mixtures.

2.5—Admixtures

2.5.1 Chemical admixtures—Chemical admixtures, such as water-reducing admixtures and set accelerators, are used with cellular concretes. Water-reducing admixtures can improve compressive strength for special mixtures or applications. Hot water, high-early-strength (Type III or HE) cement, and chemical accelerators can be used singly or in combination

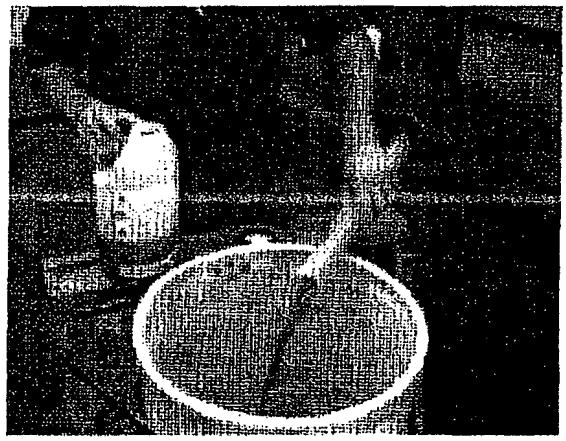


Fig. 2.1—Diluting foam concentrate in water (click on picture to view video).

Fig. 2.2—Metering preformed foam into cement-water slurry (click on picture to view video).

to accelerate setting. Accelerators containing chloride ions should not be used in cellular concrete placed in contact with steel. Chemical admixtures should conform to ASTM C 494 and be used at dosages recommended by the manufacturer or determined by trial mixtures.

Not all chemical admixtures are compatible for use in foamed cellular concrete. Individual manufacturers of foam concentrate should be contacted for information about the compatibility of specific admixtures with their foam concentrates, and trial batches should be used to determine the resulting mixture characteristics.

2.5.2 Supplementary cementitious materials—In the production of cellular concrete, supplementary cementitious materials such as fly ash, silica fume, high reactivity metakaolin, or ground-granulated blast-furnace slag. (slag cement) are included to reduce bleeding and segregation and to increase strength. Trial batches should be used to confirm the compatibility of the selected foam concentrate with other admixtures, and to help determine the proper admixture dosages and resulting physical properties. Various mineral admixtures may differ considerably in composition, fineness, and other properties. The user should review major fly ash properties—loss on ignition (LOI), cementing activity, and

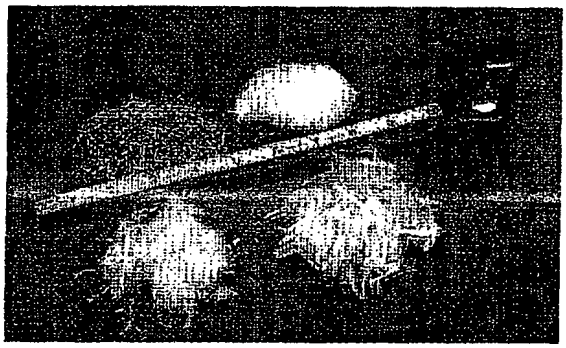


Fig. 2.3—Typical fiber types.

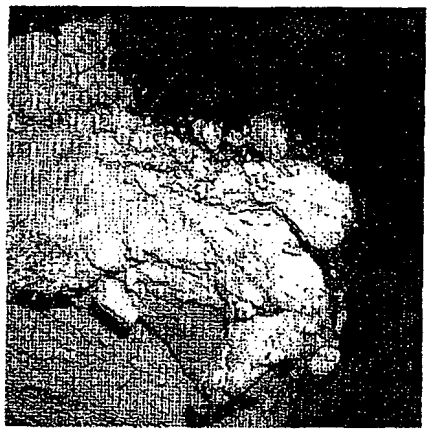


Fig. 2.4—Fibers in cellular concrete.

water demand of the fly ash—before including fly ash in a low-density cellular concrete mixture. The first of these properties (LOI) is addressed in ASTM C 618. A fly ash with a high LOI (carbon content) may adversely affect the preformed foam by causing an increase in density and loss of yield. If cementing activity is low, the concrete may set too slowly, resulting in a lower strength and a higher density. High water demand may require that the water-cementitious material ratio *(w/cm)* be adjusted to achieve the desired strength.

2.6 — Nonstandard materials

Special cements, supplementary cementitious materials, and aggregates may be included as nonstandard materials. Some mine-fill applications may use local materials as aggregates or fillers in low-density cellular concrete to extend the mixture when transportation of materials to remote areas is difficult. The user should pretest nonstandard mixtures for proper development of the desired fill properties.

2.7—Fiber reinforcement

Low-density cellular concrete may include commercially available fibers, such as nylon, polypropylene, polyester, and alkali-resistant glass, as reinforcing materials (Fig. 2.3). The choice of fiber type depends on performance requirements. Cellular concrete's flexural and tensile strength, impact resistance, fatigue limit, energy absorption, and spalling resistance can be enhanced through the use of fibers that are known to be sufficiently durable under the expected service conditions. Zollo and Hays (1998) address the material and engineering properties of fiber-reinforced cellular concrete. Fibers can also help control plastic shrinkage cracking (Fig. 2.4).

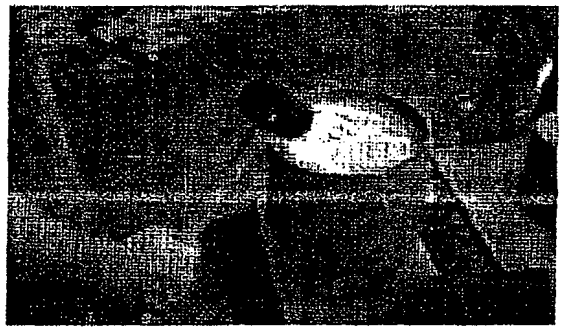


Fig. 3.1—Measuring as-cast *density* (click on *picture to view video).*

CHAPTER 3--PHYSICAL PROPERTIES

3.1—As-cast density

The as-cast density at the point of placement should be determined by calculating the density of samples using a container of known volume and empty weight, as prescribed in applicable sections of ASTM C 796 (Fig. 3.1). Monitoring the as-cast density of the cellular concrete is an important job-site quality-assurance tool for controlling the uniformity and density of the mixture at the point of placement. Procedures for sampling and testing hardened insulating cellular concrete are given in ASTM C 513.

3.2—Oven-dry density

Oven-dry density, evaluated using ASTM C 796 and C 495, determines the unit weight used to define low-density cellular concrete, which by definition has a maximum oven-dry density of 50 lb/ft^3 (800 kg/m^3).

3.3--Compressive strength

The relationship between compressive strength and as-cast density is an important indicator of the quality of cellular concrete (Kearsley and Wainwright 2002b). The compressive strength of cellular concrete should be evaluated in accordance with ASTM C 796 and C 495. Compressive strength specimens should not be oven-dried. When it is necessary to determine oven-dry density, it is necessary to make companion specimens for this test in addition to those specimens for compressive strength testing. The user should relate compressive strength to the oven-dry density of cellular concrete as indicated in Table 3.1. Table 3.1 is a guideline only, based on Type I cement, no cement substitution, and using local materials. The user should test specific local materials to determine these properties.

For geotechnical applications, the cast density of the material is usually the most significant property and is more important than bearing capacity (unconfined compressive

Table 3.1—Possible ranges of compressive strength and modulus of elasticity versus oven-dry density for cellular concrete In roof deck applications

Oven-dry density		Usual range of compressive strength at 28 days		Modulus of elasticity	
lb/ft^3	kg/m^3	psi	MPa	10^3 psi	GPa
20 to 25	320 to 400	70 to 125	0.48 to 0.86	30 to 52	0.21 to 0.36
25 to 30	400 to 480	125 to 225	0.86 to 1.55	52 to 89	0.36 to 0.61
30 to 35	480 to 560	225 to 350	1.55 to 2.41	89 to 135	0.61 to 0.93
35 to 40	560 to 640	350 to 450	2.41 to 3.10	135 to 183	0.93 to 1.26
40 to 50	640 to 800	450 to 750	3.10 to 5.17	183 to 320	1.26 to 2.21

Table 3.2—Physical properties for geotechnical (Engineered Fill 2001)

Maximum cast density		Minimum compressive strength		Bearing capacity	
lb/ft^3	kg/m^3	lb/in.^{2}	MPa	ton/ft^2	MPa
24	385	10	0.07	0.7	0.07
30	480	40	0.28	2.9	0.28
36	575	80	0.55	5.8	0.56
42	675	120	0.83	8.6	0.82
50	800	160	1.10	11.5	1.10

strength). As a result, these densities and compressive strengths are lower than those for roof deck applications (Table 3.2). If standard materials are used, the density of the low-density cellular concrete has properties that fall within ranges specified by the manufacturer of the foam concentrate. If nonstandard materials are used, special test batches may be required to confirm specific properties. To define the general relationship between cast density and compressive strength for specific applications, one manufacturer has divided the cast density into convenient ranges.

Because the need for controlled low-density fill is usually the main reason for using lowdensity cellular concrete, compressive strengths and ultimate bearing capacities require only minimum values. For specialized low-density cellular concrete geotechnical applications, other physical properties may be required.

Cellular concrete with a compressive strength below 70 psi (0.48 MPa) has proven satisfactory for special application. such as pipe and wall insulation, tunnel and mine fills, energy absorption or shock mitigation, and backfills in sewer and highway construction per ACI SP-29 (ACI Committees 213 and 523 1971).

3.4--Drying shrinkage

Drying shrinkage is not usually critical in cellular concrete used for roof deck insulation or geotechnical applications. The reason for this is that when cellular concrete is used to insulate roof decks, it is not considered to contribute structurally; and when it is used in geotechnical applications, any shrinkage cracking that it might undergo does not significantly reduce bearing capacity. Drying shrinkage is typically 0.30 to 0.60% after 6 months at 50% relative humidity and 73 °F (23 °C), and increases with decreasing density. Some of the effects of drying shrinkage can be mitigated by adding fibers to the mixture (Section 2.7). Figure 3.2 relates drying shrinkage at 56 days to the air-dry density of cellular concrete (ASTM C 157).

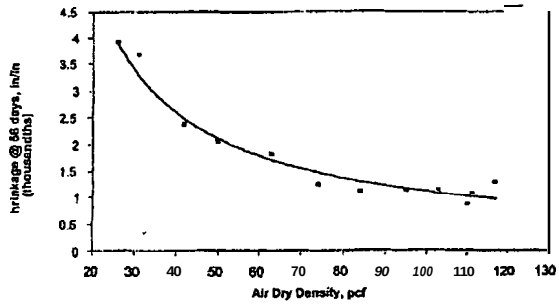


Fig. 32—Drying shrinkage versus air-dry shrinkage (I in = 25.4mm; I lb/ft^3 = 16.0 kg/m^3).

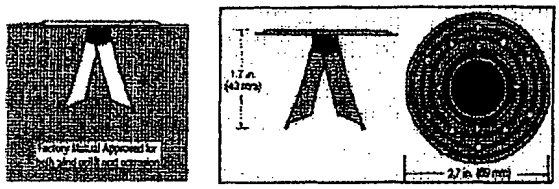


Fig. 3.3 –Typical base-sheet nail.

3.5—Thermal expansion

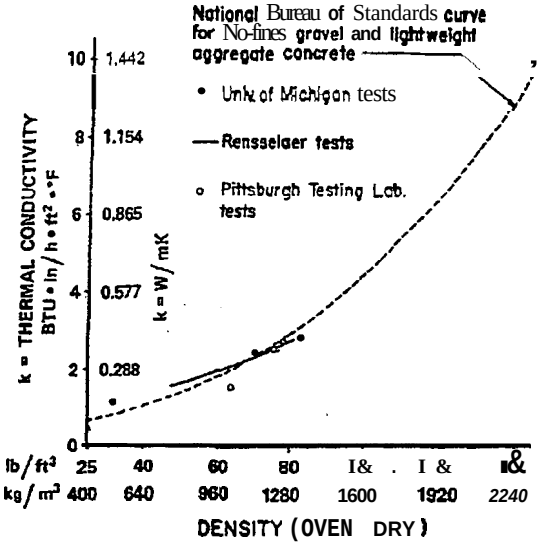
The coefficient of thermal expansion for cellular concrete varies directly with density, and is typically 5.0 to 7.0 × 10^{-6} per °F (9.0 to 12.6 x 10^{-6} per °C) as evaluated using a linear thermal expansion test with strain gauges. The designer should consider thermal expansion in applications with significant variation in placing temperatures, operating temperatures, or bath. These conditions could occur in applicationssuch as roof decks, power plants, ovens, and steam lines.

3.6—Walkability

Walkability, a term developed to describe the ability of low-density concrete to sustain normal construction-foot trafficwithoutdamage, is best judged by examining surface distress. Walkability improves with increased density. When heavy construction traffic is expected (such as from wheelbarrows, scaffolds, material storage, or pathways), the surface of the roof deck should be protected with wooden boards or by a similar method.

3.7—Mechanical attachment

For roof deck applications, the roofing base sheet should be mechanically attached to the low-density cellular concrete roof deck using specifically designed nails or screws (Fig. 3.3). Fastening within 2 to 7 days of concrete placement is possible if the fastener can be installed without shattering or spalling the cellular concrete and if an installed fastener has a minimum specified withdrawal resistance of 40 lb (180 N), which is consistent with required wind-uplift resistance and typical nailing patterns (such as three rows,



THERMAL CONDUCTIVITY VERSUS OVEN-DRY DENSITY

Fig. 3.4—Thermal conductivity versus oven-dry *density (National Bureau of Standards 1955).*

uniformly spaced over the width of each base sheer, and using a nail spacing of 7-1/2 in. [190 mm] in each row). Because no consensus standard exists, nailing patterns are generally qualified by product- and pattern-specific testing, and are published in evaluation-service reports (ANSI/SPRI FX-1-2001 2001).

3.8—Thermal conductivity

The thermal conductivity of cellular concrete should be measured using the guarded hot plate (ASTM C 177) or the heat flow meter (ASTM C 518) methods. A full-scale assembly is measured by a hot box apparatus (ASTM C 1363). Table 3.3 lists typical thermal conductivity values. These values follow the curve of Fig. 3.4, originally produced by the National Bureau of Standards (1955).

3.9—Fire resistance

The fire resistance of cellular concrete in a building system is determined by a fire test, during which the cellular concrete element must support its design load, remain within the temperature increase specified by the test standard, and withstand the transmission of flame or hot gasses per ASTM E 119. Information on the demonstrated fire resistance of slabs with cellular concrete and charts for estimating the fire resistance of various two-course roofs is available (Abrams and Gustaferro 1969; Gustaferro et al. 1970).

Fire-resistance tests have been conducted on wall, floor, and roof assemblies of cellular concrete cast over concrete (precast or cast-in-place), galvanized steel, and wood substrates. Some of these assemblies contain expanded polystyrene insulation board sandwiched within the cellular concrete. Recognized laboratories, such as Underwriters Laboratories, Inc., publish construction details for the tested assemblies, including fire ratings in hours evaluated using ASTM E 119.

Table 3.3--Typical thermal conductivity values for oven-dry cellular concrete

Oven-dry density		Thermal conductivity, K	
lb/ft³	kg/m³	BTU × in. (h × ft² × °F)	w/(m × K)
20	320	0.75	0.11
30	480	0.91	0.13
40	640	1.11	0.16
50	800	1.36	0.20

3.10-Permeability

Generally, low-density cellular concrete has a low coefficient of permeability k that is constant throughout the lower-density ranges (Kearsley and Wainwright 2001a). The coefficient of permeability is inversely related to the effective confining pressure on the sample. Because lowdensity cellular concrete is a rigid material rather than a yielding soil, its permeability is measured using a modified triaxial-type test including a confining pressure to prevent direct passage of water (short-circuiting) along the interface between the specimen and the confining membrane. A constant head should be-maintained during the test. Reported values range from 1×10^{-4} to 1×10^{-5} mm/s (4×10^{-6} to 4×10^{-7} in./s) (ASTM D 2434).

3.11—Freezing-and-thawing resistance

Freezing-and-thawing resistance of low-density cellular concrete is evaluated using Procedure B (rapid freezing and thawing) of ASTM C 666, with a modified cycling protocol involving a longer thawing period. This modification is necessary because the insulating properties of low-density cellular concrete prevent rapid lowering and raising of the temperatures at the interior of the specimen, and thus prevent completion of a freezing-and-thawing cycle in the originally prescribed maximum 4-hour time period.* Lowdensity cellular concrete intended for exterior exposure should have a relative dynamic modulus of elasticity E at least 70% of its original value after 120 cycles when tested according to Procedure B of the modified ASTM C 666. Because the freezing-and-thawing resistance of low-density cellular concrete increases with increasing density, cellular concrete within 2 to 3 ft (0.6 to 1 m) of a surface subjected to cycles of freezing and thawing while exposed to water must have a density of at least 36 lb/ft³ (575 kg/m³). MacDonald et al. (2004) provide an evaluation of the freezing-and-thawing performance and testing of cellular concrete.

CHAPTER 4--PROPORTIONING AND TESTING

4.1—Proportioning

Guidance for mixture proportioning is generally available from the manufacturer of foam concentrates. The mixture proportion specifies the range of proportions of the various ingredients needed to attain the desired physical properties (density and compressive strength). The user should test mixture proportions when nonstandard materials or special applications are involved.

*Personal correspondence from E. L. Bidwell, University of Illinois, to Elastizell Corp. of America, and report, "Freeze Thaw Testing of Low Density," *Elastizell Lightweight Concrete*, Apr. 2, 1975.

4.2—Ingredient compatibility

Each ingredient that does not meet standard specifications for mixture compatibility should have the cellular concrete physical properties checked in actual mixtures according to ASTM C 796 and C 869. Cements may have significant strength variations within standard specification limits. Mill reports and test batches are useful for reviewing the product differences between cement and fly ash sources. Kearsley and Wainwright (2002a) demonstrate how to optimize fly ash content for strength.

4.3—Cast density

Measuring the cast density at the point of placement is the simplest and most convenient test for monitoring the quality of the placed material. Cylinder specimens for compressive strength tests, usually measuring 3 x 6 in. (76 x 150 mm), should be cast at the same time that periodic density tests are performed. These samples should be covered and stored in a protected area for at least 24 hours before they are transported to the testing laboratory for testing in accordance with ASTM C 796.

4.4—Physical properties

For standard mixtures made from standard materials, cast density determines the physical properties of the cellular concrete. It is not necessary to repeat the specialized tests of materials for each project. These specialized tests include permeability and freezing-and-thawing resistance; they may require up to 3 months to complete. Strength and density determinations are often sufficient. If unique applications or nonstandard materials are used, special tests may be required. A special test is one related to the performance of the material in the specialized application. Legatski (1994) provides a detailed review of testing the properties of cellular concrete.

CHAPTER 5—BATCHING, MIXING, PLACING, FINISHING, AND CURING

5.1—Storage of materials

All materials should be stored in a manner to prevent deterioration and contamination by foreign matter.

5.2—Batching

Materials for low-density cellular concrete are typically proportioned and batched on site, directly into a specialized mixer. The cement, fly ash, and other dry materials are weighed on a calibrated scale, and the mixing water is metered. The preformed foam is metered into the mixture through a calibrated nozzle. The accuracy of each batching device is critical to the final mixture density and its subsequent reproducibility. Each batching device (scales, water meter, foam-generating nozzle) should be calibrated before starting a project, and during a project if there is a reason to believe it is necessary.

5.3—Mixing

Mechanically mixing cellular concrete produces a uniform distribution of materials with a suitable consistency at the specified as-cast density. Excessive mixing should be avoided, as it may cause changes in density and consistency.

In batch mixing, the mixer should be charged with mixture water and dry ingredients, followed by special admixtures and the preformed foam. The as-cast density should be monitored at the point of placement every 30 to 60 minutes based on consistency of results. Allowance should be made for any density changes that result from placing methods or conditions, such as pumping distances and extreme weather conditions. Ingredients should be added in the proper proportions and sequence during continuous mixing operations. This is necessary to ensure reasonable uniformity and achieve the required as-cast density at the point of placement.

Standard concrete mixing equipment is normally not acceptable for low-density cellular concrete mixtures because the action of the mixer does not combine the ingredients with the correct speed and mixing action. A high-speed paddle mixer is preferable because it properly combines the ingredients and blends the preformed foam rapidly and efficiently to produce a uniformly consistent lowdensity cellular concrete mixture. Other mixers and processes that produce uniform mixtures include high-shear mixers.

5.4—Placing

Cellular concrete should be placed by a progressive-cavity pump or a peristaltic pump. The pump hose should be large enough in diameter (usually 2 to 2.5 in. [51 to 64 mm]) to ensure uniform delivery of cellular concrete at the point of placement without damage to the structure or substrate. Low-density cellular concrete can be pumped over long distances (over–1500 ft [460 m]). This is a major advantage for low-density cellular concrete over other materials and placing methods, and is important on large, congested projects with difficult access.

5.5—Finishing

For roof deck applications, cellular concrete should be finished to the slope and thickness specified on the project drawings. A minimum slope for proper roof drainage is 2% (equivalent to 1/4 in./ft [21 mm/m]). It is possible to place this material on steeper slopes. The cellular concrete surface is usually finished with a darby or screeded to the specified slope (Fig. 5.1). The surface should be smooth and free from ridges, projections, and depressions that might adversely affect the roofing membrane.

For geotechnical applications, lift thicknesses ranging from 2 to 4 ft (0.6 to 1.2 m) are typical. The lift thickness is job-specific and related to the project layout and casting procedure. A greater lift thickness is acceptable for specific job conditions. The heat of hydration developed within the mass, the material density, the cement content, and the ambient temperature also influence the lift thickness. Thinner castings reduce the heat buildup from hydration of the cement. It is desirable to cast material in a formed area within 1 or 2 hours to permit an undisturbed setting. In general, lowdensity cellular concrete should be cast to final grade with a tolerance of 0.1 ft (0.03 m). It is not necessary intermediate lift surfaces. A darby finish is acceptable for the final lift.

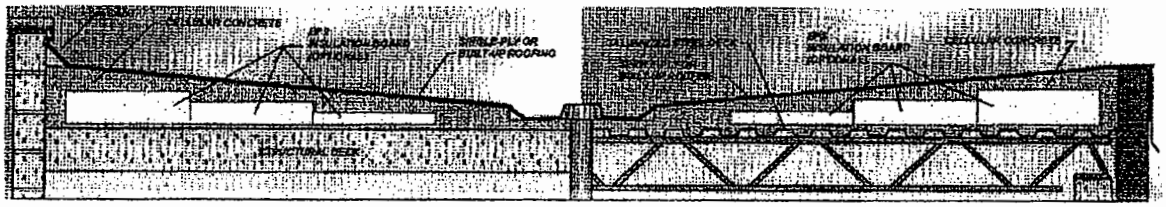


Fig. 5.1—Typical roof deck cross sections.

5.6—Curing

Water curing or use of a curing compound is advisable for roof deck applications when rapid drying is anticipated. Curing compounds should be compatible with the final roofing system. Traffic should not be permitted on freshly placed cellular concrete roof decks until adequate walkability (Section 3.6) is demonstrated. Check with the manufacturer of foaming agent for specific recommendations to ensure compatibility with subsequent roofing membrane material.

5.7—Placement in cold weather conditions

When ambient temperatures below 32 °F (0 °C) are predicted within 8 hours after placement, special precautions should be taken, including the use of Type III (high early-strength) cement or Type I cement with heated mixing water to increase the initial internal temperature of the concrete and accelerate the setting time. Because of the relatively high cement content and insulation properties of cellular concrete, these precautions are usually adequate. Cellular concrete should not be mixed or placed during freezing weather, rain, or snow, or when standing water, snow, or ice is present on the deck. The foaming agent manufacturer should be consulted for specific cold weather placement recommendations.

5.8—Placement in hot weather conditions

When expecting ambient temperatures above 100 °F (38 °C) during casting, the following special precautions should be considered:

- Casting before dawn will avoid the heat of the day;
- Vermiculite or perlite aggregate may be used as an additive to maintain moisture in the mixture;
- Fiber reinforcement may be incorporated in the mixture to minimize plastic-shrinkage cracking;
- The roof deck may be moist-cured by fogging after casting; and
- The roofing membrane may be installed as soon as the moisture content is deemed acceptable for the roofing application. The installation may begin as soon as 2 days after casting.

The foaming agent manufacturer should be consulted for specific hot weather application recommendations.

CHAPTER 6—DESIGN CONSIDERATIONS FOR ROOF DECKS

6.1—Form systems

A common application of cellular concrete is as insulation for concrete roof deck fills. The cellular concrete is cast over the structural deck system of the building. Typical deck types include corrugated or fluted steel, structural concrete, and wood.

6.1.1 *Steel*—Casting cellular concrete against permanent, uncoated structural metal formwork is not good concrete construction practice. Steel embedded in cellular concrete should be protected from corrosion in a manner consistent with its service environment (refer to ACI 222R).

Corrugated or fluted steel deck should be galvanized, coated, or both to meet the requirements of ASTM A 653. Steel decks are designed for gravity loads by selecting an appropriate steel gauge and deck profile, depending on the load and the span. The deck should be attached to the framing by welds or mechanical fasteners according to the deck manufacturer's recommendations and as required to resist the specified loadings, as determined by the designer with due consideration to diaphragm strength, uplift, and other structural design requirements. The steel sheets should be vented, with bottom slots having an open area of at least 0.5% of the plan area (Fig. 6.1). Side-lap embossments improve bond, which is important under seismic loading and wind uplift.

6.1.2 *Structural concrete*—A structural concrete base for cellular concrete (Fig. 6.2), whether cast-in-place or precast, may require venting for moisture relief that can be achieved with unsealed joints between precast structural concrete elements or by venting (refer to Fig. 6.3).

6.1.3 *Wood*—Cellular concrete is cast over structural wood roof decks to produce the proper slope for drainage and for thermal insulation (Fig. 6.4). A waterproof membrane, such as an asphalt-saturated felt, should be securely fastened to the wooden deck with the edges sealed before the cellular concrete fill is placed.

6.2—Roofing readiness

A roof membrane can generally be installed 2 to 5 days after a cellular concrete roof deck has been cast if the moisture content is deemed to be acceptable for roofing membrane application. The surface hardness of the cellular concrete should be adequate to withstand foot traffic and other light roofing operations without damage. The screeded surface of the cellular concrete should be smooth and free from ridges or depressions that would adversely affect the integrity of the roofing membrane. Ridges should be scraped flat. Roofing base sheets are commonly attached to the roof deck by nailing. The roofing membrane is commonly attached to the base sheet by mopping or torch-heating. Other roofing-attachment systems should be compatible with

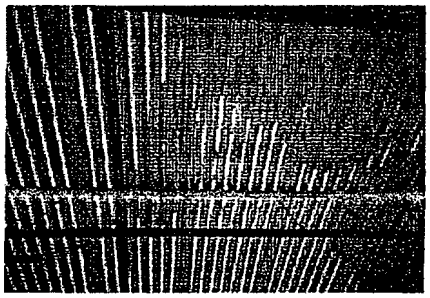


Fig. 6.1—Casting cellular concrete over vented steel deck.

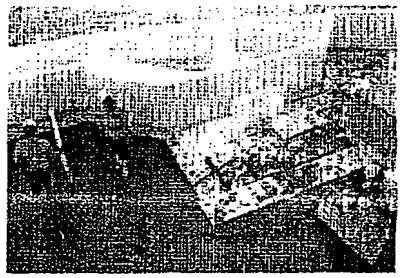


Fig. 6.2—EPS insulation board placed in cellular concrete slurry over structural concrete deck.

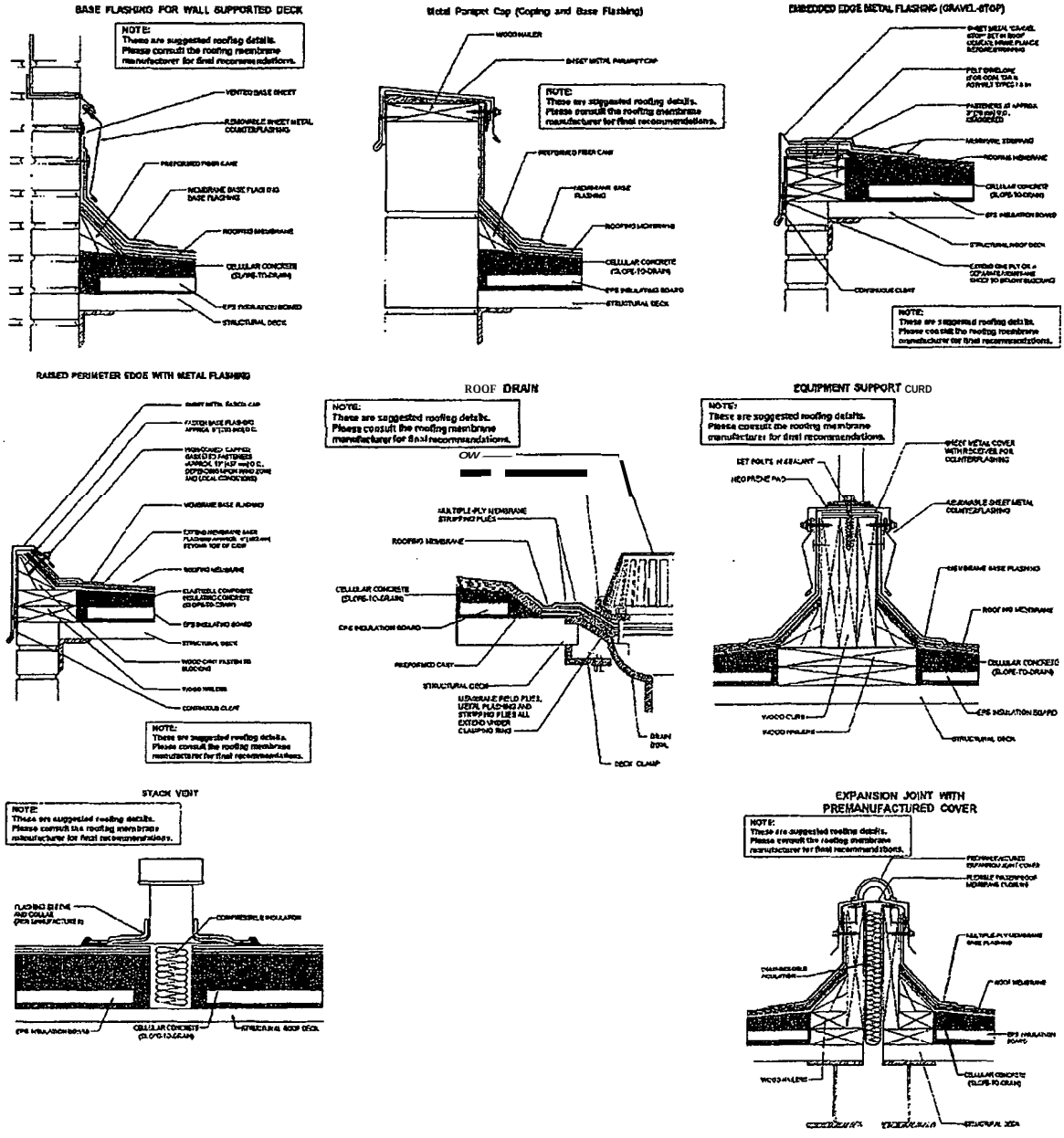


Fig. 6.3—Typical roofing details for cellular concrete roof decks.

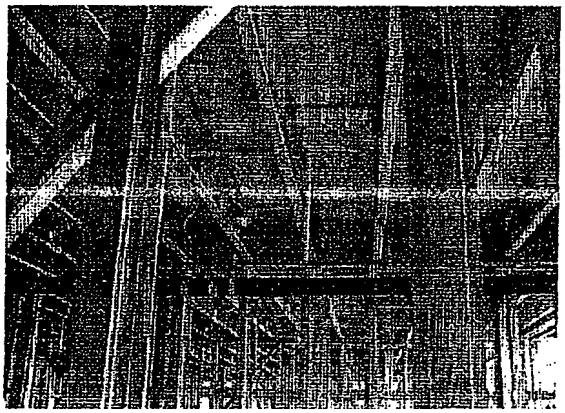


Fig. 6.4—Wood frame roof deck substrate from below.

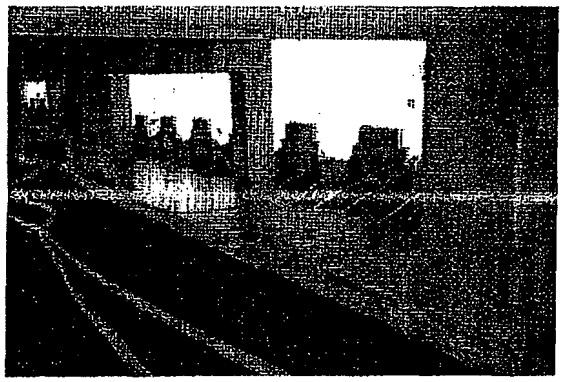


Fig. 7.1—Geotechnical application under a bridge structure with mechanically stabilized earth (MSE) containment walls.

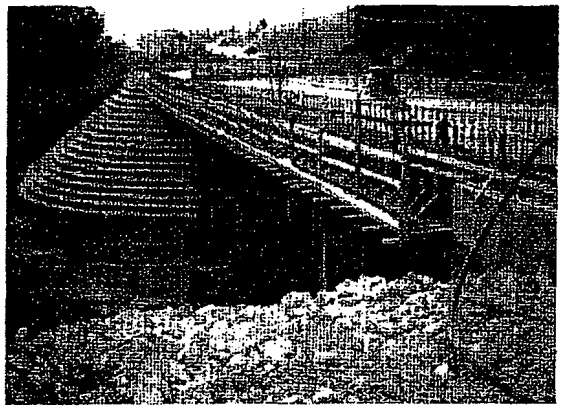


Fig. 7.2—Geotechnical application at bridge widening approach.

the cellular concrete and with the substrate (the structure that provides the required wind uplift resistance).

6.3--Load-carrying capacity

Specific structural design requirements for cellular concrete depend on the type of substrate used. The most common substrates are galvanized steel and precast or cast-in-place concrete. Although cellular concrete is not designed for composite action with the substrate, it provides additional stiffness. Designers should obtain information from substrate manufacturers regarding the ultimate flexural capacities and in-plane stiffness and strength characteristics of various systems.

6.4--Expansion and contraction joints

Cellular concrete exhibits drying shrinkage when placed in large monolithic placements such as roof decks. Because shrinkage of cellular concrete is much greater than its thermal expansion, expansion joints are generally not necessary. Expansion joints are required, however, in a cellular-concrete roof deck at expansion joints in the structural system, and at changes in the direction or type of substrate material.

6.5—Relief of vapor pressure

Under certain temperature conditions, moisture in cellular concrete or moisture intruding from external sources may cause undesirably high vapor pressure under roofing membranes covering a roof deck system. The vapor pressure can be reduced by postponing the application of the roofing membrane until the cellular concrete moisture content is at an acceptable level. A nailed base sheet, combined with perimeter venting at the intersection detail between the edge flashing and the counter-flashing, also helps reduce the vapor pressure.

The rate of drying of cellular concrete is a function of placing conditions, density and thickness, substrate, venting, and environmental conditions. The overall roof deck system, building use, and climatic conditions should be evaluated before specific recommendations regarding venting are made. This evaluation is especially important in re-roofing applications where dry portions of the existing roof membrane and insulation can be left in place and the cellular concrete cast over it.

6.6—Standard roofing details

For information on generally accepted roofing details (Fig. 6.3), refer to NRCA *Roofing and Waterproofing Manual* (The National Roofing Contractors Association 2001).

CHAPTER 7—GEOTECHNICAL APPLICATIONS

In most applications, the major advantage of cellular concrete is its low density. Other advantages include ease of excavation (a requirement in some applications) and more controllable strength as compared with standard CLSM.

7.1--Backfill

Lowdensity cellular concrete placed around and next to structures such as bridge abutment and retaining and building walls significantly reduces the dead load over poor soils (Fig. 7.1 and 7.2).

Once low-density cellular concrete sets, it does not exert active lateral pressure against the wall structure, as does standard granular backfill. Because lowdensity cellular

concrete is cementitious, it does not require compaction, and because it has low density, settlement is minimal.

Bridge approach applications may often be from 10 to 40 ft (3.0 to 12 m) or more in height. A low-density fill that does not require compaction is often a preferred alternative to heavy, compacted fill.

Most of the fill thickness of cellular concrete should be cast at a density of 30 lb/ft^3 (480 kg/m^3). The top 2 to 3 ft (610 to 910 mm) is usually 42 lb/ft^3 (675 kg/m^3) cellular concrete, which has excellent resistance to freezing and thawing and provides a solid base for an approach slab or pavement structure.

7.2—Roadway bases

Low-dcnsitv cellular concrete is often used for a roadway base over poor soil. The use of the material becomes even more important when raising or widening the roadway over poor soil, and added weight and settlement are concerns for the designer (Fig. 7.3). These designs often involve load-balancing and buoyancy calculations. Specific site conditions may require the development of special drainage details.

When constructing a roadway over poor soil, a geotextile fabric should be placed after the excavation is complete. The low-densitycellularconcreteshould be cast directly onto the geotextile fabds. This fabric acts as a tension skin and, in conjunction with the low-density cellular concrete, can span localized settlements up to 3.2 ft (1 m).

7.3—Pipeline and culvert fills

Low-density cellular concrete is often a supporting fill in pipeline applications over poor soils or a containment fill cast around these drainage structures to provide support and stability. Compaction is not necessary as it would be with a granular fill.

Culvert applications include concrete box culverts, segmented or pipe sections, and metal culvert systems including multi-plate culverts of significant size (Fig. 7.4).

Low-density cellular concrete reduces the &ad weight on the culvert. The cemcntitious nature of all CLSM mixtures provides erosion control which is an advantage over standard granular fills that erode when subjected to moving water. These mixtures may need to be evaluated for freezing-and-thawing resistance.

Placing low-density cellular concrete on both sides of the culvert simultaneously minimizes eccentric loading. In addition to supporting the culvert from below, the lowdensity cellular concretecast around these drainage structures provides lateral support because compaction is not necessary.

7.4--Void fills

Low-dcnsity cellular concrete is commonly used as a void fill when the reduction of dead load is critical. It is also applicable to mass structures where access may be limited and flowability is important. Void-fill applications include pipeline abandonment, filling around excavations, annular space fills between slip-lined pipes, and structures that are to be abandoned rather than demolished (Fig. 7.5).

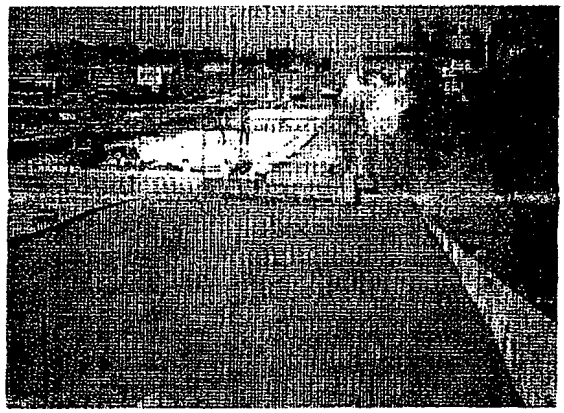


Fig. 7.3—Geotechnical roadway base at bridge approach.

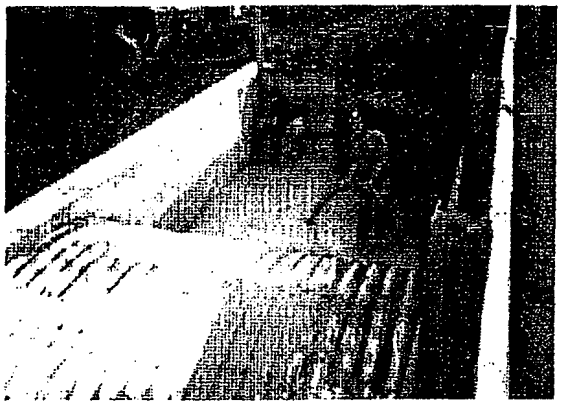


Fig. 7.4—Geotechnical fill around steel culvert under existing bridge.

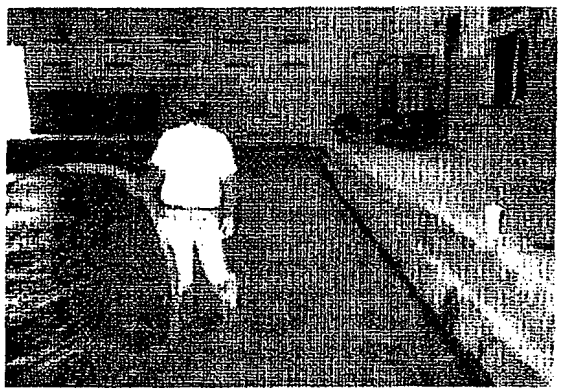


Fig. 7.5—Filling abandoned swimming pool with low-density concrete.

Because every void-fill application is unique, each one should be examined for special conditions. To contain the easy-flowing low-density cellular concrete, the entire fill area should be sealed, including pipes, drains, and structural discontinuities such as holes in walls or under footings. Lift heights for void fills may be greater than normal if the low-

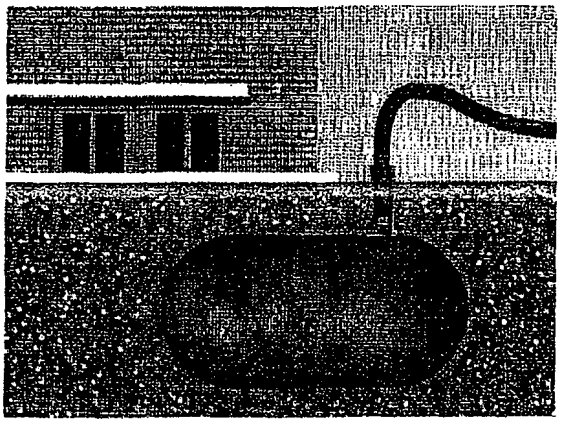


Fig. 7.6—Filing abandoned underground fuel- or oil-storaxe tank with cellular concrete (click on picture to view video).

Fig. 7.7—Cellular concrete as wall fill with say-in-place forms.

density cellular concrete can be reasonably contained by earth, forms, or a structure.

7.5—Tank fills

An acceptable abandonment alternative to the excavation and removal of underground fuel- or oil-storage tanks required by many agencies is a lowdensity cellular concrete tank fill (Fig. 7.6). Federal regulations refer to lowdensity cellular concrete fills as an "inert substance."

7.6 — Insulation and Isolation fills

The discrete air-cell structure within the cementitious matrix of low-density cellular concrete provides thermal-insulation and physical shock-mitigation properties to this material for applications such as walls (Fig. 7.7). roofs. and other similar structures. Giannakou and Jones (2004) describe the use of cellular concrete to thermally insulate foundations and slabs.

CHAPTER 8—REFERENCES

8.1—Referenced standards and reports

The standards and reports listed below were the latest editions at the time this document was prepared. Since frequent revisions occur with some of these documents, the reader is advised to contact the appropriate sponsoring group for reference to the latest version

American Concrete Institute

222R Protection of Metals in Concrete Against Corrosion

229R Conholled Low-Strength Materials

ASTM International

A 653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C 150 Specification for Portland Cement

C 157 Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus

C 332 Specification for Lightweight Aggregates for Insulating Concrete

C 494 Specification for Chemical Admixtures for Concrete

C 495 Test Method for Compressive Strength of Lightweight Insulating Concrete

C 513 Test Method for Securing, Preparing, Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength

C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C 595 Specification for Blended Hydraulic Cements

C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C 666 Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C 796 Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam

C 869 Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete

C 989 Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

C 1157 Performance Specification for Hydraulic Cement

C 1240 Specification for Silica Fume Used in Cementitious Mixtures

C 1363 Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

D 2434 Test Method for Permeability of Granular Soils (Constant Head)

E 119 Test Methods for Fire Tests of Building Construction and Materials

The above publications may be obtained from:

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
www.concrete.org

ASTM International
100 Barr Harbor Drive
West Conshohocken. PA 19428-2959
www.astm.org

8.2—Cited references

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APPENDIX D
ANALYSES AND CALCULATIONS
(SUBMITTED IN SEPARATE PACKAGE)

APPENDIX E
CALTRANS COMMENTS AND RESPONSES

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

April 17, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments dated March 26, 2009**
(2nd Submittal)
Foundation Report
Retaining Walls RW 1325 and RW 1326 (PM 20.91-21.03)
Precast Walls with Lightweight Fill
West County Connector Project
I-405/SR22 HOV Connector Segment
12-ORA-22, EA: 071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 31, 2008 (revised February 18, 2009)
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Explain why the settlement monitoring information is not shown on the project plans?

A note will be indicated on the plan that settlement monitoring is required, and station and offset of each settlement monument are included in the specifications.

2. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th, 2009)

The requested change has been made in the revised logs.

3. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).

The requested change has been made in the revised logs.

4. Is the settlement calculated based on direct (Consolidation test) or indirect (correlation) method? Explain and justify your response.

C_c and C_r were obtained from consolidation tests (direct method) applying Schmertmann's correction; Cr was approximated by C_e (unloading). C_v, coefficient of consolidation, was based on correlations (Navfac, 1987) Figure 3-6, 7-3-15.

5. Explain in detail and provide backup information as to how the strength parameters were found for the light weight fill and the native materials for the slope stability?

Drained shear strength parameters are primarily obtained from the Consolidated Drained (CD, slow) direct shear test results using peak and ultimate values of cohesion intercept and friction angle. Laboratory test results are included in Appendix B. Undrained shear strengths were obtained from the interpreted CPT data which uses $S_u = Q_c / N_k$ in which:

S_u = undrained shear strength, ksf
Q_c = cone tip resistance, tsf, and
N_k = 15.

Interpreted S_u values are shown in the interpreted CPT data in Appendix A. Penetration resistance and pocket penetrometer / torvane data were used to confirm reasonableness of CPT S_u data. For granular soils below water table, correlations with penetration resistance (SPT, CPT) were used for drained friction angles.

For the lightweight fill, we analyzed as a cohesive material using undrained shear strength equal to ½ of the compressive strength of the material. Per ACI 523.1R-06 (report Appendix C), minimum compressive strength is 40 psi for cellular concrete with 30 pcf unit weight, giving a cohesion of 20 psi or about 3 ksf for the 30 pcf unit weight lightweight fill. Actual specified minimum compressive strength is 60 pci for the 30 pcf material, and 125 psi for the upper 42 pcf material, so our shear strength values for slope stability are conservative.

6. Explain why and how the cohesion intercept has been modified for seismic stability for the native material CL layer and not for the other CL layers? Elaborate.

For the very stiff native clays (Layer 1) we used ultimate (post-peak) shear strength from drained direct shear tests, which is the worst case for static (long term) loads.

For dynamic (rapid) loading drained conditions do not strictly apply, and shear strengths are likely to fall between the peak drained values and the undrained shear strength. For dynamic loading, we used peak value of drained strength since it gives a lower factor of safety than using the undrained strength for the very stiff clays.

For the medium stiff to stiff (Layer 2) clays, undrained shear strength was determined to be more critical for both static and dynamic cases than using the drained shear strength parameters derived from direct shear tests, so we used undrained shear strength for both static and seismic analysis.

7. Define all acronyms in the CPT liquefaction spread sheet.

Each column in the table has the description of acronyms. The acronyms are listed as follows:

- NCEER=National Council for Earthquake Engineering Research
- NSF=National Science Foundation
- GWT=Ground Water Table
- γ_t=total unit weight
- M_{eq}=earthquake magnitude
- A_{max}=peak ground acceleration
- Z_w=groundwater depth during test
- Z_{wd}=groundwater depth for design
- CSR=Cyclic Stress Ration
- σ_v=total overburden stress
- σ'_v=total overburden stress
- r_d=Shear Stress Reduction coefficient
- FS=factor of safety against liquefaction
- $CRR_{7.5}$=Cyclic resistance ratio for Magnitude 7.5
- MSF=Magnitude Scaling Factor
- K_σ=Correction for high overburden stress
- K_α=Correction factor for sloping ground
- CPT=Cone Penetration Test
- SPT=Standard Penetration Test
- $q_{t\text{-}avg}$=Average CPT tip resistance
- $f_{s\text{-}avg}$=Average CPT sleeve friction
- $R_{f\text{-}avg}$=Average CPT friction ratio
- N_{60}=Equivalent SPT blowcount for 60% efficient hammer
- I_c=CPT soil behavior type index
- K_c=Fines correction factor
- q_{c1Ncs}=Fines and overburden corrected CPT tip resistance

- N_{corr}=SPT blowcount correction for residual strength
- $(N_1)_{60CS}$=Fines and overburden corrected SPT blowcount
- S_r=Residual undrained shear strength
- γ_c=cyclic shear strain
- ε_v=Volumetric Strain
- S_i=Layer settlement

8. Provide a summary both in text and tabulated form of the magnitude of immediate and consolidation settlement and time duration, location and how it will impact the performance of the subject wall.

A tabulated summary of anticipated settlement and time rate for various wall heights is included in Figure 1 of this response. The magnitude of settlement is tabulated in the report in Section 4.4.3.2, and time rate of settlement is discussed in Section 4.4.4 of the report. Due to stiff / overconsolidated soils, settlements are small and will occur relatively quickly.

Maximum settlement is anticipated to be on the order of 1.5 inches (say 1 to 2 inches) for the highest wall, and less for shorter walls. For layers other than layer 2, settlements will be completed within an estimated 15 to 30 days. Layer 2 may continue with small settlements for 45 to 60 days. We expect about half the total settlement to occur during placement of the fill, and the vast majority of the remainder will occur over 30 to 45 days. After 15 days, 30 days, and 45 days of completing the embankment, remaining settlement is expected to be less than ½ inch, ¼ inch, and 1/10 inch, respectively.

Estimated differential settlements are small, and well below the tolerance of MSE-type panel walls, so the settlement has no impact on wall performance. The wall coping is expected to accommodate the small settlements.

9. Settlement of the pavement does not belong to the subject report and ought to be discussed in the Geotechnical Design Report. (GDR)

We will remove and include in the GDR.

10. Explain the impact of the anticipated settlement on the buried utilities if any.

No significant utilities have been identified below the wall. The civil / structural engineer may utilize our settlement estimates to evaluate any potential impacts to utilities.

11. Why the over-excavation and placement of the geogrid are not shown on the plans? Explain

Based on available data and proposed depth of excavation, we do not anticipate the need for subgrade improvement. However, the subgrade should be proof-rolled and observed by GDC to disclose the presence of any unsuitable areas. If proof-rolling is successful, no subgrade improvement is required. If areas of unsuitable materials are revealed, they should be improved by overexcavation and placement of geogrid or other means recommended by GDC in the field.

The following are attached and complete our response:

Figure 1 Settlement Estimate Summary

Attachment 1 Caltrans Comments dated March 26, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 450-2100.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
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Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

FIGURES

SETTLEMENT ESTIMATE SUMMARY
RW 1325 and 1326

H=8 feet Station "H" Line 1329+22 to 1331+57

Total Settlement= 0.70 inch

Layer 2 Settlement= 0.30 inch

Days after Completion of Embankment

	0	15	30	45	60	90
Settlement completed	0.36	0.48	0.62	0.65	0.67	0.69
Settlement remaining	0.34	0.22	0.08	0.05	0.03	0.01

H=12 feet Station "H" Line 1328+22 to 1329+22

Total Settlement= 0.70 inch

Layer 2 Settlement= 0.30 inch

Days after Completion of Embankment

	0	15	30	45	60	90
Settlement completed	0.36	0.48	0.62	0.65	0.67	0.69
Settlement remaining	0.34	0.22	0.08	0.05	0.03	0.01

H=17 feet Station "H" Line 1326+22 to 1328+22

Total Settlement= 1.00 inch

Layer 2 Settlement= 0.40 inch

Days after Completion of Embankment

	0	15	30	45	60	90
Settlement completed	0.52	0.69	0.89	0.93	0.96	0.99
Settlement remaining	0.48	0.31	0.11	0.07	0.04	0.01

H=22 feet Station "H" Line 1325+22 to 1326+22

Total Settlement= 1.25 inch

Layer 2 Settlement= 0.45 inch

Days after Completion of Embankment

	0	15	30	45	60	90
Settlement completed	0.66	0.88	1.13	1.18	1.21	1.24
Settlement remaining	0.59	0.37	0.12	0.07	0.04	0.01

H=27 feet Station "H" Line 1324+22 to 1325+22

Total Settlement= 1.50 inch

Layer 2 Settlement= 0.55 inch

Days after Completion of Embankment

	0	15	30	45	60	90
Settlement completed	0.79	1.05	1.35	1.41	1.45	1.48
Settlement remaining	0.71	0.45	0.15	0.09	0.05	0.02

Assumptions: 40% of layer 2 and 60% of other layer settlement occurs during placement
15 days after completion 80% of settlement of other layers is complete
30 days after completion 100% of settlement of other layers is complete
Layer 2 consolidates as single drained layer with H=12 feet and Cv=2.1ft^2/day

Notes: Values presented are estimates and may vary

GROUP DELTA CONSULTANTS

FIGURE 1

ATTACHMENT 1
CALTRANS COMMENTS DATED March 26, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc

DATED: February 18, 2009 Retaining Wall 1325
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: N.A.

12-071621 55E0075
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW1325 and RW1326 Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM-20.91-21.03, EA:12-071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 18, 2009, submitted to our office on February 26, 2009.

In our review, we made reference to the following:

- "Foundation Report, Retaining Walls RW1325 and RW1326, Precast Walls With Light Weight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment,12-ORA-22-PM20.91, EA 12-071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 31, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 23, 2009."

We have the following comments:

1. Explain why the settlement monitoring information is not shown on the project plans?
2. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
3. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).
4. Is the settlement calculated based on direct (Consolidation test) or indirect (correlation) method? Explain and justify your response.
5. Explain in detail and provide backup information as to how the strength parameters were found for the light weight fill and the native materials for the slope stability?
6. Explain why and how the cohesion intercept has been modified for seismic stability for the native material CL layer and not for the other CL layers? Elaborate.
7. Define all acronyms in the CPT liquefaction spread sheet.
8. Provide a summary both in text and tabulated form of the magnitude of immediate and consolidation settlement and time duration, location and how it will impact the performance of the subject wall.

9. Settlement of the pavement does not belong to the subject report and ought to be discussed in the Geotechnical Design Report. (GDR)
10. Explain the impact of the anticipated settlement on the buried utilities if any.
11. Why the over-excavation and placement of the geogrid are not shown on the plans? Explain

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc

DATED: February 18, 2009 Retaining Wall 1326
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: N.A.

12-071621 55E0076
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW1325 and RW1326 Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM-20.91-21.03, EA:12-071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 18, 2009, submitted to our office on February 26, 2009.

In our review, we made reference to the following:

- "Foundation Report, Retaining Walls RW1325 and RW1326, Precast Walls With Light Weight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment,12-ORA-22-PM20.91, EA 12-071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 31, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 23, 2009."

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4. Is the settlement calculated based on direct (Consolidation test) or indirect (correlation) method? Explain and justify your response.
5. Explain in detail and provide backup information as to how the strength parameters were found for the light weight fill and the native materials for the slope stability?
6. Explain why and how the cohesion intercept has been modified for seismic stability for the native material CL layer and not for the other CL layers? Elaborate.
7. Define all acronyms in the CPT liquefaction spread sheet.
8. Provide a summary both in text and tabulated form of the magnitude of immediate and consolidation settlement and time duration, location and how it will impact the performance of the subject wall.

9. Settlement of the pavement does not belong to the subject report and ought to be discussed in the Geotechnical Design Report. (GDR)
10. Explain the impact of the anticipated settlement on the buried utilities if any.
11. Why the over-excavation and placement of the geogrid are not shown on the plans? Explain

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

APPENDIX E
RESPONSE TO CALTRANS REVIEW COMMENTS
AND
CALTRANS REVIEW COMMENTS DATED January 23, 2009

Retaining Walls RW1325 and RW1326

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

February 18, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments**
Foundation Report
Retaining Walls R1325 and RW1326
Precast Walls with Lightweight Fill
West County Connector Project
12-ORA-22PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 23, 2008
GDC Project No. I-36

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Check the post mile for the subject structures and confirm its accuracy.

Checked per GP.

2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.

The requested change has been made in the revised report, Section 1.3.1.

3. Include a Figure describing Site Location Map in Section 1.

The site vicinity map (Figure 1) is included in Figures at the end of report, and is referenced in Section 1.0.

4. Revise section 2 title "Field and Laboratory Investigations" to "Field Investigation and Laboratory Testing"

The requested change has been made in the revised report.

5. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).

The requested table is included in Appendix A, Table A-1. We have added a sentence in the revised report directing the reader to this table.

6. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).

We have modified the Table in Section 2.2. A complete description of the tests, their purpose, and ASTM / CT test numbers are included in Appendix B. The reader is also referred to Appendix B in Section 2.2.

7. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.

The Exploration Location Plan (Figure 2) is included in Figures at the end of report, and is referenced in Section 2.1.

8. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.

The borings and CPTs were surveyed and the locations and elevations have been updated in Appendix A and in the LOTB in the revised report and plans.

9. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per previous comment.

Refer to our response to Comment 8.

10. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

The requested change has been made in the revised report, Section 3.2.

11. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

The requested information is included in Section 3.4. The high historical groundwater contour map is included in Figure 6 at the end of the report, and is consistent with our recent data at the site. The text of the report has been revised to Reference CDC.

12. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion, and friction angle.

The tabulated idealized soil profile containing the requested information is included in Table 1 at the end of the report, and is referenced in Section 3.5.

13. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.

The graphic soil profile is included in Figure 5 at 11x17" size at the end of the report and is referenced in Section 3.3.

14. Include backup data for the Corrosion in the Appendix.

Corrosion test results are presented in Section B.8 of Appendix B (Table B-1).

15. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.

The requested items are submitted along with the revised report.

16. Provide the slope stability using SLIDE program, provide the input and output files.

GDC does not currently possess the SLIDE software. We have used PCSTABL5M, which is well documented and widely used software for slope stability analysis. We have ordered the SLIDE program for future projects, to meet Caltrans requirements.

17. Appendix D-4 is left blank and does not contain any information. Please explain.

The appropriate calculations are provided.

18. Calculations are not performed specific to each wall structure, revise accordingly.

Calculations are included in the new package.

The following is attached and completes our response:

Attachment 1 Caltrans Comments dated January 23, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

ATTACHMENT 1
CALTRANS COMMENTS DATED JANUARY 23, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 23, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: October 31, 2008 Retaining Wall 1325
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 RW 1325
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW1325 and RW1326 Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM20.91, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 31, 2008.

We have the following comments:

1. Check the post mile for the subject structures and confirm its accuracy.
2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.
3. Include a Figure describing Project Location Map in Section 1
4. Revise section 2 title " Field and Laboratory Investigations" to " Field Investigation and Laboratory Testing"
5. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).
6. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).
7. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.
8. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.
9. Revise the Log of Test Borings (LOTB) sheets in the Wall Plan accordingly, per previous comment.
10. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.
11. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

12. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion and friction angle.
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14. Include backup data for the Corrosion in the Appendix.
15. Provide the calculations in a separate volume. Include a CD that provides a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.
16. Provide the slope stability using SLIDE program.
17. Calculations are not performed specific to each wall structure, revise accordingly.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 23, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: October 31, 2008 Retaining Wall 1326
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 RW 1326
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW1325 and RW1326 Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM20.91, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 31, 2008.

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10. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.
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14. Include backup data for the Corrosion in the Appendix.
15. Provide the calculations in a separate volume. Include a CD that provides a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.
16. Provide the slope stability using SLIDE program.
17. Calculations are not performed specific to each wall structure, revise accordingly.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

FOUNDATION REPORT
RETAINING WALLS RW3319 (PM 20.80 – 20.89) AND RW3320 (PM 20.82 – 20.88)
PRECAST WALLS WITH LIGHTWEIGHT FILL
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-22, EA 071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Prepared By:

Group Delta Consultants, Inc.
32 Mauchly, Suite B
Irvine, CA 92618

GDC Project No. I-436
November 3, 2008
Revised February 18, 2009
Revised April 20, 2009

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

November 3, 2008
(Revised February 18, 2009 and April 20, 2009)

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: Foundation Report
Retaining Walls RW3319 (PM 20.80 – 20.89) and
RW3320 (PM 20.82 – 20.88)
Precast Walls with Lightweight Fill
West County Connector Project
I-405/SR-22 HOV Connector Segment
12-ORA-22, EA 071621
Orange County, California
GDC Project No. I-436

Dear Mohsen:

We are transmitting with this letter eight copies of our Foundation Report for the proposed Precast Walls RW3319 and RW3320 with Lightweight Fill (Cellular Concrete). This report presents the results of our field and laboratory investigations, and provides recommendations for the foundation design of the proposed retaining walls. This report has been revised to incorporate the 2nd comments from Caltrans dated March 26, 2009 (Appendix E). We appreciate the opportunity to work with you on this important and challenging project. Should you have any questions, please give us a call at (949) 450-2100.

Very truly yours,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

Kul Bhushan, Ph.D., G.E.
Sr. Consulting Principal

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
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STATE OF CALIFORNIA

Sinniah K. Navaratnarajah
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
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Exp. 6/30/09
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STATE OF CALIFORNIA

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FOUNDATION REPORT
RETAINING WALLS RW3319 (PM 20.80 – 20.89) AND RW3320 (PM 20.82 – 20.88)
PRECAST WALLS WITH LIGHTWEIGHT FILL
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-22-PM20.91, EA 071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

1.1 General

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The overall project name is "West County Connector Project" and the proposed project has been divided into 2 segments. The easterly segment, "I-405/SR-22 HOV Connector Segment," extends from Valley View Street to just east of Seal Beach Boulevard, and the westerly segment, "I-405/I-605 HOV Connector Segment," extends from just east of Seal Beach Boulevard to the I-605 interchange. Precast Walls with Lightweight Fill RW3319 and RW3320 are part of the easterly segment. The walls are proposed in the west abutment approach of the S405-E22 Connector Separation (Bridge No. 55-1101F). The site location is shown on the Vicinity Map in Figure 1.

1.2 Purpose and Scope of Work

The purpose of our study is to investigate and document site geotechnical conditions and provide site specific geotechnical recommendations for design and construction of the proposed walls. Our scope of work for this study included:

- Review existing data;
- Perform subsurface investigation along the proposed wall alignment;
- Perform laboratory testing on selected samples of the subsurface soils;
- Develop geologic profiles and engineering parameters for foundation design;
- Perform geotechnical analyses;
- Develop geotechnical recommendations for design and construction of the walls; and
- Present the results of our investigations and our recommendations in this report.

The design and construction of the project will be performed in accordance with current Caltrans Standard Plans and Specifications. This report is structured in general accordance with "Caltrans Guidelines for Foundation Investigation and Reports, Version 1.2 (dated June, 2002)."

1.3 Project Description

1.3.1 General

The length of main portion of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405, from just east of Valley View Street to just east of Seal Beach Boulevard (see Figure 1). In addition, from just east of Valley View Street to just east of Springdale Street, several signs are proposed which are outside the main project area. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges (Bolsa Chica Road OC over SR-22 and 22/405 Connector Separation [to be renamed S405-E22 Connector Separation]), and construct a new HOV Connector bridge (405-22 HOV Connector Separation);
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls (RW3311+3312 at east abutment of S405-E22 HOV Connector Separation);
- Pre-cast Lightweight Fill (PCLW) Retaining Walls (RW1325+1326 at west abutment of 405-22 HOV Connector Separation, RW1299+1300 at east abutment of 405-22 HOV Connector Separation, and RW3319+3320 at west abutment of S405-E22 HOV Connector Separation);
- Drainage improvements; and
- Lighting, roadside signs, and overhead signs.

This report presents the Retaining Walls RW3319 and RW3320 foundation recommendations.

1.3.2 RW 3319 and RW 3320

Retaining walls RW3319 and RW3320 will create the west abutment approach to Abutment 4 of the proposed S405-E22 Connector Separation (Bridge No. 55-1101F), which replaces the existing southbound San Diego Freeway (I-405) to eastbound SR-22 connector. A site plan is shown in Figure 2.

Due to moderately weak and compressible soils shallow groundwater below freeway grade, and normally consolidated conditions below the existing embankment, lightweight cellular concrete fill was selected for the walls and embankment to eliminate long-term settlements and avoid need for ground improvements due to low bearing capacity.

The final approach embankment will be 59 feet wide with vertical walls on both sides (RW3319 on the south and RW3320 on the north). Wall heights increase from about 8 feet on the west to a maximum of about 28 to 29 feet at the S405-E22 Connector Separation Abutment 4. The walls and embankment consist of lightweight cellular concrete fill with precast concrete facing panels anchored into the cellular concrete with threaded studs. Wall limits with respect to the "E" Line and dimensions are as follows:

- **RW3319**: "E"3319+11 to 3323+33, Length=430 feet, Max Ht.=29 ft;
- **RW3320**: "E"3319+75 to 3322+62, Length=285 feet, Max Ht.=28 ft.

Grades will be increased by up to about 16 feet above original grades along RW3319 and up to about 5 feet on RW3320. RW3320 will be primarily in a cut area, and RW3319 is in a fill area. The cut is being made along RW3320 to facilitate re-alignment of Bolsa Chica Road off-ramp below the new Connector.

The wall General Plans are shown in Figures 3A through 3D. A typical section across the freeway illustrating existing and proposed grades and general soil layering is shown in Figure 4. The section location is shown in Figure 2.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

The subsurface conditions at the wall site were investigated by performing two (2) soil borings and three (3) Cone Penetration Tests (CPTs) along the connector alignment (see Log of Test Borings, Plates 1-10). Two additional borings along the adjacent 405-22 HOV Connector Separation were also used as supplementary data. Borings and CPTs were performed during the period of March 27th to April 24th, 2008. The CPT and boring locations were selected such that representative soil profiles could be developed along the wall alignment. Boring locations are shown in Figure 2, and a detailed description of the exploration and the boring / CPT logs are presented in Appendix A. The location and depth of borings and CPTs is summarized in Table A-1 of Appendix A. The Log of Test Boring Sheets (LOTBs) are presented in Plates 1 through 10.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, engineering, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

Test	ASTM Designation	Purpose
• Moisture Content and Dry Density	ASTM D 2216	Soil Classification
• Grain Size Distribution (Sieve Analysis)	ASTM D 422	Soil Classification
• Percent Passing #200 Sieve	ASTM D 1140	Soil Classification
• Atterberg Limits	ASTM D 4318	Soil Classification
• Direct Shear	ASTM D 3080	Shear Strength
• Pocket Penetrometer		Undrained Shear Strength
• Soil Corrosivity (pH, sulfate, and chloride)	CT 422. 443 417, and 643	Corrosion Potential
• Consolidation	ASTM D 2435	Compressibility

Moisture content, dry density, percentage passing a No. 200 sieve and the pocket penetrometer readings are shown on the boring logs in Appendix A. Detailed descriptions of the other tests performed and their results are presented in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The wall site is located on top of the west abutment approach to the existing 22/405 Connector Separation bridge and off-ramp to Bolsa Chica Road, between I-405 freeway and Seal Beach Naval Weapons Station. Existing ramp elevations near the west end of the walls is near El. 36 feet, and near the east end is near El. 45 feet. Slopes are present on both the north and south sides of the embankment with maximum height up to about 25 feet with inclinations of 2h:1v to 1.5h:1v. A small slope less than 5 feet high is present between the existing connector ramp and Bolsa Chica off ramp. Grades on I-405 freeway are near El. 24 to 25 feet, and in the weapons station grades are near El. 22 to 24 feet.

Slopes are generally vegetated with iceplant, and locally with a thick growth of other vegetation and large trees. Bolsa Chica Channel passes under the freeway just east of the proposed walls in a box culvert, discharging to an open channel south of the freeway. RW3319 layout line is within the existing south facing slope, and an existing concrete cantilever retaining with height of about 6 feet is present at the base of the slope below the proposed wall between about Station "E" 3319+25 and 3325+10. RW3320 layout line is located near the center of the existing embankment. The bridge abutment will also be in a cut area. The topographic plan is shown in Figure 2.

3.2 Geologic Conditions

3.2.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange County coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach

Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

3.2.2 Stratigraphy

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County coastal plain of the southern portion of the Central Block of the Los Angeles Basin. The basin is in filled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of poorly consolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Stratigraphy consists of alternating layers of sands, silts, and clays (Figure 5B). Shallow compacted roadway fills and abutment approach fills up to about 30 feet high have been placed in the area over the natural alluvial deposits. Relative density and stiffness of the alluvial soils generally increases with depth.

3.2.3 Geologic Structure

Since the bedrock is more than 4,000 ft deep, geologic structure at the site is not a design issue.

3.2.4 Geologic Hazards

Geologic hazards include landslides, expansive or collapsible soils, and seismic hazards include liquefaction, lateral spreading, seismic slope stability, fault rupture, tsunamis, and seismic shaking. The site is not located in landslide prone area and no natural slopes are present. Expansive soils are present and recommendations regarding expansive soils with 4 ft of the finished grade are provided in the GDR and in expansive soil exclusion zone in the Bridge Foundation Reports.

3.3 Subsurface Soil Conditions

CPTs were used to accurately determine stratigraphy and correlate with data from borings. Cross-sections were developed and an idealized profile was adopted for design. The soils profile and general engineering characteristics of the subsurface soils are illustrated in the Soil Profile in Figure 5, and summarized in Table 1. The

soil profile is divided into 5 general layers. Layer descriptions and layer boundary elevations selected for design are described below.

3.3.1 Layer 1 – Fill and Stiff Native CL (above El.+19')

The existing ramp grades are near El. 36 feet to 45 feet along the wall alignments. The upper soil layer consists of approach embankment fills to about El. 22 to 24 feet, and stiff native alluvium below the fill down to about El. +19 feet. The fill and stiff alluvium are similar in engineering properties and consist primarily of very stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent layers of medium dense silty sands (SM) and clayey sands (SC).

3.3.2 Layer 2 – Firm to Stiff CL (El. +19' to +5')

This top of this layer is near the water table. In the overall project area it is typically about 11 to 14 feet thick (average 12) and is present generally between El. +3 and +20 feet (average El. +5 to +17 feet). The material classifies as locally firm but predominantly stiff lean clay or lean sandy clay (CL) with typical undrained shear strengths of 1.0 to 1.4 ksf based on CPT correlations and pocket penetrometer readings. Thin seams of medium dense sand to silty sand to sandy silt, as well as stiffer clays, are present in this layer. Layer 2 is generally overconsolidated with respect to the adjacent freeway grades, but is close to normally consolidated below the 25 foot thick abutment fills. Since it is fairly shallow below the freeway grades and is moderately weak and compressible, it controls the magnitude and time rate of settlement, bearing capacity, and global stability of the walls.

3.3.3 Layer 3 – Very Stiff CL, ML (El. +4' to -13')

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with thin interbeds of medium dense to dense silty sands (SM) and sandy silts (ML), and layers of stiff clay. Pocket penetrometer readings in the fine grained materials typically range from 2.0 to 4.5 ksf, and CPT correlations indicate average undrained shear strengths in this layer generally more than 3.0 ksf. These clays are overconsolidated.

3.3.4 Layer 4 – Dense to V. Dense SM/ML/SP (El. -13' to -30')

Layer 4 is a predominantly granular layer of variable thickness consisting of interbedded Sand (SP), Silty Sand (SM), and Sandy Silt (ML), with less frequent interbeds of clayey silt and clay (ML, CL). The granular materials are generally dense with SPT N-values of 30 to 45 blows per foot, and cohesive materials are

typically very stiff to hard based on pocket penetrometer and CPT correlations. Thin layers of medium dense sandy and silty soils are also present.

3.3.5 Layer 5 – V. Dense SP & Hard CL/ML (Below El. -30')

This layer is older alluvium composed of alternating beds of dense to very dense sands (SP), silty sands (SM), and sandy silts (ML), interbedded with very stiff to hard clays and clayey silts. The cleaner sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 600 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf. The upper 15 to 20 feet of this layer (Layer 5-1) is typically very stiff to hard clay and silt.

3.4 Groundwater

Groundwater was observed within the native alluvium at El. +16 feet (see Table A-1 of Appendix A). In the Caltrans 1959 As-Built LOTB for the Route 22/405 Separation (Bridge No. 55-1101F), groundwater was reported near El. +7 feet. Based on California Geological Survey (CGS) (previously known as California Department of Conservation (CDC) Division of Mines and Geology) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater is at a depth of about 10 to 15 feet (see Figure 6). The exact reference elevation is not known. If the 10 ft depth is taken below freeway grade (El. +26 ft) then the groundwater would be near El. 16 feet, which is generally consistent with our investigation data. Based on the above data, we recommend groundwater elevation of +16 feet for design. The top of leveling pad elevations for the walls range from El. 25.5 to 28.0 feet (RW3319) and from El. 22.5 to 30 for RW3320 are at or above El. +21 ft and not expected to be below the permanent groundwater table. However, due to capillary moisture, zones of moist or wet soils could be encountered in the lowest foundation excavations (El. 22.5 ft).

3.5 Engineering Parameters

Recommended design engineering properties for the soil layers shown in Figure 5 were developed from the field and laboratory data from our investigation, and are summarized in Table 1. Index properties of soils were based on testing for natural moisture content and dry density, percent passing No. 200 sieve, grain size distribution, and Atterberg Limits. Drained strength parameters for c-ϕ soils were taken from results of direct shear tests. Undrained shear strengths of clays were taken from conservative interpretation of CPT test results, pocket penetrometer readings, and torvane readings. Friction angles of sandy soils below the water

table were based on CPT and SPT penetration resistance correlations. Consolidation parameters for poorly consolidated clays were developed based on consolidation testing in combination with correlations of natural moisture content, ratio of undrained shear strength to effective overburden stress, and Atterberg Limits. Compressibility of sands and very stiff overconsolidated clays were based on published CPT and SPT penetration resistance correlations. Boring and CPT data are presented in Appendix A, and laboratory test results are presented in Appendix B.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Seismic Evaluation

The project is located in a seismically active area. Seismic shaking should be anticipated during the life of the project. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding.

4.1.1 Ground Surface Rupture

The site is not located in an Alquist-Priolo Earthquake Fault Zone, and the closest known active fault is the Los Alamitos Fault at a distance of about 1.6 km. Due to the distance from the closest faults ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed.

4.1.2 Ground Motion

4.1.2.1 Site Coordinates

The wall site latitude and longitude are approximately as follows:

- 33.7741 North, 118.0441 West

A map showing the site coordinates is presented in Appendix D-1.

4.1.2.2 Faulting and Seismicity

The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 7, and the closest regional faults are summarized in Table 2. The closest faults to the site are Los Alamitos (reverse fault, maximum credible earthquake (MCE) magnitude Mw=6.0, distance=1.6 km), Newport Inglewood (strike slip fault, Mw=7.0, distance=5.0 km), San Joaquin Hills (blind thrust fault, Mw=7.0, distance =13.7 km), and Puente Hills (blind thrust, Mw=7.25, distance=18.2 km).

4.1.2.3 Deterministic Analysis

We performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base. Los Alamitos is not in the EQFAULT CGS 2002 data base, so for this fault we estimated fault to site distance from the Caltrans 1996 map (see Figure 7). We used the mean value of the rock and soil attenuation relationships presented by Sadigh et. al. (1997) to estimate peak bedrock and ground accelerations, respectively, based on the MCE magnitude and distance from the site. Results of the deterministic analyses are presented in Appendix D-1, and summarized in Table 2.

The largest deterministic site acceleration comes from a Mw=6.0 event on Los Alamitos fault, with calculated peak ground acceleration (PGA) of 0.50g. The computed PGA from a magnitude 7.0 event on Newport Inglewood gives peak ground acceleration (PGA) of 0.42g.

4.1.2.4 Design Accelerations

For pseudo-static slope stability calculations we recommend a design horizontal acceleration of 1/3 of the maximum PGA, or Kh=0.50/3=0.17. For liquefaction evaluation, it was determined that a Mw=7.0 event with PGA of 0.45 on Newport Inglewood was more critical than Mw=6.0 with PGA of 0.50 on Los Alamitos. Therefore, we used Mw=7.0 and PGA=0.45g for liquefaction analysis. For sliding and overturning evaluation of the precast lightweight cellular concrete fills we recommend using a PGA of 0.5g.

4.1.3 Seismic Compaction

Vibration such as seismic shaking can cause settlement of loose to medium dense dry clean granular soils. No zones of clean loose sand are present above the water table at the site, and therefore seismic compaction is not considered a hazard. Calculations in Appendix D-6 and the results in Table 3 show negligible settlement from seismic compaction.

4.1.4 Liquefaction Evalauation

The site is located within a State Liquefaction Hazard Zone (CDMG, 1999). Groundwater level is near the high historical levels of 10 to 15 feet below freeway grades, and El. +16 feet was selected for analysis. Sediments below the groundwater at the site are primarily stiff to very stiff clays and dense to very dense

sands, but contain localized thin interbeds of loose to medium dense sands, silty sands, and silts that may be prone to liquefaction.

We performed liquefaction calculations for CPT-08-003, CPT-08-006, and CPT-08-008. Triggering evaluation was based on the CPT method from the NCEER 1996/1998 Workshops (Youd and Idriss, 2001). Settlements were calculated using the method of Tokimatsu and Seed (1987), and residual strengths were based on the method of Seed and Harder (1990). Calculations were carried to a depth of 60 feet below existing grades. We determined that use of Magnitude 7.0 and PGA of 0.45g was more critical than using Magnitude 6.0 and PGA of 0.5g, and therefore used the higher magnitude case in our analyses.

The resulting analyses show that limited layers of silty and sandy soils below groundwater may liquefy in the design earthquake. Potentially liquefiable layers are shown as shaded on the cross-section in Figure 5. Estimated liquefaction-induced ground settlements for all CPTs range between 0 and 0.3 inches with an average value of 0.1 inch. Maximum liquefaction settlements for the whole project are less than 1 inch, with less than ½ inch average. A summary of the liquefaction settlements for the wall site is included in Table 3, and calculations are presented in Appendix D-6.

Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1,500 psf. The N1-60cs for liquefiable layers adjusted in accordance with Seed and Harder (1990) range from 18 to more than 30 blows per foot (average 27), and estimated residual shear strengths range from a minimum of 1,000 psf up to a limiting value of 1,500 psf (average 1,400 psf). Residual undrained shear strengths of liquefied soils generally exceed the design undrained shear strength of Layer 2 clays, and therefore the clay layer controls the bearing capacity and slope stability.

Due to the relatively isolated thin liquefied layers, depth of liquefiable layers, small ground settlements, and relatively high residual shear strengths, it is our conclusion that liquefaction does not have a significant adverse impact on the walls.

4.1.5 Other Seismic Hazards

The site has no known history of subsidence. Static and seismic stability of the walls and embankments is evaluated later in this report.

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the 100-yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

4.2 Corrosion Evaluation

Based on Caltrans Memo to Designers 3-1 (July, 2008) and Caltrans Corrosion Guidelines (2003) a corrosive area is defined as "an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates, has a minimum resistivity of less than 1000 ohm-cm, or has a pH of less than 5.5."

Representative samples of the fill and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests performed for the subject walls are summarized as:

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-004	B-1	1.5-3.5	CL	1350	9.1	465	604

Based on these test data the site soils classify as corrosive due to high chlorides in accordance with Caltrans Corrosion Guidelines (2003). Based on testing elsewhere in the overall site, high sulfates (between 2,000 and 15,000 ppm) are also present locally in the site area.

Design of reinforced concrete in contact with native soils should consider the site corrosion potential in accordance with Bridge Design Specifications (BDS) Section 8.22 (July 2000):

- For 500 to 5000 ppm Chlorides in soil the minimum concrete cover and mix design for protection of reinforcement against corrosion due to chlorides shall be as provided in BDS Table 8.22.1:
    - The maximum water to cementitious material ratio shall not exceed 0.40;
    - Minimum concrete cover for footings and pile caps is 3 inches;
    - Minimum concrete cover for walls and columns is 3 inches;
    - Minimum concrete cover for precast piles is 2 inches, and Mineral admixtures conforming to ASTM Designation C1240 and/or ASTM Designation C618 Type F and/or N, may be required.;
- For 2000 to 15,000 ppm Sulfates in soil the minimum requirements for protection of concrete against sulfate exposure shall conform to the requirements in BDS Table 8.22.2:
    - Cement shall be Type II modified or Type V;
    - The minimum cementitious material content shall be 658 pounds per cubic yard with a 25% mineral admixture replacement by weight. Maximum water to cementitious material ratio shall not exceed 0.40.

For cellular concrete in contact with native soils (first lift, or at least 1 ft), we recommend use of Type V cement.

4.3 Scour Evaluation

The walls are not located in a significant flood/drainage or river channel. Bolsa Chica Channel is a minimum of 100 feet from the walls and is contained in a concrete box culvert or a rip rap lined channel. Surface runoff is by sheet flow and will be collected and conveyed off-site with storm drains. Therefore, scour potential is not significant.

4.4 Foundation Recommendations

4.4.1 Cellular Concrete Embankment and Walls

4.4.1.1 General

The subsurface soils have inadequate bearing capacity to support conventional Mechanically Stabilized Embankment (MSE) walls of this maximum height (up to 29 feet), and significant long-term settlements would be expected for conventional embankment in fill areas.

For example, a 28 ft high wall with foundation elevation of El. 22.5 ft (RW3320) would be within 4 feet of Layer No. 2, and would require a minimum MSE base width of 0.7*28=20 ft. Since Layer 2 is within less than one foundation width of the base, bearing capacity is controlled primarily by this layer. Foundation pressure would be about 4 ksf (Bridge Design Aids 3-1, April 2002), and allowable bearing capacity with factor of safety of 2 is 2.5 ksf. Therefore, for conventional MSE there is inadequate factor of safety against bearing failure.

Near Station "E" 3320+50 the average grade increase above existing grades is about 8 feet over 59 ft width, and an estimated 4 to 6 inches of total settlement could occur, of which 2 to 3 inches would be long term consolidation settlement occurring over a period of 12 to 24 months.

To mitigate the inadequate bearing capacity and high long-term settlement, the walls and embankments will be constructed using low density cellular concrete, a mixture of hydraulic cement, water, and preformed foam, with cast unit weights typically ranging from 30 to 40 pcf, and compressive strengths typically ranging from 40 to 120 psi. The ACI guide for this material (ACI 523.1R-06) is included in Appendix C for reference. The materials are batched on site and poured in lifts. Vertical facing consisting of precast panels may be used as the temporary formwork and permanent facing for vertical walls, with aesthetic treatment identical to MSE walls.

Lightweight cellular concrete fills have the following advantages:

- Greatly reduced foundation pressures (maximum 1.2 ksf versus more than 4 ksf for conventional MSE walls 29 feet high), allowing construction on soils with lower bearing capacity without ground improvement;
- Greatly reduced settlement magnitude, since excavation of existing soils will result in zero net load increase and the lightweight fill settlement will be only a small amount of recompression;
- Greatly reduced time rate of consolidation at this site, since net loading is zero the lightweight fill loading is overconsolidated;
- No lateral earth pressures are exerted by the lightweight fills, other than the temporary fluid pressure during placement and prior to set of each lift;
- The low weight of the fill decreases the gravitational forces and improves the global (slope) stability of the embankment;
- The material is batched on truck mounted plants on site, and can be pumped to the point of placement rather than hauled in trucks like conventional backfill, and no compaction of backfill is required; and

- The fill can be readily poured around utilities or other elements in the backfill, or placed behind bridge abutments.

The wall facing will be 5 ft square precast concrete panels similar to Mechanically Stabilized Embankment (MSE) walls, anchored into the cellular concrete with threaded steel studs. Panels will be placed on leveling pads, and backfilled with cellular concrete in lifts of about 2.5 feet. Each lift will be allowed to set at least 24 hours, or until adequate strength is achieved, before proceeding the next lift. The panels will be temporarily braced to resist the fluid pressure of each lift. After setting, the cellular concrete exerts no earth pressure. Additional panels, cellular concrete and threaded studs will be placed as the wall / embankment is built from the bottom up creating a continuous monolithic mass of lightweight cellular concrete. The typical sections are shown on the General Plans in Figures 3 (A-D).

4.4.1.2 Loads

The finished embankment will have 3 basic layers. Foundation loads were based on these layers and unit weights as follows:

- **Layer 1**: 2 feet of Concrete (paving/slab, etc.), unit weight=150 pcf;
- **Layer 2**: 3 feet of Cellular Concrete, 42 pcf, 120 psi strength;
- **Layer 3**: Cellular Concrete, Wall Height minus 5 ft, 30 pcf, 60 psi strength.

Summing layer weights, the dead load at the base of the embankment (for walls higher than 5 feet) may be estimated by:

$$Q_{total}\ (psf) = 2(150) + 3(42) + 30\ (H-5)$$
$$= 276+30H, \text{ where } H = \text{ wall height in feet}$$

For the maximum height of 29 feet, gross foundation pressure is 1146 psf, or about 9.2 feet of equivalent soil. The wall foundation will be excavated below existing grades. The removal of soil will cause unloading at the foundation level, and the net load at foundation level is the pressure due to lightweight fill minus the overburden pressure of the soil removed. Existing soil unit weight is taken as 125 pcf, so net pressure is:

$$Q_{net}\ (psf) = Q_{total} - 125D = 276+30H-125D$$

Wall RW3319 has grade increases along the wall layout line of up to about 16 feet. The wall is above an existing retaining wall. Overexcavation is recommended to a depth such that net pressure increase (Q_{net}) is zero, to avoid any loading on the

existing wall as well as eliminating any long-term settlements. The depth below original grade for zero pressure increase (Q_{net} =0) is:

$$D = 2.2 + 0.24H = 2.2 + 0.24\ (D+\Delta H)$$

Rearranging and solving for overexcavation depth D versus grade increase above existing grade ΔH:

$$D = 2.9 + 0.3\ \Delta H$$

For RW3319 the recommended depth of foundation overexcavation versus grade increase along the layout line for zero load increase is:

ΔH (ft)	4	8	12	14	16
D (feet)	4	5	6.5	7	7.5

In summary, for RW3319: for grade increase of 8 feet or less minimum excavation depth is 5 feet, for up to 16 feet of grade increase excavation depth is 7 feet.

Wall RW3320 is in sufficient depth of cut that the net load increase will be zero without a specified overexcavation requirement. A typical section showing the existing and proposed grades, existing retaining wall, and excavation depths is shown in Figure 8.

For dynamic seismic lateral loads, the inertia force is the design acceleration coefficient times the weight, applied at the vertical center of gravity of the embankment.

4.4.2 Allowable Net Bearing Pressure and Minimum Embedment

Lowest foundation level (occurring for the highest walls) is within about 3.5 to 7.5 feet of Layer No. 2 (Table 1) which is saturated clay with recommended design undrained shear strength of 1 ksf. Due to large width of the embankment, bearing capacity is controlled by Layer No. 2. Ultimate bearing capacity (using Brinch-Hansen's method) is about 5 times the undrained shear strength, or 5 ksf. Calculations are provided in Appendix D-2. Allowable bearing capacity with a factor of safety of 3 for static conditions is 1.7 ksf. For seismic loading, the bearing capacity factor of safety may be taken as 75% of the static value, or 2.25, resulting in a seismic allowable bearing capacity of 2.2 ksf. Walls at higher elevation will have somewhat higher bearing capacity due to presence of fill above Layer No. 2.

The walls are supported on sloping ground. For RW3319 on an existing slope in a fill area, we recommend top-of-leveling pad embedment below original grade per Section 4.4.1.2 to provide zero load increase, with minimum of 5 feet to provide protection against undermining from potential erosion. For RW3320 on a proposed cut slope, we recommend minimum embedment of 5 feet below the finished grade to provide protection against undermining from potential erosion.

4.4.3 Settlement Magnitude

4.4.3.1 Settlements under the Embankment

The lightweight fill embankment will cause no increase in load from the existing conditions (see Section 4.4.1.2). As such, the settlement magnitude will be small and include only recompression of any heave due to excavation. We estimate that total settlements will be no more than 1 inch in the center of large embankments, and no more than ½ inch near the periphery of the embankments, including adjacent to the bridge abutment.

To verify the predicted settlements, we recommend settlement monitoring by installing a minimum of 2 settlement plates. We recommend installing 1 settlement plate in the center of embankment just behind the bridge abutment footing, and one settlement plate 10 feet inside the layout line of RW3319 near Station "E" 3321+00. Suggested locations and a typical detail for a settlement plate are shown in Figures 9A and 9B. The plates should be placed on sand bedding and the plate elevation surveyed after subgrade is prepared and before any fill is placed. Incremental sections of steel rods and PVC sleeve should be placed as the fill is being raised. The top of the plate or existing section of rod should be surveyed immediately prior to installing a new section of rod, and the top of the new rod should be surveyed immediately after it is attached. In addition, each time the plate is surveyed the elevation of the surrounding fill should be surveyed. The plate should be surveyed daily as the fill is placed and twice weekly thereafter for 30-days. GDC should review settlement data to confirm settlement has leveled off prior to construction of pavement and approach slab.

Lightweight cellular concrete may be placed after the abutment and pile foundations, since settlements of less than ½ inch are predicted and potential downdrag loads are expected to be negligible.

4.4.3.2 Settlements at the Bridge Abutment

Settlements at the back of the bridge abutment footing are estimated at ½ inch or less. Since the pile supported footing will settle less than the adjacent embankment, it is recommended that a continuous vertical joint in the lightweight fill be provided at the back edge of the bridge footing.

4.4.3.3 Settlements of Pavements

No pavements are proposed adjacent to the embankment; therefore, settlement of pavements is not an issue.

4.4.4 Lateral Resistance

In general, resistance to lateral loads is provided by a combination of frictional or adhesive sliding resistance at the cellular concrete-soil interface and passive soil resistance on the side of the embedded portion of the panels. For the cellular concrete embankment passive resistance will be much smaller than base resistance and should be ignored for design. Soils along the base of the cellular concrete are very stiff to hard clays. Based on NAVFAC DM7.02, the adhesion at the soil/cellular concrete interface for sliding resistance may be taken as 0.9 ksf.

4.4.5 Seismic Overturning and Bearing Capacity

For seismic overturning analysis of the 59 ft wide embankment, we recommend using a horizontal acceleration coefficient of 0.5. The horizontal inertia force equal to 0.5 times the weight should be applied at the center of gravity of the mass. Overturning stability is considered adequate if the base resultant falls within the middle 1/3 of the embankment. The maximum equivalent bearing pressure (weight per foot divided by equivalent foundation width [width minus 2 times eccentricity] should not exceed 2.2 ksf for seismic conditions.

4.4.6 Keying and Benching

We recommend that the walls be constructed with a level keyway behind the panels. Minimum key width (W) versus wall height (H) is recommended as follows:

- W = 8 feet ($H \leq 12$ ft)
- W= 12 feet (H=12-20 ft)
- W=15 feet (H>20 ft)

The lightweight fill should be benched into the existing embankment at a 2h:1v gradient. Benches should have a minimum width of 6 feet (3 feet vertical) and a maximum width of 10 feet (5 feet vertical). The recommended keying and benching are illustrated in Figure 8.

4.4.7 Subgrade Preparation

Prior to placing panels and lightweight fill, the embankment area should be cleared of existing pavements and excavated / benched to foundation level. The lowest foundation levels may be within several feet of the water table, and zones of capillary moisture or softened soils may be encountered. The foundation area should be proof-rolled with loaded heavy non-vibratory equipment under geotechnical observation by GDC. Vibratory equipment should not be allowed as it may disturb the subgrade and bring up the groundwater. Any areas of soft, wet, or other unsuitable materials should be removed replaced or stabilized to the limits and in a manner recommended by GDC. Soft or wet subgrade may require overexcavation of 12 inches and placement of biaxial geogrid (Tensar BX1200 or equal) and 12 inches of crushed rock.

After successful proof-rolling, the base of excavation should be scarified, brought to near optimum moisture content, and recompacted to 90% as determined by ASTM D 1557-91. We recommend that all foundation excavations be observed by GDC to confirm foundation conditions and proper subgrade preparation prior to placing the first lift of cellular concrete backfill. Any soils disturbed by construction activities or weather should be excavated and recompacted as directed by GDC. Cellular concrete may be placed directly on the approved subgrade.

4.4.8 Cellular Concrete Backfill

Cellular concrete shall be placed in lifts not to exceed 2.5 feet, and subsequent lifts shall not be placed for at least 24 hours or until the specified strength has been obtained, in accordance with the plans and specifications.

4.4.9 Wall Drainage

The surface of the cellular concrete will be waterproofed with an impervious membrane. A layer of treated permeable material will be placed below the pavement and above the waterproofing layer to collect any water permeating the joints in concrete pavements, and conveyed to drains discharging to the base of the wall. Since the wall is above the water table and there are no upslope areas

adjacent to the walls, no underdrain system is necessary for collection of groundwater.

4.5 Slope Stability Analyses

We analyzed the static and seismic global embankment stability using the computer program PCSTABL5M (Purdue University). The soil profile used in our analysis is shown in Table 1. Since the residual undrained shear strength of any shallow liquefiable layers is higher than the undrained shear strength of Layer No. 2, the Layer 2 undrained shear strength controls the stability. For cellular concrete fill, we modeled the embankment material as a cohesive soil with unconfined compressive strength of 40 psi, or undrained shear strength of 20 psi (2.8 ksf).

For pseudo-static analyses we used an acceleration coefficient of Kh = 1/3 of the PGA, or Kh=0.17. Block, random, and circular failure surfaces were evaluated. The results (Appendix D-5) indicate static and seismic factors of safety in excess of 1.5 and 1.1, respectively. Therefore, the static and seismic stability are considered adequate.

4.6 Construction Considerations

4.6.1 Construction Advisories

- Construction of the wall is on an active freeway, and numerous transportation facilities, utilities, and other improvements are present. Construction staging and maintenance of existing traffic should be considered;
- Limited space is available for ingress/egress of equipment and construction operations;
- The lowest foundation subgrade is near the water table and soils with elevated moisture may be encountered, requiring stabilization with geogrid and rock;
- The foundation area must be proof-rolled with heavy equipment, but vibratory equipment should not be allowed below El. +25 feet due to shallow groundwater;
- Wall construction will need to be coordinated with Abutment 4 construction for the 405-22 Connector Separation.

4.6.2 Excavation

All earthwork and grading should be performed in accordance with Section 19 of Caltrans Standard Specifications. Excavated soils will consist mainly of shallow existing fill and native alluvium. Soils should be excavatable with moderate effort

using heavy-duty grading equipment. During earthwork operations, the contractor should control the flow of water through the work area and maintain a dry excavation. No surcharge loads, such as the weight of heavy equipment should be placed within 1.5 m (or height of excavation, whichever is greater) of the top of unsupported excavations. Care should be taken during excavation to avoid removing support for any existing improvements, such as foundations, pavements, or buried utilities. Excavation safety is the responsibility of the contractor, and should comply with applicable OSHA guidelines.

4.6.3 Buried Utilities

Buried and overhead utilities are present in the project area. The contractor should research utility locations and take the necessary precautions to protect-in-place or relocate utilities prior to grading. If any utilities conflict with the wall construction, they should be shown on the plans and protected or relocated as necessary.

4.6.4 Remnants of Previous Construction

Construction of this improvement project will require the removal of existing facilities, including structures, v-ditches, pavements, fencing, walls, asphalt, concrete, buried utilities, and other improvements.

4.6.5 Hazardous Waste Considerations

Environmental investigation was not within the scope of our work; however, we did not observe any evidence of contamination of subsurface materials in our borings and along the alignment. Nonetheless, contaminated soils and / or groundwater may be present at the site. If encountered during construction, the owner should be notified and appropriate methods of handling and disposal should be used.

4.6.6 Differing Site Conditions

Our characterization of the site is based on the results of our field explorations, geologic analyses of cross-sections, and interpolation between exploration locations. All cuts, excavations, and foundation areas should be observed continuously during construction are consistent with the recommendations used in the design. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations.

5.0 LIMITATIONS

This report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report is provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report. This report is subject to revision.

6.0 REFERENCES

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TABLES

TABLE 1
GENERALIZED SOIL PROFILE AND SUMMARY OF ENGINEERING PROPERTIES
RW3319 RW3320

Layer No.	Soil Type*	El. (feet)**	Index Properties*	SPT N-Value* (blow/ft)	Drained Shear Strength Parameters*				Undrained Shear Strength* (psf)	Compressibility Parameters*				
					Peak Cohesion c' (psf)	Peak Friction Angle ϕ' (deg)	Ultimate Cohesion c' (psf)	Ultimate Friction Angle ϕ' (deg)		Modulus E (ksf)	$Cc/(1+e_0)$	$Cr/(1+e_0)$	OCR	Cv (ft^2/day)
1	Very Stiff to Hard Sandy Clay / Silt (CL, ML)	Above +19	**(-)#200**=8 to 86% (avg 51%) **LL**=26 to 47 (avg 33) **PL**=14 to 20 (avg 19) **PI**=11 to 27 (avg 15) ω_N=4 to 32% (avg 19%) γ=125 pcf (average)	**Borings:** 9 to 43 (avg 25) **CPT:** 16 to 30#	400	30	250	30	2,500	-	-	0.018	7	**Over Consolidated:** 2.3
2	Firm to Stiff Sandy Clay (CL)	+19 to +4	**(-)#200**=26 to 86% (avg 58%) **LL**=33 to 39 (avg 36) **PL**=19 to 21 (avg 20) **PI**=12 to 19 (avg 16) ω_N=18 to 46% (avg 28%) γ=120 pcf (average)	**Borings:** 3 to 50 (avg 15)	250	28	100	28	1,000	-	0.17	0.016	2.5 at Freeway 1.0 below Abuts	**Normally Consolidated:** 0.33 **Over Consolidated:** 2.1
3	Very Stiff Clay, Sandy Clay, Silty Clay and Sandy to Clayey Silt (CL, ML)	+4 to -13	**(-)#200**=11 to 97% (avg 63%) **LL**=29 **PL**=19 **PI**=10 ω_N=19 to 44% (avg 29%) γ=120 pcf (average)	**Borings:** 12 to 50+ (avg 32) **CPT:** Avg 18#	-	-	-	-	2,000	-	-	0.019	>3	**Over Consolidated:** 3.3
4	Dense to Very dense Silty Sand, Sandy Silt, Sand and Stiff to Hard Clayey Silt and Clay (SM, ML, SP & CL, ML)	-13 to -30	**(-)#200**=2 to 86% (avg 35%) ω_N=15 to 40% (avg 25%) γ=125 pcf (average)	**Borings:** 19 to 50+ (avg 50+) **CPT:** Avg 30#	-	-	-	-	-	1,000	-	-	-	-
5 clay	Very Stiff to Hard Clay and Silt (CL, ML)	Below -30	**(-200)**=27 to 96% (avg 60%) **LL**=31 **PL**=15 **PI**=16 w_N=17 to 45% (avg 28%) γ=125 pcf (average)	**Borings:** 21 to 50+ (Avg 44)	-	-	-	-	3,000	-	-	0.017	>2	**Over Consolidated:** 3.3
5 sand	Dense to Very Dense Sand and Silty Sand (SP, SM)			**Borings:** 21 to 50+ (Avg 44) **CPT:** (Avg 42)#	0	38	-	-	-	3,000	-	-	-	-

* Average values from the overall project were used

** Average values based on CPT-08-003, 006, and 008 (For detailed layer elevations from each CPT refer Page 2 of 2 of Table 1).

CPT N-Values are based on available correlations (Robertson et al., 1983) -see Appendix A

TABLE 1
GENERALIZED SOIL PROFILE
(Layer Elevations)
RW3319 and RW3320

Layer No.	Top/ Bot	CPTs								
		CPT-08-003			CPT-08-006			CPT-08-008		
		27.9			42			49		
		Depth	Elev.	Thick	Depth	Elev.	Thick	Depth	Elev.	Thick
1	Top	0	28	9.0	0	42.0	24.0	0	49.0	34.0
	Bot	9	19		24	18.0		34	15.0	
2	Top	9	19	11.0	24	18.0	14.0	34	15.0	11.0
	Bot	20	8		38	4.0		45	4.0	
3	Top	20	8	21.0	38	4.0	17.0	45	4.0	17.0
	Bot	41	-13		55	-13.0		62	-13.0	
4	Top	41	-13	9.0	55	-13.0	18.0	62	-13.0	17.0
	Bot	50	-22		73	-31.0		79	-30.0	
5-1	Top	50	-22	24.0	73	-31.0	15.0	79	-30.0	20.0
	Bot	74	-46		88	-46.0		99	-50.0	
5-2	Top	74	-46		88	-46.0		99	-50.0	
	Bot									

TABLE 2
SUMMARY OF NEARBY FAULTS AND SEISMICITY

Fault Name	Fault Type	Mw	LOCATION		
			Middle RW3319 & 3320		
			Lat. 33.7741 Lon. 118.0441		
			Dist (km)	PBA	PGA
Newport-Inglewood	Strike Slip	7.00	5.00	0.52	0.42
Los Alamitos	Reverse	6.00	1.60	0.60	0.50
San Joaquin Hills	Blind Thrust	7.00	13.70	0.36	0.34
Puente Hills	Blind Thrust	7.25	18.20	0.32	0.32

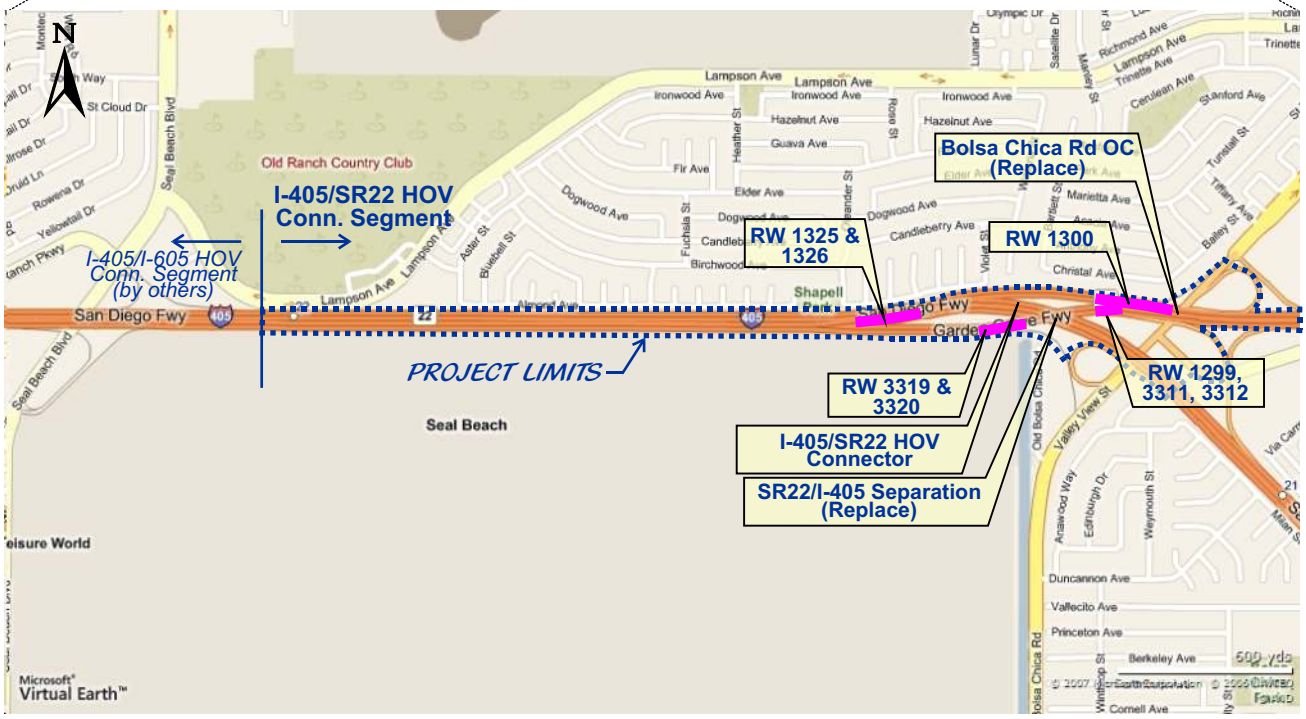
TABLE 3
SUMMARY OF LIQUEFACTION ANALYSES
RW3319 RW3320

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Design Ground Water Elevation (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-003	16	0.26	0.00	0.26
CPT-08-006	16	0.00	0.00	0.00
CPT-08-008	16	0.02	0.02	0.04

Min	**0.00**
Max	**0.26**
Average	**0.10**

FIGURES



The base maps are from Microsoft's Virtual Earth

GROUP DELTA CONSULTANTS

GDC Project No. I-436

West County Connector Project
I-405/SR22 HOV Conn. Segment
Orange County, California

Vicinity Map

Figure 1

SCALE 1" = 50'

FIGURE 2

RW 3319 AND RW 3320
EXPLORATION LOCATION PLAN

RELATIVE BORDER SCALE
IS IN INCHES

0 1 2 3

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

MOHSEN MOHSENI
No. C45999
Exp. 12/31/08
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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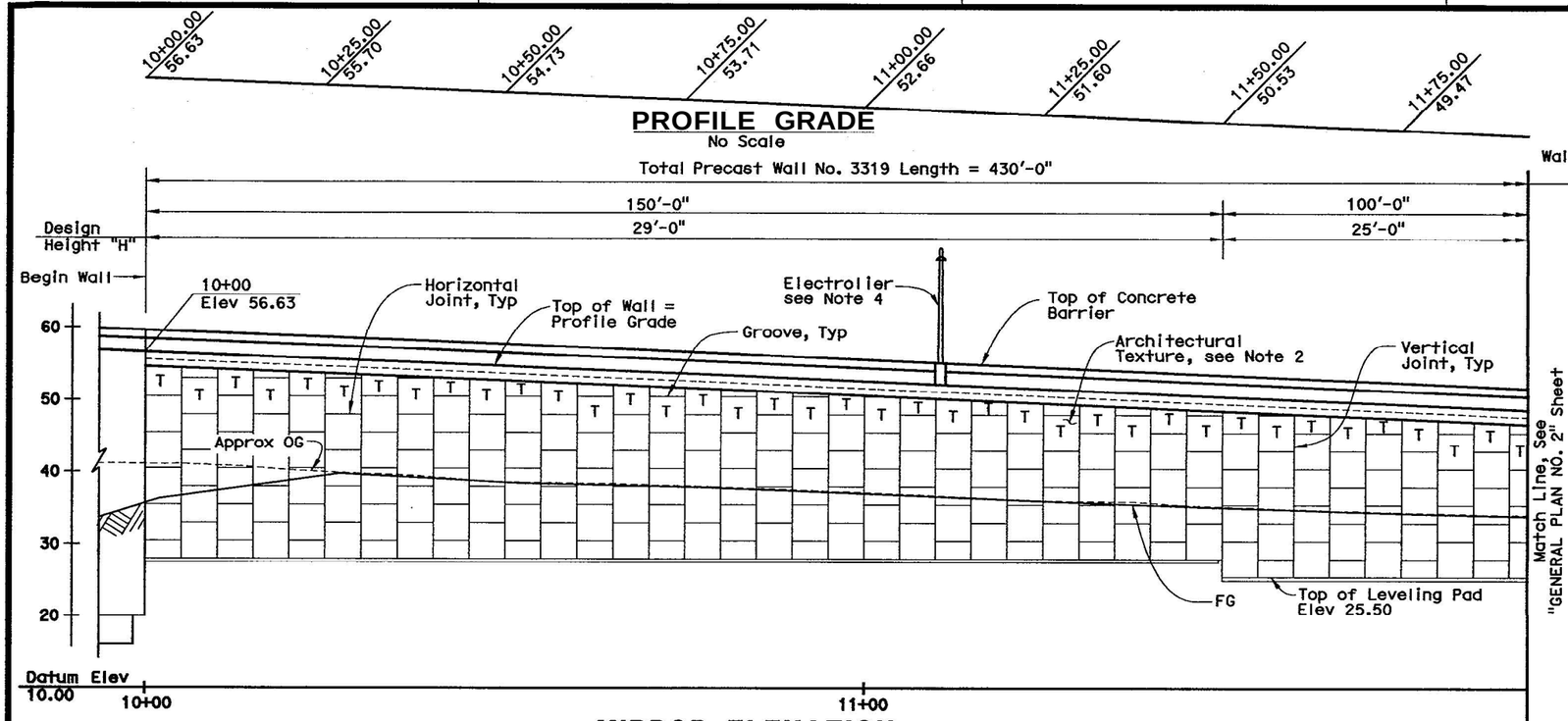
2201 DUPONT DRIVE
SUITE 200
IRVINE, CA 92612

OCTA



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No Scale

MIRROR ELEVATION
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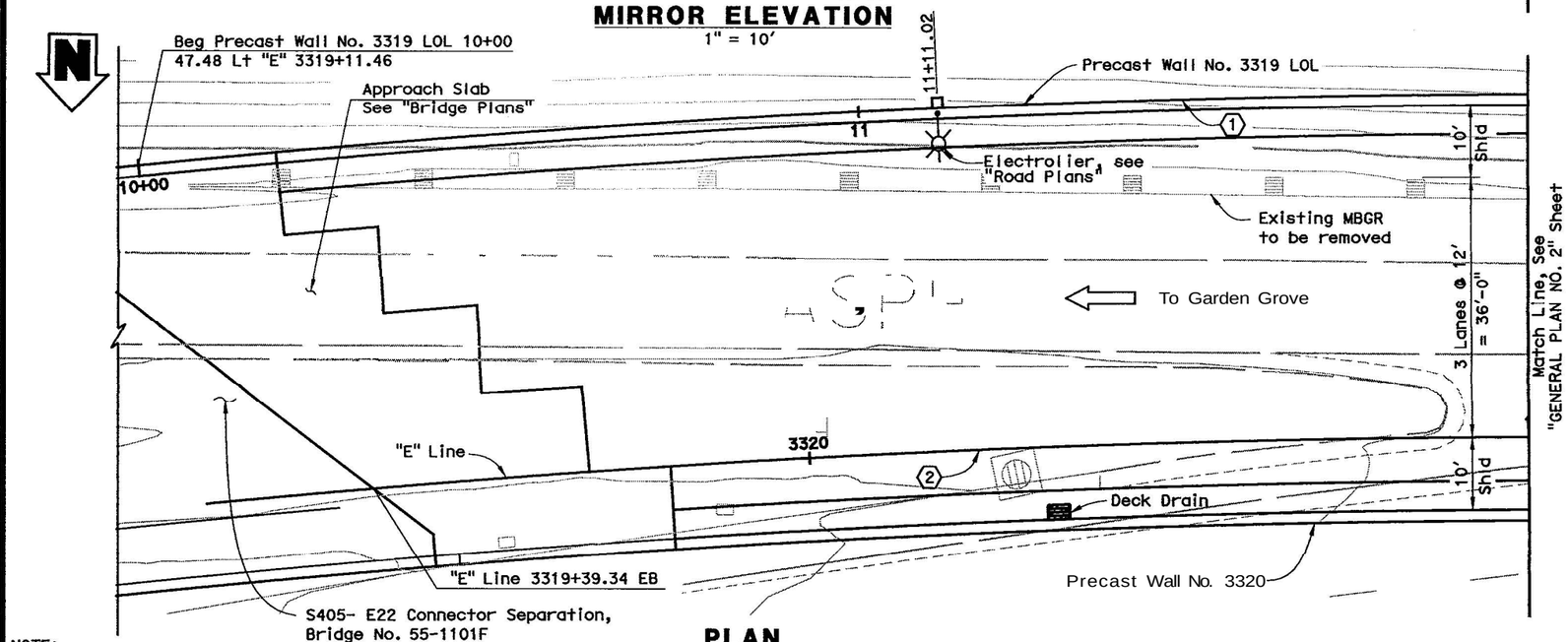
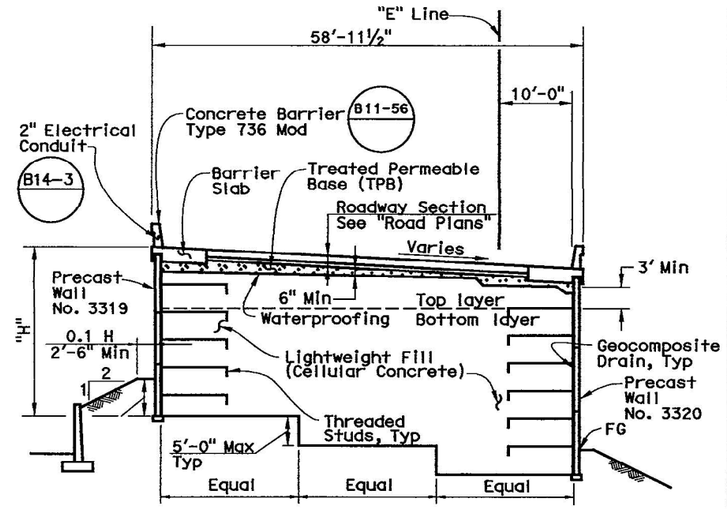


PLAN
1" = 10'



TYPICAL SECTION (Sta 10+00 to 13+75)
1" = 10'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architecural Panel sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.
4. For Electrolier Pedestal Detail, see "Precast Wall Details No. 6" sheet.

CURVE DATA

① R = 2047.48'
Δ = 10°10'07"
L = 363.38'
T = 182.17'

② R = 2000'
Δ = 14°15'17"
L = 519.70'
T = 261.32'

NOTE:
The Co ctor shall verify all controlling field dimensi before ordering or fabricating any material

Figure 3A

Sudhakar 11
DESIGN OVE
SIGN OFF D

	BY	CHECKED
DESIGN	M. Ruvalcaba	
DETAILS	M. Morcillo	
QUANTITIES	M. Ruvalcaba	
LRFD DESIGN	BY	CHECKED
LAYOUT	BY	PLANS AND SPECS COMPARED
SPECIFICATIONS		

LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	55-XXX
POST MILES	20.91

PRECAST WALL No. 3319 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
GENERAL PLAN No. 1

CU 12235
EA 071621

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

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TIME PLOTTED => $TIME
DATE PLOTTED => $DATE
USER NAME => $USER

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12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/08 — CIVIL — STATE OF CALIFORNIA

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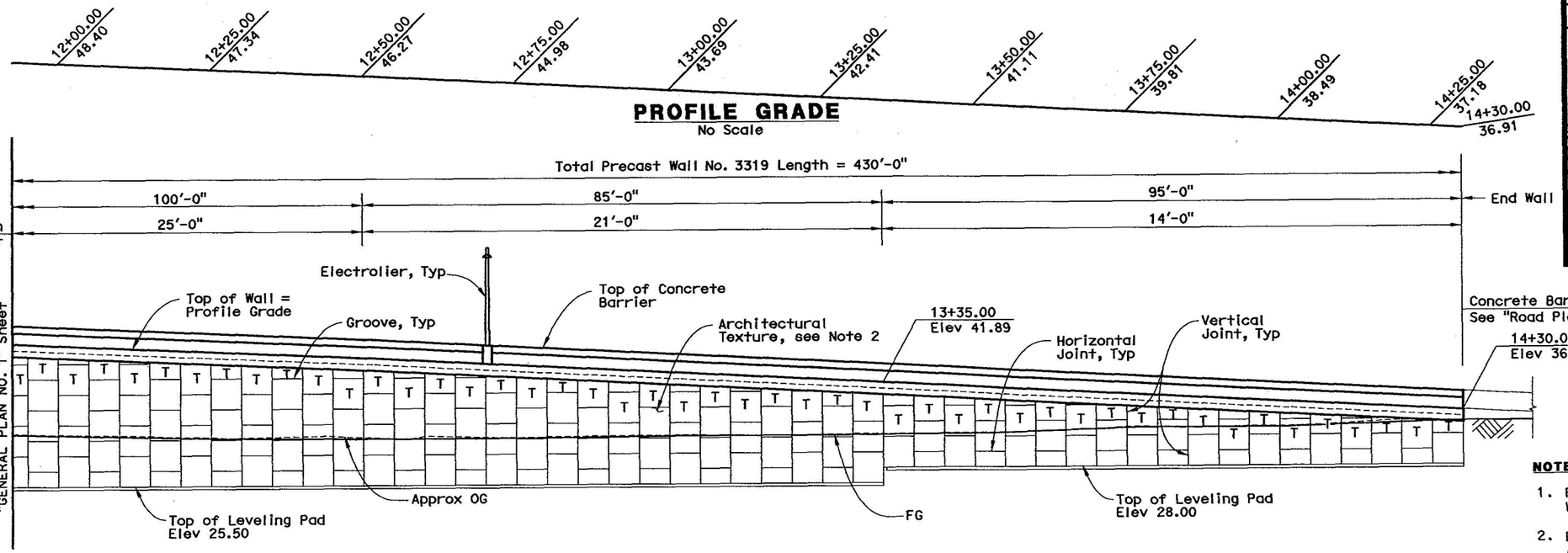
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863



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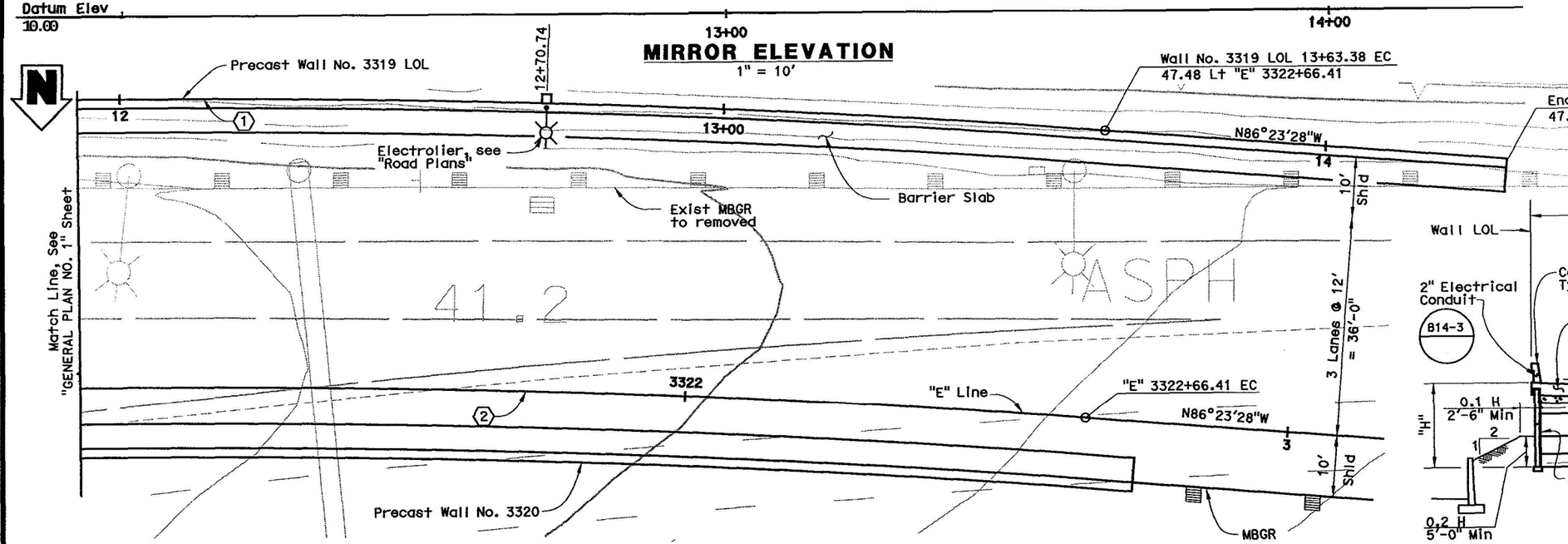
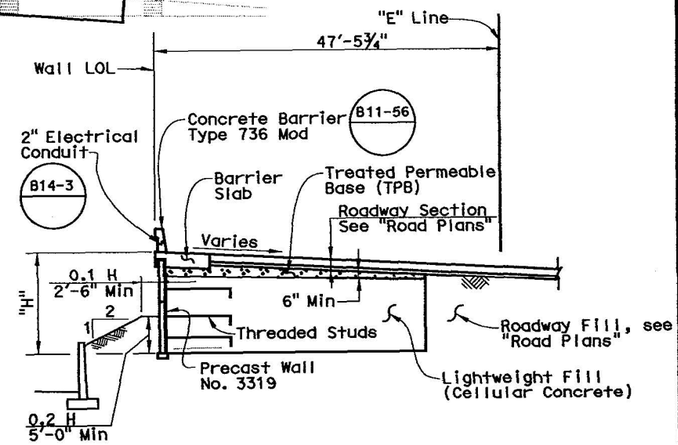
Δ = 10°10'07"
L = 363.38'
T = 182.17'

② R = 2000'
Δ = 14°15'17"
L = 519.70'
T = 261.32'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panels sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.





TYPICAL SECTION (Sta 13+75 to 14+30)
1" = 10'

NOTE:
The c… actor shall verify all controlling field dimen… is before ordering or fabricating any material

Figure 3B

Sudhak… atti DESIGN O… HT SIGN OFF	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER
	DETAILS	BY M. Morcillo	CHECKED	LAYOUT	CHECKED		
	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS BY	PLANS AND SPECS COMPARED		

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

CU 12235
EA 071621

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55-XXX	GENERAL PLAN No. 2
POST MILES 20.91	

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 10/21/08

SHEET 3 OF 19

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12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

MOHSEN MOHSENI
No. C45999
Exp. 12/31/08
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

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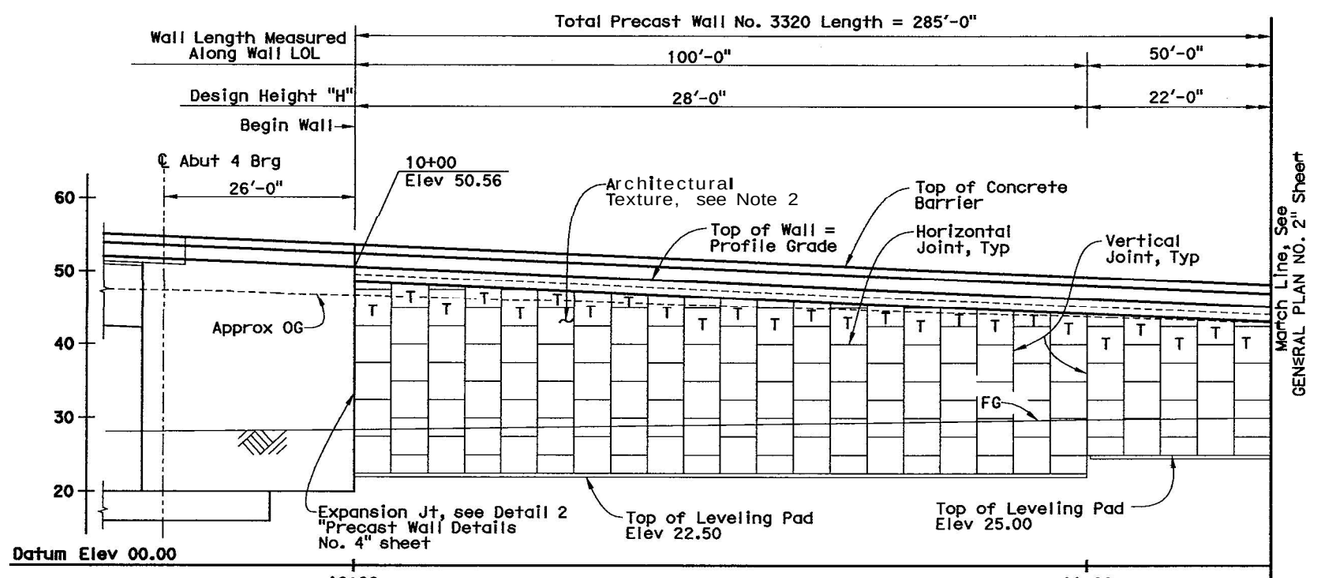
PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92865



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ELEVATION
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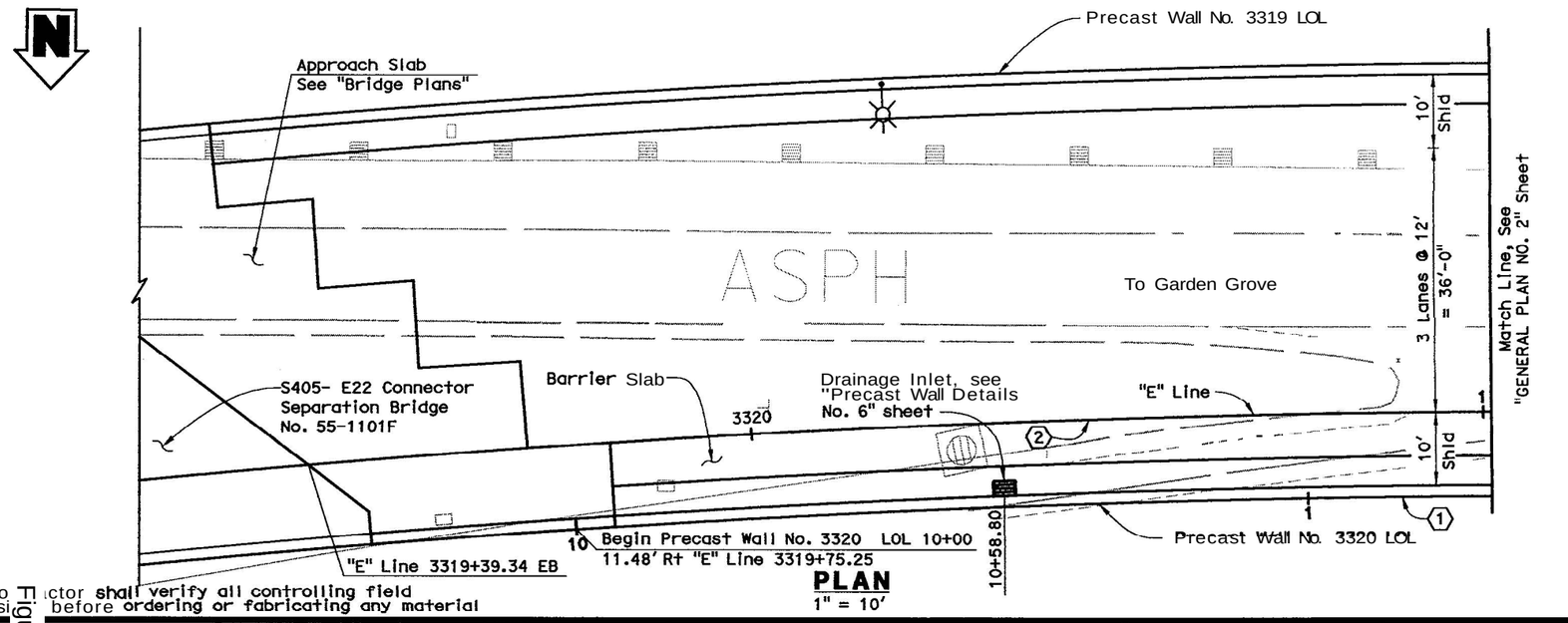
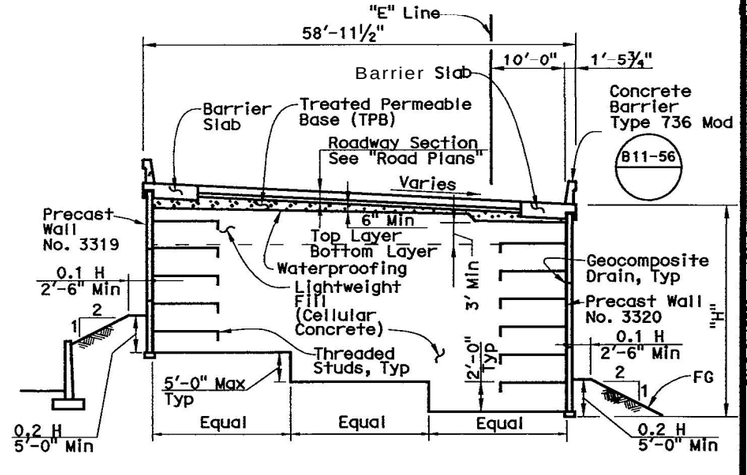


PLAN
1" = 10'



TYPICAL SECTION
1" = 10'

NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panel sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.

CURVE DATA

R = 1988.52'
Δ = 8°12'42"
L = 285.00'
T = 142.74'

② R = 2000'
Δ = 14°15'17"
L = 519.70'
T = 261.32'

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 3C

Sudhakar ☐ DESIGN OVER ☐ SIGN OFF DA	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-XXX POST MILES 20.91	PRECAST WALL No. 3320 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE) GENERAL PLAN No. 1
	DETAILS	BY M. Morolilo	CHECKED	LAYOUT	BY	CHECKED				
	QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED				

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 a

CU 12235
EA 071621
FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/08 | 1 | 1 | 1 | 1 | 1 | 1 | 1

SHEET 2 OF 20

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TIME PLOTTED => $TIME
DATE PLOTTED => $DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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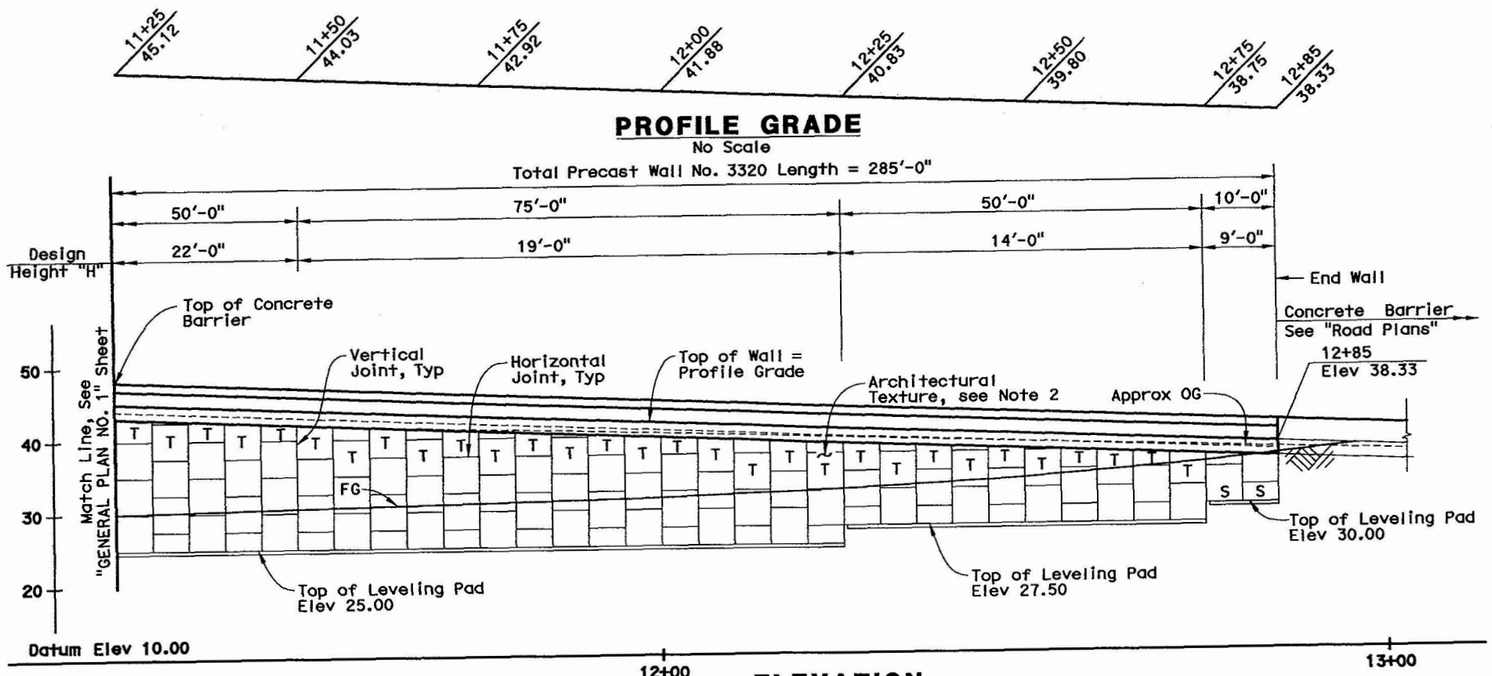
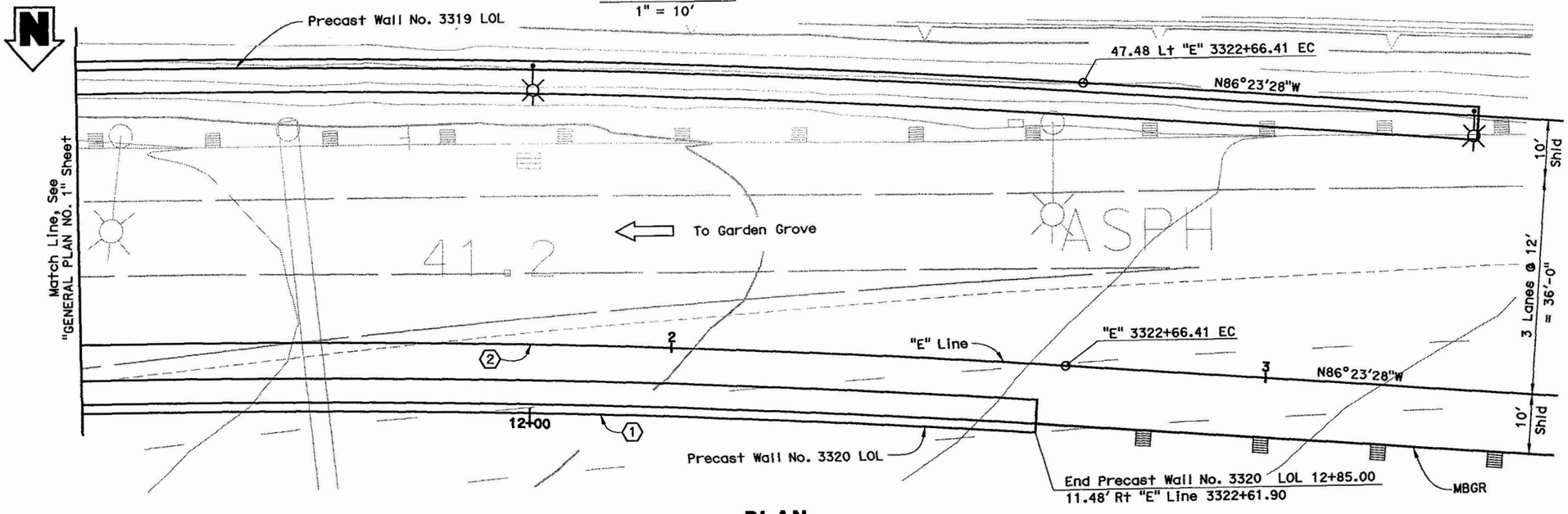
REGISTERED PROFESSIONAL ENGINEER
MOHSEN MOHSENI
No. C45999
Exp. 12/31/08
CIVIL
STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863





NOTES:

1. For Precast Wall Details, see "Precast Wall Details No.1" sheet.
2. For Architectural Details, see Architectural Panels sheets.
3. For Joint and Groove Details, see "Precast Wall Details No.2" sheet.

CURVE DATA

① R = 1988.52'
Δ = 8°12'42"
L = 285.00'
T = 142.74'

② R = 2000'
Δ = 14°15'17"
L = 519.70'
T = 261.32'

Figure 3D

NOTE: The contractor shall verify all controlling field dimensions before ordering or fabricating any material

DESIGN	Sudhc Vatti	DESIGN	BY M. Ruvalcaba	CHECKED	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	CHECKED
DETAILS		DETAILS	BY M. Morcillo	CHECKED	LAYOUT	BY	PLANS AND SPECS COMPARED
QUANTITIES		QUANTITIES	BY M. Ruvalcaba	CHECKED	SPECIFICATIONS	BY	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

CU 12235
EA 071621

FILE => @REQUEST

BRIDGE NO. 55-XXX
POST MILES 20.91

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/06

SHEET 3 OF 20

PRECAST WALL No. 3320 WITH LIGHTWEIGHT FILL (CELLULAR CONCRETE)
GENERAL PLAN No. 2

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

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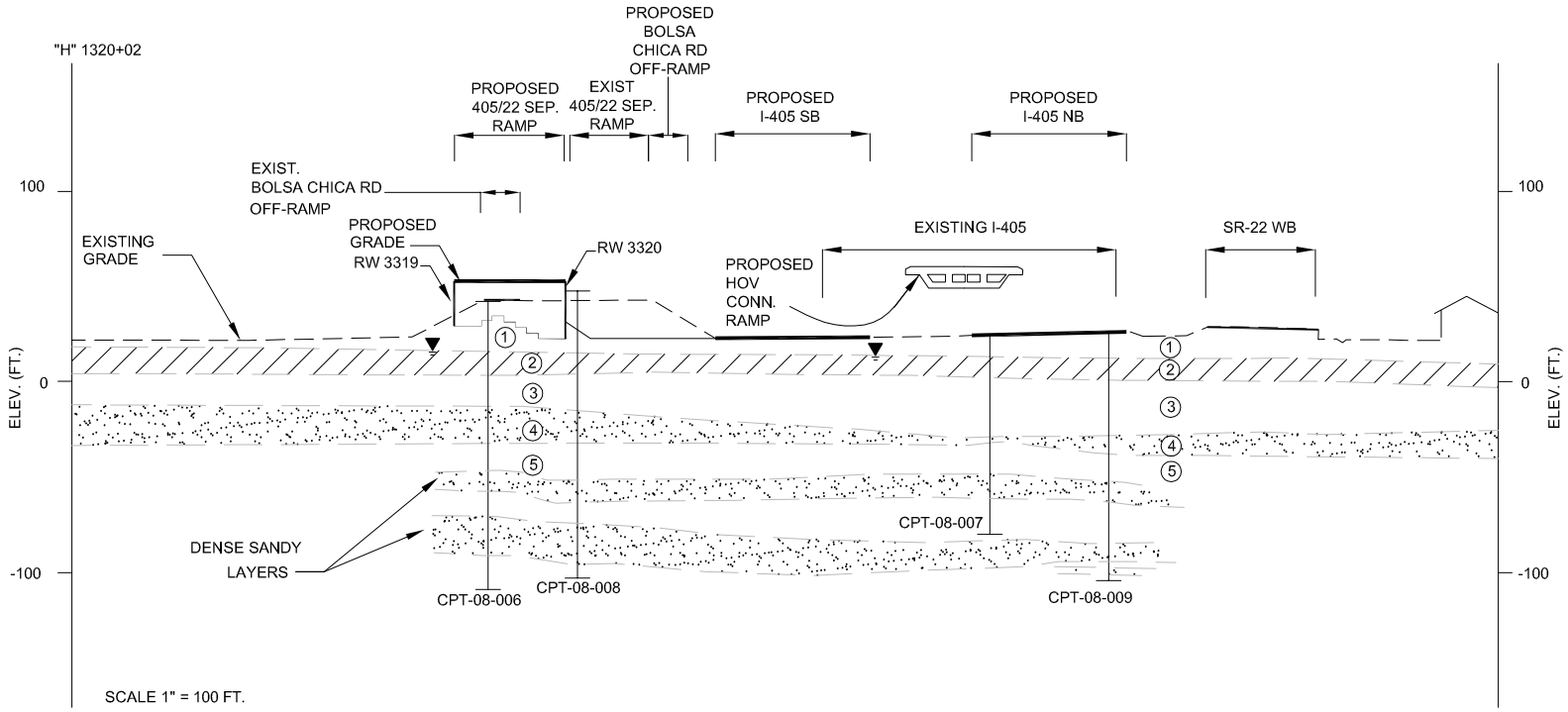


SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 92 ARGONAUT, SUITE 120 ALISO VIEJO, CA 92656 (949) 609-1020	FIGURE NUMBER 4
	PROJECT NAME WEST COUNTY CONNECTOR PROJECT I-405/SR-22 HOV. CONN. SEGMENT	PROJECT NUMBER I-436
	CROSS SECTION - "H" 1320+02	

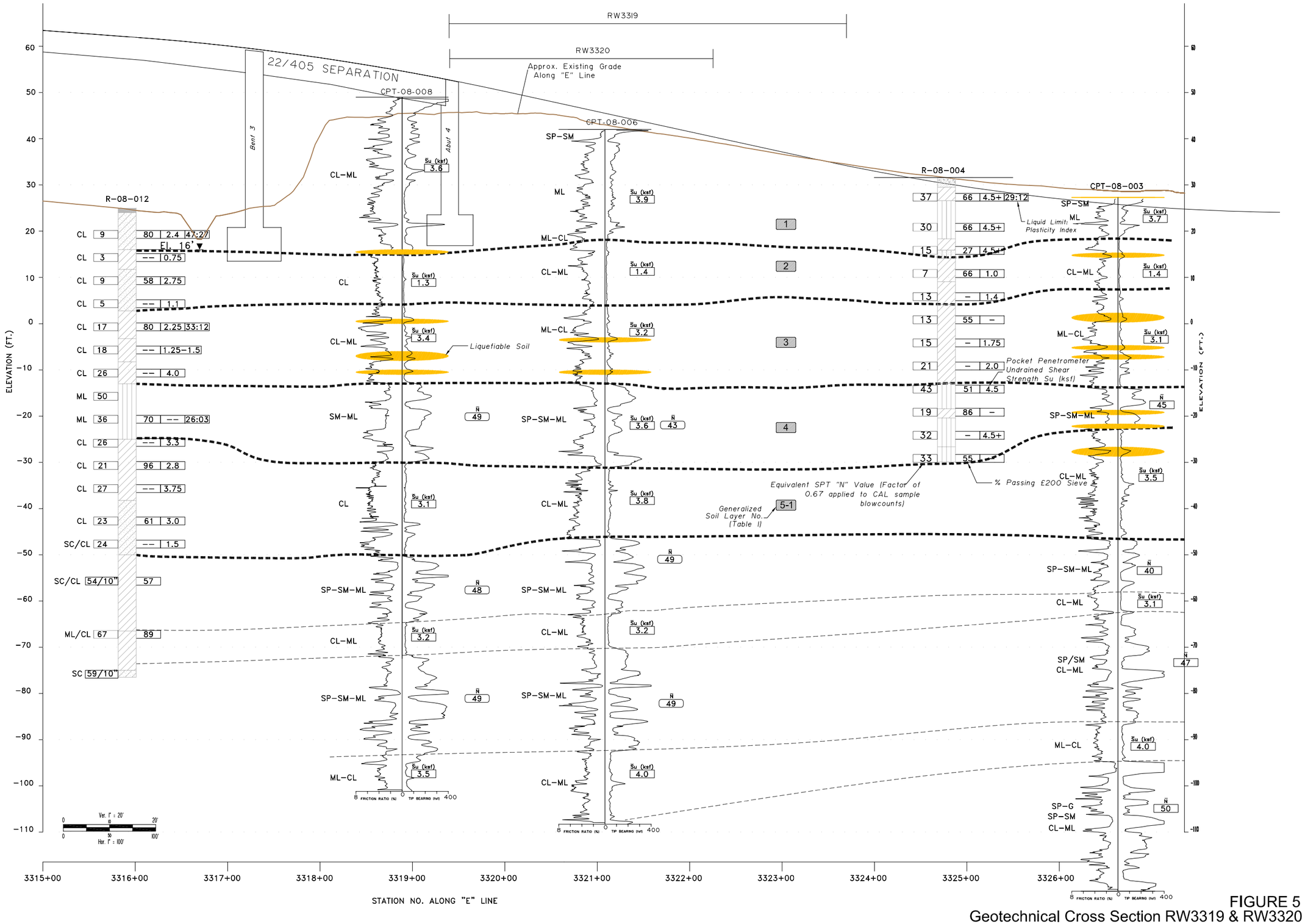


FIGURE 5
Geotechnical Cross Section RW3319 & RW3320

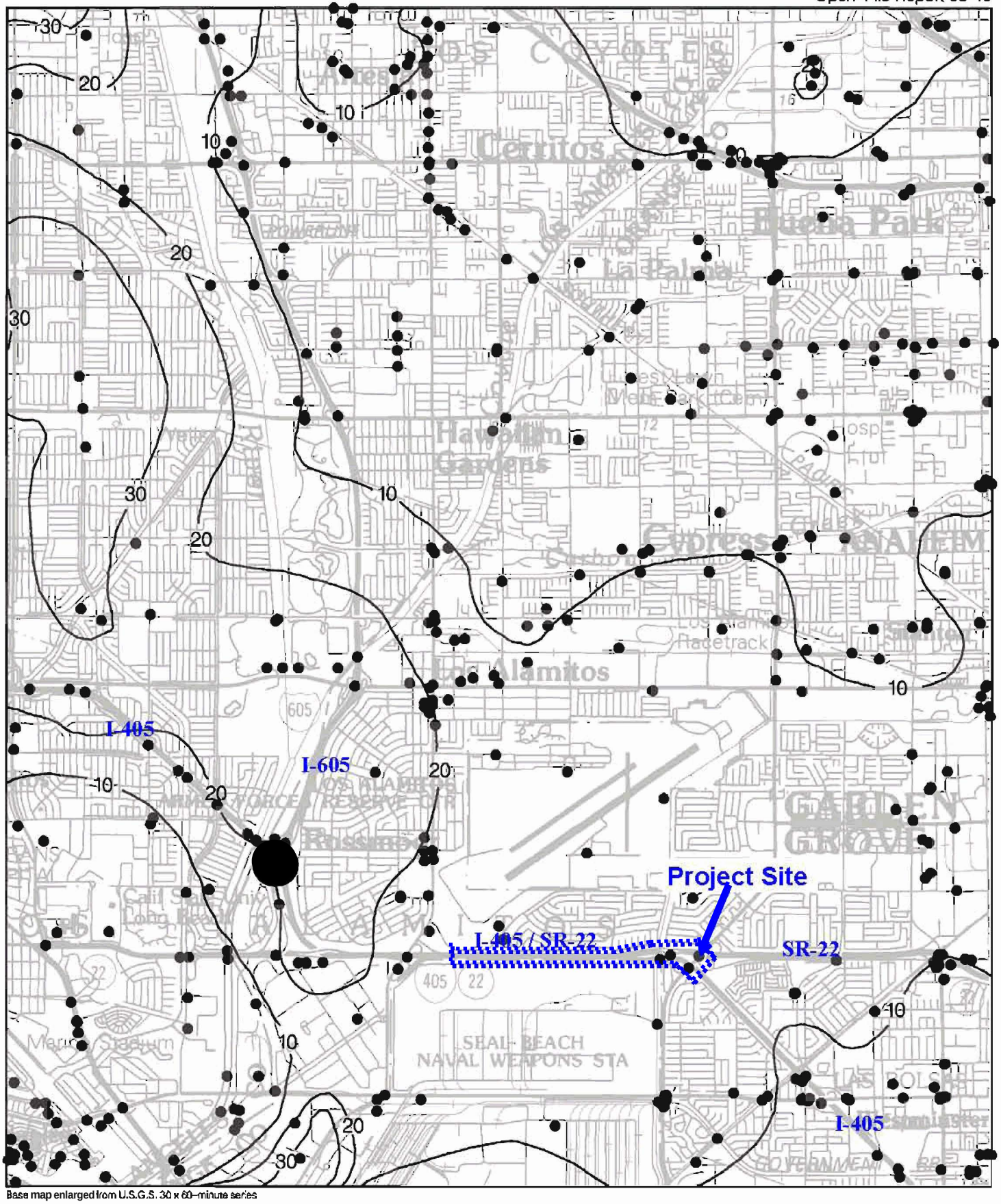


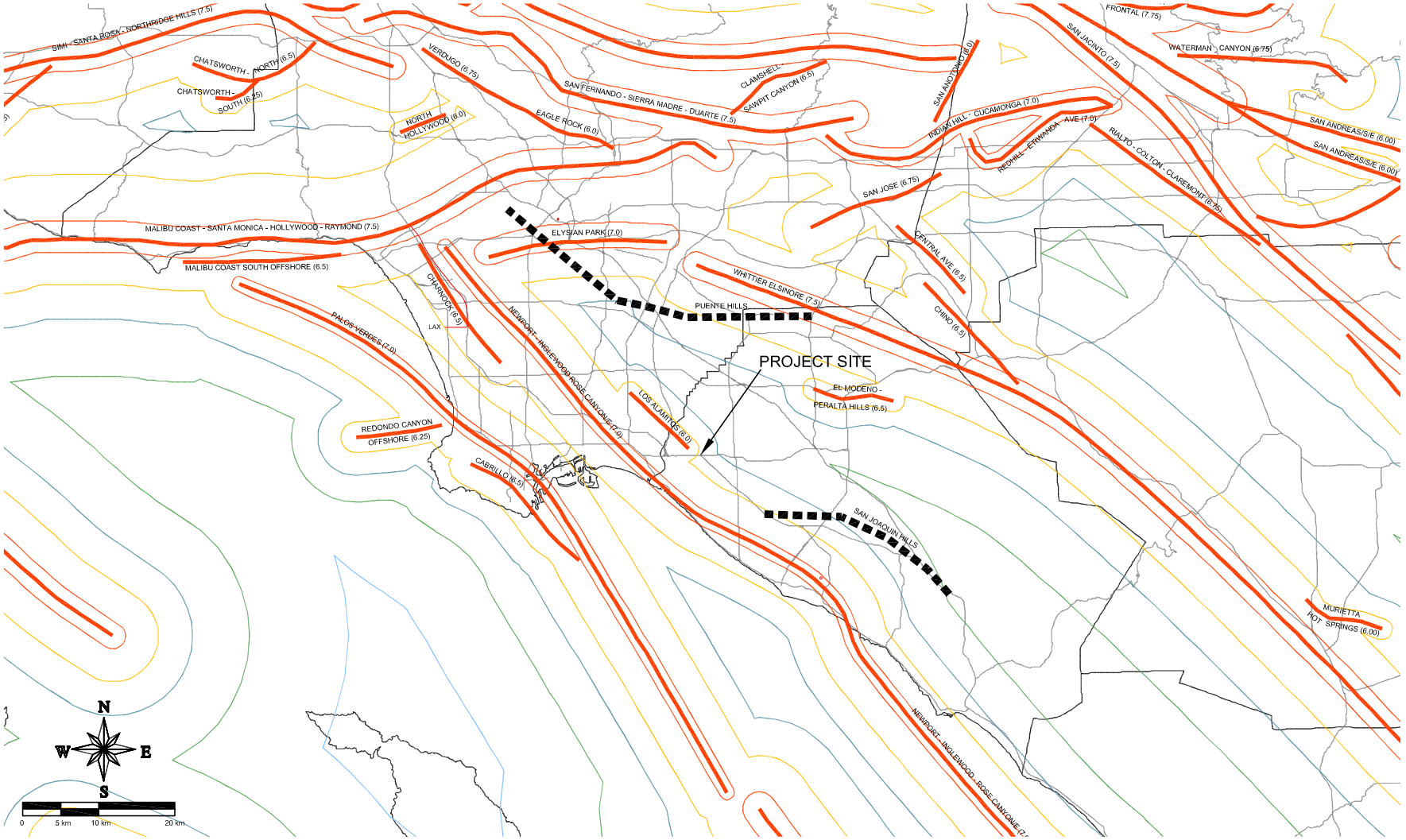
Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

● Borehole Site

30 Depth to ground water in feet

Figure 6: Historically Highest Groundwater Map

ONE MILE



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills fault in Orange County is currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

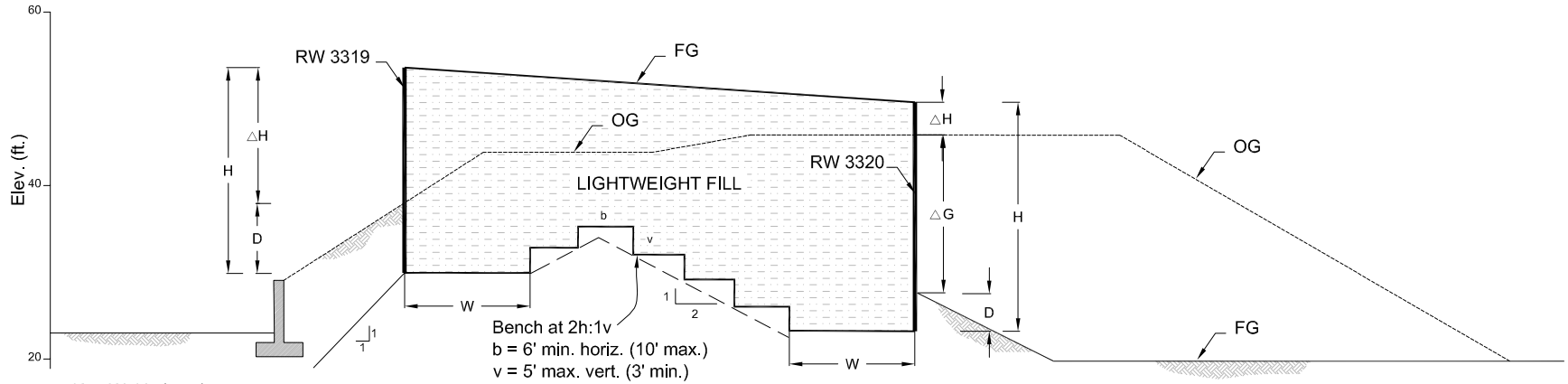
GROUP DELTA

GDC PROJECT NO. I-436

PRECAST WALLS NOS. RW3319 AND RW3320
SR 22 Improvements - Phase 2

Caltrans Fault and PBA Map

Figure 7

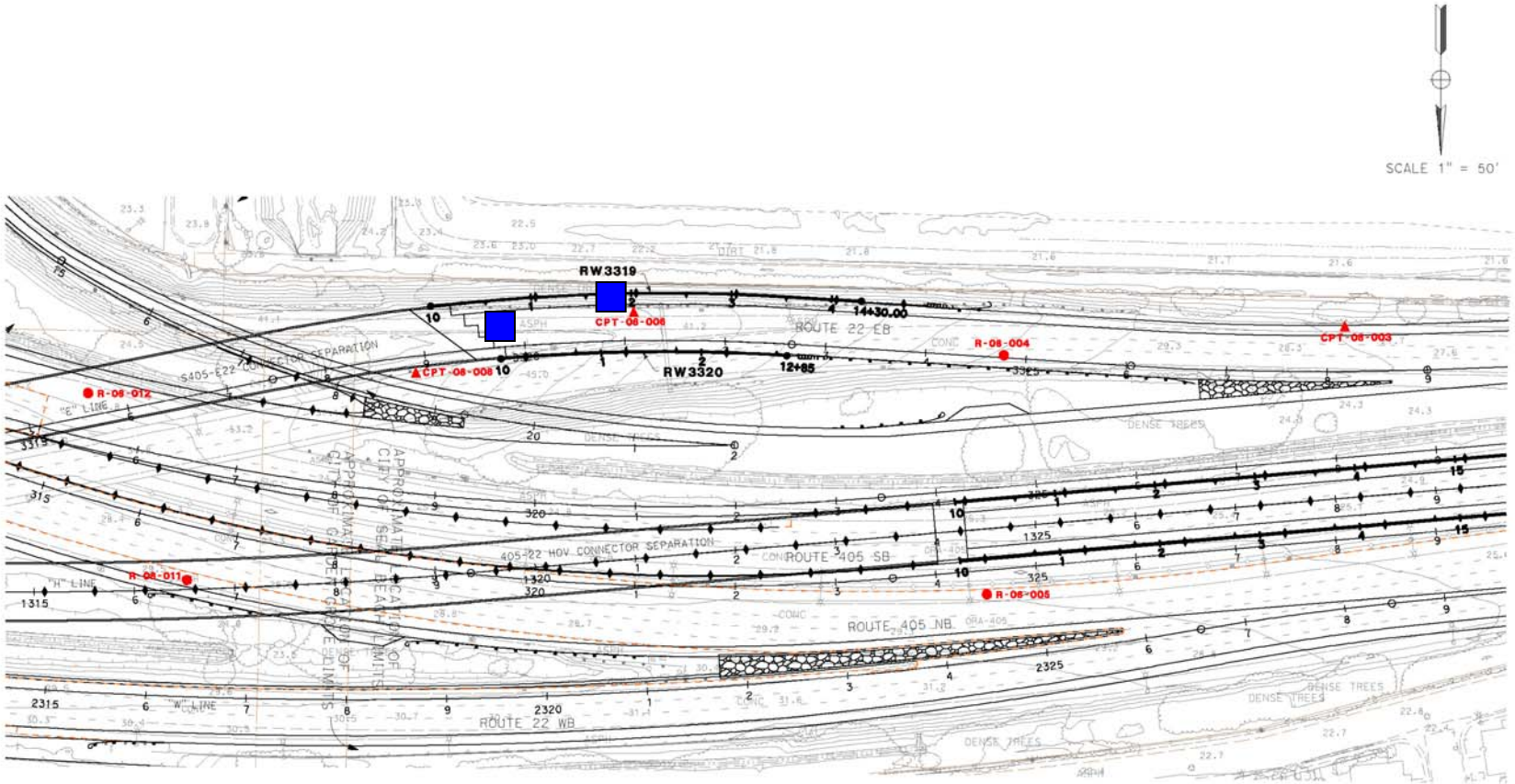


Key Width (min.)
w = 8' (H ⩽ 12')
w = 12' (H = 12 - 20')
w = 15' (H > 20')

Depth Below FG (min.)
RW 3319 : D = 2.9 + 0.3 △H (5' min.)
△H < 8' D = 5' min.
△H 9-16' D = 7' min.
RW 3320 : D = 5' min.

H = Total Wall Height
D = Depth Below FG
△H = Grade Increase Above OG
W = Key Width
△G = Cut Below OG at Front of Wall

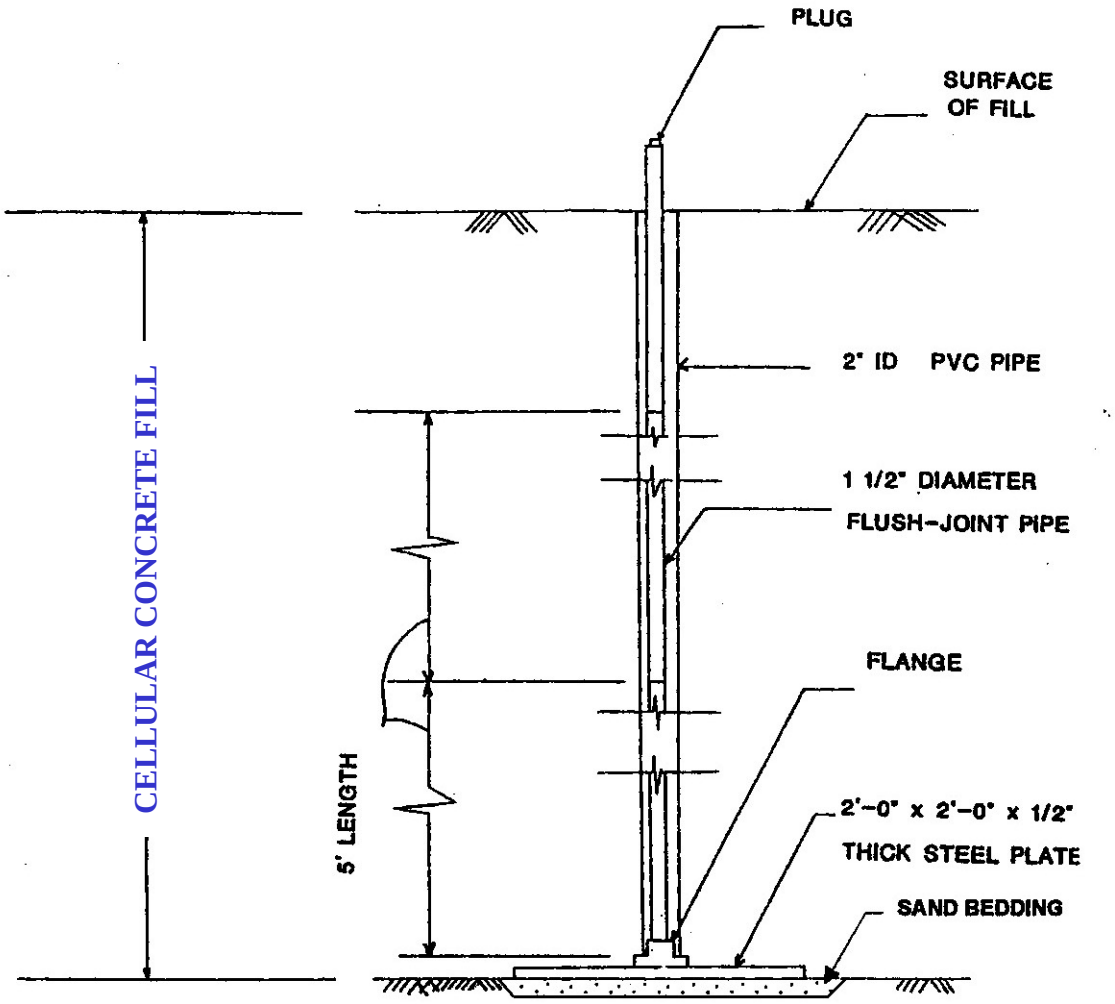
GROUP DELTA CONSULTANTS	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 92 ARGONAUT, SUITE 120 ALISO VIEJO, CA 92656 (949) 609-1020	FIGURE NUMBER 8
	PROJECT NAME WEST COUNTY CONNECTOR PROJECT WALLS RW3319 & RW3320	PROJECT NUMBER I-436
	TYPICAL SECTION RW3319 & RW3320	



LEGEND

SETTLEMENT PLATE

FIGURE 9A
SETTLEMENT PLATE LOCATIONS



No Scale

GROUP DELTA CONSULTANTS

GDC Project No. I-436

West County Connectors 405/22 HOV Segment
Orange County, CA

Settlement Plate Detail

Figure 9B

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing — CERTIFIED GEOTECHNICAL ENGINEER — 05/18/09

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

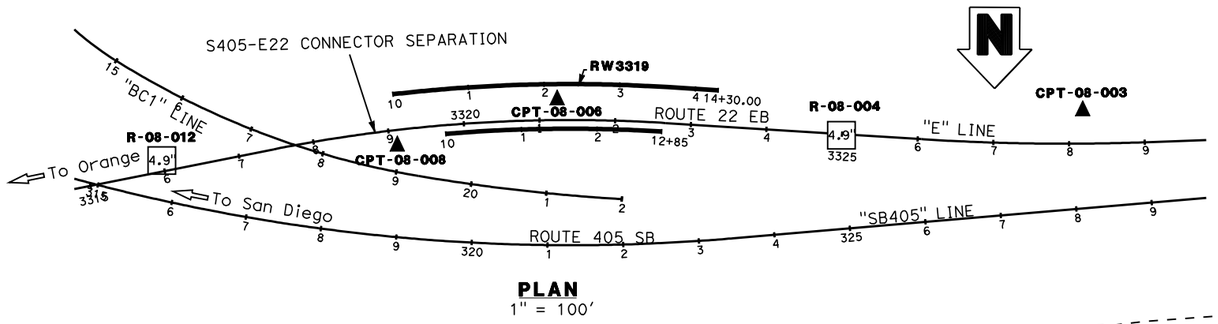
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

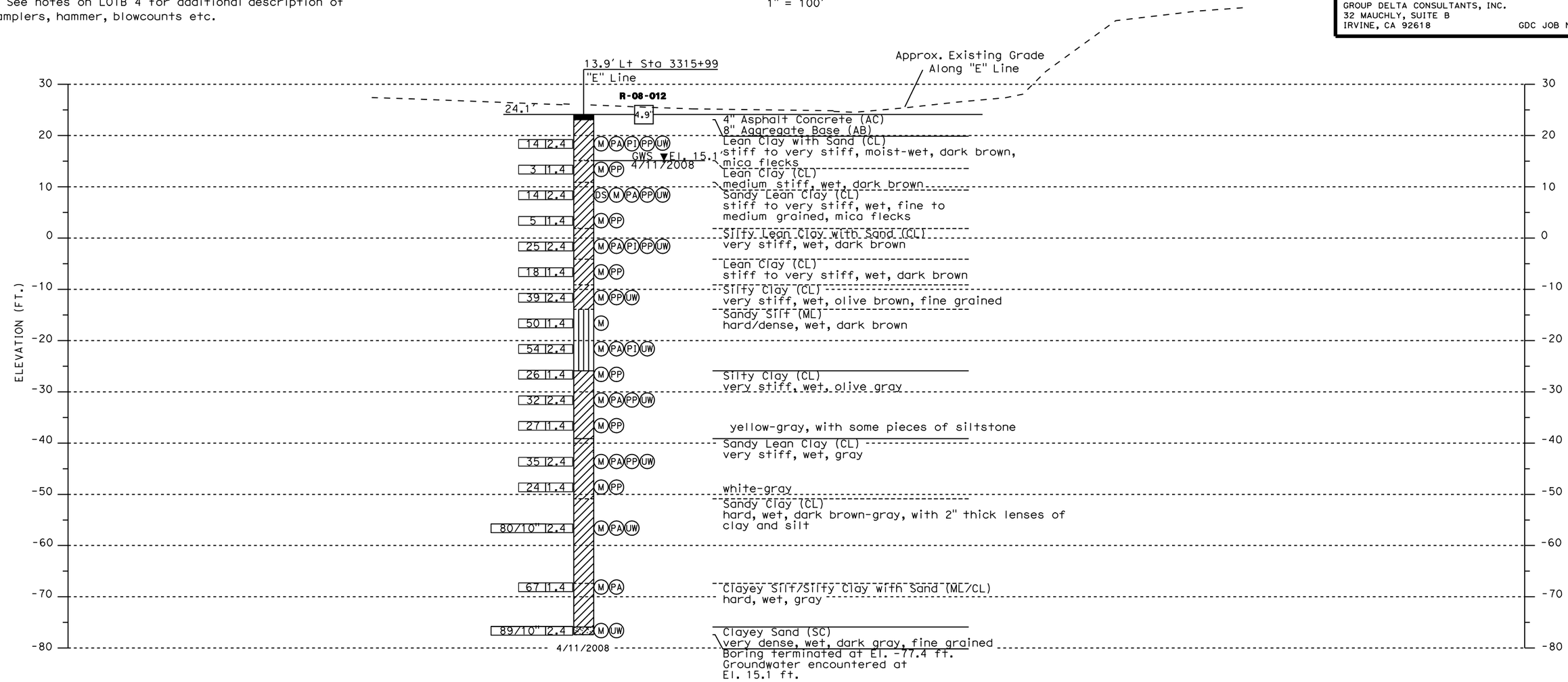
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 1

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0077 POST MILES 20.80-20.89	PRECAST WALL NO. RW3319 LOG OF TEST BORINGS 1 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES: 10/23/08, 02/27/09, 05/18/09	SHEET 16 OF 20

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FILE => $REQUEST

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

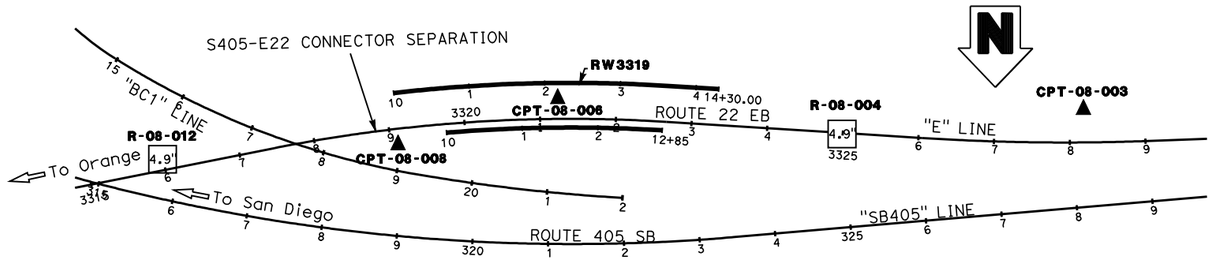
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

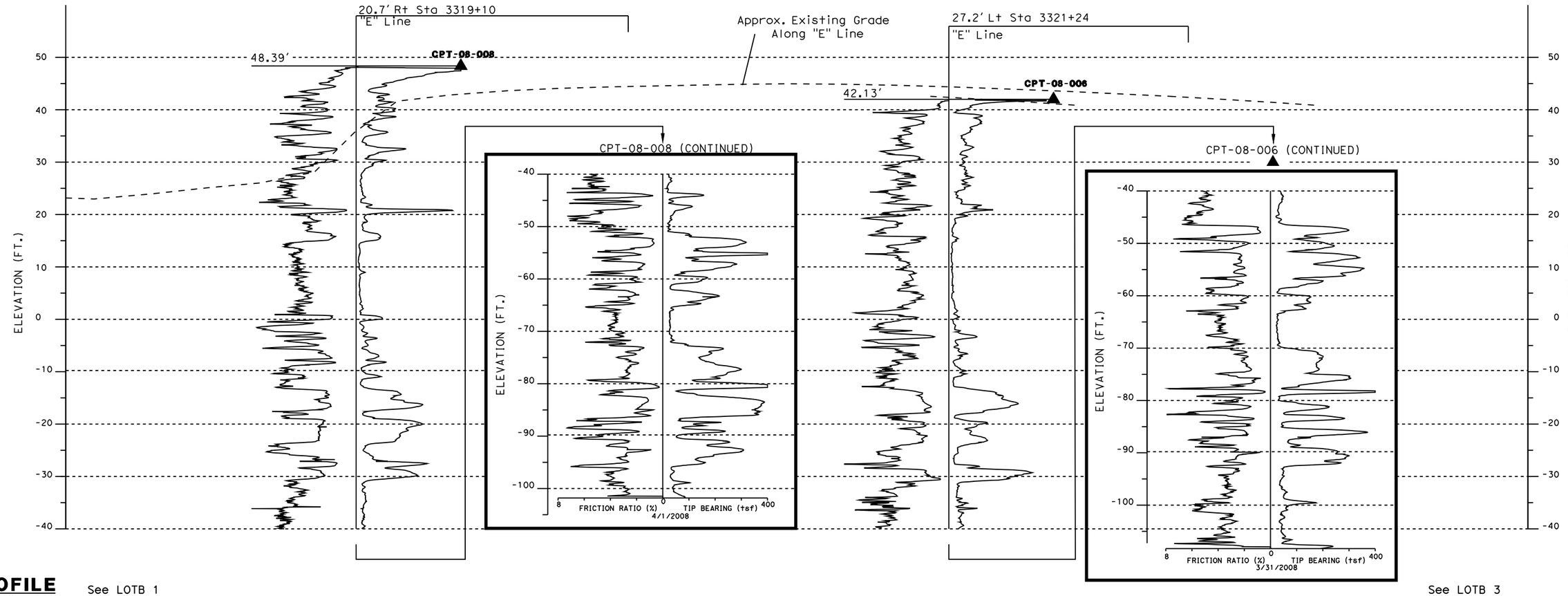
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 2

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0077 POST MILES 20.80-20.89	PRECAST WALL NO. RW3319 LOG OF TEST BORINGS 2 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES: 10/23/08, 02/23/09, 05/18/09; SHEET 17 OF 20

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

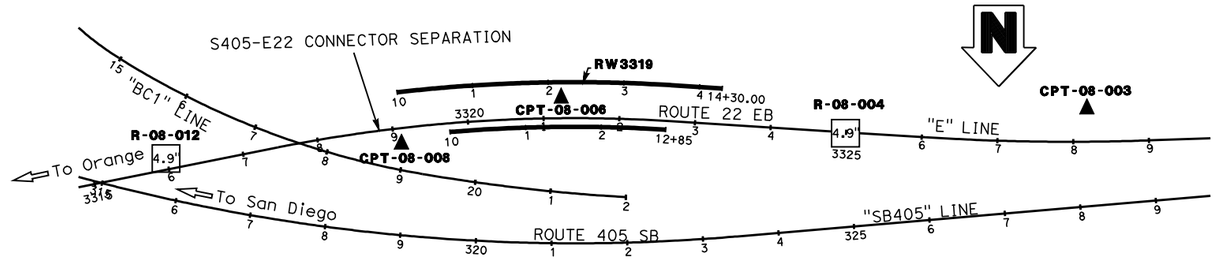
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

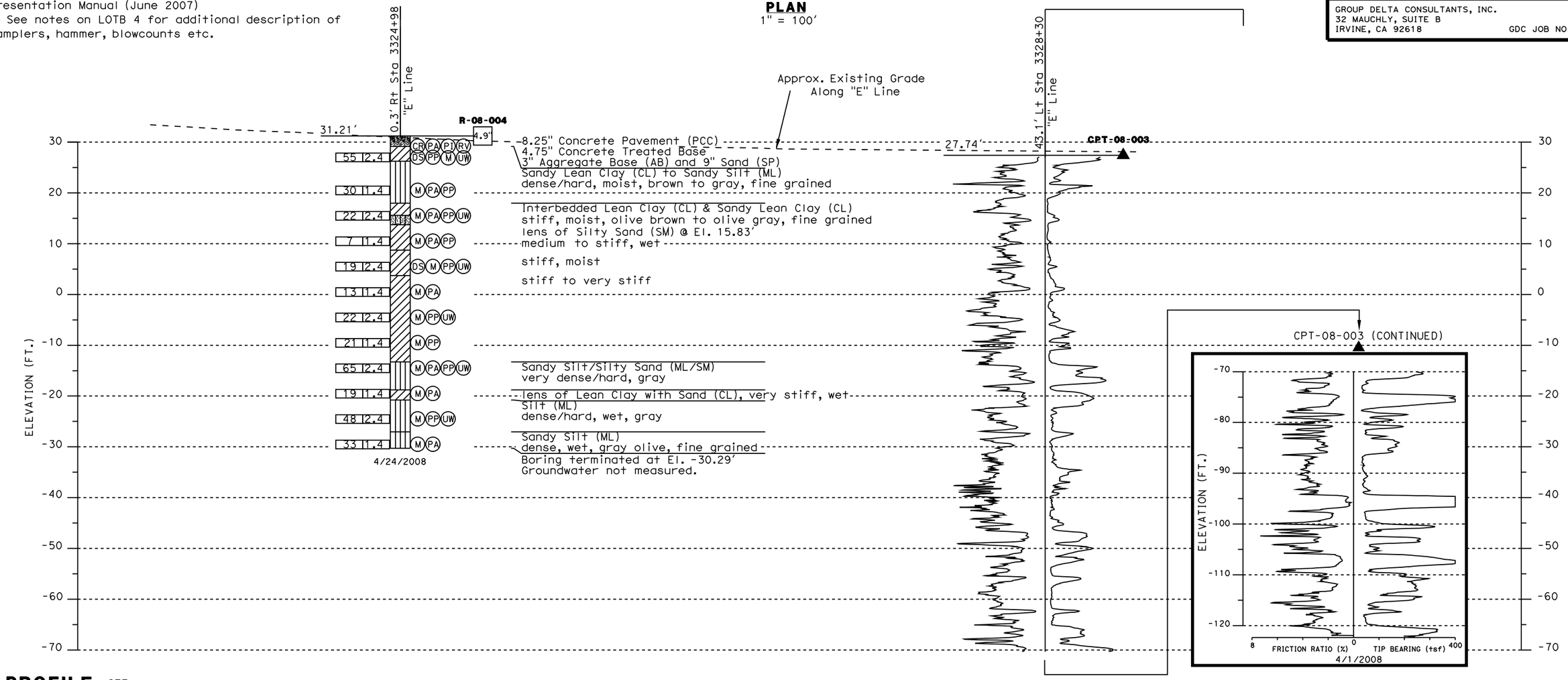
BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:
1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE SEE LOTB 2
HOR. 1" = 20'
VER. 1" = 10'

3324+00 3325+00 3326+00 3327+00 3328+00 3329+00
STATION NO. ALONG "E" LINE

PLATE 3

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0077 POST MILES 20.80-20.89	PRECAST WALL NO. RW3319 LOG OF TEST BORINGS 3 OF 5

OGS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU 12235 EA 071621 — FILE => $REQUEST — DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 10/23/08 02/23/09 05/18/09 — SHEET 18 OF 20

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REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

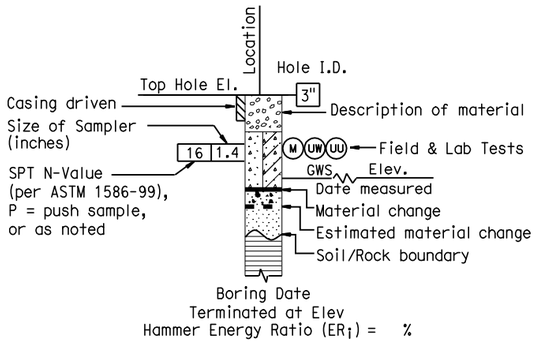
Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
⌜ ⌝ ⌞ ⌟	O	Other

Note: Size in inches.

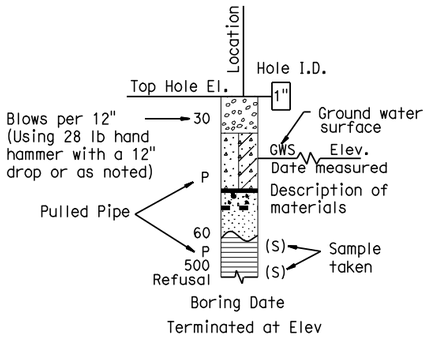
PLASTICITY OF FINE-GRAINED SOILS

Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

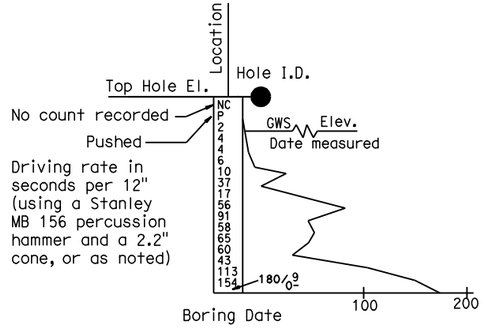
Notes :
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.
2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers in rotary borings.
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



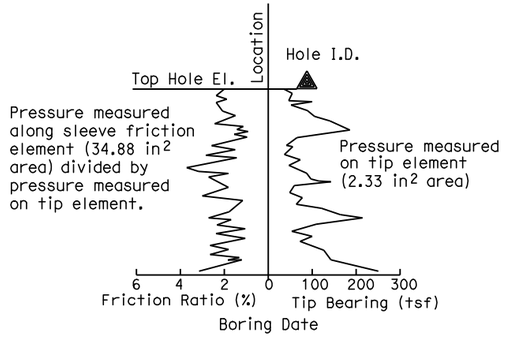
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 4

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55E0077 POST MILES 20.80-20.89	SOIL LEGEND LOG OF TEST BORINGS 4 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 10/23/08 02/23/09 05/18/09	SHEET 19 OF 20

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USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 5

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

WALL NO. 55E0077
POST MILES 20.80-20.89

SOIL LEGEND
LOG OF TEST BORINGS 5 OF 5

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 20 OF 20

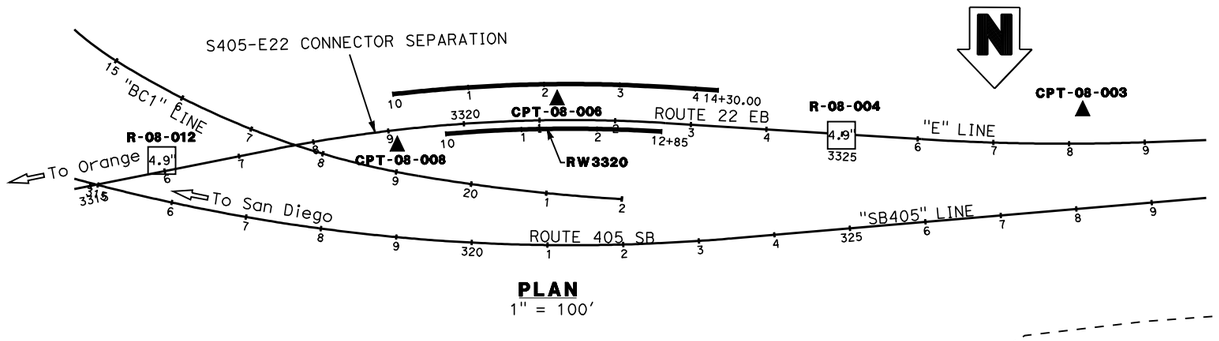
FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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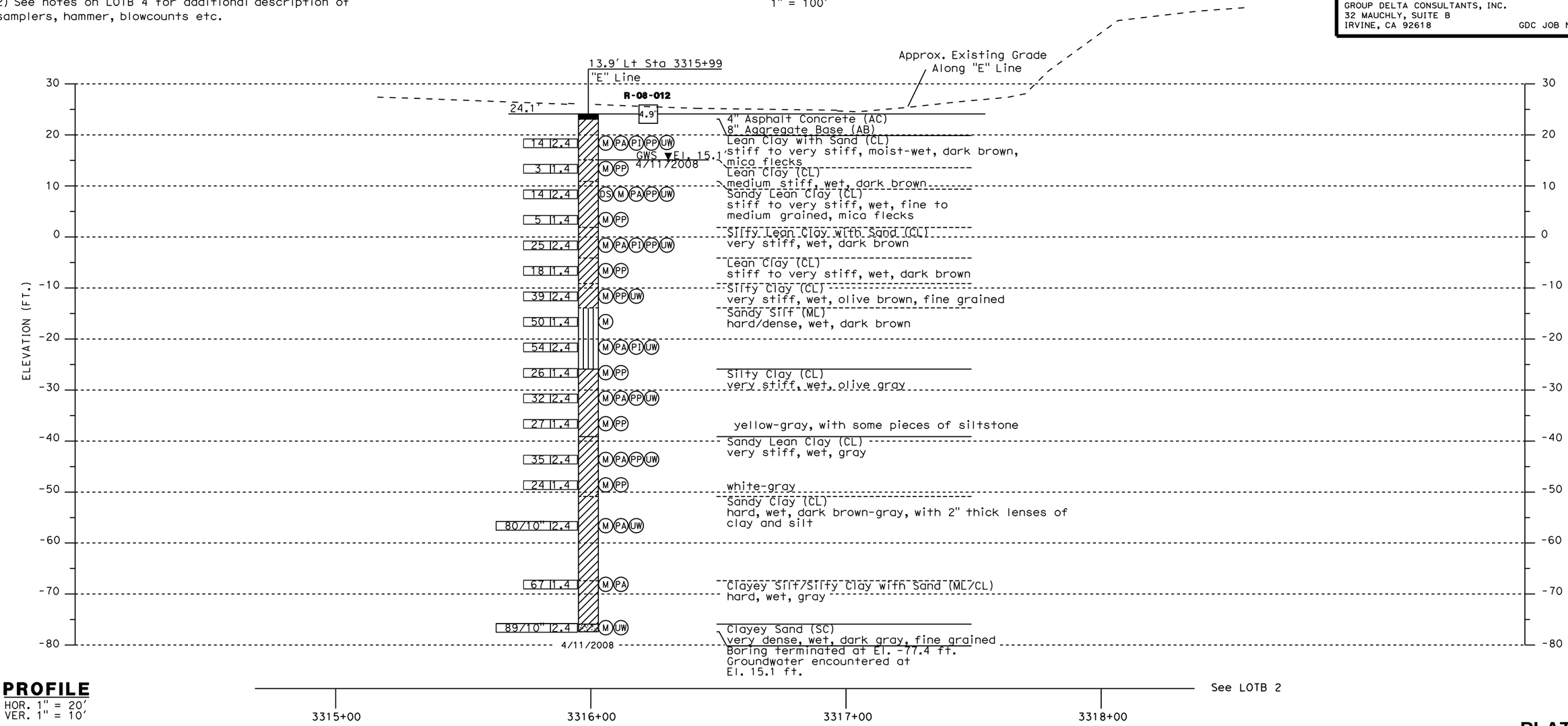
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618

GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 6

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0072 POST MILES 20.82-20.89	PRECAST WALL NO. RW3320 LOG OF TEST BORINGS 1 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES: 10/23/08, 02/27/09, 05/18/09 — SHEET 16 OF 20

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

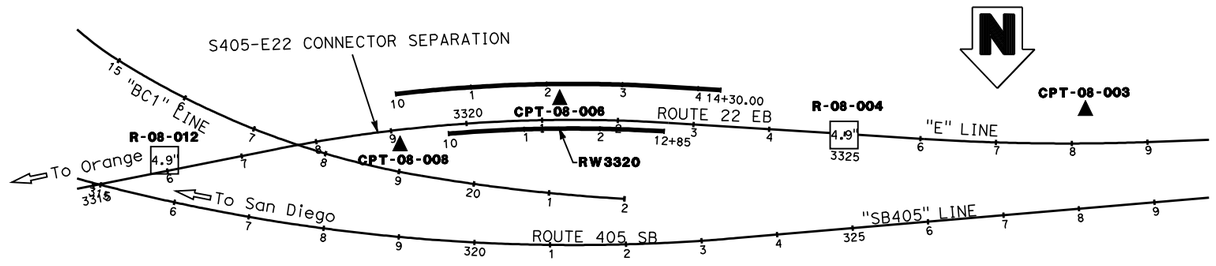
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

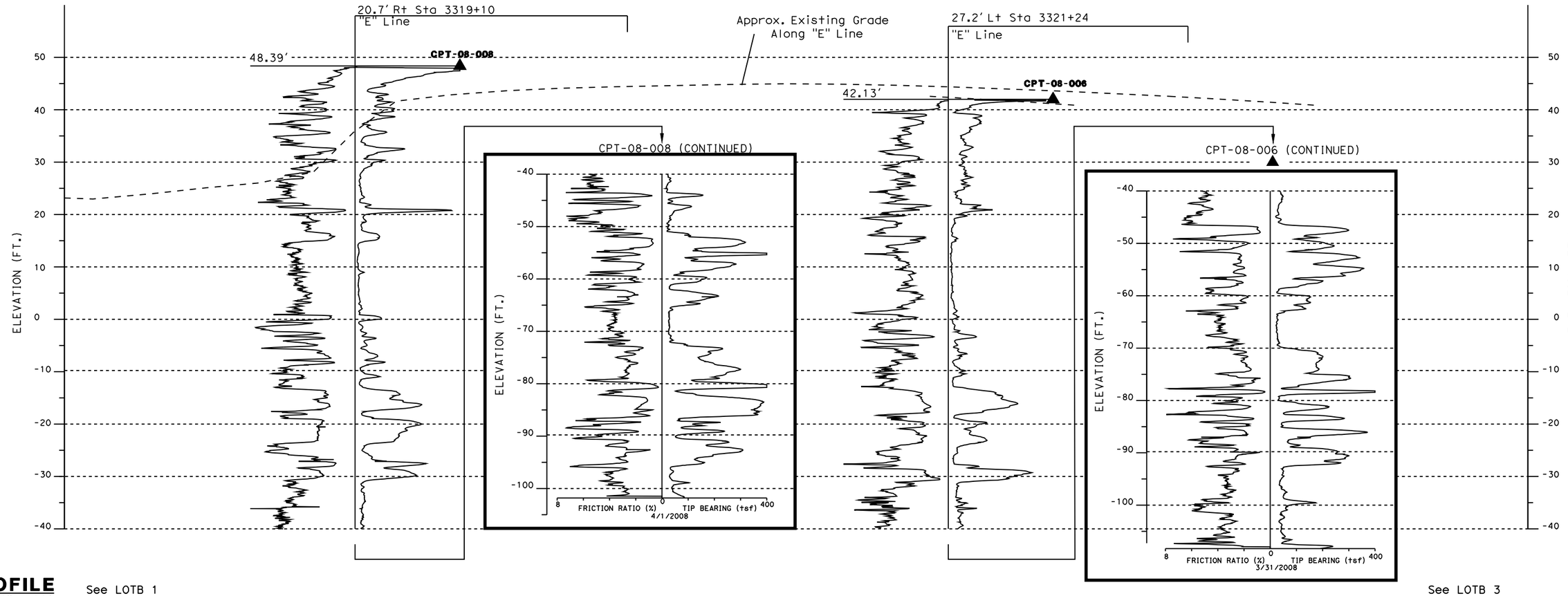
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 7

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0072 POST MILES 20.82-20.89	PRECAST WALL NO. RW3320 LOG OF TEST BORINGS 2 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES: 10/23/08, 02/23/09, 05/18/09; SHEET 17 OF 20

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes:
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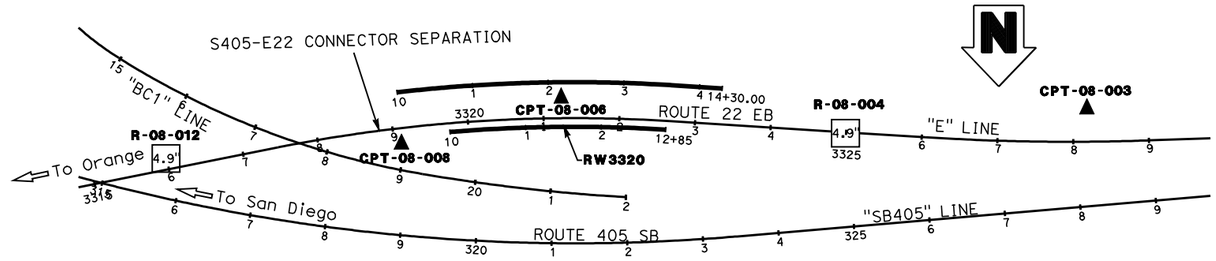
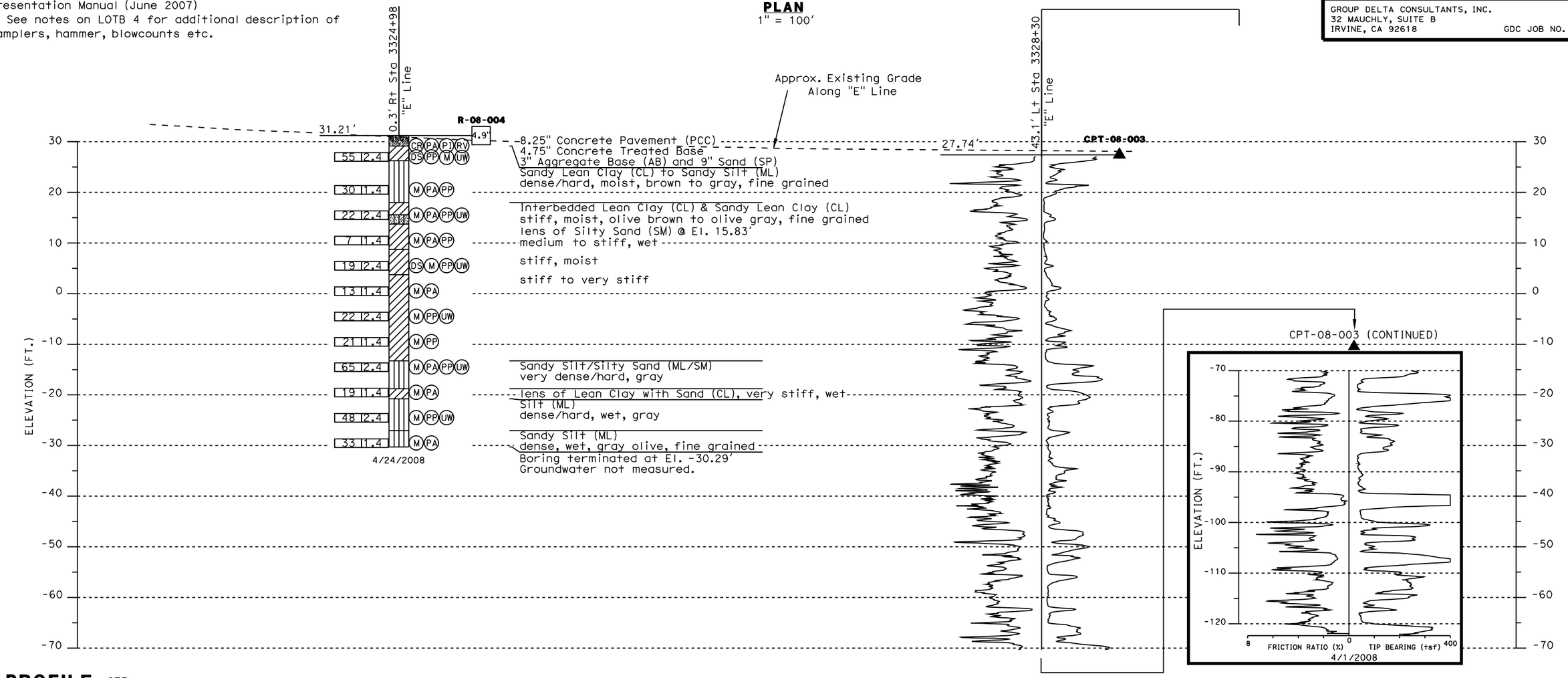
2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE SEE LOTB 2
HOR. 1" = 20'
VER. 1" = 10'

3324+00 3325+00 3326+00 3327+00 3328+00 3329+00

STATION NO. ALONG "E" LINE

PLATE 8

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	**PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION**	M. MOHSENI PROJECT ENGINEER	WALL NO. 55E0072 POST MILES 20.82-20.89	**PRECAST WALL NO. RW3320** **LOG OF TEST BORINGS 3 OF 5**
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES: 10/23/08, 02/23/09, 05/18/09; SHEET 18 OF 20

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

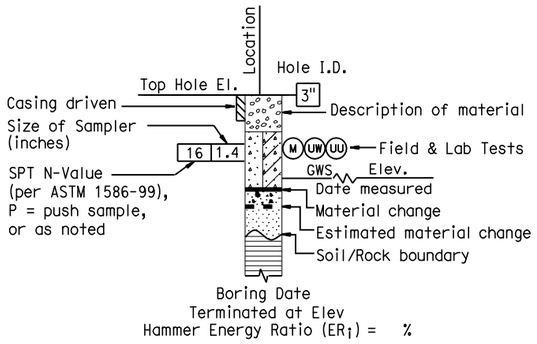
Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
⌜ ⌝ ⌞ ⌟	O	Other

Note: Size in inches.

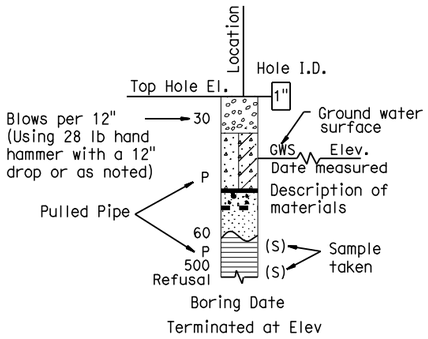
PLASTICITY OF FINE-GRAINED SOILS

Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

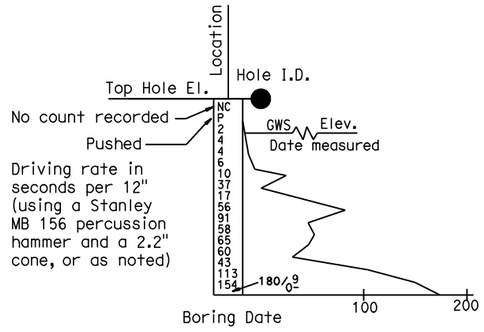
Notes :
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.
2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers in rotary borings.
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



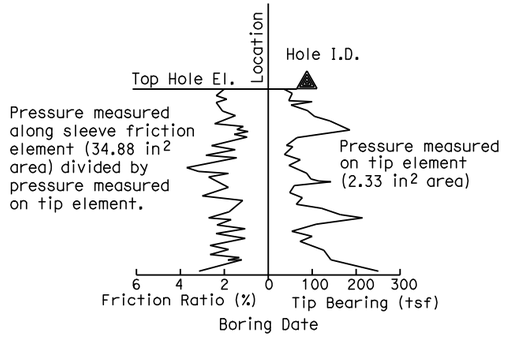
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 9

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55E0072 POST MILES 20.82-20.89	SOIL LEGEND LOG OF TEST BORINGS 4 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 10/23/08 02/23/09 05/18/09	SHEET 19 OF 20

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 10

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

WALL NO. 55E0072
POST MILES 20.82-20.89

SOIL LEGEND
LOG OF TEST BORINGS 5 OF 5

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES: 10/23/08 02/20/09 05/18/09

SHEET 20 OF 20

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the project site were investigated by Group Delta Consultants, Inc. (GDC) by performing four (4) rotary wash soil borings and three (3) Cone Penetration Tests (CPTs) during the period of March 27th to April 24th, 2008. The borings were performed to depths of 61.5 feet to 137 feet below ground surface (bgs) and the CPTs were performed to depths of roughly 150 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at the subject retaining wall. Locations of the borings and CPTs are presented in Figure 2a through 2b of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1.

The rotary wash borings and CPTs were performed from the freeway lanes and shoulders of SR-22/I-405. All of the exploration locations were within the Caltrans Right-of-Way (ROW).

Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night.

The exploration methods are described in the following sections. Rotary wash boring and CPT logs from the current exploration program are presented in Figures A-2a through A-5e and A-6a through A-8e, respectively.

A.2 Soil Drilling and Sampling

A total of four (4) rotary wash soil borings (R-08-004, R-08-005, R-08-011, and R-08-012) were drilled and sampled using a truck mounted Mayhew 1000 drill rig during this project. The Mayhew 1000 used a 4.875-inch drill bit in conjunction with bentonite slurry to drill to desired depths. C & L Drilling, Inc. of La Habra, California drilled and sampled the soil borings as a subcontractor to GDC.

All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS) and were assigned a group name and group symbol,

as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The soil boring logs are presented in Figures A-2a through A-5e.

Drive samples were collected from the borings generally at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using a downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured using a well sounder.

The soil borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with either asphalt patch or quickset cement.

Rotary wash boring drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California. for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of three (3) CPT soundings (CPT-08-003, CPT-08-006, and CPT-08-008), were performed during this project to depths of roughly 150 feet bgs. Kehoe Testing and Engineering, Inc. of Long Beach, California, performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D3441 test standard using an electronic cone penetrometer. A 2.32-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in Appendix A on Figures A-6a through A-8e. Soil behavior type and other interpretations of the CPT data provided by Kehoe are in our files.

At the completion of the sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned following each test by backfilling bentonite into the hole, to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1 Summary of Field Explorations

List of Figures

Figure A-1a Key for Soil Classification
Figure A-1b Boring Legend
Figures A-2a to A-5e Soil Boring Logs
Figures A-6a to A-8e Cone Penetration Test Results

TABLE A-1
SUMMARY OF TEST EXPLORATIONS
RW3319 RW 3320
SR-22 WEST ORANGE COUNTY CONNECTORS PROJECT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Plan Figure No.	Appendix Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
CPT-08-003	"E" 3328+30 43 L	4/1/2008	CPT	27.74	150.0	L-7	A-6a to A-6e	Hole obstructed at 10' (dry)	NA	GW is below Elev. 17.9 feet
CPT-08-006	"E" 3321+24 27 L	3/31/2008	CPT	42.13	150.3	L-6	A-7a to A-7e	Hole obstructed at 20' (dry)	NA	GW is below Elev. 22 feet
CPT-08-008	"E"3319+10 21 R	4/1/2008	CPT	48.39	150.2	L-6	A-8a to A-8e	Hole obstructed at 34' (dry)	NA	GW is below Elev. 15 feet
R-08-004	"E" 3324+98 0.3 R	4/24/2008	R	31.21	61.5	L-7	A-2a to A-2c	NA	NA	
R-08-005	1324+48 63 R	3/27/2008	R	27.83	137.0	L-7	A-3a to A-3f	NA	NA	
R-08-011	1316+25 20 L	4/15/2008	R	29.54	121.5	L-6	A-4a to A-4e	NA	NA	
R-08-012	1315+94 196 L	4/11/2008	R	24.10	101.5	L-6	A-5a to A-5e	9	15.1	

Notes:
1. Stationing relative to SR-22 "H" line except where otherwise noted. Right and left offsets defined by looking along SR-22 centerline in direction of increasing station.
2. Elevations based upon January 2009 survey

NA = Not Available
NE = Not encountered

CPT = Cone Penetration Test
R = Rotary Wash Boring

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

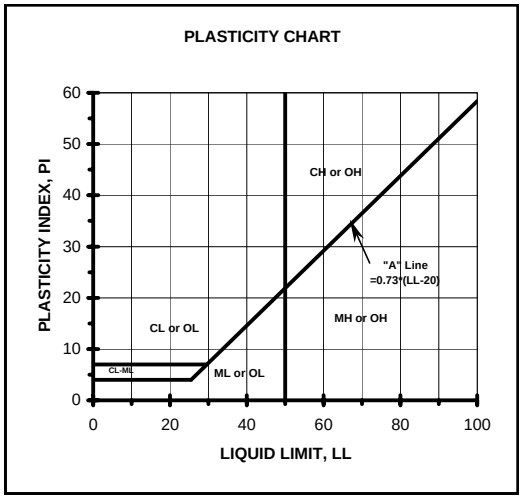
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375-inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-004

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.

NOTES: Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	30											**8.25" Concrete Pavement (PCC)** **4.75" Concrete Treated Base** **3" Aggregate Base (AB)**
												9" Poorly Graded Sand (SP) moist, red-yellow, fine grained
			B1			16	CR RV	66	29:12			**Sandy Lean Clay (CL)** firm, moist, dark brown, in chunks up to 1.5"
			R2	13 25 30	117.1	16	DS			4.5+		hard, dry, dark gray, fine grained
5	25											**Sandy Silt (ML)** dense/hard, dry-moist, brown, fine grained, trace of clay
10	20		S3	6 12 18		22		66		4.5+		
												Lean Clay (CL) stiff, moist, olive brown
15	15		R4	5 9 13	100.5	24		27				pocket penetrometer = 1.0-1.25 **Silty Sand (SM)** medium dense, wet, light brown gray, fine grained with occasional coarse grains and few fine gravel, with clay
												Sandy Lean Clay (CL) firm to stiff, wet, olive light brown, very fine grains barely visible with some to trace of silt
20	10		S5	2 3 4		31		66		1.0		
												Lean Clay (CL) stiff, moist, gray olive brown

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-004

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	5		R6	5 7 12	91.1	31	DS			1.25-1.5		**Lean Clay (CL)** stiff, moist, gray olive brown, no visible sand grains, with fine to 3/4" angular light gray fine grained sandstone gravel in sampler shoe
30	0		S7	2 5 8		29		55				**Sandy Lean Clay (CL)** stiff, moist, olive gray, trace fine grains, with some silt
35	-5		R8	8 8 14	92.3	30				1.5-2.2		stiff to very stiff, less silt, occasional fine grain
40	-10		S9	2 7 14		32				2.0		
45	-15		R10	20 27 38	105.2	22		51		4.5		**Sandy Silt/Silty Sand (ML/SM)** very dense/hard, gray, trace of clay

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-20		S11	10 8 11		32		86				**Lean Clay with Sand (CL)** very stiff, wet, olive gray, little to no silt, rolls very good thread
55	-25		R12	12 23 25	109.6	19				4.5+		**Silt (ML)** dense/hard, wet, gray,with some fine grains and clay
60	-30		S13	9 13 20		26		56				**Sandy Silt (ML)** dense, wet, gray olive, fine grains barely visible
65	-35											*Boring terminated at 61.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
70	-40											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-2 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	1 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH *ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												8.5" Concrete Pavement (PCC) **8.5" Lean Concrete/slurry** **6" Aggregate Base (AB)**
	25		B1			16	RV	63	29:9			**Sandy Lean Clay (CL)** moist, gray, very fine grains and few coarse grains, rolls very good thread
5			R1	3 9 16	108.3	19	CN PA	53	32:13	4.5+		dark gray, very stiff to hard, with silt
	20											
10			S2	3 5 5		26	PA	18				**Silty Sand (SM)** loose to medium dense, moist-wet, gray brown, fine grained
	15											**Sandy Silty Clay (CL)** stiff, moist, brown gray, fine grained
15			R3	5 6 7	98	27	DS	65				
	10											
20			S4	3 3 4		29						**Silty Sand (SM)** loose, wet, gray brown, fine grained with scattered coarse grains
	5											**Silty Clay with Sand (CL)** stiff, moist, brown gray, fine grained

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 2 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	7 12 12	97.6	26		24				**Silty Sand (SM)** medium dense, wet, gray brown, fine grained with scattered coarse grains and fine gravel of clay cemented coarse sand
	0											**Lean Clay (CL)** stiff, wet-moist, gray brown
30			S6	3 4 8		41		97	46:20	1.25		
	-5											
35												
	-10											
40			S7	4 4 8		31			39:20	1.5		with very fine to coarse sand grains and some silt
	-15											**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay harder drilling
45												
	-20											

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	3 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R8	18 28 23	103	23		85		4.5		**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay, slight to no plasticity
	-25											
55												**Lean Clay with Sand (CL)** hard, wet, scattered fine grains
	-30											
60												
	-35											
65												
	-40											
70			R9	30 50/6"		45		75	43:19	4.5		very stiff to hard Torvane = 3.6 to 4.0 ksf
	-45											

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FIGURE A-3 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 4 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
80	-50											
85	-55											
90	-60											
95	-65											
	-70											

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FIGURE A-3 d

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-005
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 3/27/2008	**FINISH** 3/27/2008	**SHEET NO.** 5 of 6
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 137	**GROUND ELEV (ft)** 27.83
DEPTH *ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
105	-75	⋈	R10	50/5"	82.4	39				2.5		**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)**hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray, drill chatter at 100'
110	-80											
115	-85											
120	-90											
	-95											

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FIGURE A-3 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	6 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
	-100											
130												drill chatter
	-105											
135			S11	12 17 32		27						
	-110											*Boring terminated at 137 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
140												
	-115											
145												
	-120											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-3 f

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 1 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Asphalt Concrete (AC) **Aggregate Base (AB)**
												Clayey Sand (SC) medium dense, moist, olive brown, fine grained, with some silt
5	25		S1	7 12 13		19		47	33:14			
10	20		R2	7 12 20	96.9	19						
15	15		S3	2 2 4		31	CR			0.5		**Sandy Lean Clay (CL)** firm, wet, olive brown, fine grained, scattered few fine gravel, rolls very good thread
20	10		R4	4 8 11	94.6	24	CN	52	34:18	1.0		stiff, olive gray, with gravelly lense at 20' to 20.3' containing sunrounded to angular black and gray with orange limonite stained granite pieces 1/4" to 3/4"
	5											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 2 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	4 5 5		46						**Sandy Lean Clay (CL)** stiff, wet, olive brown, fine grained, with few fine gravel
	0											**Sandy Silt (ML)** stiff to very stiff, moist, gray, single black and white granodiorite cobble 2.5", with some clay and decomposed organic fibers
30			R6	5 13 18	93.2	30				1.5		
	-5											
35			S7	4 11 16		28		68		1.0		with fine angular gravel in thin lense at 35', little to no clay
	-10											**Silty Clay with Sand (CL)** hard, moist, gray, rolls very poor thread, with some gravel in lense at 40'
40			R8	11 15 32	97.9	25		80		4.0		
	-15											
45			S9	10 20 30		33						**Clayey Silt (ML)** hard, moist, gray, no gravel
	-20											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 3 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	14 24 36	83.9	35				3.5		**Clayey Silt (ML)** hard, moist, gray, no gravel **Silt (ML)** very dense, moist, gray, trace to no clay
55	-25											
												Well Graded Sand with Silt (SW-SM) very dense, wet, gray-red-black-brown, fine to medium grained
60	-30		S11	26 44 50/4"		15	PA	7				
65	-35											**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains
70	-40		R12	27 28 50/5"	114.8	17			31:16	3.5		
	-45											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-4 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 4 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-50		S13	11 21 32		17		45				**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains **Clayey Sand (SC)** very dense, dry-moist, light brown-gray-orange, fine grained
85	-55											**Silty Sand (SM)** very dense, moist, gray, fine grains barely visible, trace to no clay
90	-60		R14	20 37 48	102.4	24		29				
95	-65											**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-70											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-4 d

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 5 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S15	11 22 48		40						**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
105	-75											**Silty Sand (SM)** very dense, moist, gray, fine grained
110	-80											
115	-85											
120	-90		R16	40 50/4"		24		27				*Boring terminated at 121.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-95											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-4 e

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-012
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/11/2008	**FINISH** 4/11/2008	**SHEET NO.** 1 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 101.5	**GROUND ELEV (ft)** 24.10
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH*ELEV.* GROUND WATER (ft)** ▼ 9.0 / *15.1*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												4" Asphalt Concrete (AC) **8" Aggregate Base (AB)**
												Lean Clay with Sand (CL) stiff to very stiff, moist-wet, dark brown, fine to medium grained, tiny flecks of mica
5	20		R1	4 5 9	95.8	28		80	47:27	2.4		
												▼
10	15		S2	1 1 2		39				0.75		**Lean Clay (CL)** firm, wet, dark brown
												Sandy Lean Clay (CL) stiff to very stiff, wet, fine to medium grained, tiny flecks of mica
15	10		R3	3 6 8	102.1	24	DS	58		2.75		
20	5		S4	2 2 3		27				1.1		with some fine gravel
	0											**Silty Lean Clay with Sand (CL)** very stiff, wet, dark brown, with fine gravel

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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Irvine, CA 92618

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FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	5 10 15	92.7	29		80	33:12	2.25		**Silty Lean Clay with Sand (CL)** very stiff, wet, dark brown, with fine gravel
	-5											**Lean Clay (CL)** stiff to very stiff, wet, dark brown, with some silt
30			S6	2 6 12		34				1.25-1.5		
	-10											**Silty Clay (CL)** very stiff, wet, olive brown, fine grained
35			R7	9 18 21	93.9	30				4.0		
	-15											**Sandy Silt (ML)** hard/dense, wet, dark brown
40			S8	7 24 26		28						
	-20											
45			R9	16 20 34	99	26		70	26:03			
	-25											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S10	7 11 15		38				3.3		**Silty Clay (CL)** very stiff, wet, olive gray, with scattered coarse grains
	-30											
55			R11	7 15 17	88.5	33		96		2.8		
	-35											
60			S12	6 11 16		29				3.75		color changes to yellow-gray, with some pieces of siltstone
	-40											**Sandy Lean Clay (CL)** very stiff, wet, gray
65			R13	10 15 20	107.1	21		61		3.0		with some white clay and some small pieces of claystone gravel
	-45											
70												
			S14	5 6 18		21				1.5		color changes to white-gray
	-50											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-55		R15	19 30 50/4"	97.9	31		57				**Sandy Lean Clay (CL)** hard, wet, dark brown-gray, fine grained, with up to 2" thick lenses of clay and silt
85	-60											
90	-65		S16	15 32 38								no recovery (no sand catcher in sampler)
95	-70		S17	15 32 35		31		89				**Clayey Silt/Silty Clay with Sand (ML/CL)** hard, wet, gray
	-75											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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FIGURE A-5 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R18	14 39 50/4"	134.9	18						**Clayey Sand (SC)** very dense, wet, dark gray, fine grained
												Boring terminated at 101.5 feet below ground surface (bgs). *Groundwater encountered at 9.0 feet bgs.* *Borehole backfilled with cement/bentonite grout mix and patched with asphalt.*
105	-80											
110	-85											
	-90											
115	-95											
120	-100											

GDC_LOG_BORING_1A I-436 RW 3319_3320 BORING LOGS.GPJ GDCLOG.GDT 02/18/09

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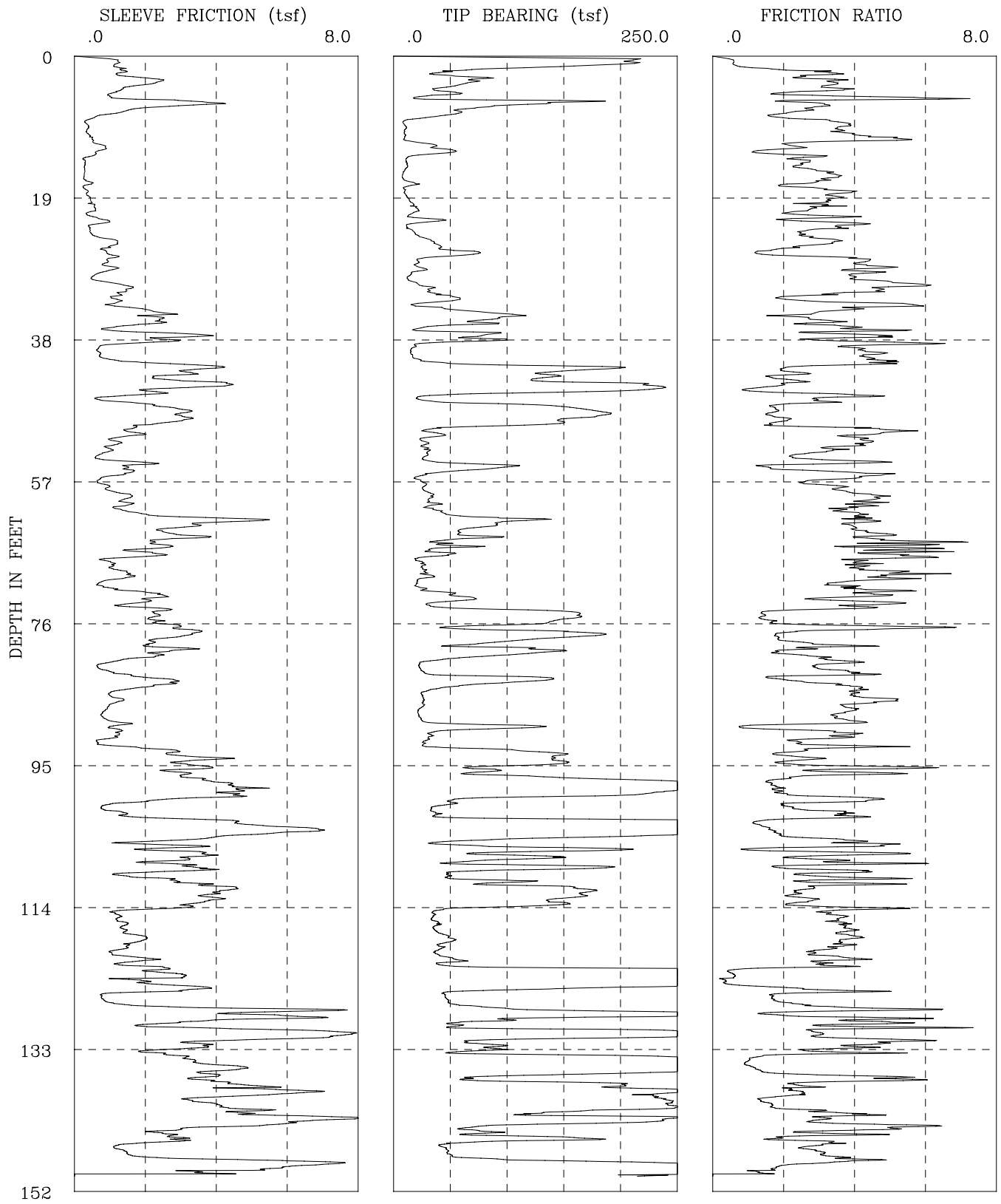
FIGURE A-5 e



CPT-08-003	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-6a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-003
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	194.33	1.07	0.55	0.03	sand	>90	>48	37	UNDEFINED
0.60	2	113.82	1.27	1.11	0.09	sand to silty sand	>90	>48	27	UNDEFINED
0.95	3	56.03	1.63	2.91	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	61.88	2.07	3.34	0.22	sandy silt to clayey silt	UNDFND	UNDFD	24	4.1
1.55	5	46.25	1.21	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.85	6	67.11	1.84	2.74	0.33	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
2.15	7	97.86	2.93	3.00	0.39	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.45	8	52.21	1.11	2.12	0.45	sandy silt to clayey silt	UNDFND	UNDFD	20	3.4
2.75	9	14.50	0.39	2.69	0.51	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.05	10	10.33	0.38	3.63	0.57	clay	UNDFND	UNDFD	10	.6
3.35	11	9.85	0.42	4.30	0.61	clay	UNDFND	UNDFD	9	.6
3.65	12	23.30	0.62	2.64	0.64	clayey silt to silty clay	UNDFND	UNDFD	11	1.5
3.95	13	45.75	0.75	1.65	0.67	silty sand to sandy silt	50-60	38-40	15	UNDEFINED
4.25	14	16.32	0.39	2.42	0.69	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
4.55	15	11.85	0.29	2.48	0.72	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.85	16	9.10	0.29	3.14	0.75	silty clay to clay	UNDFND	UNDFD	6	.5
5.15	17	10.43	0.33	3.14	0.78	silty clay to clay	UNDFND	UNDFD	7	.6
5.45	18	13.44	0.33	2.43	0.81	clayey silt to silty clay	UNDFND	UNDFD	6	.8
5.75	19	10.57	0.38	3.60	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	15.08	0.48	3.15	0.86	silty clay to clay	UNDFND	UNDFD	10	.9
6.40	21	19.81	0.53	2.66	0.89	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
6.70	22	24.65	0.60	2.44	0.93	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
7.00	23	17.45	0.62	3.57	0.95	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	18.51	0.48	2.60	0.98	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
7.65	25	32.58	1.08	3.31	1.02	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
7.95	26	46.32	0.94	2.02	1.04	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
8.25	27	54.56	1.04	1.91	1.07	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
8.55	28	20.67	0.88	4.27	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	22.71	0.99	4.35	1.13	clay	UNDFND	UNDFD	22	1.4
9.15	30	13.39	0.54	4.05	1.16	clay	UNDFND	UNDFD	13	.7
9.45	31	24.92	1.31	5.25	1.19	clay	UNDFND	UNDFD	24	1.5
9.75	32	35.11	1.37	3.91	1.21	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
10.05	33	50.18	1.17	2.33	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
10.35	34	32.32	1.44	4.45	1.27	silty clay to clay	UNDFND	UNDFD	21	2.0
10.65	35	95.00	2.33	2.45	1.30	silty sand to sandy silt	60-70	38-40	30	UNDEFINED
10.95	36	79.01	2.32	2.94	1.33	sandy silt to clayey silt	UNDFND	UNDFD	30	5.1
11.25	37	32.63	1.17	3.57	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	81.49	3.02	3.70	1.38	clayey silt to silty clay	UNDFND	UNDFD	39	5.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	40.60	1.68	4.13	1.41	silty clay to clay	UNDFND	UNDFD	26	2.5
12.15	40	15.50	0.68	4.39	1.44	clay	UNDFND	UNDFD	15	.8
12.45	41	20.46	0.93	4.55	1.47	clay	UNDFND	UNDFD	20	1.2
12.80	42	130.77	3.33	2.55	1.50	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
13.10	43	138.62	2.87	2.07	1.53	silty sand to sandy silt	60-70	40-42	44	UNDEFINED
13.40	44	161.68	3.47	2.14	1.56	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
13.75	45	199.32	2.77	1.39	1.59	sand to silty sand	70-80	40-42	48	UNDEFINED
14.05	46	29.23	1.06	3.62	1.62	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.35	47	109.13	2.12	1.94	1.65	silty sand to sandy silt	60-70	38-40	35	UNDEFINED
14.65	48	181.84	3.07	1.69	1.68	sand to silty sand	70-80	40-42	44	UNDEFINED
14.95	49	156.24	3.03	1.94	1.70	silty sand to sandy silt	70-80	40-42	50	UNDEFINED
15.25	50	75.12	1.78	2.37	1.73	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
15.55	51	36.79	1.63	4.43	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	26.68	1.15	4.30	1.79	silty clay to clay	UNDFND	UNDFD	17	1.5
16.15	53	28.65	0.98	3.42	1.82	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
16.45	54	27.87	0.68	2.45	1.85	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
16.75	55	68.67	1.68	2.45	1.87	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
17.05	56	58.30	1.53	2.63	1.90	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
17.35	57	22.31	0.82	3.68	1.93	silty clay to clay	UNDFND	UNDFD	14	1.2
17.65	58	27.15	0.86	3.16	1.96	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
17.95	59	31.09	1.29	4.15	1.99	silty clay to clay	UNDFND	UNDFD	20	1.8
18.25	60	33.00	1.47	4.45	2.02	silty clay to clay	UNDFND	UNDFD	21	1.9
18.55	61	34.39	1.32	3.85	2.04	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
18.85	62	59.32	2.49	4.20	2.07	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
19.20	63	100.08	4.10	4.09	2.10	clayey silt to silty clay	UNDFND	UNDFD	48	6.4
19.50	64	60.03	2.58	4.30	2.13	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
19.80	65	62.52	2.93	4.69	2.16	silty clay to clay	UNDFND	UNDFD	40	3.9
20.15	66	45.80	2.27	4.96	2.19	silty clay to clay	UNDFND	UNDFD	29	2.7
20.45	67	39.51	2.08	5.25	2.22	clay	UNDFND	UNDFD	38	2.3
20.75	68	23.35	0.97	4.15	2.25	silty clay to clay	UNDFND	UNDFD	15	1.2
21.05	69	26.37	1.19	4.52	2.28	clay	UNDFND	UNDFD	25	1.4
21.35	70	29.19	1.47	5.02	2.31	clay	UNDFND	UNDFD	28	1.6
21.65	71	20.43	0.75	3.65	2.34	silty clay to clay	UNDFND	UNDFD	13	1.0
21.95	72	37.47	1.67	4.46	2.37	silty clay to clay	UNDFND	UNDFD	24	2.2
22.25	73	61.04	2.26	3.70	2.39	clayey silt to silty clay	UNDFND	UNDFD	29	3.7
22.55	74	40.74	1.78	4.36	2.42	silty clay to clay	UNDFND	UNDFD	26	2.4
22.85	75	153.95	2.38	1.55	2.45	sand to silty sand	60-70	38-40	37	UNDEFINED
23.15	76	145.43	2.26	1.55	2.48	sand to silty sand	60-70	38-40	35	UNDEFINED
23.45	77	79.79	3.08	3.86	2.51	clayey silt to silty clay	UNDFND	UNDFD	38	5.0
23.75	78	166.37	3.12	1.87	2.54	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.05	79	86.63	2.13	2.46	2.56	sandy silt to clayey silt	UNDFND	UNDFD	33	5.4
24.35	80	121.85	2.70	2.22	2.59	silty sand to sandy silt	50-60	36-38	39	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	70.56	1.96	2.77	2.62	sandy silt to clayey silt	UNDFND	UNDFD	27	4.3
24.95	82	23.48	0.79	3.36	2.65	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
25.25	83	27.90	1.08	3.87	2.68	silty clay to clay	UNDFND	UNDFD	18	1.5
25.60	84	116.37	2.50	2.15	2.71	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
25.90	85	45.45	1.79	3.94	2.74	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.20	86	25.31	1.05	4.16	2.77	silty clay to clay	UNDFND	UNDFD	16	1.3
26.55	87	26.18	1.15	4.37	2.80	silty clay to clay	UNDFND	UNDFD	17	1.3
26.85	88	22.08	0.84	3.82	2.83	silty clay to clay	UNDFND	UNDFD	14	1.1
27.15	89	23.95	0.88	3.68	2.86	silty clay to clay	UNDFND	UNDFD	15	1.2
27.45	90	91.50	1.23	1.35	2.88	sand to silty sand	40-50	34-36	22	UNDEFINED
27.75	91	36.80	1.25	3.38	2.91	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
28.05	92	28.62	0.79	2.77	2.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
28.35	93	63.32	1.89	2.99	2.97	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
28.65	94	143.01	3.21	2.24	3.00	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
28.95	95	139.64	3.26	2.33	3.03	silty sand to sandy silt	60-70	36-38	45	UNDEFINED
29.25	96	77.29	3.22	4.16	3.05	clayey silt to silty clay	UNDFND	UNDFD	37	4.7
29.55	97	144.11	3.30	2.29	3.08	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
29.85	98	260.92	4.43	1.70	3.11	sand to silty sand	70-80	40-42	>50	UNDEFINED
30.15	99	239.29	4.51	1.89	3.14	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.45	100	76.41	2.91	3.81	3.17	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
30.75	101	39.98	0.85	2.13	3.20	sandy silt to clayey silt	UNDFND	UNDFD	15	2.2
31.05	102	36.80	1.41	3.83	3.22	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
31.35	103	302.36	4.13	1.37	3.25	sand	80-90	40-42	>50	UNDEFINED
31.65	104	401.48	6.37	1.59	3.28	sand to silty sand	80-90	40-42	>50	UNDEFINED
32.00	105	187.48	4.19	2.24	3.31	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
32.30	106	69.33	2.47	3.56	3.34	clayey silt to silty clay	UNDFND	UNDFD	33	4.2
32.60	107	131.64	3.09	2.35	3.37	silty sand to sandy silt	50-60	36-38	42	UNDEFINED
32.95	108	94.61	2.82	2.98	3.40	sandy silt to clayey silt	UNDFND	UNDFD	36	5.8
33.25	109	138.97	3.40	2.45	3.43	silty sand to sandy silt	50-60	36-38	44	UNDEFINED
33.55	110	48.16	1.68	3.48	3.46	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
33.85	111	96.45	3.23	3.35	3.49	sandy silt to clayey silt	UNDFND	UNDFD	37	5.9
34.15	112	167.98	4.29	2.56	3.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	154.78	3.87	2.50	3.55	silty sand to sandy silt	60-70	36-38	49	UNDEFINED
34.75	114	125.68	3.30	2.63	3.57	silty sand to sandy silt	50-60	34-36	40	UNDEFINED
35.05	115	37.68	1.39	3.70	3.60	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.35	116	35.49	1.27	3.57	3.63	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
35.65	117	37.17	1.41	3.78	3.66	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
35.95	118	43.23	1.66	3.84	3.69	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
36.25	119	48.24	1.79	3.72	3.72	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
36.55	120	40.35	1.31	3.23	3.74	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
36.85	121	44.49	1.56	3.52	3.77	clayey silt to silty clay	UNDFND	UNDFD	21	2.4
37.15	122	49.84	1.64	3.29	3.80	clayey silt to silty clay	UNDFND	UNDFD	24	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	405.25	2.48	0.61	3.83	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
37.75	124	522.17	2.37	0.45	3.86	gravelly sand to sand	>90	42-44	>50	UNDEFINED
38.05	125	366.03	2.89	0.79	3.89	sand	80-90	40-42	>50	UNDEFINED
38.40	126	56.03	1.57	2.80	3.92	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
38.70	127	49.16	0.98	1.99	3.95	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
39.00	128	128.27	4.85	3.78	3.97	sandy silt to clayey silt	UNDFND	UNDFD	49	8.0
39.35	129	207.98	5.28	2.54	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.65	130	54.46	2.58	4.74	4.04	silty clay to clay	UNDFND	UNDFD	35	3.1
39.95	131	236.15	6.99	2.96	4.06	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.25	132	135.01	5.24	3.88	4.09	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
40.55	133	89.44	3.39	3.79	4.12	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
40.85	134	133.31	2.54	1.91	4.15	silty sand to sandy silt	50-60	34-36	43	UNDEFINED
41.15	135	356.55	3.44	0.97	4.18	sand	80-90	40-42	>50	UNDEFINED
41.45	136	364.45	4.41	1.21	4.21	sand	80-90	40-42	>50	UNDEFINED
41.75	137	111.47	3.66	3.28	4.23	sandy silt to clayey silt	UNDFND	UNDFD	43	6.8
42.05	138	163.59	4.57	2.80	4.26	silty sand to sandy silt	50-60	36-38	>50	UNDEFINED
42.35	139	249.43	5.82	2.33	4.29	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
42.65	140	236.17	3.79	1.60	4.32	sand to silty sand	70-80	38-40	>50	UNDEFINED
42.95	141	244.78	4.13	1.69	4.35	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.25	142	151.12	5.28	3.49	4.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
43.55	143	230.25	6.98	3.03	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	77.11	3.85	4.99	4.43	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.15	145	106.06	2.68	2.53	4.46	silty sand to sandy silt	40-50	32-34	34	UNDEFINED
44.45	146	89.20	2.17	2.44	4.49	silty sand to sandy silt	40-50	30-32	28	UNDEFINED
44.80	147	46.72	1.33	2.85	4.52	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
45.10	148	90.27	3.53	3.91	4.55	clayey silt to silty clay	UNDFND	UNDFD	43	5.4
45.40	149	304.28	6.52	2.14	4.58	sand to silty sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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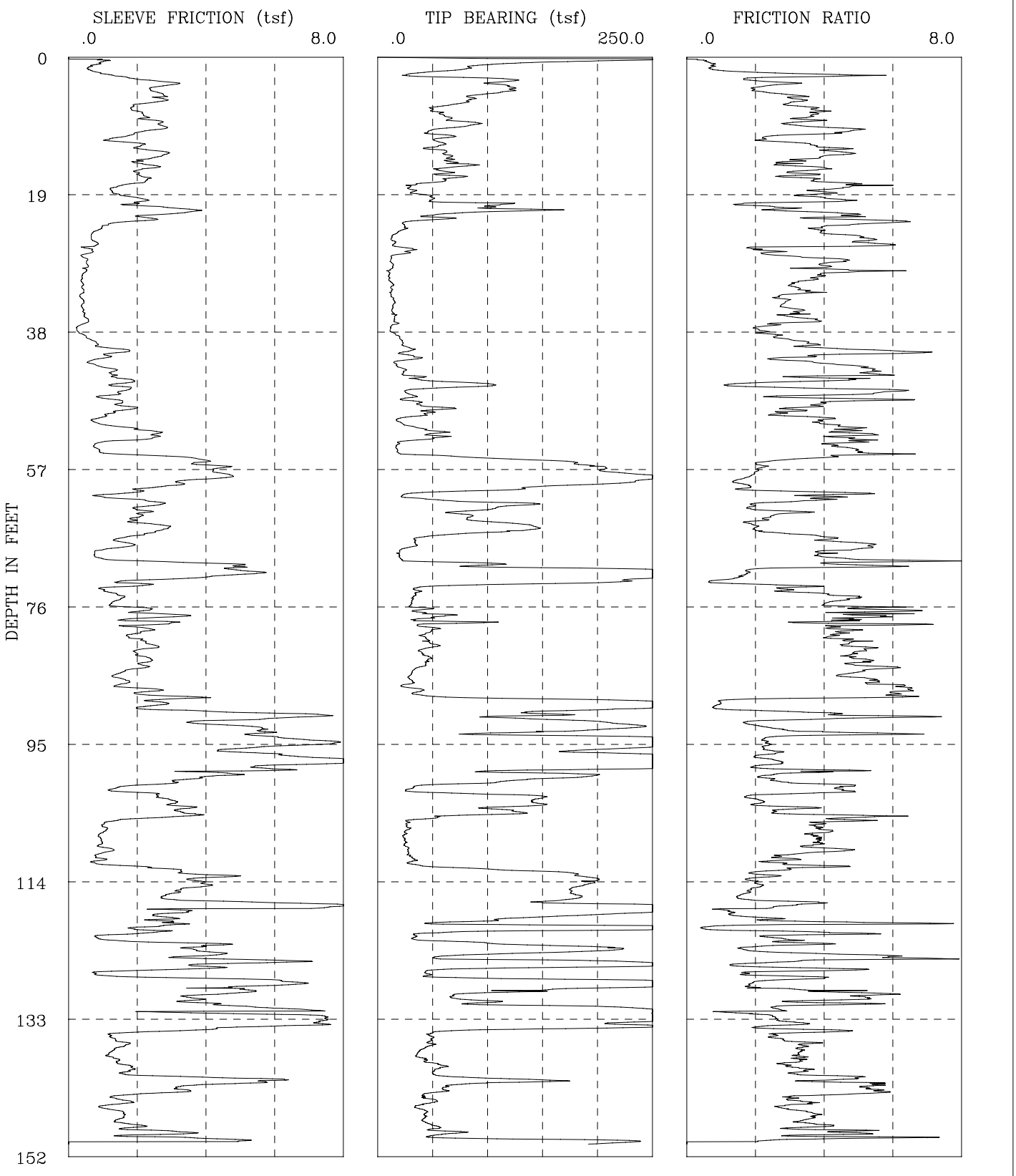
Figure A-6e



I-436 SR-22 Phase 2	CPT-08-006
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-7a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-006
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 23.95013

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	162.45	0.77	0.48	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	76.38	0.63	0.82	0.09	sand to silty sand	>90	>48	18	UNDEFINED
0.95	3	63.52	1.49	2.35	0.15	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
1.25	4	113.90	2.86	2.51	0.22	silty sand to sandy silt	>90	46-48	36	UNDEFINED
1.55	5	115.30	2.51	2.17	0.28	silty sand to sandy silt	80-90	46-48	37	UNDEFINED
1.85	6	84.43	2.76	3.27	0.33	sandy silt to clayey silt	UNDFND	UNDFD	32	5.6
2.15	7	63.54	2.01	3.17	0.39	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
2.45	8	54.73	2.06	3.76	0.45	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
2.75	9	70.87	2.42	3.42	0.51	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
3.05	10	73.38	2.72	3.70	0.57	clayey silt to silty clay	UNDFND	UNDFD	35	4.8
3.35	11	54.98	1.90	3.46	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	56.38	1.52	2.69	0.69	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
3.95	13	53.42	2.17	4.07	0.75	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
4.25	14	63.43	2.72	4.28	0.81	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
4.55	15	73.86	2.10	2.84	0.87	sandy silt to clayey silt	UNDFND	UNDFD	28	4.8
4.85	16	62.42	2.22	3.56	0.93	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
5.15	17	65.35	2.18	3.34	0.98	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
5.45	18	42.04	1.86	4.43	1.04	silty clay to clay	UNDFND	UNDFD	27	2.7
5.75	19	31.71	1.28	4.04	1.10	silty clay to clay	UNDFND	UNDFD	20	2.0
6.05	20	48.78	1.96	4.01	1.16	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
6.40	21	104.43	2.40	2.30	1.23	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
6.70	22	79.82	3.00	3.76	1.29	clayey silt to silty clay	UNDFND	UNDFD	38	5.2
7.00	23	42.95	2.00	4.65	1.35	silty clay to clay	UNDFND	UNDFD	27	2.7
7.35	24	23.52	0.94	3.99	1.41	silty clay to clay	UNDFND	UNDFD	15	1.4
7.65	25	14.30	0.67	4.67	1.46	clay	UNDFND	UNDFD	14	.8
7.95	26	14.61	0.79	5.38	1.48	clay	UNDFND	UNDFD	14	.8
8.25	27	28.39	0.61	2.15	1.51	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
8.55	28	13.67	0.46	3.40	1.54	silty clay to clay	UNDFND	UNDFD	9	.8
8.85	29	13.23	0.54	4.12	1.57	clay	UNDFND	UNDFD	13	.7
9.15	30	10.79	0.47	4.38	1.60	clay	UNDFND	UNDFD	10	.6
9.45	31	10.52	0.39	3.68	1.63	clay	UNDFND	UNDFD	10	.5
9.75	32	13.07	0.41	3.11	1.65	silty clay to clay	UNDFND	UNDFD	8	.7
10.05	33	12.31	0.40	3.24	1.68	silty clay to clay	UNDFND	UNDFD	8	.6
10.35	34	14.68	0.41	2.81	1.71	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.65	35	13.72	0.40	2.95	1.74	silty clay to clay	UNDFND	UNDFD	9	.7
10.95	36	14.96	0.45	3.03	1.77	silty clay to clay	UNDFND	UNDFD	10	.8
11.25	37	16.01	0.53	3.31	1.80	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	11.83	0.26	2.20	1.82	clayey silt to silty clay	UNDFND	UNDFD	6	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.63	0.45	2.55	1.85	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	22.52	0.77	3.43	1.88	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	27.99	1.43	5.13	1.91	clay	UNDFND	UNDFD	27	1.7
12.80	42	29.48	0.96	3.27	1.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	17.73	0.83	4.67	1.97	clay	UNDFND	UNDFD	17	1.0
13.40	44	24.24	1.32	5.42	2.00	clay	UNDFND	UNDFD	23	1.4
13.75	45	55.41	1.62	2.93	2.03	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.05	46	64.79	1.58	2.43	2.06	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
14.35	47	29.69	1.21	4.07	2.09	silty clay to clay	UNDFND	UNDFD	19	1.7
14.65	48	32.38	1.44	4.44	2.12	silty clay to clay	UNDFND	UNDFD	21	1.9
14.95	49	52.70	1.67	3.17	2.14	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
15.25	50	32.61	1.01	3.10	2.17	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
15.55	51	22.71	0.93	4.11	2.20	silty clay to clay	UNDFND	UNDFD	15	1.3
15.85	52	47.86	2.26	4.73	2.23	silty clay to clay	UNDFND	UNDFD	31	2.9
16.15	53	47.63	2.28	4.79	2.26	silty clay to clay	UNDFND	UNDFD	30	2.9
16.45	54	18.02	0.82	4.52	2.29	clay	UNDFND	UNDFD	17	.9
16.75	55	21.24	1.11	5.21	2.31	clay	UNDFND	UNDFD	20	1.1
17.05	56	120.80	3.63	3.01	2.34	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8
17.35	57	195.95	4.16	2.12	2.37	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
17.65	58	227.67	4.46	1.96	2.40	sand to silty sand	70-80	40-42	>50	UNDEFINED
17.95	59	242.58	3.71	1.53	2.43	sand to silty sand	70-80	40-42	>50	UNDEFINED
18.25	60	144.72	2.54	1.75	2.46	sand to silty sand	60-70	38-40	35	UNDEFINED
18.55	61	32.52	1.34	4.12	2.48	silty clay to clay	UNDFND	UNDFD	21	1.9
18.85	62	92.90	2.38	2.56	2.51	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
19.20	63	94.62	2.15	2.27	2.54	silty sand to sandy silt	50-60	36-38	30	UNDEFINED
19.50	64	82.54	2.00	2.42	2.57	sandy silt to clayey silt	UNDFND	UNDFD	32	5.2
19.80	65	126.10	2.42	1.92	2.60	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.15	66	104.68	2.48	2.37	2.63	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.45	67	35.75	1.52	4.24	2.66	silty clay to clay	UNDFND	UNDFD	23	2.1
20.75	68	29.61	1.56	5.27	2.69	clay	UNDFND	UNDFD	28	1.7
21.05	69	19.51	0.76	3.91	2.72	silty clay to clay	UNDFND	UNDFD	12	1.0
21.35	70	51.59	2.44	4.73	2.75	silty clay to clay	UNDFND	UNDFD	33	3.1
21.65	71	183.98	4.92	2.67	2.78	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	284.59	4.66	1.64	2.81	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.25	73	178.65	2.05	1.15	2.83	sand to silty sand	60-70	38-40	43	UNDEFINED
22.55	74	37.16	1.16	3.11	2.86	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
22.85	75	32.94	1.51	4.59	2.89	silty clay to clay	UNDFND	UNDFD	21	1.8
23.15	76	30.33	1.31	4.33	2.92	silty clay to clay	UNDFND	UNDFD	19	1.7
23.45	77	40.64	2.27	5.57	2.95	clay	UNDFND	UNDFD	39	2.4
23.75	78	49.14	2.50	5.08	2.98	clay	UNDFND	UNDFD	47	2.9
24.05	79	58.91	2.43	4.12	3.00	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
24.35	80	46.35	2.11	4.55	3.03	silty clay to clay	UNDFND	UNDFD	30	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	43.88	2.01	4.57	3.06	silty clay to clay	UNDFND	UNDFD	28	2.6
24.95	82	49.09	2.41	4.90	3.09	silty clay to clay	UNDFND	UNDFD	31	2.9
25.25	83	41.14	2.00	4.87	3.12	silty clay to clay	UNDFND	UNDFD	26	2.4
25.60	84	45.40	2.28	5.01	3.15	clay	UNDFND	UNDFD	43	2.6
25.90	85	35.27	1.95	5.52	3.18	clay	UNDFND	UNDFD	34	2.0
26.20	86	29.36	1.41	4.82	3.21	clay	UNDFND	UNDFD	28	1.6
26.55	87	27.94	1.59	5.70	3.24	clay	UNDFND	UNDFD	27	1.5
26.85	88	36.55	2.29	6.28	3.27	clay	UNDFND	UNDFD	35	2.0
27.15	89	144.06	2.95	2.05	3.30	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
27.45	90	276.73	2.43	0.88	3.32	sand	70-80	40-42	>50	UNDEFINED
27.75	91	155.74	5.46	3.51	3.35	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.0
28.05	92	162.70	4.92	3.03	3.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	224.38	5.18	2.31	3.41	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
28.65	94	156.75	5.65	3.60	3.44	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
28.95	95	316.45	7.30	2.31	3.47	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
29.25	96	221.44	5.16	2.33	3.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
29.55	97	292.69	6.53	2.23	3.52	sand to silty sand	70-80	40-42	>50	UNDEFINED
29.85	98	304.81	7.81	2.56	3.55	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
30.15	99	185.34	5.18	2.80	3.58	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	172.86	4.09	2.37	3.61	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.75	101	72.03	2.46	3.42	3.64	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
31.05	102	45.82	1.71	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
31.35	103	145.21	2.81	1.93	3.69	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
31.65	104	129.56	3.25	2.51	3.72	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
32.00	105	106.14	3.35	3.16	3.75	sandy silt to clayey silt	UNDFND	UNDFD	41	6.6
32.30	106	33.99	1.49	4.39	3.78	silty clay to clay	UNDFND	UNDFD	22	1.8
32.60	107	27.13	1.05	3.88	3.81	silty clay to clay	UNDFND	UNDFD	17	1.3
32.95	108	24.39	0.93	3.79	3.84	silty clay to clay	UNDFND	UNDFD	16	1.1
33.25	109	24.87	0.93	3.75	3.87	silty clay to clay	UNDFND	UNDFD	16	1.2
33.55	110	27.90	1.14	4.09	3.90	silty clay to clay	UNDFND	UNDFD	18	1.4
33.85	111	31.44	0.89	2.82	3.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
34.15	112	40.50	1.37	3.38	3.96	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
34.45	113	149.32	3.39	2.27	3.99	silty sand to sandy silt	50-60	36-38	48	UNDEFINED
34.75	114	195.25	4.02	2.06	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	184.39	3.78	2.05	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.35	116	178.86	3.01	1.68	4.07	sand to silty sand	60-70	36-38	43	UNDEFINED
35.65	117	166.93	4.09	2.45	4.10	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	293.52	6.35	2.16	4.13	sand to silty sand	70-80	38-40	>50	UNDEFINED
36.25	119	203.09	2.92	1.44	4.16	sand to silty sand	60-70	36-38	49	UNDEFINED
36.55	120	89.66	2.95	3.29	4.18	sandy silt to clayey silt	UNDFND	UNDFD	34	5.5
36.85	121	284.22	2.34	0.82	4.21	sand	70-80	38-40	>50	UNDEFINED
37.15	122	36.08	1.23	3.42	4.24	clayey silt to silty clay	UNDFND	UNDFD	17	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	101.45	3.10	3.05	4.27	sandy silt to clayey silt	UNDFND	UNDFD	39	6.2
37.75	124	194.66	3.85	1.98	4.30	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.05	125	83.68	4.24	5.07	4.33	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	220.43	4.73	2.14	4.36	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.70	127	46.37	1.29	2.78	4.39	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
39.00	128	205.41	4.99	2.43	4.42	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.35	129	242.22	5.49	2.27	4.45	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
39.65	130	78.54	4.06	5.17	4.48	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	98.93	3.91	3.96	4.50	clayey silt to silty clay	UNDFND	UNDFD	47	6.0
40.25	132	241.09	5.40	2.24	4.53	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
40.55	133	283.46	6.92	2.44	4.56	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.85	134	243.92	6.92	2.84	4.59	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
41.15	135	99.59	2.95	2.96	4.62	sandy silt to clayey silt	UNDFND	UNDFD	38	6.1
41.45	136	48.78	1.29	2.65	4.65	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
41.75	137	46.78	1.61	3.44	4.67	clayey silt to silty clay	UNDFND	UNDFD	22	2.5
42.05	138	37.42	1.22	3.27	4.70	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
42.35	139	41.42	1.36	3.29	4.73	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
42.65	140	56.91	1.74	3.07	4.76	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2
42.95	141	53.32	1.97	3.70	4.79	clayey silt to silty clay	UNDFND	UNDFD	26	2.9
43.25	142	121.91	5.49	4.51	4.82	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	62.84	3.38	5.37	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.85	144	44.82	1.97	4.39	4.87	silty clay to clay	UNDFND	UNDFD	29	2.4
44.15	145	47.98	1.57	3.26	4.90	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
44.45	146	39.48	1.21	3.06	4.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.0
44.80	147	42.47	1.55	3.65	4.96	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
45.10	148	49.22	1.82	3.70	4.99	clayey silt to silty clay	UNDFND	UNDFD	24	2.6
45.40	149	61.08	2.67	4.37	5.02	clayey silt to silty clay	UNDFND	UNDFD	29	3.4
45.75	150	144.76	2.88	1.99	5.05	silty sand to sandy silt	50-60	34-36	46	UNDEFINED

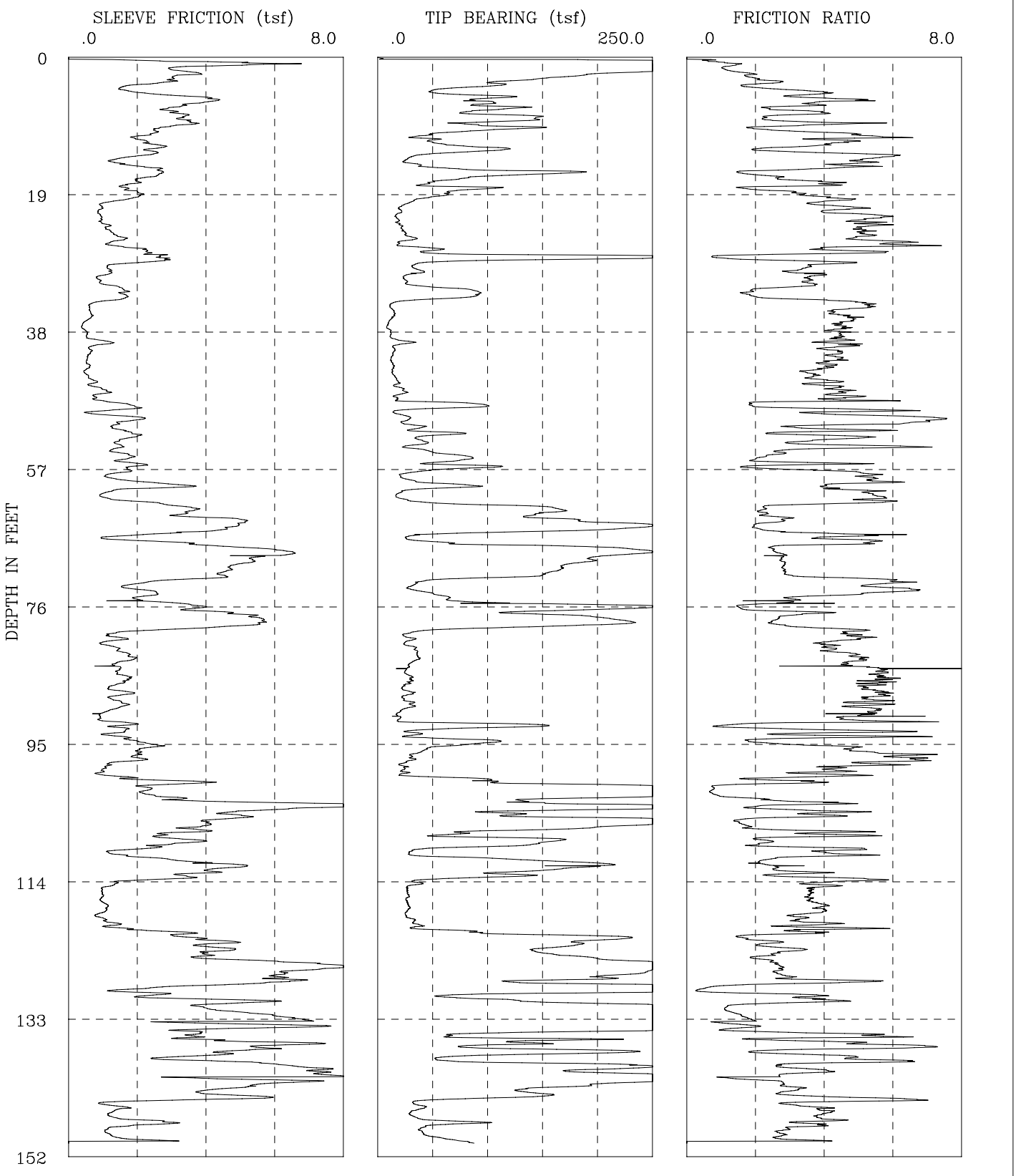
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-7e



I-436 Sr-22 Phase 2	CPT-08-008
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-8a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-008
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 30.83989

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	317.32	3.23	1.02	0.03	sand	>90	UNDFD	>50	UNDEFINED
0.60	2	284.69	3.39	1.19	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	174.65	3.27	1.87	0.15	sand to silty sand	>90	>48	42	UNDEFINED
1.25	4	106.28	2.30	2.16	0.22	silty sand to sandy silt	>90	46-48	34	UNDEFINED
1.55	5	55.47	1.86	3.36	0.28	clayey silt to silty clay	UNDFND	UNDFD	27	3.6
1.85	6	102.04	3.91	3.83	0.33	clayey silt to silty clay	UNDFND	UNDFD	49	6.7
2.15	7	109.15	3.36	3.08	0.39	sandy silt to clayey silt	UNDFND	UNDFD	42	7.2
2.45	8	97.11	3.13	3.22	0.45	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.75	9	129.81	3.40	2.62	0.51	silty sand to sandy silt	80-90	44-46	41	UNDEFINED
3.05	10	111.34	2.96	2.66	0.57	sandy silt to clayey silt	UNDFND	UNDFD	43	7.3
3.35	11	55.24	2.33	4.22	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	49.76	2.17	4.35	0.69	silty clay to clay	UNDFND	UNDFD	32	3.2
3.95	13	96.84	2.55	2.63	0.75	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
4.25	14	43.32	2.14	4.94	0.81	clay	UNDFND	UNDFD	41	2.8
4.55	15	29.77	1.42	4.78	0.87	clay	UNDFND	UNDFD	29	1.9
4.85	16	103.20	2.55	2.47	0.93	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.15	17	104.66	2.36	2.26	0.98	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.45	18	50.64	1.80	3.55	1.04	clayey silt to silty clay	UNDFND	UNDFD	24	3.3
5.75	19	79.14	1.87	2.36	1.10	sandy silt to clayey silt	UNDFND	UNDFD	30	5.2
6.05	20	45.48	1.82	4.00	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.40	21	23.42	0.99	4.22	1.23	silty clay to clay	UNDFND	UNDFD	15	1.4
6.70	22	19.08	0.89	4.66	1.29	clay	UNDFND	UNDFD	18	1.1
7.00	23	18.32	0.95	5.20	1.35	clay	UNDFND	UNDFD	18	1.1
7.35	24	22.28	1.16	5.19	1.41	clay	UNDFND	UNDFD	21	1.3
7.65	25	29.23	1.46	5.01	1.48	clay	UNDFND	UNDFD	28	1.8
7.95	26	21.33	1.29	6.07	1.54	clay	UNDFND	UNDFD	20	1.3
8.25	27	47.64	2.14	4.50	1.59	silty clay to clay	UNDFND	UNDFD	30	3.0
8.55	28	221.16	2.65	1.20	1.65	sand	80-90	42-44	42	UNDEFINED
8.85	29	39.56	1.59	4.02	1.71	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.15	30	35.53	1.19	3.36	1.77	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
9.45	31	24.82	0.88	3.55	1.83	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
9.75	32	42.57	1.26	2.95	1.87	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.05	33	90.03	1.63	1.81	1.90	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
10.35	34	42.78	1.27	2.96	1.93	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.65	35	12.07	0.61	5.04	1.95	clay	UNDFND	UNDFD	12	.6
10.95	36	14.80	0.66	4.43	1.98	clay	UNDFND	UNDFD	14	.8
11.25	37	10.69	0.50	4.69	2.01	clay	UNDFND	UNDFD	10	.5
11.55	38	9.83	0.44	4.44	2.04	clay	UNDFND	UNDFD	9	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	12.25	0.54	4.44	2.07	clay	UNDFND	UNDFD	12	.6
12.15	40	22.75	1.01	4.45	2.10	clay	UNDFND	UNDFD	22	1.3
12.45	41	14.68	0.63	4.27	2.12	clay	UNDFND	UNDFD	14	.8
12.80	42	12.86	0.56	4.32	2.15	clay	UNDFND	UNDFD	12	.6
13.10	43	14.12	0.58	4.09	2.19	clay	UNDFND	UNDFD	14	.7
13.40	44	13.63	0.50	3.65	2.21	silty clay to clay	UNDFND	UNDFD	9	.7
13.75	45	17.72	0.69	3.89	2.24	silty clay to clay	UNDFND	UNDFD	11	1.0
14.05	46	19.72	0.86	4.35	2.27	clay	UNDFND	UNDFD	19	1.1
14.35	47	20.11	0.91	4.52	2.30	clay	UNDFND	UNDFD	19	1.1
14.65	48	55.24	1.26	2.28	2.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.4
14.95	49	48.93	1.49	3.04	2.36	sandy silt to clayey silt	UNDFND	UNDFD	19	3.0
15.25	50	24.62	1.53	6.20	2.39	clay	UNDFND	UNDFD	24	1.4
15.55	51	28.65	1.48	5.15	2.42	clay	UNDFND	UNDFD	27	1.7
15.85	52	46.69	1.58	3.39	2.44	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
16.15	53	42.68	1.80	4.21	2.47	silty clay to clay	UNDFND	UNDFD	27	2.6
16.45	54	35.11	1.46	4.17	2.50	silty clay to clay	UNDFND	UNDFD	22	2.1
16.75	55	51.15	1.43	2.79	2.53	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
17.05	56	77.09	1.67	2.16	2.56	silty sand to sandy silt	40-50	34-36	25	UNDEFINED
17.35	57	75.95	1.93	2.54	2.59	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
17.65	58	29.92	1.41	4.70	2.61	clay	UNDFND	UNDFD	29	1.7
17.95	59	33.00	1.79	5.42	2.64	clay	UNDFND	UNDFD	32	1.9
18.25	60	62.66	2.61	4.16	2.67	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
18.55	61	18.58	1.01	5.45	2.70	clay	UNDFND	UNDFD	18	.9
18.85	62	45.21	2.05	4.54	2.73	silty clay to clay	UNDFND	UNDFD	29	2.7
19.20	63	158.20	3.51	2.22	2.76	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
19.50	64	152.38	4.01	2.63	2.79	silty sand to sandy silt	60-70	38-40	49	UNDEFINED
19.80	65	229.45	4.96	2.16	2.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
20.15	66	126.43	3.42	2.71	2.85	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.45	67	37.10	1.83	4.94	2.88	clay	UNDFND	UNDFD	36	2.2
20.75	68	171.97	4.77	2.77	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.05	69	229.56	6.06	2.64	2.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
21.35	70	188.98	5.27	2.79	2.96	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.65	71	166.90	4.70	2.81	2.99	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	136.64	4.43	3.25	3.02	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
22.25	73	39.86	2.33	5.84	3.05	clay	UNDFND	UNDFD	38	2.3
22.55	74	34.00	2.05	6.03	3.08	clay	UNDFND	UNDFD	33	1.9
22.85	75	59.66	2.21	3.71	3.11	clayey silt to silty clay	UNDFND	UNDFD	29	3.6
23.15	76	160.88	3.05	1.89	3.13	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.45	77	169.77	4.07	2.40	3.16	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.75	78	203.90	5.53	2.71	3.19	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
24.05	79	181.16	5.03	2.77	3.22	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	36.69	1.77	4.82	3.25	clay	UNDFND	UNDFD	35	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	28.63	1.36	4.73	3.28	clay	UNDFND	UNDFD	27	1.5
24.95	82	29.79	1.24	4.16	3.30	silty clay to clay	UNDFND	UNDFD	19	1.6
25.25	83	36.03	1.65	4.58	3.33	silty clay to clay	UNDFND	UNDFD	23	2.0
25.60	84	32.99	1.63	4.93	3.36	clay	UNDFND	UNDFD	32	1.8
25.90	85	26.08	1.38	5.31	3.39	clay	UNDFND	UNDFD	25	1.4
26.20	86	28.70	1.63	5.66	3.42	clay	UNDFND	UNDFD	27	1.5
26.55	87	26.79	1.45	5.41	3.45	clay	UNDFND	UNDFD	26	1.4
26.85	88	27.43	1.55	5.64	3.48	clay	UNDFND	UNDFD	26	1.4
27.15	89	24.58	1.33	5.41	3.51	clay	UNDFND	UNDFD	24	1.2
27.45	90	30.17	1.56	5.19	3.54	clay	UNDFND	UNDFD	29	1.6
27.75	91	19.23	1.02	5.32	3.57	clay	UNDFND	UNDFD	18	.9
28.05	92	29.02	1.14	3.94	3.60	silty clay to clay	UNDFND	UNDFD	19	1.5
28.35	93	105.53	1.62	1.54	3.62	sand to silty sand	40-50	34-36	25	UNDEFINED
28.65	94	30.76	1.39	4.51	3.65	silty clay to clay	UNDFND	UNDFD	20	1.6
28.95	95	91.03	2.02	2.22	3.68	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
29.25	96	49.59	2.27	4.58	3.71	silty clay to clay	UNDFND	UNDFD	32	2.9
29.55	97	32.21	2.01	6.24	3.74	clay	UNDFND	UNDFD	31	1.7
29.85	98	25.46	1.50	5.87	3.77	clay	UNDFND	UNDFD	24	1.3
30.15	99	24.99	1.00	3.98	3.79	silty clay to clay	UNDFND	UNDFD	16	1.2
30.45	100	57.94	1.52	2.63	3.82	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
30.75	101	182.64	3.08	1.69	3.85	sand to silty sand	60-70	36-38	44	UNDEFINED
31.05	102	304.83	2.25	0.74	3.88	sand	70-80	38-40	>50	UNDEFINED
31.35	103	191.91	3.15	1.64	3.91	sand to silty sand	60-70	36-38	46	UNDEFINED
31.65	104	309.81	7.76	2.51	3.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
32.00	105	132.49	5.06	3.82	3.97	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
32.30	106	261.51	4.25	1.63	4.00	sand to silty sand	70-80	38-40	>50	UNDEFINED
32.60	107	180.06	3.81	2.11	4.03	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
32.95	108	92.84	2.93	3.15	4.06	sandy silt to clayey silt	UNDFND	UNDFD	36	5.7
33.25	109	143.35	3.24	2.26	4.09	silty sand to sandy silt	50-60	34-36	46	UNDEFINED
33.55	110	37.99	1.65	4.34	4.12	silty clay to clay	UNDFND	UNDFD	24	2.0
33.85	111	84.92	2.33	2.75	4.14	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
34.15	112	195.34	4.57	2.34	4.17	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	134.08	3.88	2.90	4.20	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
34.75	114	68.75	2.67	3.89	4.23	clayey silt to silty clay	UNDFND	UNDFD	33	4.1
35.05	115	31.48	1.18	3.75	4.26	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
35.35	116	27.43	0.99	3.61	4.29	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.65	117	26.74	0.97	3.62	4.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.95	118	28.14	1.12	3.98	4.34	silty clay to clay	UNDFND	UNDFD	18	1.4
36.25	119	25.84	0.90	3.47	4.37	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
36.55	120	33.59	1.22	3.65	4.40	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
36.85	121	53.41	1.86	3.48	4.43	clayey silt to silty clay	UNDFND	UNDFD	26	3.0
37.15	122	177.85	3.50	1.97	4.46	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	184.03	4.24	2.31	4.48	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.75	124	147.66	4.37	2.96	4.51	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.3
38.05	125	188.81	4.20	2.22	4.54	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.40	126	279.50	7.41	2.65	4.57	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
38.70	127	236.16	6.36	2.69	4.60	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.00	128	165.57	6.23	3.76	4.63	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
39.35	129	372.47	2.81	0.75	4.66	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
39.65	130	109.59	2.43	2.22	4.69	silty sand to sandy silt	40-50	32-34	35	UNDEFINED
39.95	131	181.83	4.81	2.64	4.72	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
40.25	132	367.72	4.34	1.18	4.75	sand	80-90	38-40	>50	UNDEFINED
40.55	133	372.43	6.20	1.66	4.78	sand to silty sand	80-90	38-40	>50	UNDEFINED
40.85	134	356.93	5.62	1.58	4.80	sand to silty sand	80-90	38-40	>50	UNDEFINED
41.15	135	235.11	4.02	1.71	4.83	sand to silty sand	60-70	36-38	>50	UNDEFINED
41.45	136	115.16	3.79	3.29	4.86	sandy silt to clayey silt	UNDFND	UNDFD	44	7.1
41.75	137	106.79	6.18	5.79	4.89	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	181.15	4.74	2.61	4.92	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.35	139	65.23	3.56	5.45	4.95	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.65	140	225.04	6.72	2.99	4.97	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.95	141	235.00	7.51	3.20	5.00	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
43.25	142	267.68	5.61	2.10	5.03	sand to silty sand	70-80	36-38	>50	UNDEFINED
43.55	143	155.70	4.77	3.06	5.06	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.8
43.85	144	140.77	4.76	3.38	5.09	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
44.15	145	41.24	2.02	4.89	5.12	clay	UNDFND	UNDFD	40	2.1
44.45	146	37.43	1.46	3.90	5.14	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
44.80	147	36.25	1.47	4.06	5.18	silty clay to clay	UNDFND	UNDFD	23	1.8
45.10	148	65.19	2.24	3.44	5.21	clayey silt to silty clay	UNDFND	UNDFD	31	3.7
45.40	149	40.22	1.12	2.78	5.23	sandy silt to clayey silt	UNDFND	UNDFD	15	2.0
45.75	150	66.48	1.28	1.93	5.27	silty sand to sandy silt	<40	<30	21	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

→

Figure A-8e

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed by GDC and laboratory subconsultants Geologic Associates of Anaheim, California, using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples were then transported to our Aliso Viejo geotechnical laboratory and to Geologic Associates for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of moisture content and dry unit weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Consolidation, R-Value, and Soil Corrosivity. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The soil classifications are presented on key for soil classification and on the boring logs Figures A-1a through A-5e of Appendix A.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented on the boring logs in Figures A-2a through A-5e of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a through A-5e of Appendix A and in Figure B-1 of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided graphically in Figure B-2. The relative proportion (or percentage) by dry weight of fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a through A-5e of Appendix A.

B.6 Direct Shear Test

To determine the shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under two additional normal loads. The test results are presented in Figures B-3a and B-3b.

B.7 Consolidation Test

One-dimensional consolidation test was performed on selected undisturbed samples in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation tests are graphically shown in Figures B-4a and B-4b.

B.8 R-Value

A Resistance or R-Value test was performed on selected bulk samples of the subgrade soils encountered under proposed pavement locations. The test was conducted in general accordance with CTM 301. The test results are summarized in Table B-1.

TABLE B-1:
SUMMARY OF R-VALUE TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	R-Value
R-08-004	B-1	1.5 - 3.5	CL	39
R-08-005	B-1	2 - 5	CL	25

B.9 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included soil pH (Caltrans method 643), water-soluble chlorides (Caltrans Test Method 422), water-soluble sulfates (Caltrans Test Method 417) and electrical resistivity (Caltrans Test Method 643). The test results are summarized in Table B-2.

TABLE B-2:
SUMMARY OF CORROSION TEST RESULTS

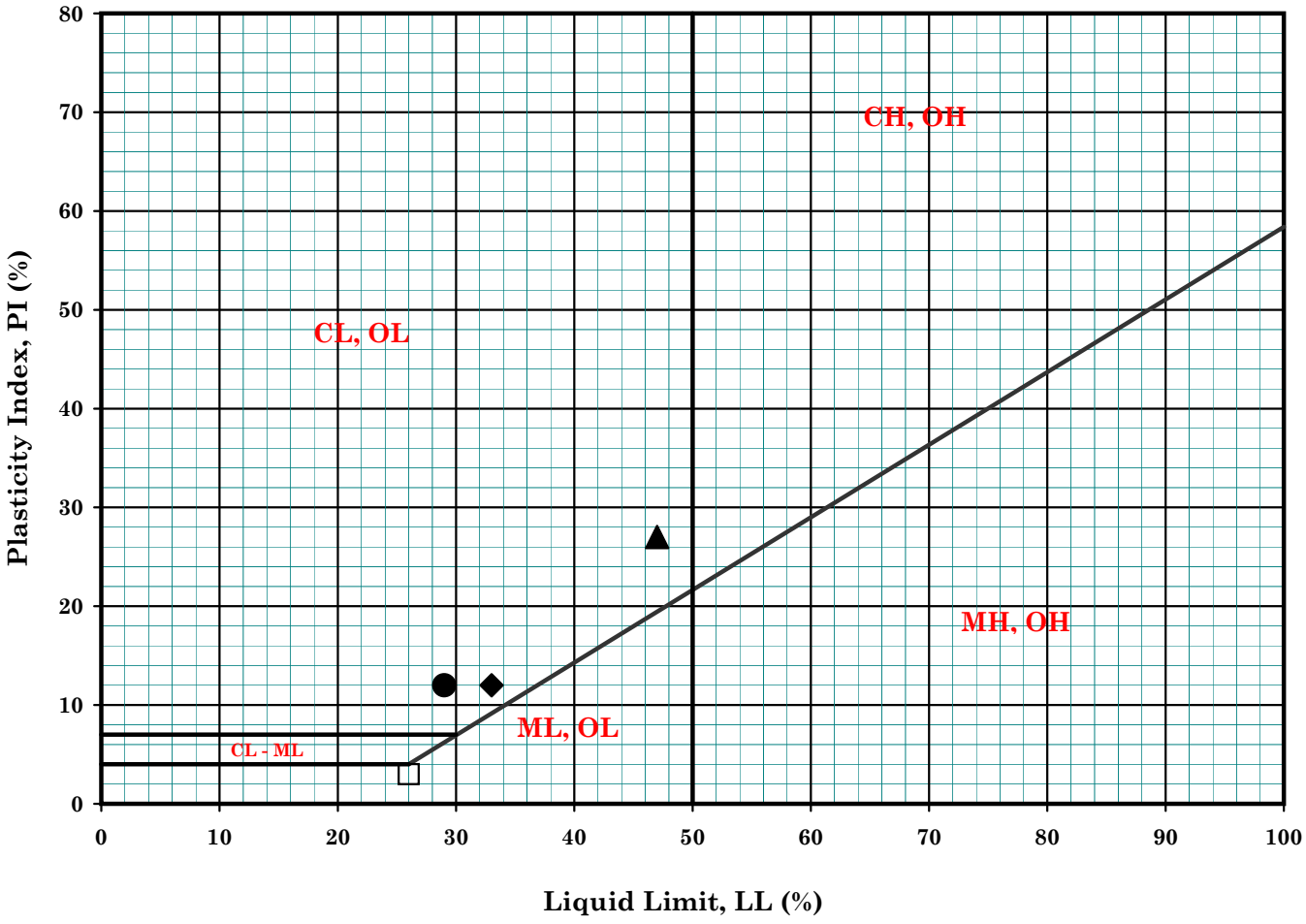
Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
R-08-004	B-1	1.5-3.5	CL	1350	9.1	465	604
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330

B.10 List of Attached Figures

The following figures are attached and complete this appendix:

Figure B-1	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figures B-3a, b	Direct Shear Test Results
Figures B-4a, b	Consolidation Test Results

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-004	B-1	1.3	3.5	0.4	1.1	16	29	17	12	-0.08	Dark Brown Sandy Lean Clay (CL)
▲	R-08-012	R-1	6.0	6.5	1.8	2.0	28	47	20	27	0.30	Dark Brown Lean Clay with Sand (CL)
◆	R-08-012	R-5	26.0	26.5	7.9	8.1	29	33	21	12	0.67	Dark Brown Lean Clay with Sand (CL)
□	R-08-012	R-9	46.0	46.5	14.0	14.2	26	26	23	3	1.00	Dark Brown Sandy Silt (ML)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

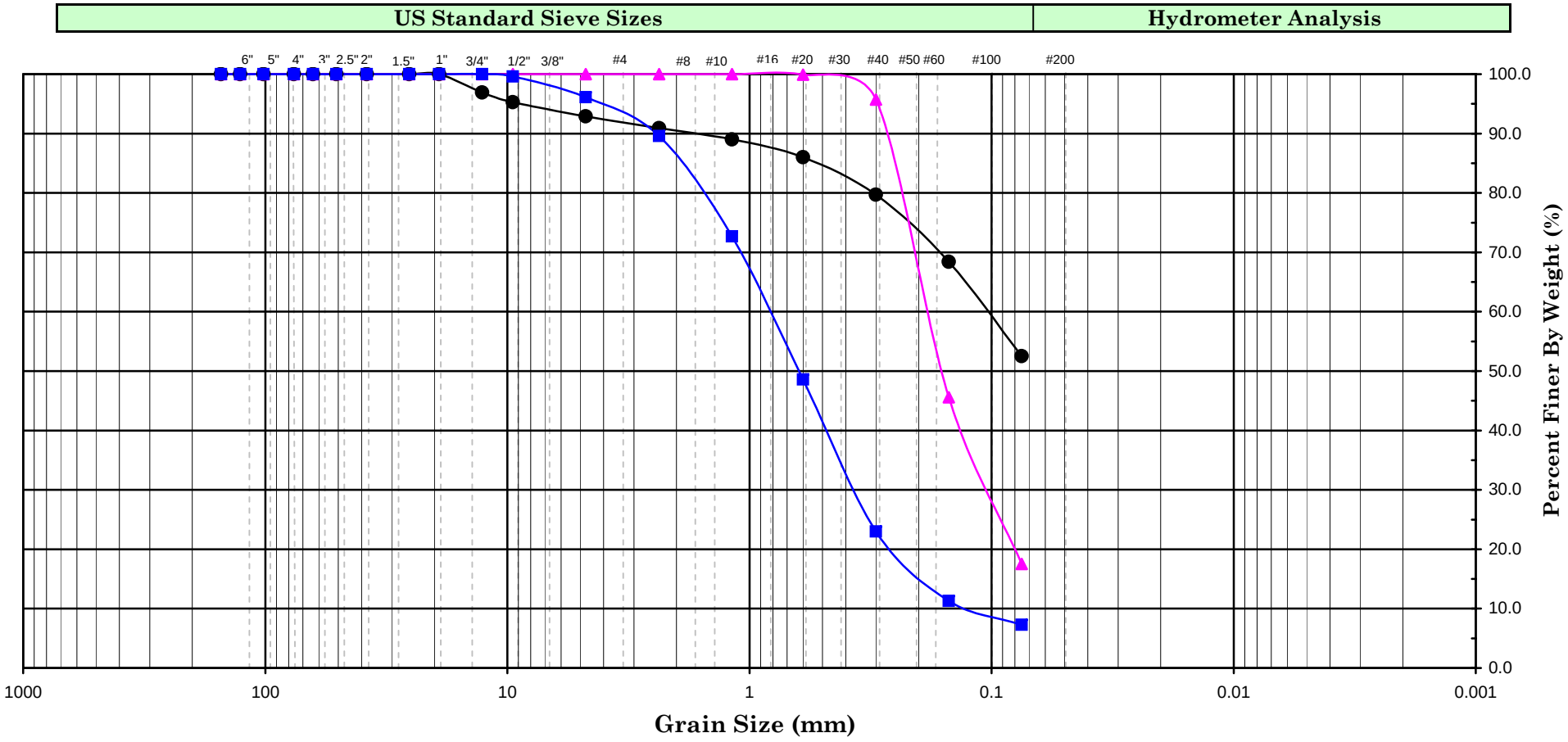
Project No. : I-436

Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	R-08-005	R-1	5.0	6.5	1.53	1.98	Gray	Sandy Lean Clay (CL)	CL
▲	R-08-005	S-2	10.0	11.5	3.05	3.51	Gray Brown	Silty Sand (SM)	SM
■	R-08-011	S-11	60.0	61.3	18.30	18.70	Gray Brown	Well Graded Sand with Silt (SW-SM)	SW-SM

Remark :

GROUP DELTA CONSULTANTS

SR-22

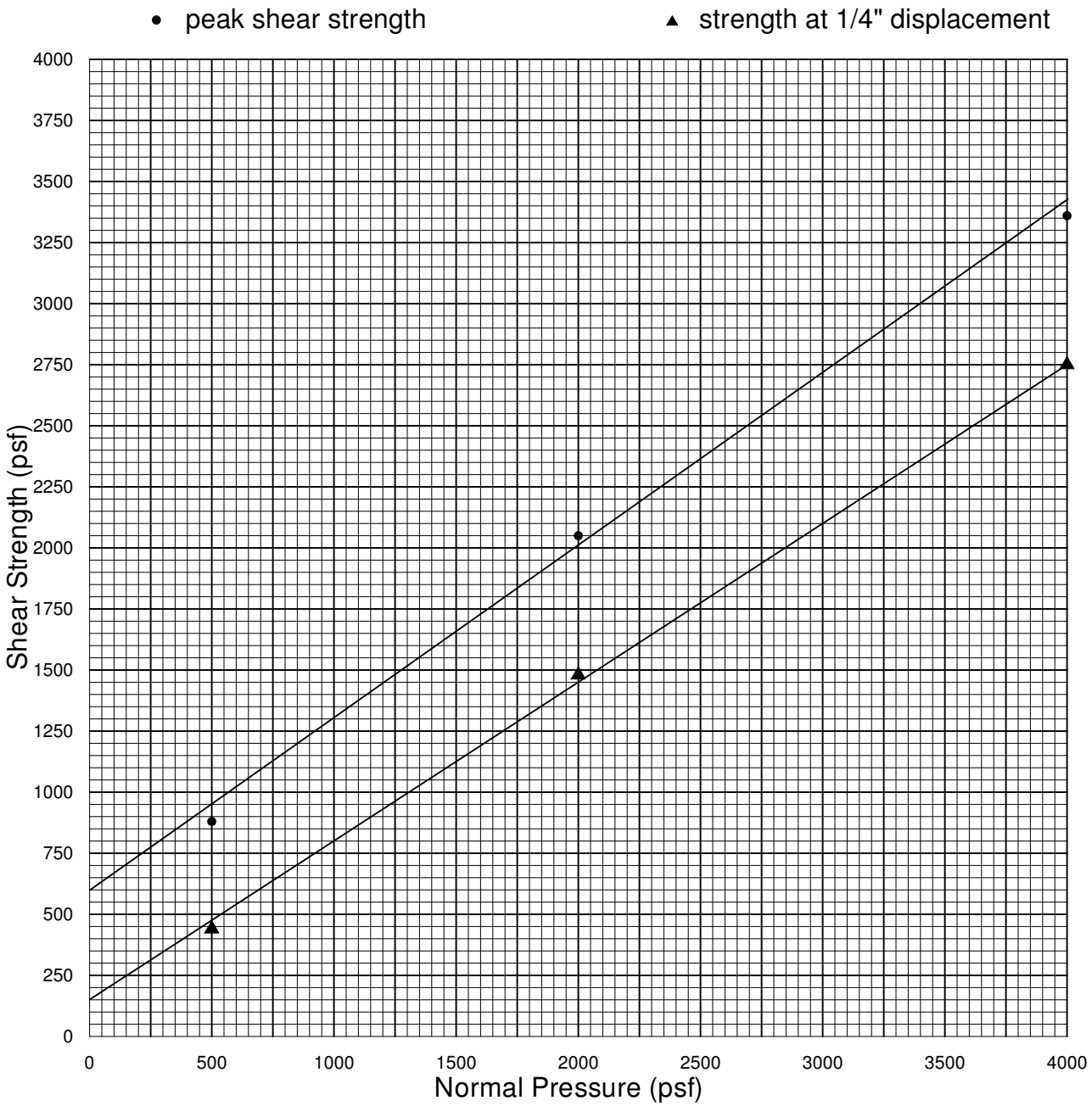
Project No. : I-436 **Date :** 05/28/08

GRAIN SIZE ANALYSIS

(ASTM D-422-63)

Figure No. : B-2

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-004 @ 3'-5'	Undisturbed & Saturated	Clayey Silt / Clayey Sand	120.4	10.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	880 @ 0.0750"	440
2000	2050 @ 0.1000"	1480
4000	3360 @ 0.1050"	2750
	C = 600 psf	C = 150 psf
	ϕ = 35 deg.	ϕ = 33 deg.

Figure B-3a

Geo**L**ogic **A**ssociates

DIRECT SHEARS

GLA JOB NO. : **2002-017**
CLIENT: **Group Delta # I-436**
JOB NAME:

DATE: 6/12/2008

BY: LD

SAMPLE	DESCRIPTION	DRY DENSITY (PCF)	WATER CONTENT (%)	SHEAR RATE (IN/MIN.)	NORMAL STRESS (PSF)	PEAK SHEAR STRESS (PSF)	SHEAR STRESS (PSF) @ 0.25 IN.
R-08-004 / R-6	Clayey Silt w. Siltstone	96.4	26.7	0.0042	1500	1200 @ 0.095	1100
R-08-005 / R-3	Silty Clay	99.3	25.3	0.0042	800	780 @ 0.11	700
R-08-005 / R-3	Silty Clay	99.0	25.3	0.0042	5000	3350 @ 0.185	3320
R-08-012 / R-3	Silty Clay	103.7	24.1	0.0042	4000	2540 @ 0.245	2530

Figure B-3b

Geo**L**ogic **A**ssociates

CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	R-08-005	Depth:	5' - 6.5'	Date	05-13-08

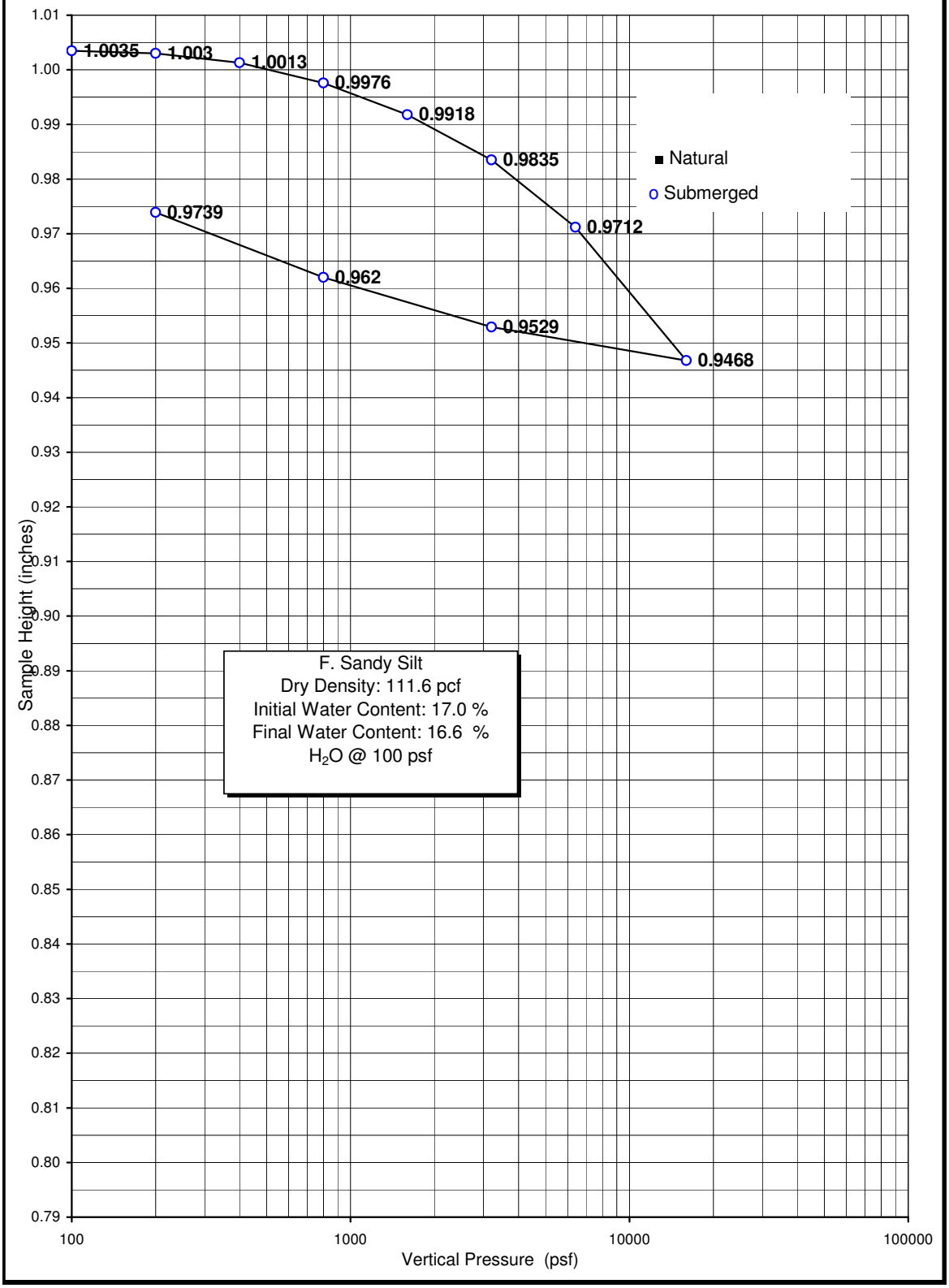


Figure B-4a

Geo**L**ogic **A**ssociates

CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	R-08-011	Depth:	20' - 21.5'	Date	05-13-08

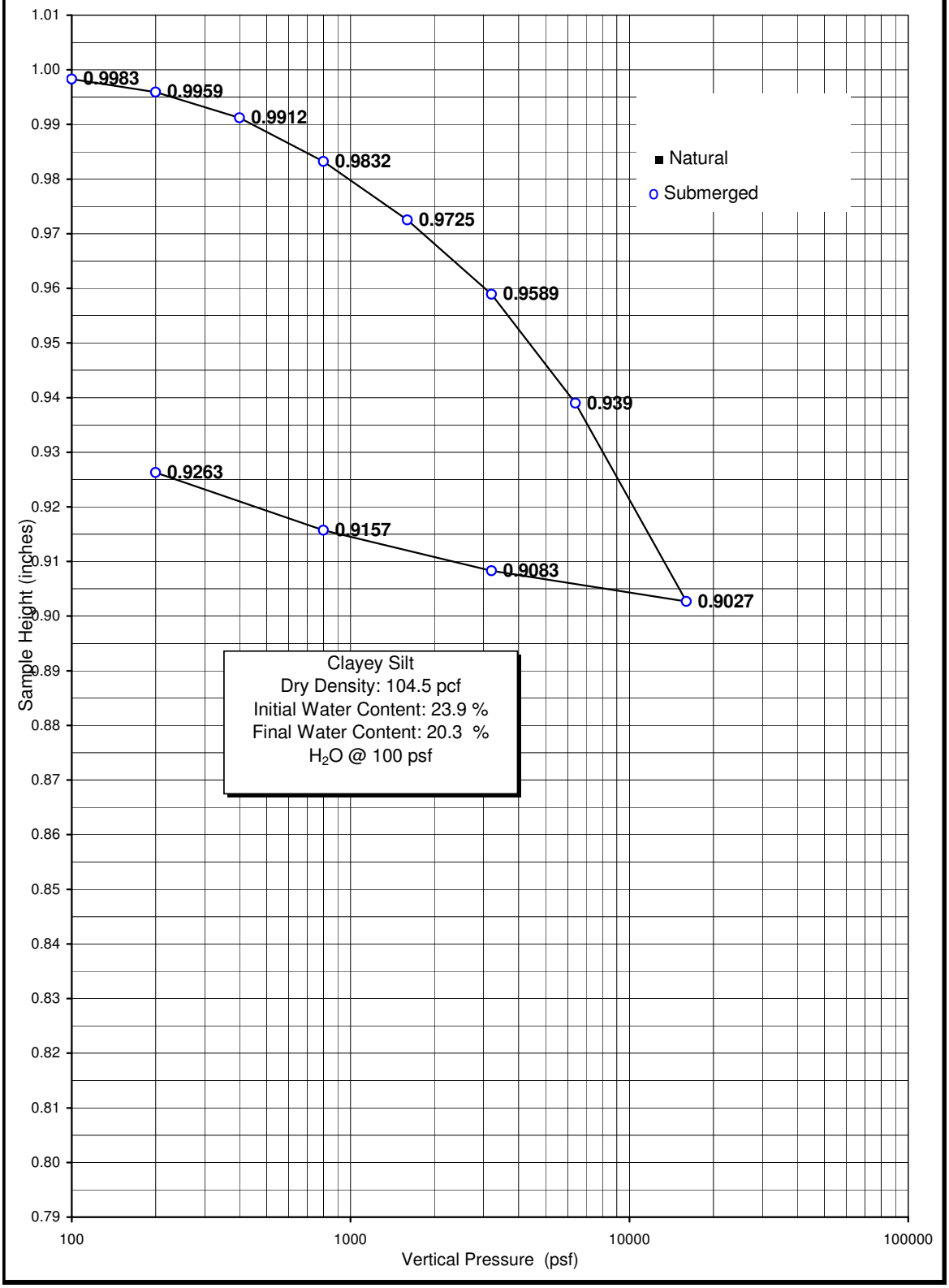


Figure B-4b

Geo**L**ogic **A**ssociates

APPENDIX C
ACI GUIDE FOR CAST-IN-PLACE LOW-DENSITY CELLULAR CONCRETE

Guide for Cast-in-Place Low-Density Cellular Concrete

Reported by ACI Committee 523

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Chair

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Secretary

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Dean M. Golden
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Ali M. Memari
Edgar Nunez
Caijun Shi
Konstantin Sobolev
Jennifer E. Tanner
Peter T. Yen
Ronald F. Zollo

This guide provides information on the materials, properties, design, proper handling, and applications of cast-in-place low-density cellular concretes having oven-dry densities of 50 lb/ft^3 (800 kg/m^3) or less. Roof deck systems and geotechnical applications often incorporate these low density cellular concretes.

Keywords: cellular concrete; engineered fill; foaming agent, geotechnical fill; insulating concrete; insulating concrete roof decks: low-density cellular concrete; low-density controlled low-strength material (LD-CLSM); preformed foam.

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CHAPTER 1-GENERAL

1.1—Definition of cellular concrete

Low-density cellular concrete (Fig. 1.1) is defined as concrete made with hydraulic cement, water, and preformed foam to form a hardened material having an oven-dry density of 50 lb/ft^3 (800 kg/m^3) or less. These mixtures may include aggregate and other material components including, but not limited to, fly ash and chemical admixtures.

This guide provides data and techniques pertaining to the properties and applications of cast-in-place low-density cellular concrete. Common applications of cast-in-place low-density cellular concrete are on roof decks and geotechnical applications. On roof decks, the material provides roofing base, thermal insulation, and drainage slope for flat-roofed industrial and commercial buildings (Fig. 1.2).

In geotechnical applications, the material is applied in thick sections of cellular concrete with low compressive strengths (Fig. 1.3) for the replacement of poor soils, fills for abandoned structures (pipelines), and cellular concrete fills designed, mixed, and placed to meet specific job conditions and functional requirements.

1.2—Definition of low-density, controlled low-strength material (LD-CLSM)

Controlled low-strength material (CLSM) is a cementitious material that is in a flowable state at the time of placement, and that has a specified compressive strength of 1200 psi (8.3 MPa) or less at the age of 28 days. This material is discussed further in ACI 229R. Low-density CLSM (LD-CLSM) meets this definition, and has a cast density that is controllable from 20 to 50 lb/ft^3 (320 to 800 kg/m^3). The quantity of preformed foam in the mixture determines the mixture's final density.

CHAPTER 2—MATERIALS

The basic materials in low-density cellular concrete are cement, water, and preformed foam. Because the main ingredient by volume of a low-density cellular concrete mixture is preformed foam, it is critical that all admixtures be compatible with the preformed foam within the specific mixture. Trial mixture tests are needed to determine compatibility and the resulting physical properties. Low-density cellular concrete mixtures may also include supplementary cementitious materials.

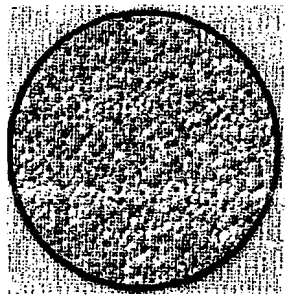

Fig. 1.1—Typical cell structure of cellular concrete.

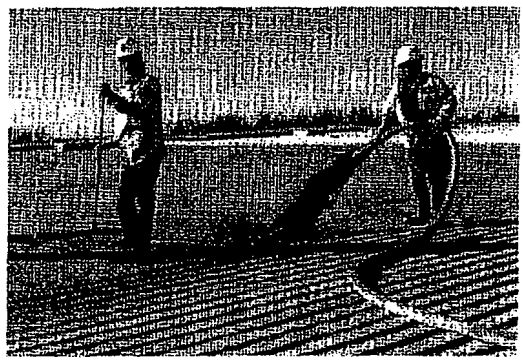

Fig. 1.2—Roof deck application (click on picture to view video).

Fig. 1.3—Geotechnical application (click on picture to view video).

2.1—Cement

The cement should meet the requirements of ASTM C 150 (portland cement), C 595 (blended cement), or C 1157 (hydraulic cement). Blended cements include cement containing combinations of portland cement, pozzolans, slag, other hydraulic cement, or some combination of these. Blended cement may result in lower rates of early strength

development and should be tested for specific applications. High-early-strength (Type III or HE) cement produces cellular concrete with higher rates of early strength development.

2.2—Water

Mixing water for concrete should be clean and free from detrimental amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete or reinforcement. Any nonpotable water should be tested for hardness, pH, suspended solids, total salt content, and other characteristics that might affect the preformed foam. the setting time, and the strength of the low-density cellular concrete.

2.3—Preformed foam

Preformed foam is created by diluting a liquid foam concentrate with water in predetermined proportions (Fig. 2.1) and passing this mixture through a foam generator. Meter the preformed foam directly into the cement-water slurry at the job site (Fig. 2.2). The density of the preformed foam is typically between 25 and 4.0 lb/ft^3 (40 and 65 kg/m^3).

The foam concentrate should have a chemical composition capable of producing and maintaining stable air cells within the concrete mixture. The air cells should be able to resist the physical and chemical forces imposed during mixing, pumping, placing, and setting of the cellular concrete. If the cellular (air-cell) structure is not stable, it may break down under these forces, resulting in an increased concrete density. Most common proprietary formulations of foam concentrates contain. protein hydrozylates or synthetic surfactants. ASTM C 796 provides a standard method for laboratory measurement of the performance of a foaming chemical to be used in producing foam (air cells) for making cellular concrete. ASTM C 869 is a standard specification that covers foaming agents specifically formulated for making preformed foam for use in the production of cellular concrete. This specification provides the means for evaluating the performance of a specific foaming agent. Further information concerning these formulations and the procedures for using them is available from foam manufacturers.

2.4—Aggregates

Low-density cellular concrete may include lightweight aggregates such as vermiculite or perlite meeting the requirements of ASTM C 332 Group 1 to lower the slump to achieve steeper roof slopes, and to maintain moisture in dry climates. Wilson (1981) provides additional information on the use of lightweight aggregates used in cellular concrete. Any proposed aggregates should be tested for physical properties, pumpability, and compatibility in trial mixtures.

2.5—Admixtures

2.5.1 Chemical admixtures—Chemical admixtures, such as water-reducing admixtures and set accelerators, are used with cellular concretes. Water-reducing admixtures can improve compressive strength for special mixtures or applications. Hot water, high-early-strength (Type III or HE) cement, and chemical accelerators can be used singly or in combination

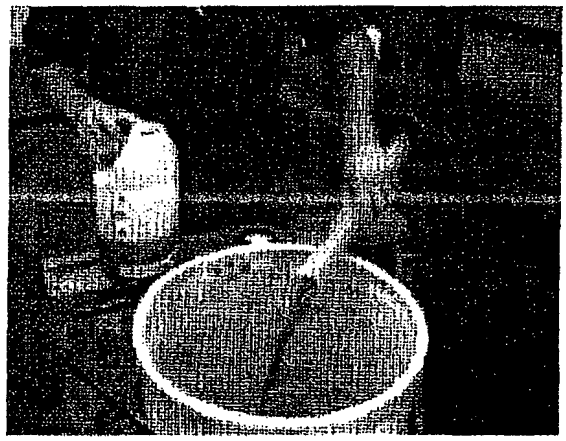

Fig. 2.1—Diluting foam concentrate in water (click on picture to view video).

Fig. 2.2—Metering preformed foam into cement-water slurry (click on picture to view video).

to accelerate setting. Accelerators containing chloride ions should not be used in cellular concrete placed in contact with steel. Chemical admixtures should conform to ASTM C 494 and be used at dosages recommended by the manufacturer or determined by trial mixtures.

Not all chemical admixtures are compatible for use in foamed cellular concrete. Individual manufacturers of foam concentrate should be contacted for information about the compatibility of specific admixtures with their foam concentrates, and trial batches should be used to determine the resulting mixture characteristics.

2.5.2 Supplementary cementitious materials—In the production of cellular concrete, supplementary cementitious materials such as fly ash, silica fume, high reactivity metakaolin, or ground-granulated blast-furnace slag. (slag cement) are included to reduce bleeding and segregation and to increase strength. Trial batches should be used to confirm the compatibility of the selected foam concentrate with other admixtures, and to help determine the proper admixture dosages and resulting physical properties. Various mineral admixtures may differ considerably in composition, fineness, and other properties. The user should review major fly ash properties—loss on ignition (LOI), cementing activity, and

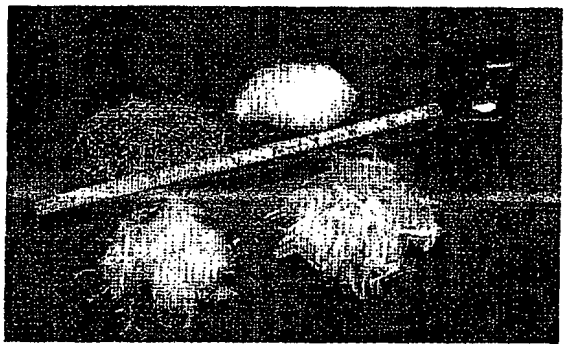

Fig. 2.3—Typical fiber types.

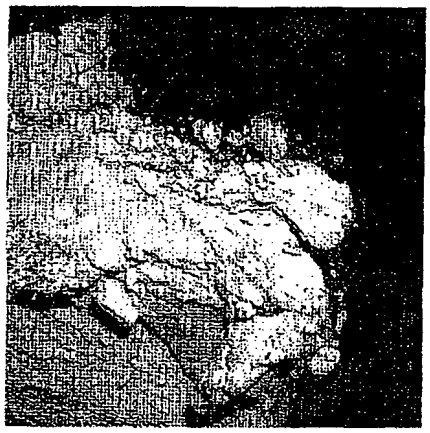

Fig. 2.4—Fibers in cellular concrete.

water demand of the fly ash—before including fly ash in a low-density cellular concrete mixture. The first of these properties (LOI) is addressed in ASTM C 618. A fly ash with a high LOI (carbon content) may adversely affect the preformed foam by causing an increase in density and loss of yield. If cementing activity is low, the concrete may set too slowly, resulting in a lower strength and a higher density. High water demand may require that the water-cementitious material ratio *(w/cm)* be adjusted to achieve the desired strength.

2.6 — Nonstandard materials

Special cements, supplementary cementitious materials, and aggregates may be included as nonstandard materials. Some mine-fill applications may use local materials as aggregates or fillers in low-density cellular concrete to extend the mixture when transportation of materials to remote areas is difficult. The user should pretest nonstandard mixtures for proper development of the desired fill properties.

2.7—Fiber reinforcement

Low-density cellular concrete may include commercially available fibers, such as nylon, polypropylene, polyester, and alkali-resistant glass, as reinforcing materials (Fig. 2.3). The choice of fiber type depends on performance requirements. Cellular concrete's flexural and tensile strength, impact resistance, fatigue limit, energy absorption, and spalling resistance can be enhanced through the use of fibers that are known to be sufficiently durable under the expected service conditions. Zollo and Hays (1998) address the material and engineering properties of fiber-reinforced cellular concrete. Fibers can also help control plastic shrinkage cracking (Fig. 2.4).

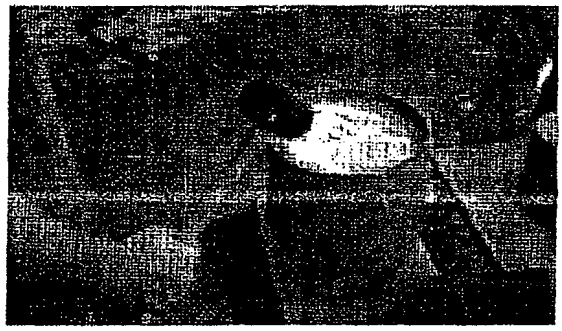

Fig. 3.1—Measuring as-cast *density* (click on *picture to view video).*

CHAPTER 3--PHYSICAL PROPERTIES

3.1—As-cast density

The as-cast density at the point of placement should be determined by calculating the density of samples using a container of known volume and empty weight, as prescribed in applicable sections of ASTM C 796 (Fig. 3.1). Monitoring the as-cast density of the cellular concrete is an important job-site quality-assurance tool for controlling the uniformity and density of the mixture at the point of placement. Procedures for sampling and testing hardened insulating cellular concrete are given in ASTM C 513.

3.2—Oven-dry density

Oven-dry density, evaluated using ASTM C 796 and C 495, determines the unit weight used to define low-density cellular concrete, which by definition has a maximum oven-dry density of 50 lb/ft^3 (800 kg/m^3).

3.3--Compressive strength

The relationship between compressive strength and as-cast density is an important indicator of the quality of cellular concrete (Kearsley and Wainwright 2002b). The compressive strength of cellular concrete should be evaluated in accordance with ASTM C 796 and C 495. Compressive strength specimens should not be oven-dried. When it is necessary to determine oven-dry density, it is necessary to make companion specimens for this test in addition to those specimens for compressive strength testing. The user should relate compressive strength to the oven-dry density of cellular concrete as indicated in Table 3.1. Table 3.1 is a guideline only, based on Type I cement, no cement substitution, and using local materials. The user should test specific local materials to determine these properties.

For geotechnical applications, the cast density of the material is usually the most significant property and is more important than bearing capacity (unconfined compressive

Table 3.1—Possible ranges of compressive strength and modulus of elasticity versus oven-dry density for cellular concrete In roof deck applications

Oven-dry density		Usual range of compressive strength at 28 days		Modulus of elasticity	
lb/ft^3	kg/m^3	psi	MPa	10^3 psi	GPa
20 to 25	320 to 400	70 to 125	0.48 to 0.86	30 to 52	0.21 to 0.36
25 to 30	400 to 480	125 to 225	0.86 to 1.55	52 to 89	0.36 to 0.61
30 to 35	480 to 560	225 to 350	1.55 to 2.41	89 to 135	0.61 to 0.93
35 to 40	560 to 640	350 to 450	2.41 to 3.10	135 to 183	0.93 to 1.26
40 to 50	640 to 800	450 to 750	3.10 to 5.17	183 to 320	1.26 to 2.21

Table 3.2—Physical properties for geotechnical (Engineered Fill 2001)

Maximum cast density		Minimum compressive strength		Bearing capacity	
lb/ft^3	kg/m^3	lb/in.^{2}	MPa	ton/ft^2	MPa
24	385	10	0.07	0.7	0.07
30	480	40	0.28	2.9	0.28
36	575	80	0.55	5.8	0.56
42	675	120	0.83	8.6	0.82
50	800	160	1.10	11.5	1.10

strength). As a result, these densities and compressive strengths are lower than those for roof deck applications (Table 3.2). If standard materials are used, the density of the low-density cellular concrete has properties that fall within ranges specified by the manufacturer of the foam concentrate. If nonstandard materials are used, special test batches may be required to confirm specific properties. To define the general relationship between cast density and compressive strength for specific applications, one manufacturer has divided the cast density into convenient ranges.

Because the need for controlled low-density fill is usually the main reason for using lowdensity cellular concrete, compressive strengths and ultimate bearing capacities require only minimum values. For specialized low-density cellular concrete geotechnical applications, other physical properties may be required.

Cellular concrete with a compressive strength below 70 psi (0.48 MPa) has proven satisfactory for special application. such as pipe and wall insulation, tunnel and mine fills, energy absorption or shock mitigation, and backfills in sewer and highway construction per ACI SP-29 (ACI Committees 213 and 523 1971).

3.4--Drying shrinkage

Drying shrinkage is not usually critical in cellular concrete used for roof deck insulation or geotechnical applications. The reason for this is that when cellular concrete is used to insulate roof decks, it is not considered to contribute structurally; and when it is used in geotechnical applications, any shrinkage cracking that it might undergo does not significantly reduce bearing capacity. Drying shrinkage is typically 0.30 to 0.60% after 6 months at 50% relative humidity and 73 °F (23 °C), and increases with decreasing density. Some of the effects of drying shrinkage can be mitigated by adding fibers to the mixture (Section 2.7). Figure 3.2 relates drying shrinkage at 56 days to the air-dry density of cellular concrete (ASTM C 157).

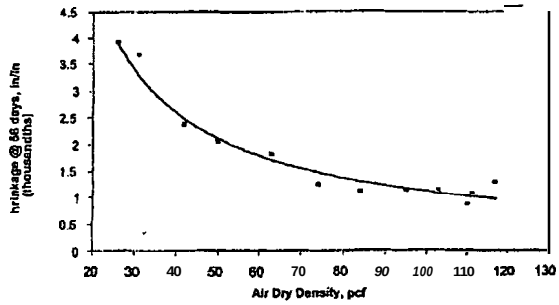

Fig. 32—Drying shrinkage versus air-dry shrinkage (I in = 25.4mm; I lb/ft^3 = 16.0 kg/m^3).

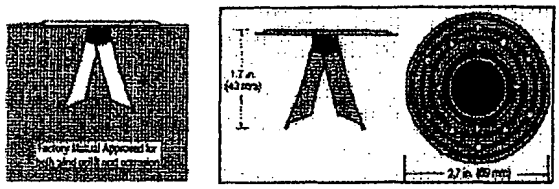

Fig. 3.3 –Typical base-sheet nail.

3.5—Thermal expansion

The coefficient of thermal expansion for cellular concrete varies directly with density, and is typically 5.0 to 7.0 × 10^{-6} per °F (9.0 to 12.6 x 10^{-6} per °C) as evaluated using a linear thermal expansion test with strain gauges. The designer should consider thermal expansion in applications with significant variation in placing temperatures, operating temperatures, or bath. These conditions could occur in applicationssuch as roof decks, power plants, ovens, and steam lines.

3.6—Walkability

Walkability, a term developed to describe the ability of low-density concrete to sustain normal construction-foot trafficwithoutdamage, is best judged by examining surface distress. Walkability improves with increased density. When heavy construction traffic is expected (such as from wheelbarrows, scaffolds, material storage, or pathways), the surface of the roof deck should be protected with wooden boards or by a similar method.

3.7—Mechanical attachment

For roof deck applications, the roofing base sheet should be mechanically attached to the low-density cellular concrete roof deck using specifically designed nails or screws (Fig. 3.3). Fastening within 2 to 7 days of concrete placement is possible if the fastener can be installed without shattering or spalling the cellular concrete and if an installed fastener has a minimum specified withdrawal resistance of 40 lb (180 N), which is consistent with required wind-uplift resistance and typical nailing patterns (such as three rows,

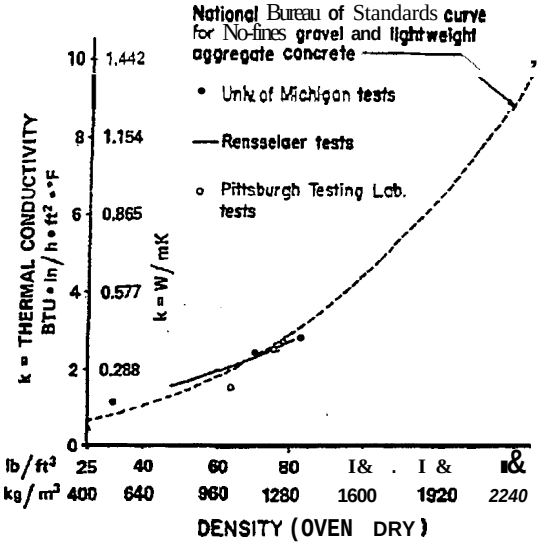

Fig. 3.4—Thermal conductivity versus oven-dry *density (National Bureau of Standards 1955).*

uniformly spaced over the width of each base sheer, and using a nail spacing of 7-1/2 in. [190 mm] in each row). Because no consensus standard exists, nailing patterns are generally qualified by product- and pattern-specific testing, and are published in evaluation-service reports (ANSI/SPRI FX-1-2001 2001).

3.8—Thermal conductivity

The thermal conductivity of cellular concrete should be measured using the guarded hot plate (ASTM C 177) or the heat flow meter (ASTM C 518) methods. A full-scale assembly is measured by a hot box apparatus (ASTM C 1363). Table 3.3 lists typical thermal conductivity values. These values follow the curve of Fig. 3.4, originally produced by the National Bureau of Standards (1955).

3.9—Fire resistance

The fire resistance of cellular concrete in a building system is determined by a fire test, during which the cellular concrete element must support its design load, remain within the temperature increase specified by the test standard, and withstand the transmission of flame or hot gasses per ASTM E 119. Information on the demonstrated fire resistance of slabs with cellular concrete and charts for estimating the fire resistance of various two-course roofs is available (Abrams and Gustaferro 1969; Gustaferro et al. 1970).

Fire-resistance tests have been conducted on wall, floor, and roof assemblies of cellular concrete cast over concrete (precast or cast-in-place), galvanized steel, and wood substrates. Some of these assemblies contain expanded polystyrene insulation board sandwiched within the cellular concrete. Recognized laboratories, such as Underwriters Laboratories, Inc., publish construction details for the tested assemblies, including fire ratings in hours evaluated using ASTM E 119.

Table 3.3--Typical thermal conductivity values for oven-dry cellular concrete

Oven-dry density		Thermal conductivity, K	
lb/ft³	kg/m³	BTU × in. (h × ft² × °F)	w/(m × K)
20	320	0.75	0.11
30	480	0.91	0.13
40	640	1.11	0.16
50	800	1.36	0.20

3.10-Permeability

Generally, low-density cellular concrete has a low coefficient of permeability k that is constant throughout the lower-density ranges (Kearsley and Wainwright 2001a). The coefficient of permeability is inversely related to the effective confining pressure on the sample. Because lowdensity cellular concrete is a rigid material rather than a yielding soil, its permeability is measured using a modified triaxial-type test including a confining pressure to prevent direct passage of water (short-circuiting) along the interface between the specimen and the confining membrane. A constant head should be-maintained during the test. Reported values range from 1×10^{-4} to 1×10^{-5} mm/s (4×10^{-6} to 4×10^{-7} in./s) (ASTM D 2434).

3.11—Freezing-and-thawing resistance

Freezing-and-thawing resistance of low-density cellular concrete is evaluated using Procedure B (rapid freezing and thawing) of ASTM C 666, with a modified cycling protocol involving a longer thawing period. This modification is necessary because the insulating properties of low-density cellular concrete prevent rapid lowering and raising of the temperatures at the interior of the specimen, and thus prevent completion of a freezing-and-thawing cycle in the originally prescribed maximum 4-hour time period.* Lowdensity cellular concrete intended for exterior exposure should have a relative dynamic modulus of elasticity E at least 70% of its original value after 120 cycles when tested according to Procedure B of the modified ASTM C 666. Because the freezing-and-thawing resistance of low-density cellular concrete increases with increasing density, cellular concrete within 2 to 3 ft (0.6 to 1 m) of a surface subjected to cycles of freezing and thawing while exposed to water must have a density of at least 36 lb/ft³ (575 kg/m³). MacDonald et al. (2004) provide an evaluation of the freezing-and-thawing performance and testing of cellular concrete.

CHAPTER 4--PROPORTIONING AND TESTING

4.1—Proportioning

Guidance for mixture proportioning is generally available from the manufacturer of foam concentrates. The mixture proportion specifies the range of proportions of the various ingredients needed to attain the desired physical properties (density and compressive strength). The user should test mixture proportions when nonstandard materials or special applications are involved.

*Personal correspondence from E. L. Bidwell, University of Illinois, to Elastizell Corp. of America, and report, "Freeze Thaw Testing of Low Density," *Elastizell Lightweight Concrete*, Apr. 2, 1975.

4.2—Ingredient compatibility

Each ingredient that does not meet standard specifications for mixture compatibility should have the cellular concrete physical properties checked in actual mixtures according to ASTM C 796 and C 869. Cements may have significant strength variations within standard specification limits. Mill reports and test batches are useful for reviewing the product differences between cement and fly ash sources. Kearsley and Wainwright (2002a) demonstrate how to optimize fly ash content for strength.

4.3—Cast density

Measuring the cast density at the point of placement is the simplest and most convenient test for monitoring the quality of the placed material. Cylinder specimens for compressive strength tests, usually measuring 3 x 6 in. (76 x 150 mm), should be cast at the same time that periodic density tests are performed. These samples should be covered and stored in a protected area for at least 24 hours before they are transported to the testing laboratory for testing in accordance with ASTM C 796.

4.4—Physical properties

For standard mixtures made from standard materials, cast density determines the physical properties of the cellular concrete. It is not necessary to repeat the specialized tests of materials for each project. These specialized tests include permeability and freezing-and-thawing resistance; they may require up to 3 months to complete. Strength and density determinations are often sufficient. If unique applications or nonstandard materials are used, special tests may be required. A special test is one related to the performance of the material in the specialized application. Legatski (1994) provides a detailed review of testing the properties of cellular concrete.

CHAPTER 5—BATCHING, MIXING, PLACING, FINISHING, AND CURING

5.1—Storage of materials

All materials should be stored in a manner to prevent deterioration and contamination by foreign matter.

5.2—Batching

Materials for low-density cellular concrete are typically proportioned and batched on site, directly into a specialized mixer. The cement, fly ash, and other dry materials are weighed on a calibrated scale, and the mixing water is metered. The preformed foam is metered into the mixture through a calibrated nozzle. The accuracy of each batching device is critical to the final mixture density and its subsequent reproducibility. Each batching device (scales, water meter, foam-generating nozzle) should be calibrated before starting a project, and during a project if there is a reason to believe it is necessary.

5.3—Mixing

Mechanically mixing cellular concrete produces a uniform distribution of materials with a suitable consistency at the specified as-cast density. Excessive mixing should be avoided, as it may cause changes in density and consistency.

In batch mixing, the mixer should be charged with mixture water and dry ingredients, followed by special admixtures and the preformed foam. The as-cast density should be monitored at the point of placement every 30 to 60 minutes based on consistency of results. Allowance should be made for any density changes that result from placing methods or conditions, such as pumping distances and extreme weather conditions. Ingredients should be added in the proper proportions and sequence during continuous mixing operations. This is necessary to ensure reasonable uniformity and achieve the required as-cast density at the point of placement.

Standard concrete mixing equipment is normally not acceptable for low-density cellular concrete mixtures because the action of the mixer does not combine the ingredients with the correct speed and mixing action. A high-speed paddle mixer is preferable because it properly combines the ingredients and blends the preformed foam rapidly and efficiently to produce a uniformly consistent lowdensity cellular concrete mixture. Other mixers and processes that produce uniform mixtures include high-shear mixers.

5.4—Placing

Cellular concrete should be placed by a progressive-cavity pump or a peristaltic pump. The pump hose should be large enough in diameter (usually 2 to 2.5 in. [51 to 64 mm]) to ensure uniform delivery of cellular concrete at the point of placement without damage to the structure or substrate. Low-density cellular concrete can be pumped over long distances (over–1500 ft [460 m]). This is a major advantage for low-density cellular concrete over other materials and placing methods, and is important on large, congested projects with difficult access.

5.5—Finishing

For roof deck applications, cellular concrete should be finished to the slope and thickness specified on the project drawings. A minimum slope for proper roof drainage is 2% (equivalent to 1/4 in./ft [21 mm/m]). It is possible to place this material on steeper slopes. The cellular concrete surface is usually finished with a darby or screeded to the specified slope (Fig. 5.1). The surface should be smooth and free from ridges, projections, and depressions that might adversely affect the roofing membrane.

For geotechnical applications, lift thicknesses ranging from 2 to 4 ft (0.6 to 1.2 m) are typical. The lift thickness is job-specific and related to the project layout and casting procedure. A greater lift thickness is acceptable for specific job conditions. The heat of hydration developed within the mass, the material density, the cement content, and the ambient temperature also influence the lift thickness. Thinner castings reduce the heat buildup from hydration of the cement. It is desirable to cast material in a formed area within 1 or 2 hours to permit an undisturbed setting. In general, lowdensity cellular concrete should be cast to final grade with a tolerance of 0.1 ft (0.03 m). It is not necessary intermediate lift surfaces. A darby finish is acceptable for the final lift.

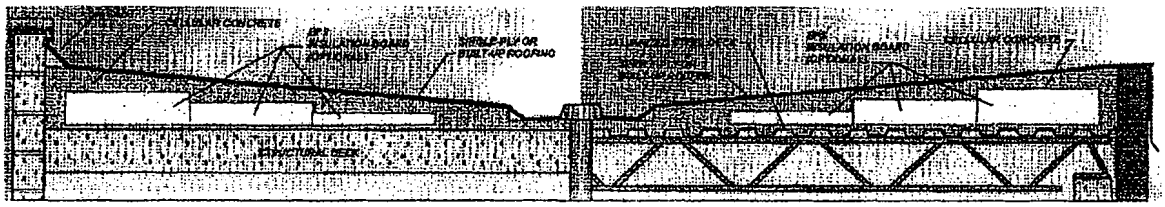

Fig. 5.1—Typical roof deck cmss sections.

5.6—Curing

Water curing or use of a curing compound is advisable for roof deck applications when rapid drying is anticipated. Curing compounds should be compatible with the final roofing system. Traffic should not be permitted on freshly placed cellular concrete roof decks until adequate walkability (Section 3.6) is demonstrated. Check with the manufacturer of foaming agent for specific recommendations to ensure compatibility with subsequent roofing membrane material.

5.7--Placement in cold weather conditions

When ambient temperatures below 32 °F (0 °C) are predicted within 8 hours after placement special precautions should be taken, including the use of Type III (high early-strength) cement or Type I cement with heated mixing water to increase the initial internal temperature of the concrete and accelerate the setting time. Because of the relatively high cement content and insulation properties of cellular concrete, these precautions are usually adequate. Cellular concrete should not be mixed or placed during freezing weather, rain, or snow, or when standing water, snow, or ice is present on the deck. The foaming agent manufacturer should be consulted for specific cold weather placement recommendations.

5.8—Placement in hot weather conditions

When expecting ambient temperatures above 100 °F (38 °C) during casting, the following special precautions should be considered:

- Casting before dawn will avoid the heat of the day;
- Vermiculite or perlite aggregate may be used as an additive to maintain moisture in the mixture;
- Fiber reinforcement may be incorporated in the mixture to minimize plastic-shrinkagecracking;
- The roof deck may be moist-cured by fogging after casting; and
- The roofing membrane may be installed as soon as the moisture content is deemed acceptable for the roofing application. The installation may begin as soon as 2 days after casting.

The foaming agent manufacturer should be consulted for specific hot weather application recommendations.

CHAPTER 6—DESIGN CONSIDERATIONS FOR ROOF DECKS

6.1—Form systems

A common application of cellular concrete is as insulation for concrete roof deck fills. The cellular concrete is cast over the structural deck system of the building. Typical deck types include corrugated or fluted steel, structural concrete, and wood.

6.1.1 *Steel*—Casting cellular concrete against permanent. uncoated structural metal formwork is not good concrete construction practice. Steel embedded in cellular concrete should be protected from corrosion in a manner consistent with its service environment (refer to ACI 222R).

Corrugated or fluted steel deck should be galvanized, coated, or both to meet the requirements of ASTM A 653. Steel decks are designed for gravity loads by selecting an appropriate steel gauge and deck profile, depending on the load and the span. The deck should be attached to the framing by welds or mechanical fasteners according to the deck manufacturer's recommendations and as required to resist the specified loadings, as determined by the designer with due consideration to diaphragm strength, uplift, and other structural design requirements. The steel sheets should be vented, with bottom slots having an open area of at least 0.5% of the plan area (Fig. 6.1). Side-lap embossments improve bond, which is important under seismic loading and wind uplift.

6.1.2 *Structural* concrete—A structural concrete base for cellular concrete (Fig. 6.2), whether cast-in-place or precast. may require venting for moisture relief that can be achieved with unsealed joints between precast structural concrete elements or by venting (refer to Fig. 6.3).

6.1.3 Wood—Cellular concrete is cast over structural wood roof decks to produce the proper slope for drainage and for thermal insulation (Fig. 6.4). A waterproof membrane. such as an asphalt-saturated felt, should be securely fastened to the wooden deck with the edges sealed before the cellular concrete fill is placed.

6.2—Roofing readiness

A roof membrane can generally be installed 2 to 5 days after a cellular concrete roof deck has been cast if the moisture content is deemed to be acceptable for roofmg membrane application. The surface hardness of the cellular concrete should be adequate to withstand foot traffic and other light roofing operations without damage. The screeded surface of the cellular concrete should be smooth and free from ridges or depressions that would adversely affect the integrity of the roofing membrane. Ridges should be scraped flat. Roofing base sheets are commonly attached to the roof deck by nailing. The roofing membrane is commonly attached to the base sheet by mopping or torch-heating. Other roofing-attachmentsystems should be compatible with

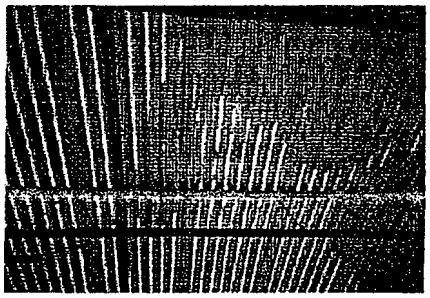

Fig. 6.1—Casting cellular concrete over vented steel deck.

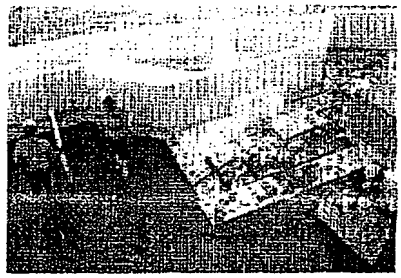

Fig. 6.2—EPS insulation board placed in cellular concrete slurry over structural concrete deck.

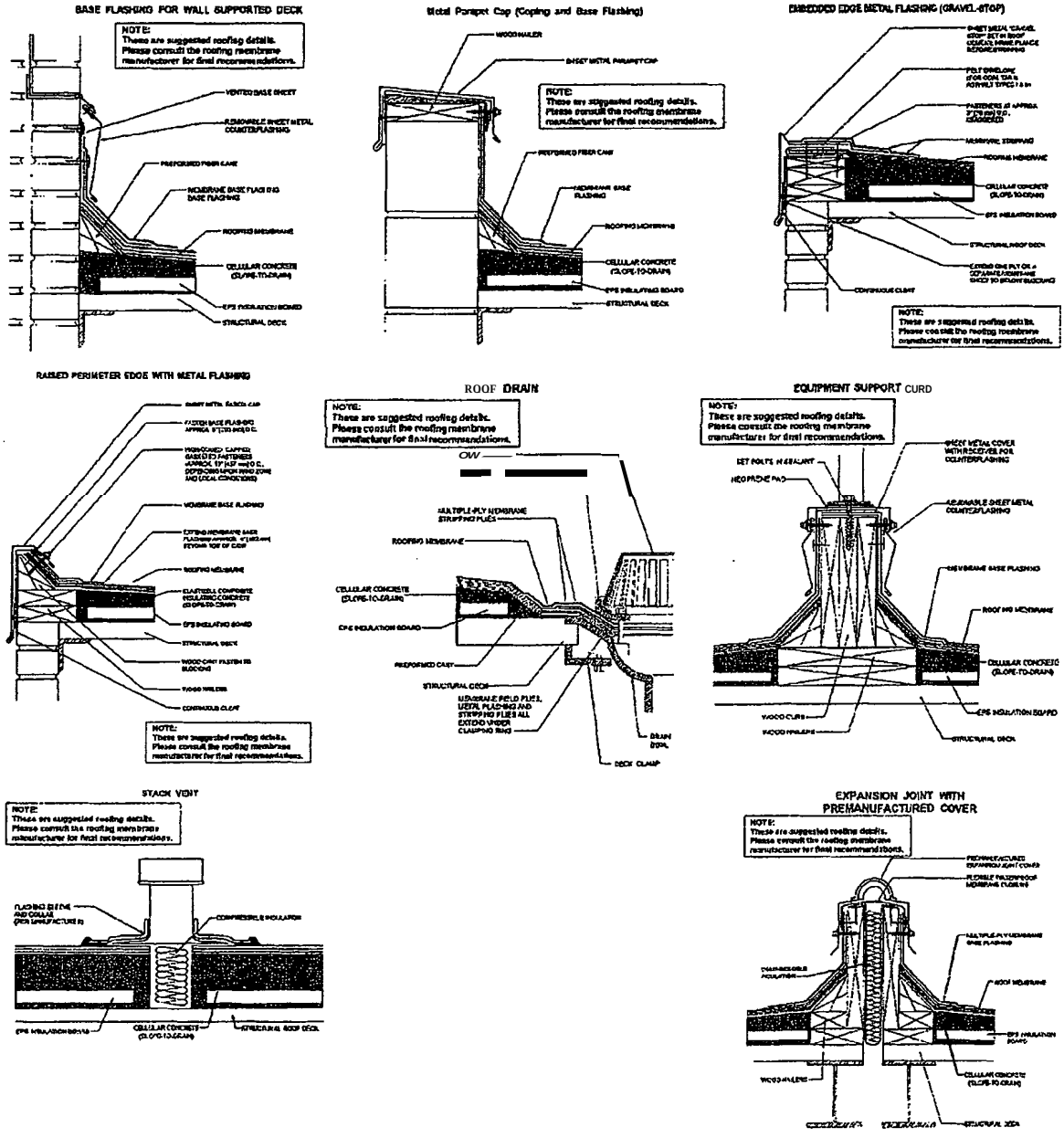

Fig. 6.3—Typical roofing details for cellular concrete roof decks.

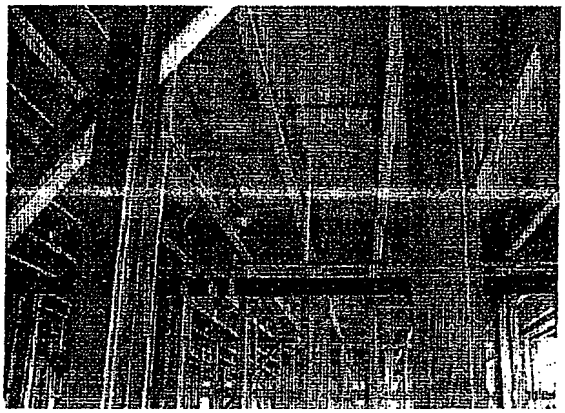

Fig. 6.4—Wood frame roof deck substrate from below.

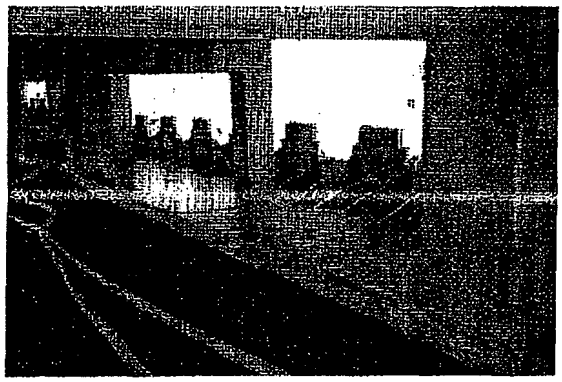

Fig. 7.1—Geotechnical application under a bridge structure with mechanically stabilized earth (MSE) containment walls.

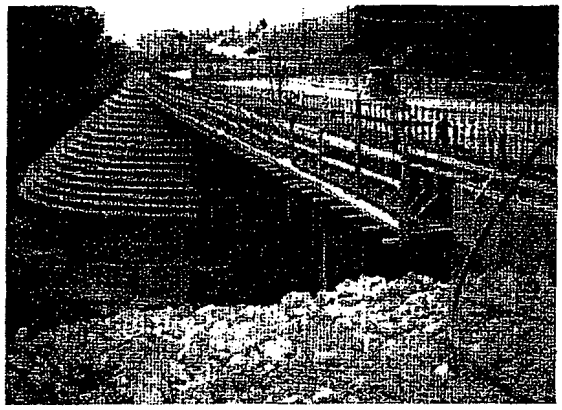

Fig. 7.2—Geotechnical application at bridge widening approach.

the cellular concrete and with the substrate (the structure that provides the required wind uplift resistance).

6.3--Load-carrying capacity

Specific structural design requirements for cellular concrete depend on the type of substrate used. The most common substrates are galvanized steel and precast or cast-in-place concrete. Although cellular concrete is not designed for composite action with the substrate, it provides additional stiffness. Designers should obtain information from substrate manufacturers regarding the ultimate flexural capacities and in-plane stiffness and strength characteristics of various systems.

6.4--Expansion and contraction joints

Cellular concrete exhibits drying shrinkage when placed in large monolithic placements such as roof decks. Because shrinkage of cellular concrete is much greater than its thermal expansion, expansion joints are generally not necessary. Expansion joints are required, however, in a cellular-concrete roof deck at expansion joints in the structural system, and at changes in the direction or type of substrate material.

6.5—Relief of vapor pressure

Under certain temperature conditions, moisture in cellular concrete or moisture intruding from external sources may cause undesirably high vapor pressure under roofing membranes covering a roof deck system. The vapor pressure can be reduced by postponing the application of the roofing membrane until the cellular concrete moisture content is at an acceptable level. A nailed base sheet, combined with perimeter venting at the intersection detail between the edge flashing and the counter-flashing, also helps reduce the vapor pressure.

The rate of drying of cellular concrete is a function of placing conditions, density and thickness, substrate, venting, and environmental conditions. The overall roof deck system, building use, and climatic conditions should be evaluated before specific recommendations regarding venting are made. This evaluation is especially important in re-roofing applications where dry portions of the existing roof membrane and insulation can be left in place and the cellular concrete cast over it.

6.6—Standard roofing details

For information on generally accepted roofing details (Fig. 6.3), refer to NRCA *Roofing and Waterproofing Manual* (The National Roofing Contractors Association 2001).

CHAPTER 7—GEOTECHNICAL APPLICATIONS

In most applications, the major advantage of cellular concrete is its low density. Other advantages include ease of excavation (a requirement in some applications) and more controllable strength as compared with standard CLSM.

7.1--Backfill

Lowdensity cellular concrete placed around and next to structures such as bridge abutment and retaining and building walls significantly reduces the dead load over poor soils (Fig. 7.1 and 7.2).

Once low-density cellular concrete sets, it does not exert active lateral pressure against the wall structure, as does standard granular backfill. Because lowdensity cellular

concrete is cementitious, it does not require compaction, and because it has low density, settlement is minimal.

Bridge approach applications may often be from 10 to 40 ft (3.0 to 12 m) or more in height. A low-density fill that does not require compaction is often a preferred alternative to heavy, compacted fill.

Most of the fill thickness of cellular concrete should be cast at a density of 30 lb/ft^3 (480 kg/m^3). The top 2 to 3 ft (610 to 910 mm) is usually 42 lb/ft^3 (675 kg/m^3) cellular concrete, which has excellent resistance to freezing and thawing and provides a solid base for an approach slab or pavement structure.

7.2—Roadway bases

Low-dcnsitv cellular concrete is often used for a roadway base over poor soil. The use of the material becomes even more important when raising or widening the roadway over poor soil, and added weight and settlement are concerns for the designer (Fig. 7.3). These designs often involve load-balancing and buoyancy calculations. Specific site conditions may require the development of special drainage details.

When constructing a roadway over poor soil, a geotextile fabric should be placed after the excavation is complete. The low-densitycellularconcreteshould be cast directly onto the geotextile fabds. This fabric acts as a tension skin and, in conjunction with the low-density cellular concrete, can span localized settlements up to 3.2 ft (1 m).

7.3—Pipeline and culvert fills

Low-density cellular concrete is often a supporting fill in pipeline applications over poor soils or a containment fill cast around these drainage structures to provide support and stability. Compaction is not necessary as it would be with a granular fill.

Culvert applications include concrete box culverts, segmented or pipe sections, and metal culvert systems including multi-plate culverts of significant size (Fig. 7.4).

Low-density cellular concrete reduces the &ad weight on the culvert. The cemcntitious nature of all CLSM mixtures provides erosion control which is an advantage over standard granular fills that erode when subjected to moving water. These mixtures may need to be evaluated for freezing-and-thawing resistance.

Placing low-density cellular concrete on both sides of the culvert simultaneously minimizes eccentric loading. In addition to supporting the culvert from below, the lowdensity cellular concretecast around these drainage structures provides lateral support because compaction is not necessary.

7.4--Void fills

Low-dcnsity cellular concrete is commonly used as a void fill when the reduction of dead load is critical. It is also applicable to mass structures where access may be limited and flowability is important. Void-fill applications include pipeline abandonment, filling around excavations, annular space fills between slip-lined pipes, and structures that are to be abandoned rather than demolished (Fig. 7.5).

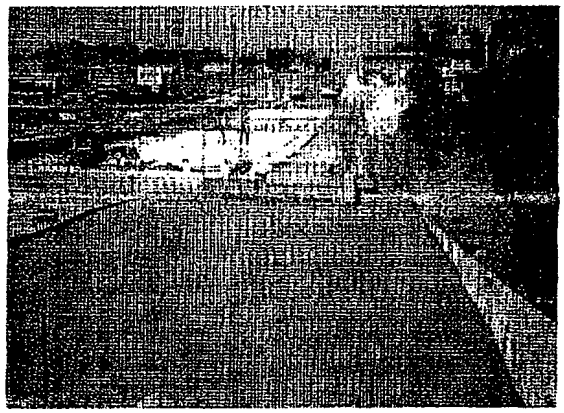

Fig. 7.3—Geotechnical roadway base at bridge approach.

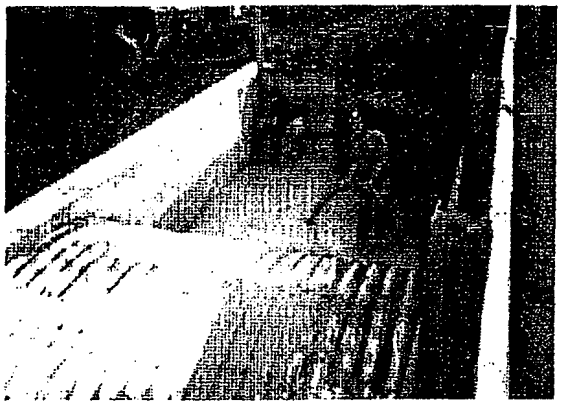

Fig. 7.4—Geotechnical fill around steel culvert under existing bridge.

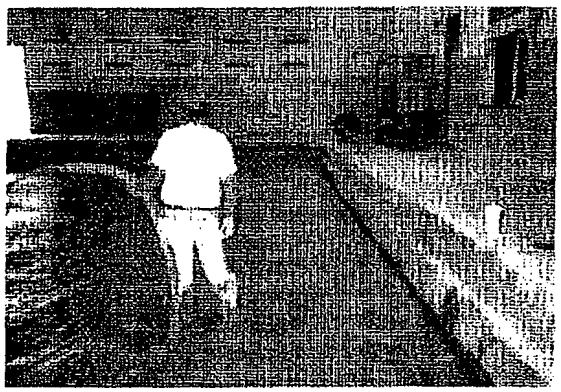

Fig. 7.5—Filling abandoned swimming pool with low-density concrete.

Because every void-fill application is unique, each one should be examined for special conditions. To contain the easy-flowing low-density cellular concrete, the entire fill area should be sealed, including pipes, drains, and structural discontinuities such as holes in walls or under footings. Lift heights for void fills may be greater than normal if the low-

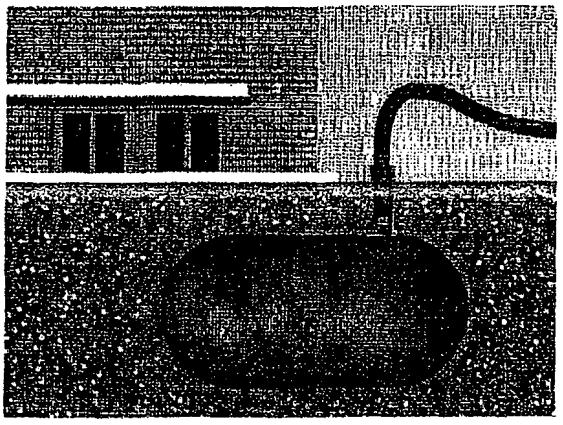

Fig. 7.6—Filing abandoned underground fuel- or oil-storaxe tank with cellular concrete (click on picture to view video).

Fig. 7.7—Cellular concrete as wall fill with say-in-place forms.

density cellular concrete can be reasonably contained by earth, forms, or a structure.

7.5—Tank fills

An acceptable abandonment alternative to the excavation and removal of underground fuel- or oil-storage tanks required by many agencies is a lowdensity cellular concrete tank fill (Fig. 7.6). Federal regulations refer to lowdensity cellular concrete fills as an "inert substance."

7.6 — Insulation and Isolation fills

The discrete air-cell structure within the cementitious matrix of low-density cellular concrete provides thermal-insulation and physical shock-mitigation properties to this material for applications such as walls (Fig. 7.7). roofs. and other similar structures. Giannakou and Jones (2004) describe the use of cellular concrete to thermally insulate foundations and slabs.

CHAPTER 8—REFERENCES

8.1—Referenced standards and reports

The standards and reports listed below were the latest editions at the time this document was prepared. Since frequent revisions occur with some of these documents, the reader is advised to contact the appropriate sponsoring group for reference to the latest version

American Concrete Institute

222R Protection of Metals in Concrete Against Corrosion

229R Conholled Low-Strength Materials

ASTM International

A 653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C 150 Specification for Portland Cement

C 157 Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus

C 332 Specification for Lightweight Aggregates for Insulating Concrete

C 494 Specification for Chemical Admixtures for Concrete

C 495 Test Method for Compressive Strength of Lightweight Insulating Concrete

C 513 Test Method for Securing, Preparing, Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength

C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C 595 Specification for Blended Hydraulic Cements

C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C 666 Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C 796 Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam

C 869 Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete

C 989 Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

C 1157 Performance Specification for Hydraulic Cement

C 1240 Specification for Silica Fume Used in Cementitious Mixtures

C 1363 Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

D 2434 Test Method for Permeability of Granular Soils (Constant Head)

E 119 Test Methods for Fire Tests of Building Construction and Materials

The above publications may be obtained from:

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
www.concrete.org

ASTM International
100 Barr Harbor Drive
West Conshohocken. PA 19428-2959
www.astm.org

8.2—Cited references

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Gustaferro, A. H.; Abrams, M. S.; and Litvin, A., 1970, "Fire Resistance of Lightweight Insulating Concretes," ***Research*** and ***Development Bulletin*** No. RD004B, Portland Cement Association. Skokie, Ill., 12 pp.

Kearsley, E. P., and Wainwright, P. J., 2001a, "Porosity and Permeability of Foamed Concrete." ***Cement and Concrete Research, V.*** 31, No. 5, May, pp. 805-812.

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APPENDIX D
ANALYSES AND CALCULATIONS
(SUBMITTED IN SEPARATE PACKAGE)

APPENDIX E
CALTRANS COMMENTS AND RESPONSES

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

April 20, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments dated March 26, 2009**
(2nd Submittal)
Foundation Report
Retaining Walls RW 3319 (PM 20.80-20.89) and
RW 3320 (PM 20.82-20.88)
Precast Walls with Lightweight Fill
West County Connector Project
I-405/SR22 HOV Connector Segment
12-ORA-22, EA: 071621
ORANGE COUNTY, CALIFORNIA
Report Dated November 3, 2008 (revised February 18, 2009)
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Explain why the settlement monitoring information is not shown on the project plans?

A note will be indicated on the plan that settlement monitoring is required, and station and offset of each settlement monument are included in the specifications and attached to this response (see Figure 1).

2. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)

The requested change has been made in the revised logs.

3. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).

The requested change has been made in the revised logs.

4. Is the settlement calculated based on direct (Consolidation test) or indirect (correlation) method? Explain and justify your response.

C_c and C_r were obtained from consolidation tests (direct method) applying Schmertmann's correction; Cr was approximated by C_e (unloading). C_v, coefficient of consolidation, was based on correlations (Navfac, 1987) Figure 3-6, 7-3-15. Since the new load is less than or equal to soil removed, only a small amount of recompression settlement is anticipated.

5. Explain in detail and provide backup information as to how the strength parameters were found for the light weight fill and the native materials for the slope stability?

Drained shear strength parameters are primarily obtained from the Consolidated Drained (CD, slow) direct shear test results using peak and ultimate values of cohesion intercept and friction angle. Laboratory test results are included in Appendix B. Undrained shear strengths were obtained from the interpreted CPT data which uses $S_u = Q_c / N_k$ in which:

S_u = undrained shear strength, ksf
Q_c = cone tip resistance, tsf, and
N_k = 15.

Interpreted S_u values are shown in the interpreted CPT data in Appendix A. Penetration resistance and pocket penetrometer / torvane data were used to confirm reasonableness of CPT S_u data. For granular soils below water table, correlations with penetration resistance (SPT, CPT) were used for drained friction angles.

For the lightweight fill, we analyzed as a cohesive material using undrained shear strength equal to ½ of the compressive strength of the material. Per ACI 523.1R-06 (report Appendix C), minimum compressive strength is 40 psi for cellular concrete with 30 pcf unit weight, giving a cohesion of 20 psi or about 3 ksf for the 30 pcf unit weight lightweight fill. Actual specified minimum compressive strength is 60 pci for the 30 pcf material, and 125 psi for the upper 42 pcf material, so our shear strength values for lightweight fill in slope stability are conservative.

6. Explain how the cohesion intercept value for seismic stability for the native material CL layer was arrived at? Unlike the other walls for the West County Connector project, the value for both seismic and static analysis has remained unchanged. Elaborate and reconcile.

Due to the high factor of safety from use of lightweight fill, we conservatively used ultimate (post-peak) drained shear strengths for the fill / upper native clays under both static and dynamic loads. Use of peak strength would be appropriate for dynamic loading of the very stiff clays, in which case the actual factor of safety would be higher. The strengths we used are conservative.

7. Define all acronyms in the CPT liquefaction spread sheet.

Each column in the table has the description of acronyms. The acronyms and variables are listed as follows:

- NCEER=National Council for Earthquake Engineering Research
- NSF=National Science Foundation
- GWT=Ground Water Table
- γ_t=total unit weight
- M_{eq}=earthquake magnitude
- A_{max}=peak ground acceleration
- Z_w=groundwater depth during test
- Z_{wd}=groundwater depth for design
- CSR=Cyclic Stress Ratio
- σ_v=total overburden stress
- σ'_v=total overburden stress
- r_d=Shear Stress Reduction coefficient
- FS=factor of safety against liquefaction
- $CRR_{7.5}$=Cyclic resistance ratio for Magnitude 7.5
- MSF=Magnitude Scaling Factor
- K_σ=Correction for high overburden stress
- K_α=Correction factor for sloping ground
- CPT=Cone Penetration Test
- SPT=Standard Penetration Test
- $q_{t\text{-}avg}$=Average CPT tip resistance
- $f_{s\text{-}avg}$=Average CPT sleeve friction
- $R_{f\text{-}avg}$=Average CPT friction ratio
- N_{60}=Equivalent SPT blowcount for 60% efficient hammer
- I_c=CPT soil behavior type index
- K_c=Fines correction factor
- q_{c1Ncs}=Fines and overburden corrected CPT tip resistance

- N_{corr}=SPT blowcount correction for residual strength
- $(N_1)_{60CS}$=Fines and overburden corrected SPT blowcount
- S_r=Residual undrained shear strength
- γ_c=cyclic shear strain
- ε_v=Volumetric Strain
- S_i=Layer settlement

8. Provide a summary both in text and tabulated form of the magnitude of immediate and consolidation settlement and time duration, location and how it will impact the performance of the subject wall.

The lightweight fill embankment will cause no increase in load from the existing conditions. As such, the settlement magnitude will be small and include only recompression of any heave due to excavation. We estimate that total settlements will be no more than 1 inch in the center of large embankments, and no more than ½ inch near the periphery of the embankments, including adjacent to the bridge abutment. We estimate that at least 60% of the total settlement will occur by the time the embankment is completed, and the remaining settlement will be completed in 30 days or less, as summarized in the following table.

Location	Total Estimated Settlement (Inches)	% of settlement completed at completion of fill	% of settlement completed 30 days after completion of fill
Center of embankment	$\leq$1	$\geq$ 60%	100%
Edges of embankment (wall LOL and bridge abutment)	$\leq$0.5	$\geq$ 60%	100%

Differential settlements along the panels will be substantially less than 1/500, which is acceptable for MSE panel type walls; therefore, settlement will not impact performance of the wall.

9. Explain the impact of the anticipated settlement on the buried utilities if any.

No significant utilities have been identified below the wall. The civil / structural engineer may utilize our settlement estimates to evaluate any potential impacts to utilities, if necessary.

10. Why the over-excavation and placement of the geogrid are not shown on the plans? Explain

Based on available data and proposed depth of excavation, we do not anticipate the need for subgrade improvement. However, the subgrade should be proof-rolled and observed by GDC to disclose the presence of any unsuitable areas. If proof-rolling is successful, no subgrade improvement is required. If areas of unsuitable materials are revealed, they should be improved by overexcavation and placement of geogrid or other means recommended by GDC in the field.

The following is attached and completes our response:

Figure 1 Settlement Plate Locations

Attachment 1 Caltrans Comments dated March 26, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 450-2100.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

GROUP DELTA CONSULTANTS

Distribution: Addressee (1 electronic PDF file via e-mail)

FIGURES

SETTLEMENT PLATE LOCATIONS

Structure	Station Line	Station	Offset
RW 3319 & RW3320	"E"	3320+85	45 Left
	"E"	3319+75	24 Left

ATTACHMENT 1
CALTRANS COMMENTS DATED March 26, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 20.80
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc

DATED: February 18, 2009 Retaining Wall 3319
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: N.A.

12-071621 55E0077
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW3319 (PM 20.80-20.89) and RW3320 (PM 20.82-20.88) Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 18, 2009, submitted to our office on February 26, 2009.

In our review, we made reference to the following:

- "Foundation Report, Retaining Walls RW3319 and RW3320, Precast Walls With Light Weight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment,12-ORA-22-PM20.91, EA 12-071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated November 3, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 23, 2009."

3

We have the following comments:

1. Explain why the settlement monitoring information is not shown on the project plans?
2. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
3. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).
4. Is the settlement calculated based on direct (Consolidation test) or indirect (correlation) method? Explain and justify your response.
5. Explain in detail and provide backup information as to how the strength parameters were found for the light weight fill and the native materials for the slope stability?
6. Explain how the cohesion intercept value for seismic stability for the native material CL layer was arrived at? Unlike the other walls for the West County Connector project, the value for both seismic and static analysis has remained unchanged. Elaborate and reconcile.
7. Define all acronyms in the CPT liquefaction spread sheet.
8. Provide a summary both in text and tabulated form of the magnitude of immediate and consolidation settlement and time duration, location and how it will impact the performance of the subject wall.

9. Explain the impact of the anticipated settlement on the buried utilities if any.
10. Why the over-excavation and placement of the geogrid are not shown on the plans? Explain

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 20.82
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc

DATED: February 18, 2009 Retaining Wall 3320
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: N.A.

12-071621 55E0072
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW3319 (PM 20.80-20.89) and RW3320 (PM 20.82-20.88) Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 18, 2009, submitted to our office on February 26, 2009.

In our review, we made reference to the following:

- "Foundation Report, Retaining Walls RW3319 and RW3320, Precast Walls With Light Weight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment,12-ORA-22-PM20.91, EA 12-071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated November 3, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 23, 2009."

3

We have the following comments:

1. Explain why the settlement monitoring information is not shown on the project plans?
2. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
3. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).
4. Is the settlement calculated based on direct (Consolidation test) or indirect (correlation) method? Explain and justify your response.
5. Explain in detail and provide backup information as to how the strength parameters were found for the light weight fill and the native materials for the slope stability?
6. Explain how the cohesion intercept value for seismic stability for the native material CL layer was arrived at? Unlike the other walls for the West County Connector project, the value for both seismic and static analysis has remained unchanged. Elaborate and reconcile.
7. Define all acronyms in the CPT liquefaction spread sheet.
8. Provide a summary both in text and tabulated form of the magnitude of immediate and consolidation settlement and time duration, location and how it will impact the performance of the subject wall.

9. Explain the impact of the anticipated settlement on the buried utilities if any.
10. Why the over-excavation and placement of the geogrid are not shown on the plans? Explain

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

APPENDIX E
RESPONSE TO CALTRANS REVIEW COMMENTS
AND
CALTRANS REVIEW COMMENTS DATED January 23, 2009

Retaining Walls RW3319 and RW3320

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

February 18, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments**
Foundation Report
Retaining Walls R3319 and RW3320
Precast Walls with Lightweight Fill
West County Connector Project
12-ORA-22PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 23, 2008
GDC Project No. I-36

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Check the post mile for the subject structures and confirm its accuracy.

Checked per GP.

2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.

The requested change has been made in the revised report. Section 1.3.1.

3. Include a Figure describing Site Location Map in Section 1.

The site vicinity map (Figure 1) is included in Figures at the end of report, and is referenced in Section 1.0.

4. Revise section 2 title "Field and Laboratory Investigations" to "Field Investigation and Laboratory Testing"

The requested change has been made in the revised report.

5. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).

The requested table is included in Appendix A, Table A-1. We have added a sentence in the revised report directing the reader to this table.

6. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).

We have modified the Table in Section 2.2. A complete description of the tests, their purpose, and ASTM / CT test numbers are included in Appendix B. The reader is also referred to Appendix B in Section 2.2.

7. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.

The Exploration Location Plan (Figure 2) is included in Figures at the end of report, and is referenced in Section 2.1.

8. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.

The borings and CPTs were surveyed and the locations and elevations have been updated in Appendix A and in the LOTB in the revised report and plans.

9. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per previous comment.

Refer to our response to Comment 8.

10. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

The requested change has been made in the revised report. Section 3.2.

11. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

The requested information is included in Section 3.4. The high historical groundwater contour map is included in Figure 6 at the end of the report, and is consistent with our recent data at the site. The text of the report has been revised to Reference CDC.

12. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion, and friction angle.

The tabulated idealized soil profile containing the requested information is included in Table 1 at the end of the report, and is referenced in Section 3.5.

13. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.

The graphic soil profile is included in Figure 5 at 11x17" size at the end of the report and is referenced in Section 3.3.

14. Include backup data for the Corrosion in the Appendix.

Corrosion test results are presented in Section B.9 of Appendix B (Table B-2).

15. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.

The requested items are submitted along with the revised report.

16. Provide the slope stability using SLIDE program, provide the input and output files.

GDC does not currently possess the SLIDE software. We have used PCSTABL5M, which is well documented and widely used software for slope stability analysis. We have ordered the SLIDE program for future projects, to meet Caltrans requirements.

17. Appendix D-4 is left blank and does not contain any information. Please explain.

The appropriate calculations are provided.

18. Calculations are not performed specific to each wall structure, revise accordingly.

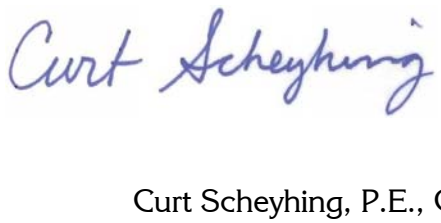
Calculations are included in the new package.

The following is attached and completes our response:

Attachment 1 Caltrans Comments dated January 23, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.



Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

ATTACHMENT 1
CALTRANS COMMENTS DATED JANUARY 23, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 23, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: November 3, 2008 Retaining Wall 3319
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 RW 3319
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW3319 and RW 3320 Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM20.91, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated November 3, 2008.

We have the following comments:

1. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.
2. Include a Figure describing Project Location Map in Section 1.
3. Revise section 2 title " Field and Laboratory Investigations" to " Field Investigation and Laboratory Testing"
4. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).
5. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).
6. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.
7. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.
8. Revise the Log of Test Borings (LOTB) sheets in the Wall Plan accordingly, per previous comment.
9. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.
10. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

11. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion and friction angle.
12. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and wall locations.
13. Include backup data for the Corrosion in the Appendix.
14. Provide the calculations in a separate volume. Include a CD that provides a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.
15. Provide the slope stability using SLIDE program.
16. Appendix D-4 is left blank and does not contain any information, explain.
17. Calculations are not performed specific to each wall structure, revise accordingly.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 23, 2009

FILE: 12 ORA 22 20.91
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: November 3, 2008 Retaining Wall 3320
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 RW 3320
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled " Foundation Report, Retaining Walls RW3319 and RW 3320 Precast Walls with Lightweight Fill, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM20.91, EA: 071621, Orange County, California", prepared by Group Delta Consultants, Inc, dated November 3, 2008.

We have the following comments:

1. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.
2. Include a Figure describing Project Location Map in Section 1.
3. Revise section 2 title " Field and Laboratory Investigations" to " Field Investigation and Laboratory Testing"
4. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).
5. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).
6. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.
7. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.
8. Revise the Log of Test Borings (LOTB) sheets in the Wall Plan accordingly, per previous comment.
9. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.
10. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

11. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion and friction angle.
12. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and wall locations.
13. Include backup data for the Corrosion in the Appendix.
14. Provide the calculations in a separate volume. Include a CD that provides a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report.
15. Provide the slope stability using SLIDE program.
16. Appendix D-4 is left blank and does not contain any information, explain.
17. Calculations are not performed specific to each wall structure, revise accordingly.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

June 26, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Addendum No. 1 – Vibration Monitoring for Pile Driving**
Foundation Report (*Final Revision dated 4-10-09*)
S405-E22 CONNECTOR SEPARATION
BRIDGE NO. 55-1101F
12-ORA-22,405-PM20.75, CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants in coordination with Parsons is pleased to present this addendum to the foundation report for the subject bridge structure. This letter outlines our recommendations for monitoring the effects of pile driving vibrations on adjacent structures. These recommendations have been included in the NSSP.

VIBRATION MONITORING

This work shall consist of furnishing, installing and maintaining vibration monitoring instrumentation; collecting vibration data; and interpreting and reporting the results of vibration monitoring as specified herein.

The Contractor shall be responsible for the following:

1. Within 15 days or less before pile driving begins; perform a preconstruction condition survey, including photographs, of buildings and residential structures within a 200-foot radius of Class 200 pile driving activities and within a 300-foot radius of 48-inch cast-in-steel-shell concrete pile driving activities.

2. Furnish and install vibration monitoring instrumentation.

3. Protect from damage and maintain instruments installed by the Contractor and repair or replace damaged or inoperative instruments.

4. Collect, interpret and report data from instrumentation specified herein.

5. Implement response actions.

6. Perform a post-construction condition survey of buildings and residential structures within 3 days if the vibration levels equal to or exceed 0.3 inches per second.

SUBMITTALS

Prior to beginning pile driving, the Contractor shall submit to the Engineer a written vibration monitoring plan, vibration monitoring equipment manufacturer's product data, and the resumes of the Vibration Instrumentation Engineer and any vibration monitoring technical support personnel.

Preconstruction and post-construction condition surveys of buildings and residential structures shall be submitted to the Engineer within 5 days of the survey.

VIBRATION MONITORING AND RECORDING

The Contractor shall monitor vibration during pile driving activities at buildings and residential structures within a 200-foot radius of Class 200 pile driving activities (Abutments 1 and 4) and at buildings and residential structures within a 300-foot radius of 48-inch cast-in-steel-shell concrete pile driving activities (Bents 2 and 3) on S405-E22 Connector Separation. The distances shall be measured from the point of pile driving.

The seismograph vibration sensors shall be firmly mounted on the surface slab of concrete or asphalt, or firmly set in undisturbed soil.

Sincerely,

Curt Scheyhing

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer
GROUP DELTA CONSULTANTS

REGISTERED PROFESSIONAL ENGINEER
AREG GHARABEGIAN
No. 20664
Exp. 6/30/11
STATE OF CALIFORNIA

Areg Gharabegian
Principal Project Manager
Noise and Vibration Specialist
PARSONS

GROUP DELTA CONSULTANTS

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Earthquake Engineering
Materials Testing & Inspection
Forensic Services

June 26, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Addendum No. 1 – Vibration Monitoring for Pile Driving**
Foundation Report (*Final Revision dated 4-13-09*)
405-22 HOV Connector Separation
BRIDGE NO. 55-1103E
12-ORA-405-PM 20.66, CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants in coordination with Parsons is pleased to present this addendum to the foundation report for the subject bridge structure. This letter outlines our recommendations for monitoring the effects of pile driving vibrations on adjacent structures. These recommendations have been included in the NSSP.

VIBRATION MONITORING

This work shall consist of furnishing, installing and maintaining vibration monitoring instrumentation; collecting vibration data; and interpreting and reporting the results of vibration monitoring as specified herein.

The Contractor shall be responsible for the following:

1. Within 15 days or less before pile driving begins; perform a preconstruction condition survey, including photographs, of buildings and residential structures within a 200-foot radius of Class 200 pile driving activities and within a 300-foot radius of 48-inch cast-in-steel-shell concrete pile driving activities.

2. Furnish and install vibration monitoring instrumentation.

3. Protect from damage and maintain instruments installed by the Contractor and repair or replace damaged or inoperative instruments.

4. Collect, interpret and report data from instrumentation specified herein.

5. Implement response actions.

6. Perform a post-construction condition survey of buildings and residential structures within 3 days if the vibration levels equal to or exceed 0.3 inches per second.

SUBMITTALS

Prior to beginning pile driving, the Contractor shall submit to the Engineer a written vibration monitoring plan, vibration monitoring equipment manufacturer's product data, and the resumes of the Vibration Instrumentation Engineer and any vibration monitoring technical support personnel.

Preconstruction and post-construction condition surveys of buildings and residential structures shall be submitted to the Engineer within 5 days of the survey.

VIBRATION MONITORING AND RECORDING

The Contractor shall monitor vibration during pile driving activities at buildings and residential structures within a 200-foot radius of Class 200 pile driving activities (Abutments 1 and 6) and at buildings and residential structures within a 300-foot radius of 48-inch cast-in-steel-shell concrete pile driving activities (Bents 2 through 5) on 405-22 HOV Connector Separation. The distances shall be measured from the point of pile driving.

The seismograph vibration sensors shall be firmly mounted on the surface slab of concrete or asphalt, or firmly set in undisturbed soil.

Sincerely,

Curt Scheyhing

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
AREG GHARABEGIAN
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Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer
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Areg Gharabegian
Principal Project Manager
Noise and Vibration Specialist
PARSONS

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Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

June 26, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Addendum No. 1 – Vibration Monitoring for Pile Driving**
Foundation Report (*Final Revision dated 4-16-09*)
BOLSA CHICA ROAD OC (REPLACE)
BRIDGE NO. 55-1102
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants in coordination with Parsons is pleased to present this addendum to the foundation report for the subject bridge structure. This letter outlines our recommendations for monitoring the effects of pile driving vibrations on adjacent structures. These recommendations have been included in the NSSP.

VIBRATION MONITORING

This work shall consist of furnishing, installing and maintaining vibration monitoring instrumentation; collecting vibration data; and interpreting and reporting the results of vibration monitoring as specified herein.

The Contractor shall be responsible for the following:

1. Within 15 days or less before pile driving begins; perform a preconstruction condition survey, including photographs, of buildings and residential structures within a 200-foot radius of Class 200 concrete pile or H-pile driving activities for Bolsa Chica Road OC.

2. Furnish and install vibration monitoring instrumentation.

3. Protect from damage and maintain instruments installed by the Contractor and repair or replace damaged or inoperative instruments.

4. Collect, interpret and report data from instrumentation specified herein.

5. Implement response actions.

REPORT OF ENVIRONMENTAL SITE INVESTIGATION
SR-22 FREEWAY PHASE II IMPROVEMENTS
I-405/SR-22 HOV CONNECTOR
ORANGE COUNTY, CALIFORNIA
CALTRANS EA#12-071631

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Prepared By:

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, California 92618
Phone 949.450.2100
Fax 949.450.2108

Group Delta Project No. I-436A
January 30, 2009

GROUP DELTA CONSULTANTS

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Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

January 30, 2009

Carlos Cadena
Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

SUBJECT: REPORT OF ENVIRONMENTAL SITE INVESTIGATION
SR-22 FREEWAY PHASE II IMPROVEMENTS
I-405/SR-22 HOV CONNECTOR
ORANGE COUNTY, CALIFORNIA
CALTRANS EA#12-071631

Dear Mr. Cadena:

Group Delta Consultants, Inc. is pleased to submit this Site Investigation report for West County Connector Project, State Route 22 Phase II Improvements, I-405/SR-22 HOV Connector project segment in Orange County, California. GDC prepared the Initial Site Assessment Report for the subject project dated July 30, 2008.

This report is intended for the sole use of Parsons Transportation Group, Inc. and their clients and on the specific project identified. Our services have been performed under mutually agreed-upon terms and conditions. If other parties wish to rely on this report, please have them contact us so that a mutual understanding and agreement of the terms and conditions for our services can be established prior to their use and reliance of this report and the information it contains.

We appreciate your selection of Group Delta Consultants, Inc. for this project and look forward to assisting you further on this and other projects. If you have any questions, please do not hesitate to contact us.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
VESNA GLISIC
No. 70907
Exp. 6/30/2009
CIVIL
STATE OF CALIFORNIA

Vesna Glisic, P.E.
Project Engineer

Opjit S. Ghuman, P.E.
Associate

GROUP DELTA CONSULTANTS

32 Mauchly, Suite B ▲ Irvine, California 92618-2336 ▲ (949) 450-2100 voice ▲ (949) 450-2108 fax
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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase II improvements for the West County Connector (WCC) Project. The project consists of improvements to SR-22 Freeway and interchanges at SR-22 / I-405 / I-605 in Orange County, California.

Parsons Transportation Group, Inc. (hereafter Parsons) has retained Group Delta Consultants, Inc. (hereafter GDC) to perform a Site Investigation (SI) for the WCC project. The proposed project has been divided into 2 segments. The easterly segment is named "I-405/SR-22 HOV Connector" and extends from just east of Bolsa Chica Road - Valley View Street to just east of Seal Beach Boulevard. The westerly segment is named "I-405/I-605 HOV Connector" and extends from just east of Seal Beach Boulevard to north of the I-405/I-605 Fwy interchange. This SI report addresses the I-405/SR-22 HOV Connector Segment portion of the WCC Project. GDC also performed an SI for the I-405/I-605 Connector segment, and the results of the investigation are presented in a separate report.

Proposed improvements for the I-405/SR-22 HOV Connector Segment include the following:

- Construct a new bridge for HOV lanes from SB I-405 to EB SR-22 and from WB SR-22 to NB I-405;
- Demolish and replace the existing EB SR-22/ SB I-405 Separation, Bridge No. 55-331 ;
- Demolish and replace the existing Bolsa Chica Road OC (a.k.a. Valley View OC), Bridge No. 55-332;
- Removal of Asphalt Concrete (AC) pavement and Portland Cement Concrete (PCC) during replacement of bridges;
- Widening of SR-22/I-405 Freeway between Bolsa Chica Road- Valley View Street and Seal Beach Boulevard;
- Placement of embankment fills for widening of SR-22 Freeway;
- Improvements to the Bolsa Chica Channel box culver (optional task);
- Construction of new soundwalls and retaining walls;
- Utility removal and/or relocation; and
- Landscaping and irrigation.

The project involves construction within the 20 ft wide Seal Beach Naval Weapon Station (SBNWS) easement located adjacent to SR-22 Freeway.

1.2 PROJECT BACKGROUND

GDC prepared an Initial Site Assessment (ISA) report for the subject project dated June 30, 2008. Our ISA recommendations were as follows:

- Perform Site investigation for Aerially Deposited Lead (ADL) and agricultural chemicals within the Freeway unpaved shoulders and 20 ft wide SBNWS easement in order to determine a proper way of soil managing and the on-site use;
- Perform Asbestos Containing Materials (ACM) and Lead Based Paint (LBP) investigation for the two bridges proposed for replacement (Caltrans Bridge Nos. 55-331 and 55-332) in order to determine a proper way of bridge demolition and material disposal;
- Perform groundwater testing to evaluate proper methods to manage and dispose of the groundwater that might be removed during construction.
- Perform soil and groundwater testing in the vicinity of the former Leaking Underground Storage Tank (LUST) at Los Alisos Ranch.

1.3 PURPOSE AND SCOPE OF WORK

The purpose of this SI was testing of soil and groundwater as recommended in the project ISA report for proper managing and disposal of the same. The ADL study of the soils within the Freeway unpaved shoulders and the 20 ft wide SBNWS easement, and the LBP study of the Freeway and some bridge striping was conducted by TRC (TRC, 2008). This investigation is not reviewed or addressed in this report.

Our scope of work included:

- Preparation of the SI work plan;
- Perform collection and analytical testing of soil within the Freeway unpaved shoulders for agricultural chemicals (pesticides and herbicides);
- Install 2 temporary monitoring wells and 5 geoprobes for sampling and analysis of the groundwater;
- Perform 2 geoprobes in the vicinity of the former Los Alisos Ranch LUST for collection and analysis of soil and groundwater;
- Perform ACM and LBP investigation for Caltrans Bridges 55-331 and 55-332;
- Prepare a report describing the assessment and presenting the results and findings.

Our work was performed in accordance with the SI work plan approved by Caltrans on January 13, 2009.

2.0 FIELD INVESTIGATION

2.1 SUMMARY

Field investigation consisted of:

- Seventeen 2-ft deep hand auger borings for testing of pesticides and herbicides;
- Two temporary monitoring wells up to 35 ft deep for collection and testing of groundwater;
- Five geoprobes 20 to 30 ft deep for collection and testing of groundwater;
- Two geoprobes 19 and 31 ft deep located in the vicinity of the former Los Alisos Ranch LUST for collection and testing of soil and groundwater;
- Sampling of construction materials from 2 bridges to be demolished and bridge road striping for ACM and LBP testing.

The exploration location map is shown on Figures 2a to 2k, and Figure 3.

2.2 PESTICIDES AND HERBICIDES FIELD INVESTIGATION

Seventeen hand auger borings (HA 405-01 to HA 405-04 and HA 405-06 to HA 405-18), up to 2 ft deep, were performed within the area of the future SR-22 freeway widening for testing of pesticides and herbicides. The borings were located along SR-22 freeway eastbound and northbound shoulders, approximately 5 ft from the edge of the pavement. Borings were spaced approximately 500 ft apart measuring along the SR-22 freeway centerline. Boring locations are shown on Figures 2a to 2k.

The borings were performed with a hand-held 3-inch diameter stainless steel auger. The samples were collected at 0-0.5 ft, 0.5-1.0 ft and 1-2.0 ft bgs and placed into 8oz sealed glass jars with Teflon lined lids. The hand auger was decontaminated between the samples by washing the auger in solution of trisodium phosphate followed by tap water and deionized water. Upon collection, the jars were labeled with the boring number, sample depth, and time and date of sample collection and placed on ice in a cooler box for transport to the laboratory.

A chain of custody form was filled out for all collected samples and the samples were transported to a chemical testing laboratory certified by the California Department of Health Services, Environmental Laboratory Accreditation Program (ELAP). The chain of custody forms are presented in Appendix B.

2.3 GROUNDWATER FIELD INVESTIGATION

2.3.1 Monitoring Wells

Two temporary monitoring wells (MW-405-01 and MW-405-02) were installed at the site for collection and testing of groundwater. The wells were installed within the area of the proposed bridge widening at locations where groundwater will likely be encountered during the construction. The location of the wells is shown in Figures 2d and 2e.

The wells MW-405-01 and MW-405-02 were drilled with a 6-inch hollow stem auger to depths of 35 ft and 30 ft, respectively. Clean augers were used for each boring to minimize cross-contamination between the borings. The soil samples were collected at 5 ft intervals and soil was visually classified in the field. The logs of borings are presented in figures A-2 and A-3 of the Appendix A.

After the drilling was completed, a 2-inch PVC well pipe with 25 ft and 20 ft long, 0.02-inch slotted section was installed in wells MW-405-01 and MW-405-02 respectively. The void around the PVC pipe within the screen section was backfilled with a clean No# 3 silica sand placed minimum 2 ft above the screen section, followed by a minimum of 3 ft of bentonite chips up to the ground surface. Well cap was placed on top of the PVC casing and a well lock box was installed at the top.

The wells were developed three days after the drilling by bailing several volumes of water from the well until no fines were observed in the removed water. Groundwater level in the MW-405-01 was measured at 9 ft bgs before bailing, and at 28 ft bgs after the bailing was done. Groundwater level in the MW-405-02 was measured at 15 ft bgs before bailing, and after the bailing was done the water was measured at 12 ft bgs.

Water sampling was performed one day after the bailing of the well was completed. An open bottom bailer was slowly lowered approximately 0.5 ft to 1 ft below the water surface to minimize the disturbance of the environment and water was collected in 40ml VOA's with HCl preservative for testing of VOC's, and 1 liter amber bottles for testing of TPH. All bottles were labeled with the well number, sample number, sampling depth, type of preservative, and time and date of sample collection and placed on ice in a cooler box for

transport to the laboratory.

A chain of custody form was filled out for all collected samples and the samples were transported to a chemical testing laboratory certified by the California Department of Health Services, Environmental Laboratory Accreditation Program (CDHSELAP). The chain of custody forms are presented in Appendix B.

Soil cuttings collected during drilling and water drawn from the wells during the bailing process was stored in 55-gallon drums, properly labeled with name of the collector, drum content medium (soil or water), number of boring, and date of collection. A sample of the soil waste material was collected and sent to a laboratory for analytical testing and characterization of the soil waste. Groundwater test results presented in Appendix B were used for proper characterization of water waste for proper removal off-site. The drums were temporary stored in the Caltrans Right-Of-Way (ROW) area. After the analytical test results of the drum content were completed the drums were transported to the appropriate facility for disposal.

2.3.2 Geoprobes

Total of five geoprobes (direct push system) labeled G-405-01 to G-405-04 and G-405-07 were advanced with Geoprobe 6600 rig to depths ranging from 20 ft to 30 ft bgs for collection and testing of groundwater. The location of the geoprobes is shown in Figures 2b to 2d.

The 2-inch diameter rods were driven into the soil with Geoprobe GH60 hammer up to the depth of expected groundwater table. Water sampling was conducted by pushing a 4-ft long protected screen sampler to a minimum of 4 ft below the expected groundwater level. After advancing to a desired depth, the screen was open for groundwater sampling. The groundwater was collected with a PVC tube bailer, and the water was collected in 40ml VOA's with HCl preservative for testing of VOC's, and 1L amber bottles for testing of TPH. The rods were decontaminated between the borings and new PVC tubing was used for each borehole.

All bottles were labeled with the well number, sample number, sampling depth, type of preservative, and time and date of sample collection and placed on ice in a cooler box for transport to the laboratory.

A chain of custody form was filled out for all collected samples and the samples were transported to a chemical testing laboratory certified by the CDHSELAP. The chain of

custody forms are presented in Appendix B.

2.4 LOS ALISOS LUST FIELD INVESTIGATION

Two geoprobes (G-405-05 and G-405-06) were advanced in the vicinity of the former LUST at Los Alisos Ranch to depths of 19 ft and 31 ft bgs, respectively for collection and testing of soil and water samples.

Soil samples were collected with a 1 ft long PVC tubes driven at approximate 2.5 ft intervals for testing of TPH and VOC's. The tubes were sealed on both sides and were labeled with the geoprobe number, sample number, sampling depth, time and date of sample collection and placed on ice in a cooler box for transport to the laboratory.

Groundwater was collected in G-405-06 with a PVC tube bailer. The water samples were collected in 40ml VOA's with HCl preservative for testing of VOC's, and 1 liter amber bottles for testing of TPH. All bottles were labeled with the geoprobe number, sample number, sampling depth, type of preservative, and time and date of sample collection and placed on ice in a cooler box for transport to the laboratory.

A chain of custody form was filled out for all collected samples and the samples were transported to a chemical testing laboratory certified by the CDHSELAP. The chain of custody forms are presented in Appendix B.

2.5 ACM AND LBP FIELD INVESTIGATION OF BRIDGES TO BE DEMOLISHED

Our subcontractor Panacea performed collection and testing of the construction materials from the two bridges to be demolished, Caltrans Bridge Numbers 55-331 and 55-332.

Presence of asbestos in concentrations of 1% or higher could present a health risk where there is enough activity to cause asbestos fibers to become airborne. If disturbed, asbestos fibers can be inhaled leading to an increased risk of cancer. The asbestos survey was conducted in order to prevent workers exposure to potential high concentrations of asbesots fiber during the bridge demolition, and to set in place measures for proper removal of potential asbestos containing materials. In addition, samples of the bridge striping paint were collected for testing of lead.

The samples of the bridge expansion joint material, concrete, rail bolt washer sealants, gasket material under rail balusters, and striping paint were collected from both bridges on January 14, 2009 by a California Site Surveillance Technician (SCCT) and sent to the

laboratory for analysis.

The details of the field investigation are presented in the ACM and LBP report in Appendix C.

3.0 LABORATORY TESTING

3.1 PESTICIDES AND HERBICIDES LABORATORY TESTING

All samples collected at 0 ft to 0.5 ft, and seven samples collected at 0.5 to 1.0 from seventeen hand auger borings were tested for organochlorine pesticides EPA method 8081A. Five our of seventeen samples collected in the upper 0 ft to 0.5 ft were also tested for organophosporous compounds and chlorinated herbicides EPA methods 8141A and 8151A. Sampling schedule and performed tests are shown in Table 1a at the end of the report. Test results are presented in Appendix B.

3.2 GROUNDWATER LABORATORY TESTING

Groundwater samples collected from all geoprobes and monitoring wells were tested for Total Petroleum Hydrocarbons (TPH) for gasoline and diesel, by EPA test methods M8015G, and M8015 D, and Volatile Organic Compounds (VOC) by EPA test method 8260B. Sampling schedule and performed tests are shown in Table 2 at the end of the report. Test results are presented in Appendix B.

3.3 LOS ALISOS RANCH LUST LABORATORY TESTING

Soil samples collected from the geoprobes I-405-05 and I-405-06 were tested for Total Petroleum Hydrocarbons (TPH) for gasoline and diesel, by EPA test methods M8015G, and M8015 D, and Volatile Organic Compounds (VOC) by EPA test method 8260B and for metals by EPA test method 6010B. Sampling schedule and performed tests are shown in Table 3 at the end of the report. Test results are presented in Appendix B.

3.4 ACM AND LBP LABORATORY TESTING OF BRIDGES TO BE DEMOLISHED

Total of 20 samples of the sealant, expansion joint, gaskets and concrete were collected from the two bridges to be demolished and tested for asbestos analysis using Polarize Light Microscopy (PLM) methods. Samples of the bridge yellow and white paint striping were collected for lead testing using flame atomic absorption spectrophotometry EPA test method 3050B/7420.

Sampling schedule and lab summary is shown in the Tables 4a and 4b at the end of the report. The test results are presented in Appendix C.

4.0 DISCUSSION

4.1 PESTICIDES AND HERBICIDES

Pesticides and herbicides were analyzed from seventeen different locations as follows:

- Organochlorine pesticides by EPA Method 8081A at a total of seventeen locations at depths of 0.5 feet and 1 foot. All samples at 0.5 feet were analyzed and at seven locations the 1 foot sample was analyzed.

- Organophosphorous compounds by EPA Method 8141A and chlorinated herbicides by EPA Method 8151A at 5 of the seventeen locations sampled at a depth of 0.5 feet.

No organophosphorous compounds or chlorinated herbicides were reported in concentrations above the laboratory reporting limits. Trace level concentrations of organochlorine pesticides were reported in all samples analyzed. Compounds reported in concentrations above laboratory reporting limits included: chlordane, DDD, DDE, DDT and dieldrin. A summary of the results for these compounds is presented in Table 1b and a description is provided below:

- Total chlordane was reported at estimated levels or at concentrations above reporting limits for 19 of the 24 samples analyzed with the high concentration of 39.9 μg/kg at HA-405-11. The mean concentration for chlordane was 8.26 μg/kg and the upper 95% confidence limit for the mean was calculated to be 12.2 μg/kg. The residential soil screening level for chlordane is 1,600 μg/kg (EPA, 2008). The concentrations of chlordane reported in the soil are not considered to be an environmental concern requiring action.

- DDD was reported at estimated levels or at concentrations above reporting limits for 15 of the 24 samples analyzed with the high concentration of 65.6 μg/kg at HA-405-08. The mean concentration for DDD was 6.70 μg/kg and the upper 95% confidence limit for the mean was calculated to be 12.3 μg/kg. The residential soil screening level for DDD is 2,000 μg/kg. The concentrations of DDD reported in the soil are not considered to be an environmental concern requiring action.

- DDE was reported at estimated levels or at concentrations above reporting limits for all but one of the 24 samples analyzed with the high concentration of 106 μg/kg at

HA-405-08. The mean concentration for DDE was 12.59 μg/kg and the upper 95% confidence limit for the mean was calculated to be 21.98 μg/kg. The residential soil screening level for DDE is 1,400 μg/kg. The concentrations of DDE reported in the soil are not considered to be an environmental concern requiring action.

- DDT was reported at estimated levels or at concentrations above reporting limits for all but one of the 24 samples analyzed with the high concentration of 1,150 μg/kg at HA-405-08. The mean concentration for DDT was 93.03 μg/kg and the upper 95% confidence limit for the mean was calculated to be 190.48 μg/kg. The residential soil screening level for DDT is 1,700 μg/kg. The concentrations of DDT reported in the soil are not considered to be an environmental concern requiring action.

- Dieldrin was reported at estimated levels or at concentrations above reporting limits in 10 of the 24 samples analyzed with the high concentration of 4.59 μg/kg at HA-405-14. None of the 1 foot samples analyzed were reported to contain dieldrin above laboratory reporting limits. The mean concentration for dieldrin was 1.54 μg/kg and the upper 95% confidence limit for the mean was calculated to be 2.07 μg/kg. The residential soil screening level for dieldrin is 30 μg/kg. The concentrations of dieldrin reported in the soil are not considered to be an environmental concern requiring action.

The soil sampled and analyzed contains trace concentrations of chlorinated pesticides that are below actionable levels. The soil may be reused on-site as long as it is kept 5 feet or more above the groundwater level. If this soil from unpaved areas adjacent to the freeway is to be exported during project construction, it will require proper disposal as non-hazardous California waste.

4.2 GROUNDWATER

A total of seven water samples were collected along the freeway. The water samples were analyzed for petroleum hydrocarbons – EPA Method 8015 (gas and diesel) and for volatile organic compounds (VOCs) – EPA Method 8260B. No petroleum hydrocarbons or VOCs were reported in the water samples analyzed except for the water at G405-04 that is located near the southbound on-ramp from Valley View to I-405. At this location diesel range concentration of 0.545 mg/L was reported in the water. This low level impact appears to be limited to this location and may relate to a localized condition near the on-ramp.

4.3 LOS ALISOS RANCH LUST

Two borings were drilled in the area of the Los Alisos Ranch LUST site – G-405-05 and G-405-06. Soil and groundwater samples were taken for analysis. A total of 14 soil samples were analyzed for petroleum hydrocarbons (M8015D,G), volatile organic compounds (8260B) and metals (6010B). Low level diesel range concentrations were reported for 3 samples analyzed – the 9 and 11 foot samples at G-405-05 and the 9 foot sample at G-405-06. The concentrations ranged from 17.4 to 48.8 mg/kg. These are well below the 1,000 mg/kg that is generally used as a screening level for soils impacted by diesel range petroleum hydrocarbons.

The soil samples analyzed for metals indicated concentrations below screening levels recommended by Office of Environmental Health Hazard Assessment (OEHHA). None of the metals concentration appears elevated to indicate an impact.

A water sample was collected from G-405-06 and analyzed for petroleum hydrocarbons (M8015D,G) and volatile organic compounds (8260B). No petroleum hydrocarbons or VOCs were reported in the water above laboratory reporting limits.

There does not appear to be any significant impact relating to the Los Alisos Ranch LUST site adjacent to the CALTRANS ROW. Low levels of diesel range hydrocarbons observed at the 9 to 11 foot depth may relate to the off-site case but these concentrations do not render the soil impacted to any actionable level. These concentrations of soil would be considered appropriate for re-use on site. However, if such soil was excavated and exported from the site then it would require proper disposal as non-hazardous California waste.

No groundwater impact from the LUST site was observed in the water sample collected.

4.4 ACM AND LBP CONTENT IN BRIDGES TO BE DEMOLISHED

Based on the laboratory test results of the bridges concrete, expansion joint, sealant around the bolt washer and under rail baluster there is a high potential that the asbestos containing materials (ACM) are part of the bridges and that the yellow paint removed from the bridge would be characterized as hazardous waste.

The SR-22/I-405 Connector, Bridge No. 55-331 contains 5% Chrysotile asbestos in the sealant of rail bolt washers and 75% Chrysotile asbestos in gasket under rail balusters. The Valley View Street Bridge No. 55-332 contains 5% and 75% Chrysotile asbestos in the

sealant of rail bolt washers; samples of the rail balusters gasket was not collected. No asbestos was present in tested samples of the bridge concrete. The materials were observed to be non-friable and in good condition. During demolition ACM materials could become friable, and need to be properly removed by a State certified asbestos removal contractor prior to the bridge demolition.

Based on California Code of Regulations (CCR)-22 materials with concentrations equal or greater than 1,000 mg/kg are considered hazardous waste. The white striping paint collected from the bridges contains less than 7mg/kg of lead, and is not considered hazardous. The yellow striping paint contains 6,700 mg/kg lead, therefore is considered California hazardous waste, and should be removed prior to bridge demolition and properly disposed off-site.

Only the bridge surface construction materials could be tested, and a limited number of ACM and LBP samples were collected. No guarantees can be made regarding the absence of the ACM and LBP from the portions of the bridges that were not tested and/or could not be accessed. Additional testing and sampling might be required during the bridge demolition in order to provide a higher level of confidence regarding the absence of potential ACM and LBP in the bridge.

5.0 OPINIONS

Based on the investigation performed by GDC, we are able to conclude as follows:

- The soil on the unpaved shoulder of the freeway up to 1-foot depth is impacted by trace level concentrations of organochlorine pesticides including chlordane, DDD, DDE, DDT and dieldrin. The concentrations are well below the respective soil screening levels. Soil excavated in these areas may be re-used on site. However, if off-site disposal is necessary, the soil will need to be properly disposed as non-hazardous California waste.

- There appear to be no impact on the groundwater at the seven areas sampled except at G-405-04 where low concentration of diesel range concentration was reported (0.545 mg/L). This appears to be a localized condition near the southbound on-ramp to the I-405 at Valley View, and is below actionable level.

- There is no impact of the soil or groundwater in the area of the Los Alisos Ranch LUST site except for the soil in the 9 to 11 foot zone where low levels of diesel range petroleum hydrocarbons are reports. The extent of this impact could not be assessed. It does not require any action. However, if soil from this zone is excavated and its off-site disposal is necessary, the soil will need to be properly disposed as non-hazardous California waste.

- The SR-22/I-405 Connector, Bridge No. 55-331 and the Valley View Street Bridge No. 55-332 contain asbestos in the sealant of rail bolt washers and in gasket under rail balusters. No asbestos was present in tested samples of the bridge concrete. The materials were observed to be non-friable and in good condition. During demolition ACM materials could become friable, and need to be properly removed by a State certified asbestos removal contractor prior to the bridge demolition.

- The yellow striping paint on the Caltrans Bridge Nos. 55-331 and 55-332 is a lead based paint with tested lead concentrations of up to 6,700 mg/kg, and is considered a California hazardous waste. This paint should be removed prior to bridge demolition and properly disposed off-site.

6.0 REFERENCES

Group Delta Consultants, "Report of Initial Site Assessment, SR-22 Freeway Phase II Improvements, I-405/SR-22 HOV Connector, Orange County, California, Caltrans EA#12-071631", dated July 30, 2008, prepared for Parsons.

Group Delta Consultants, "Work Plan for Collection and Testing of Soil Samples, For Phase II Environmental Site Investigation, SR-22 West Orange County Connection Project (WOCC), Transportation Improvement on SR-22, I-405 and I-605, Orange County, California, Group Delta Project No. I-436, Caltrans EA#12-071631", dated December 19, 2008, prepared for Caltrans.

Environmental Protection Agency, Superfund, Preliminary Remediation Goals (2008) - http://www.epa.gov/region09/superfund/prg/

Office of Environmental Health Hazard Assessment, Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil, January 2005.

TABLES

Table 1a
Pesticides and Herbicides Sampling and Testing Schedule
SR-22 WOCC SR-22/ I-405 Connector
Group Delta Project Number I-436A
Caltrans EA#12-071631

	Samples Collected and Tests Assigned				
	0ft -0.5ft			0.5 ft -1.0 ft	1.0 ft-2.0 ft
Boring					
HA-405-01	8081A			8081A	
HA-405-02	8081A				
HA-405-03	8081A				
HA-405-04	8081A				
HA-405-06	8081A			8081A	
HA-405-07	8081A				
HA-405-08	8081A				
HA-405-09	8081A				
HA-405-10	8081A	8141A	8151A	8081A	
HA-405-11	8081A				
HA-405-12	8081A	8141A	8151A	8081A	
HA-405-13	8081A				
HA-405-14	8081A	8141A	8151A	8081A	
HA-405-15	8081A				
HA-405-16	8081A	8141A	8151A	8081A	
HA-405-17	8081A				
HA-405-18	8081A	8141A	8151A	8081A	

Test Method Legend:

EPA Test Method 8081A- Organochlorine Pesticides
EPA Test Method 8141A- Organophosphorus Compounds
EPA Test Method 8151A- Chlorinated Herbicides

Table 1b
Pesticides and Herbicides Calculation Table
SR-22 WOCC SR-22/ I-405 Connector
Group Delta Project Number I-436A
Caltrans EA#12-071631

Sample ID	Depth	Chlordane (Total)	Chlordane (alpha)	4,4'-DDD (DDD)	4,4'-DDE (DDE)	4,4'-DDT (DDT)	Dieldrin
Units		ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
HA-405-01-1	0.5	**2.84**	**1**	**1**	**2.69**	**6.86**	**1**
HA-405-01-2	1	**2.67**	**1**	**1**	**6.22**	**10.4**	**1**
HA-405-02-1	0.5	**0.5**	**0.5**	**0.5**	**1**	**4.36**	**0.5**
HA-405-03-1	0.5	**7.66**	**3.69**	**4.6**	**6.21**	**49.8**	**1**
HA-405-04-1	0.5	**3.07**	**1.4**	**0.5**	**1.83**	**10.1**	**0.5**
HA-405-06-1	0.5	**7.73**	**3.41**	**6.25**	**13.1**	**73**	**1**
HA-405-06-2	1	**0.5**	**0.5**	**0.5**	**4.44**	**6.69**	**0.5**
HA-405-07-1	0.5	**24.1**	**10.5**	**10.2**	**9.1**	**161**	**3.77**
HA-405-08-1	0.5	**11**	**4.78**	**65.6**	**106**	**1150**	**2.07**
HA-405-09-1	0.5	**14.3**	**6.43**	**8.74**	**8.53**	**73.9**	**2.45**
HA-405-10-1	0.5	**0.5**	**0.5**	**1.35**	**17.8**	**10.3**	**0.5**
HA-405-10-2	1	**0.5**	**0.5**	**0.5**	**1.38**	**0.5**	**0.5**
HA-405-11-1	0.5	**39.9**	**18.4**	**10.4**	**5.97**	**143**	**3.07**
HA-405-12-1	0.5	**3.41**	**1.68**	**12.6**	**44.8**	**143**	**0.5**
HA-405-12-2	1	**1**	**1**	**1**	**1**	**5.18**	**1**
HA-405-13-1	0.5	**5.36**	**2.91**	**2.17**	**1.76**	**18.5**	**2.33**
HA-405-14-1	0.5	**18.1**	**8.2**	**11.7**	**12.8**	**126**	**4.59**
HA-405-14-2	1	**4.84**	**2.15**	**1.28**	**4.47**	**12.3**	**0.5**
HA-405-15-1	0.5	**20.4**	**8.53**	**7.3**	**28.4**	**97**	**3.97**
HA-405-16-1	0.5	**6.75**	**3.06**	**6.01**	**4.47**	**29.2**	**1.21**
HA-405-16-2	1	**3.41**	**1.79**	**2.81**	**1.96**	**9.15**	**0.5**
HA-405-17-1	0.5	**6.73**	**3.06**	**2.88**	**8.72**	**33.6**	**1.36**
HA-405-18-1	0.5	**8.5**	**3.26**	**1**	**4.84**	**39.8**	**2.26**
HA-405-18-2	1	**4.51**	**1**	**1**	**4.66**	**19**	**1**

	24	0				
PRG						
Residential		1600	2000	1400	1700	30
Industrial		6500	7200	5100	7000	110
RSSL		33	86	60	87	0.09
Mean		8.261666667	6.70375	12.58958333	93.02666667	1.545
Standard Error		1.907204843	2.688213728	4.538222393	47.11105564	0.252938527
Median		5.1	2.49	5.405	24.1	1
Mode		0.5	1	1	143	0.5
Standard Deviation		9.343357402	13.16950391	22.23265841	230.7960951	1.239140656
Sample Variance		87.29832754	173.4358332	494.2910998	53266.83753	1.535469565
Kurtosis		4.853949985	19.18170412	14.4532008	21.41677089	0.443352686
Skewness		2.066863254	4.201276563	3.624642439	4.528036746	1.21268465
Range		39.4	65.1	105	1149.5	4.09
Minimum		0.5	0.5	1	0.5	0.5
Maximum		39.9	65.6	106	1150	4.59
Sum		198.28	160.89	302.15	2232.64	37.08
Count		24	24	24	24	24
Confidence Level(95.0%)		3.945353791	5.560993755	9.388028238	97.45664323	0.523243206
		12.20702046	12.26474376	21.97761157	190.4833099	2.068243206

Table 2
Groundwater Testing
SR-22 WOCC SR-22/ I-405 Connector
Group Delta Project Number I-436A
Caltrans EA#12-071631

Boring Number	M8015G	M8015D	8260B	Depth of Groundwater Sample (ft)
G-405-01	ND	ND	ND	19
G-405-02	ND	ND	ND	19
G-405-03	ND	ND	ND	24
G-405-04	ND	0.545mg/L	ND	22
G-405-07	ND	ND	ND	24
MW-405-01	ND	ND	ND	10
MW-405-02	ND	ND	ND	15

Test Method Legend:

EPA Test Method M8015G	Total Petroleum Hydrocarbons (TPH) Gasoline
EPA Test Method M8015D	Total Petroleum Hydrocarbons (TPH) Diesel
8260B	Volatile Organic Compounds (VOC's)
ND	Not Detected

Table 3
Los Alisos Ranch LUST Soil and Groundwater Testing
SR-22 WOCC SR-22/ I-405 Connector
Group Delta Project Number I-436A
Caltrans EA#12-071631

		G-405-05				G-405-06			
Depth (ft)	Matrix	M8015G	M8015D	8260B	6010B	M8015G	M8015D	8260B	6010B
6-7	Soil	ND	ND	ND	See App B	ND	ND	ND	See App B
8-9	Soil	ND	48.8	ND	See App B	ND	17.4	ND	See App B
10-11	Soil	ND	28.6	ND	See App B	ND	ND	ND	See App B
12-13	Soil	ND	ND	ND	See App B	ND	ND	ND	See App B
14-15	Soil	ND	ND	ND	See App B	ND	ND	ND	See App B
16-17	Soil	ND	ND	ND	See App B	ND	ND	ND	See App B
18-19	Soil	ND	ND	ND	See App B	ND	ND	ND	See App B
27	Water	-	-	-	-	ND	ND	ND	N/A

Test Method Legend:

EPA Test Method M8015G	Total Petroleum Hydrocarbons (TPH) Gasoline
EPA Test Method M8015D	Total Petroleum Hydrocarbons (TPH) Diesel
8260B	Volatile Organic Compounds (VOC's)
6010B	CAM 22 Metals
ND	Not Detected
See App B	Various Metals Recorded, See Appendix B for concentrations

Table 4a

ASBESTOS SURVEY SUMMARY TABLE

Bridge Nos. 55-331 and 55-332

Sample No.	Description of Material	Sample Location	Analytical Results
OA090114-B-001	Expansion joint, 2", dark gray, and white	Bridge 55-332, southeastern portion, in between concrete and/or asphalt road	ND
OA090114-B-002	Expansion joint, 2", dark gray, and white	Bridge 55-332, southwestern portion, in between concrete and/or asphalt road	ND
OA090114-B-003	Expansion joint, 2", dark gray, and white	Bridge 55-332, southwestern portion, in between concrete and/or asphalt road	ND
OA090114-B-004	Sealant, gray	Bridge 55-332, southeastern portion, on rail bolt washer	5% CH
OA090114-B-005	Sealant, gray	Bridge 55-332, southern portion, on rail bolt washer	5% CH
OA090114-B-006	Sealant, gray	Bridge 55-332, southwestern portion, on rail bolt washer	5% CH
OA090114-B-007	Concrete, gray	Bridge 55-332, southeastern portion	ND
OA090114-B-021	Expansion joint, 2", dark gray, and white	Bridge 55-331, southwestern portion, in between concrete and/or asphalt road	ND
OA090114-B-022	Expansion joint, 2", dark gray, and white	Bridge 55-331, southern portion, in between concrete and/or asphalt road	ND
OA090114-B-023	Expansion joint, 2", dark gray, and white	Bridge 55-331, southeastern portion, in between concrete and/or asphalt road	ND
OA090114-B-024	Sealant, gray	Bridge 55-331, southwestern portion, on rail bolt washer	5% CH
OA090114-B-025	Sealant, gray	Bridge 55-331, southern portion, on rail bolt washer	5% CH
OA090114-B-026	Sealant, gray	Bridge 55-331, southeastern portion, on rail bolt washer	5% CH
OA090114-B-027	Gasket, dark gray	Bridge 55-331, southwestern portion, under rail baluster	75% CH
OA090114-B-028	Gasket, dark gray	Bridge 55-331, southern portion, under rail baluster	75% CH
OA090114-B-029	Gasket, dark gray	Bridge 55-331, southeastern portion, under rail baluster	75% CH
OA090114-B-030	Concrete, gray	Bridge 55-331, southeastern portion	ND
OA090114-B-055	Sealant, dark gray	Bridge 55-332, southeastern portion, on rail bolt washer	75% CH
OA090114-B-056	Sealant, dark gray	Bridge 55-332, southern portion, on rail bolt washer	75% CH
OA090114-B-057	Sealant, dark gray	Bridge 55-332, southwestern portion, on rail bolt washer	75% CH

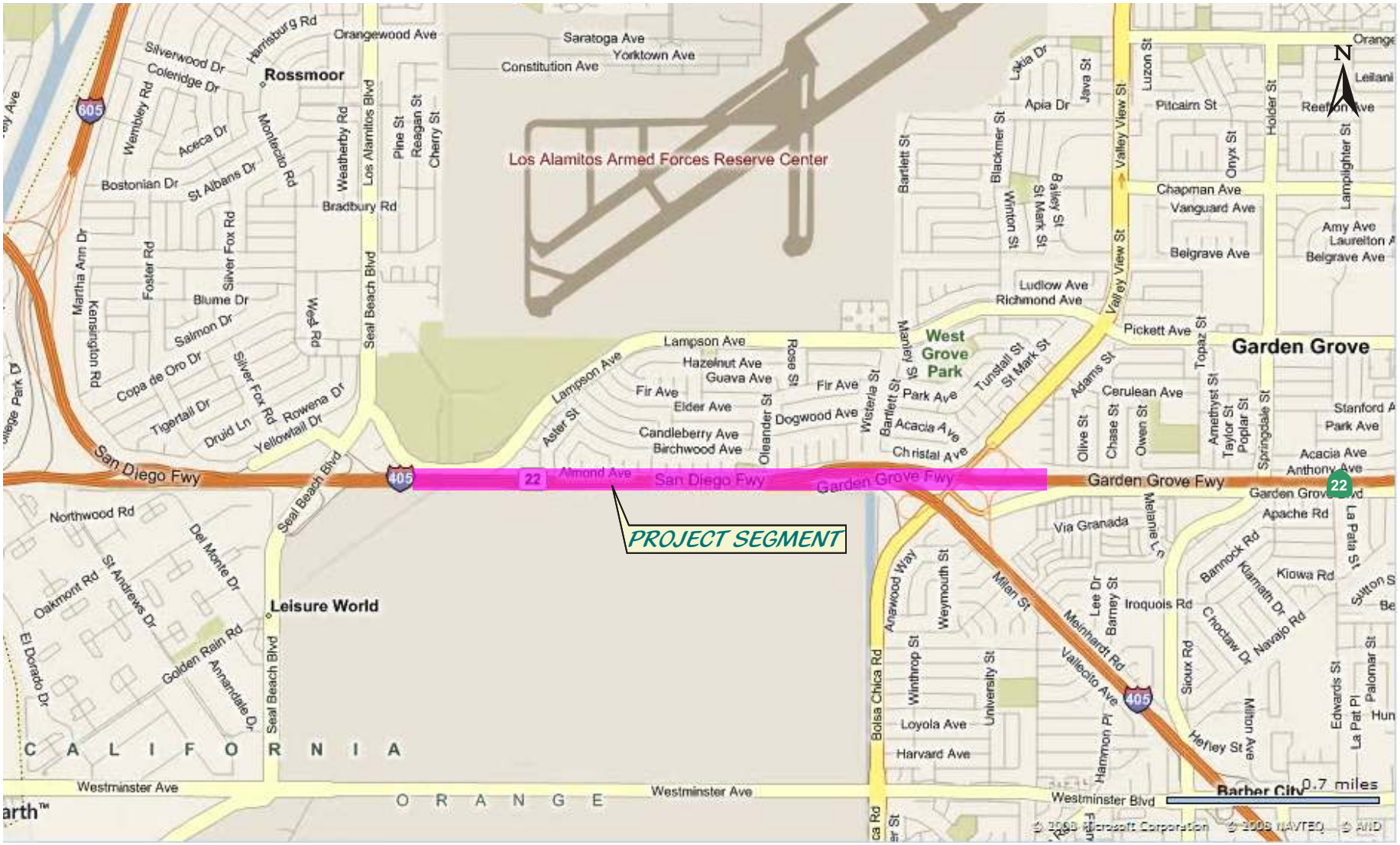
NOTES:

1. ND = none detected for asbestos.
2. CH = chrysotile asbestos.

Table 4b

SAMPLE NO.	DESCRIPTION	LEAD CONC. (Percent by Weight)	ESTIMATED QUANTITY (Square Feet)	INTERPRE-TATION
RZ090114-LB-2	Off-white paint on asphalt	<0.0007	<400 (multiple 4" off-white strips on the bridge)	non-LBP
RZ090114-LB-3	Yellow paint on asphalt	0.6700	<200 (multiple 4" yellow strips on the bridge)	LBP

FIGURES



The base map is from Microsoft's Virtual Earth

GROUP DELTA CONSULTANTS

GDC Project No. I-436-A

SR-22/I-405 Connector Improvements

Site Vicinity Map

Figure 1

NOTE: FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA
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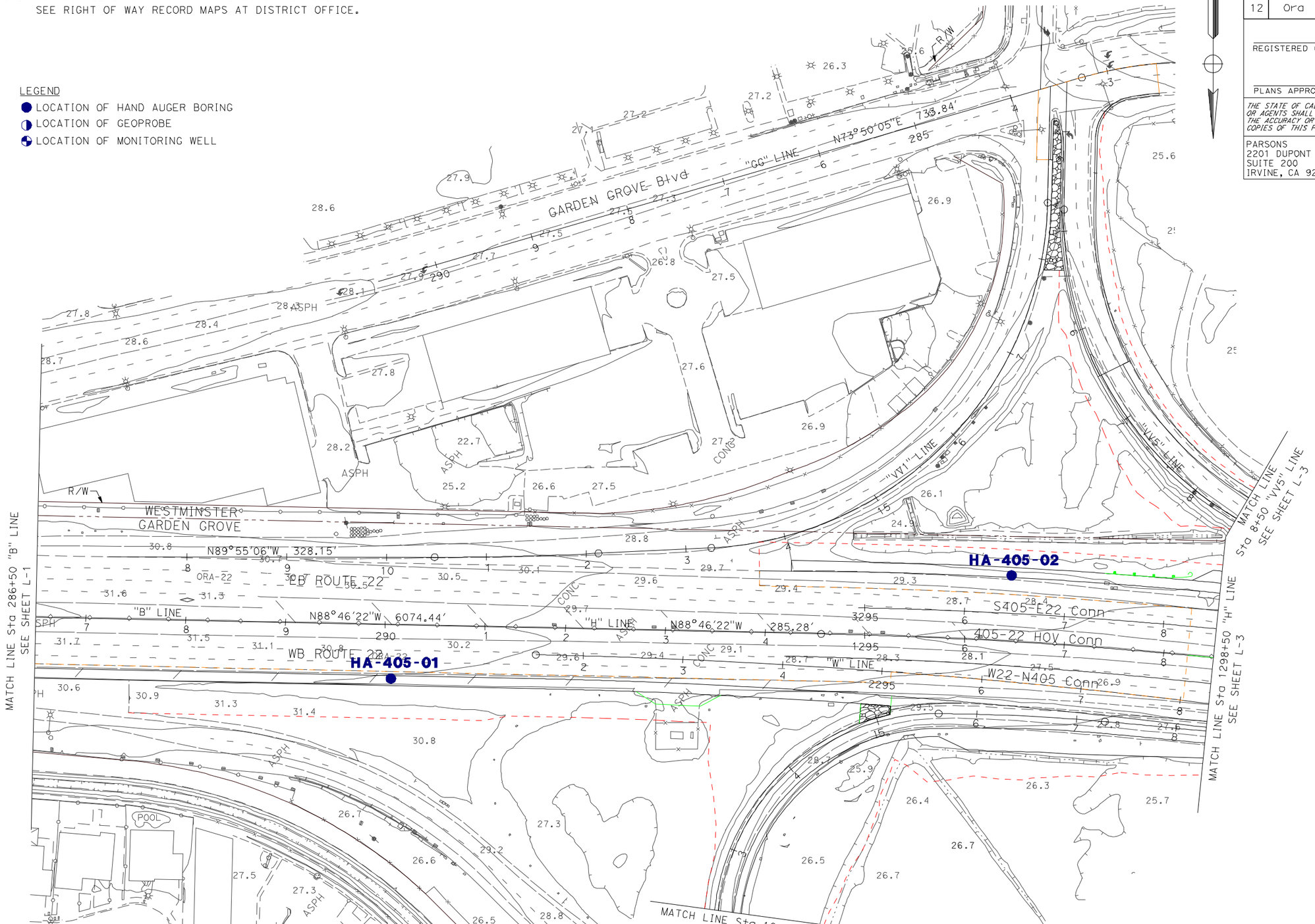
LEGEND
- LOCATION OF HAND AUGER BORING
- LOCATION OF GEOPROBE
- LOCATION OF MONITORING WELL



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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EXPLORATION LOCATION MAP FIGURE 2A LAYOUT

SCALE 1" = 50'

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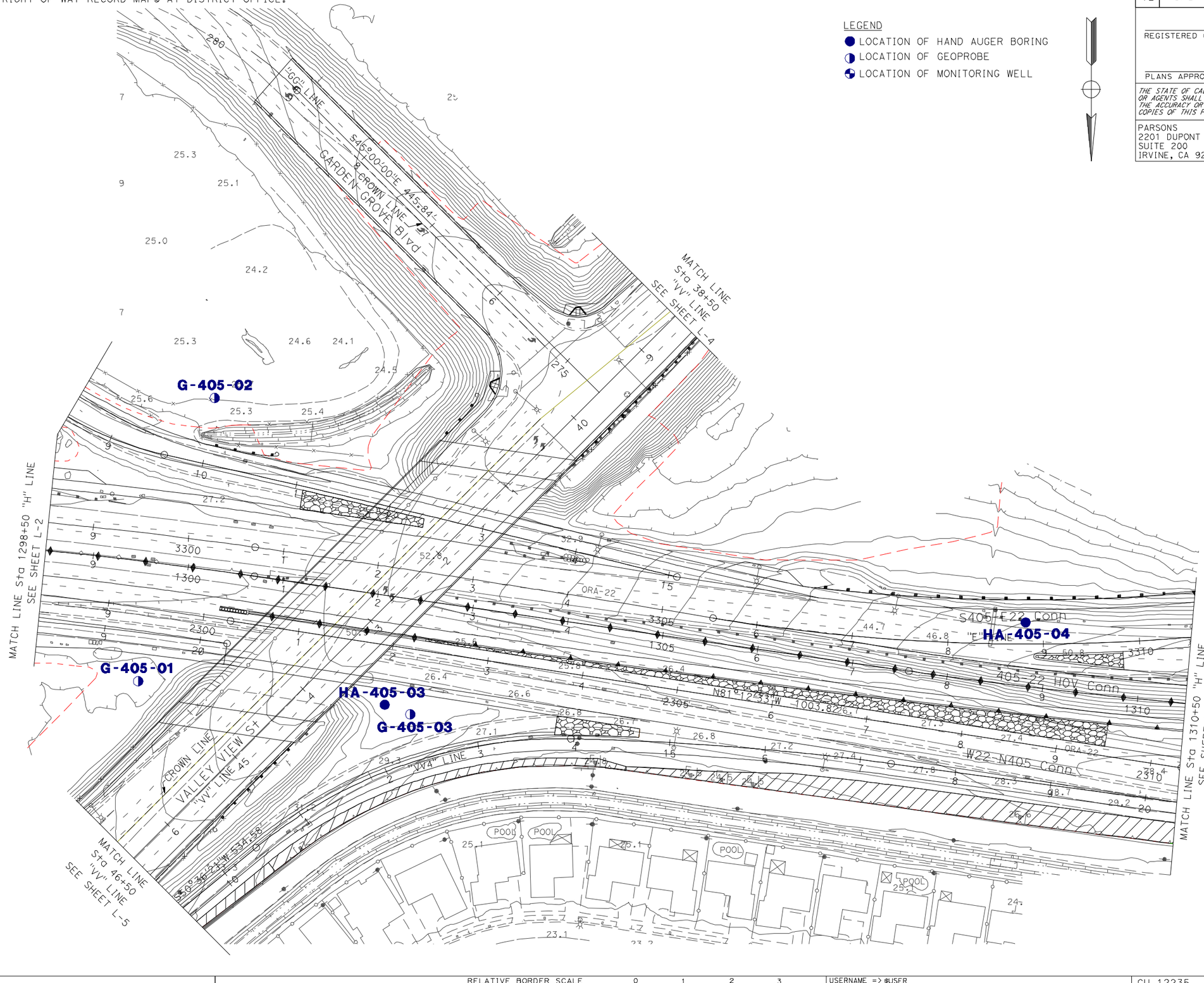

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EXPLORATION LOCATION MAP FIGURE 2B LAYOUT

SCALE 1" = 50'

L-3

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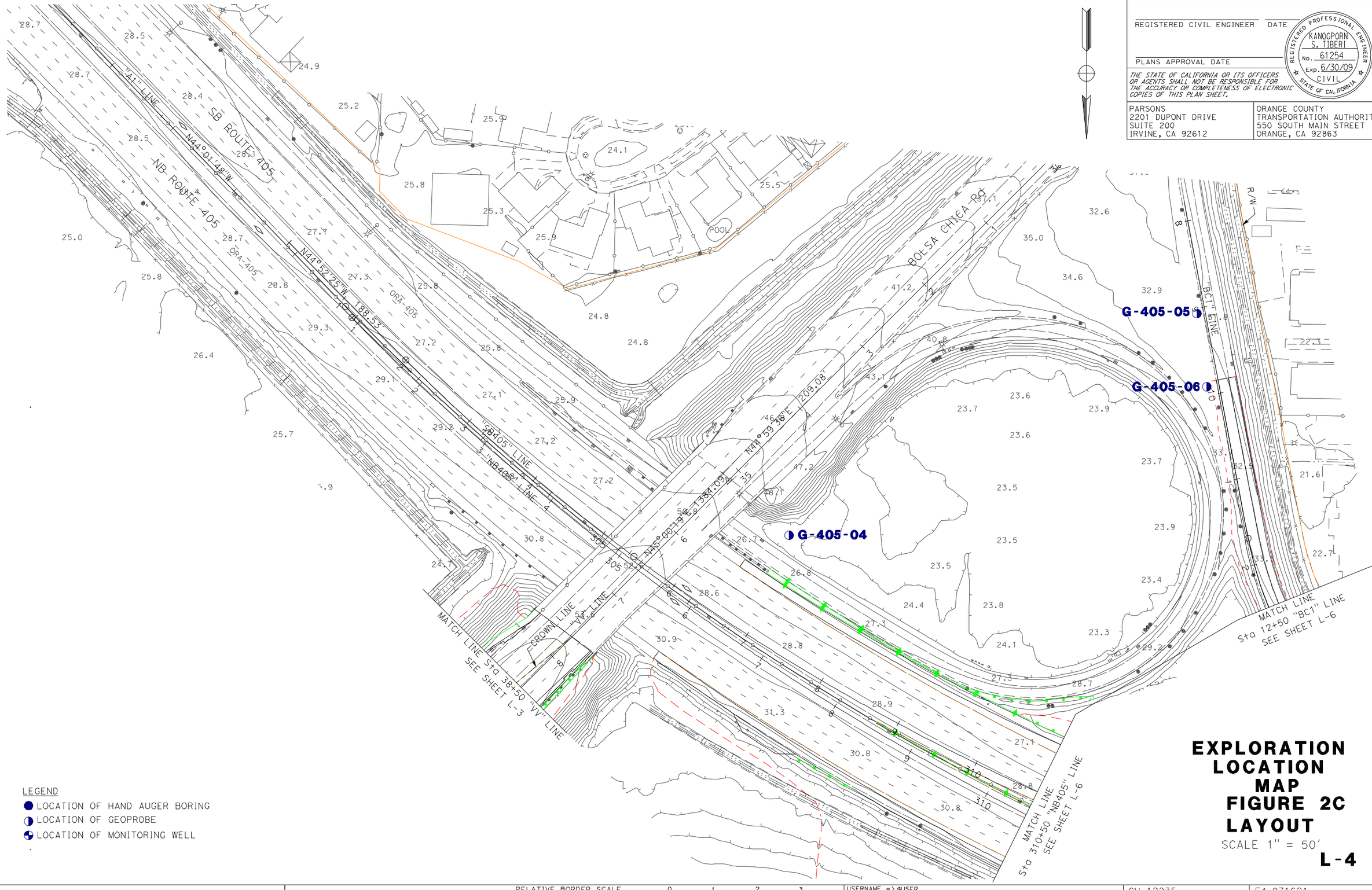

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- LOCATION OF MONITORING WELL

EXPLORATION LOCATION MAP FIGURE 2C LAYOUT

SCALE 1" = 50'

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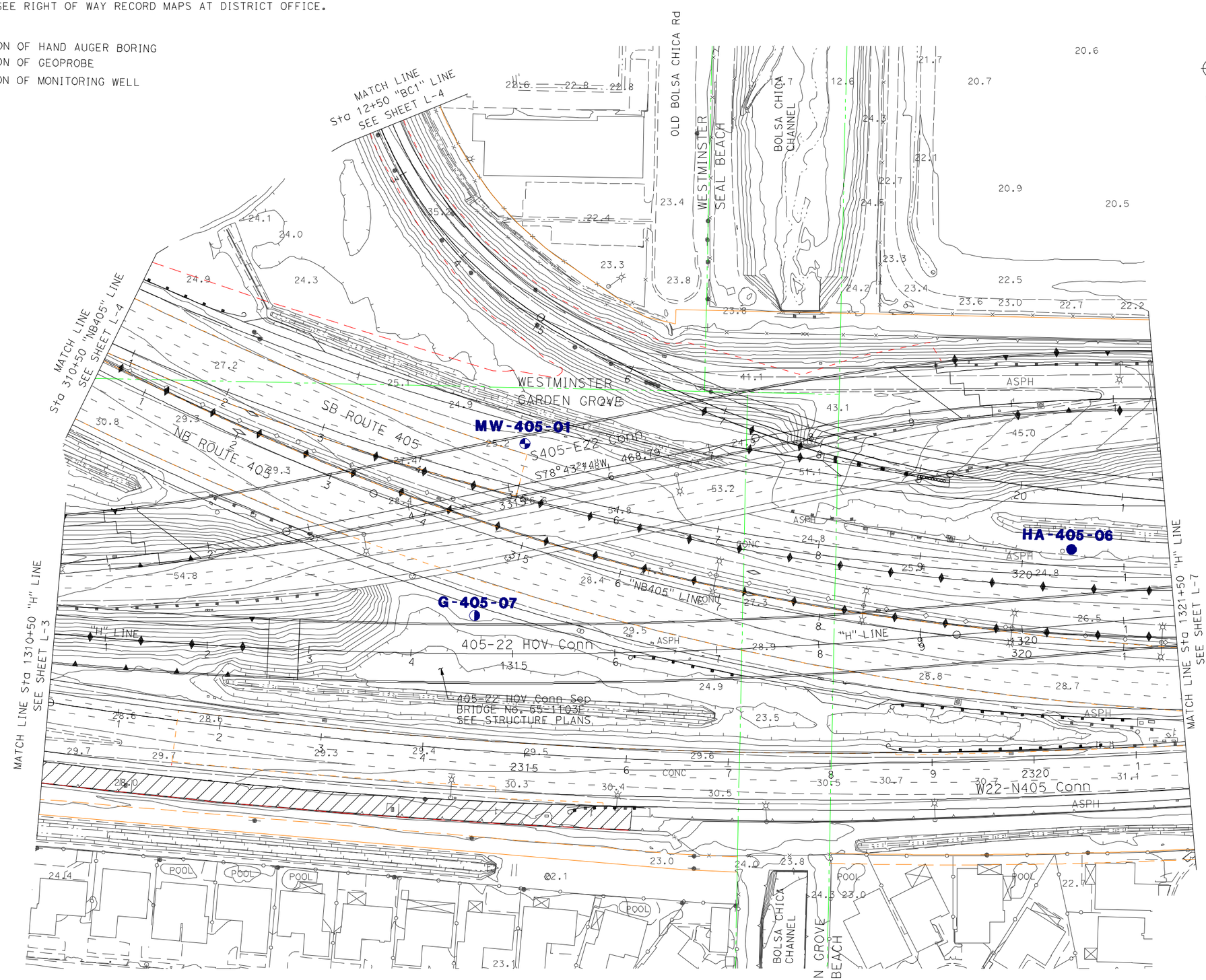

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EXPLORATION LOCATION MAP

FIGURE 2D LAYOUT

SCALE 1" = 50'

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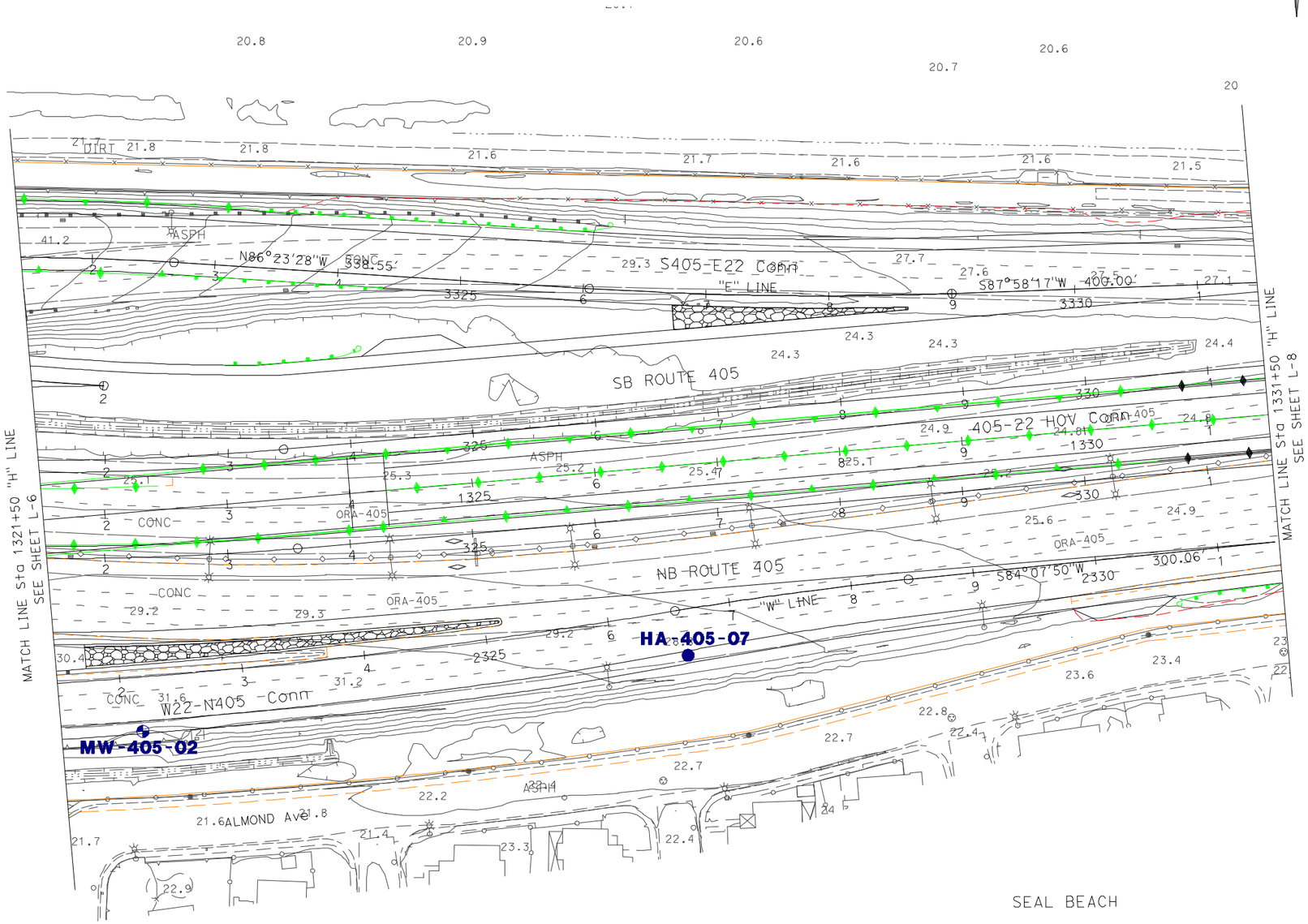

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EXPLORATION LOCATION MAP FIGURE 2E LAYOUT

SCALE 1" = 50'

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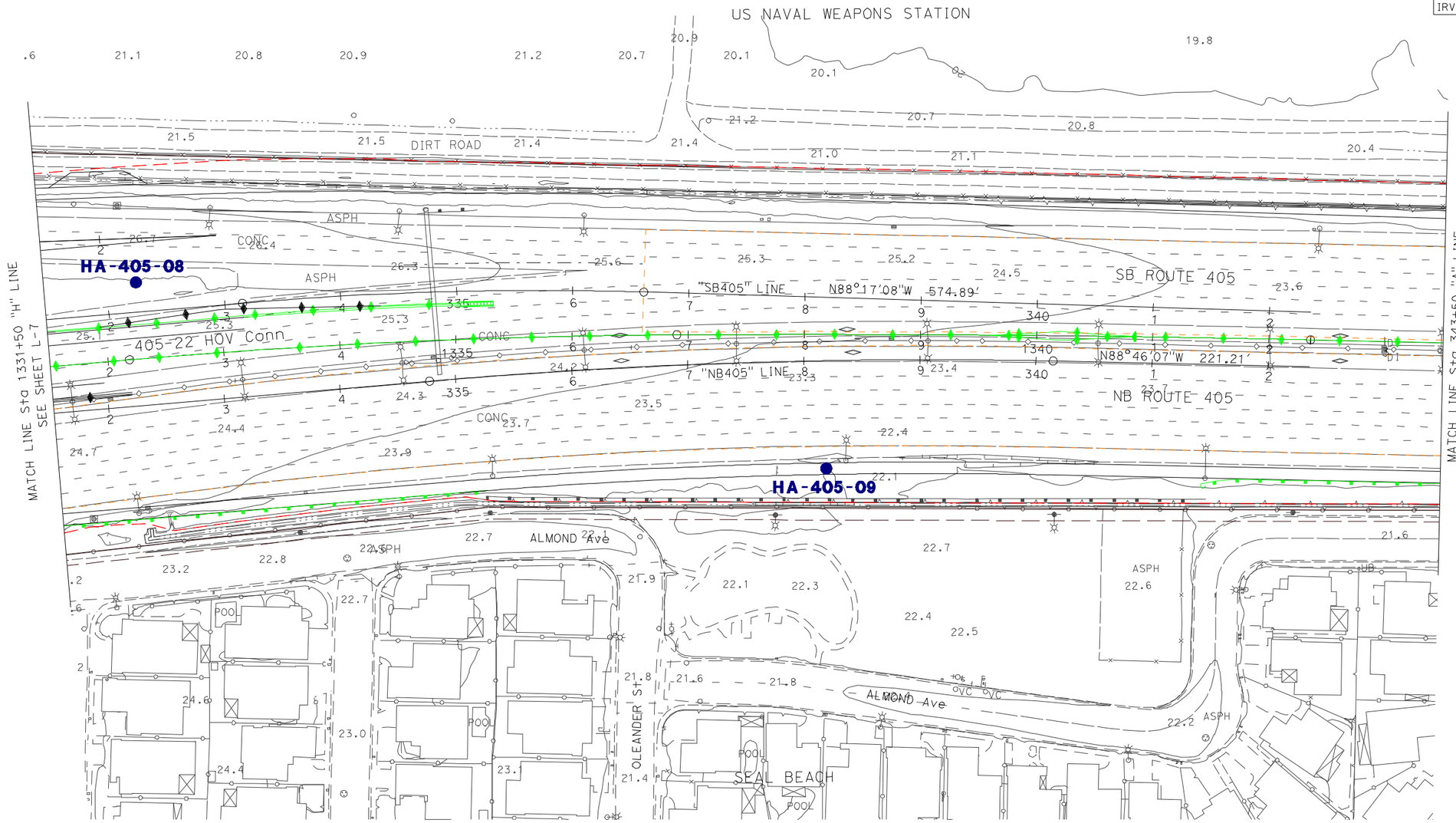

EXPLORATION LOCATION MAP FIGURE 2F LAYOUT

SCALE 1" = 50'

L-8

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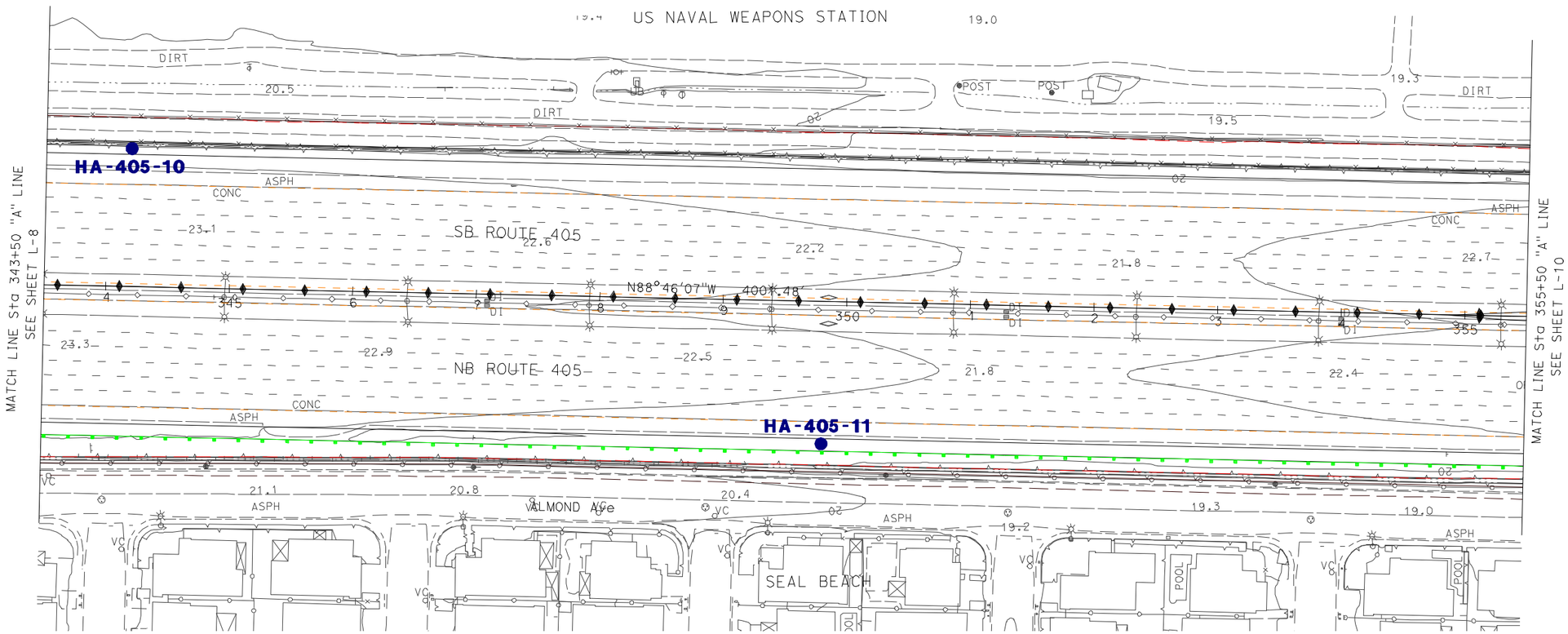

EXPLORATION LOCATION MAP FIGURE 2G LAYOUT

SCALE 1" = 50'

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LEGEND

- LOCATION OF HAND AUGER BORING
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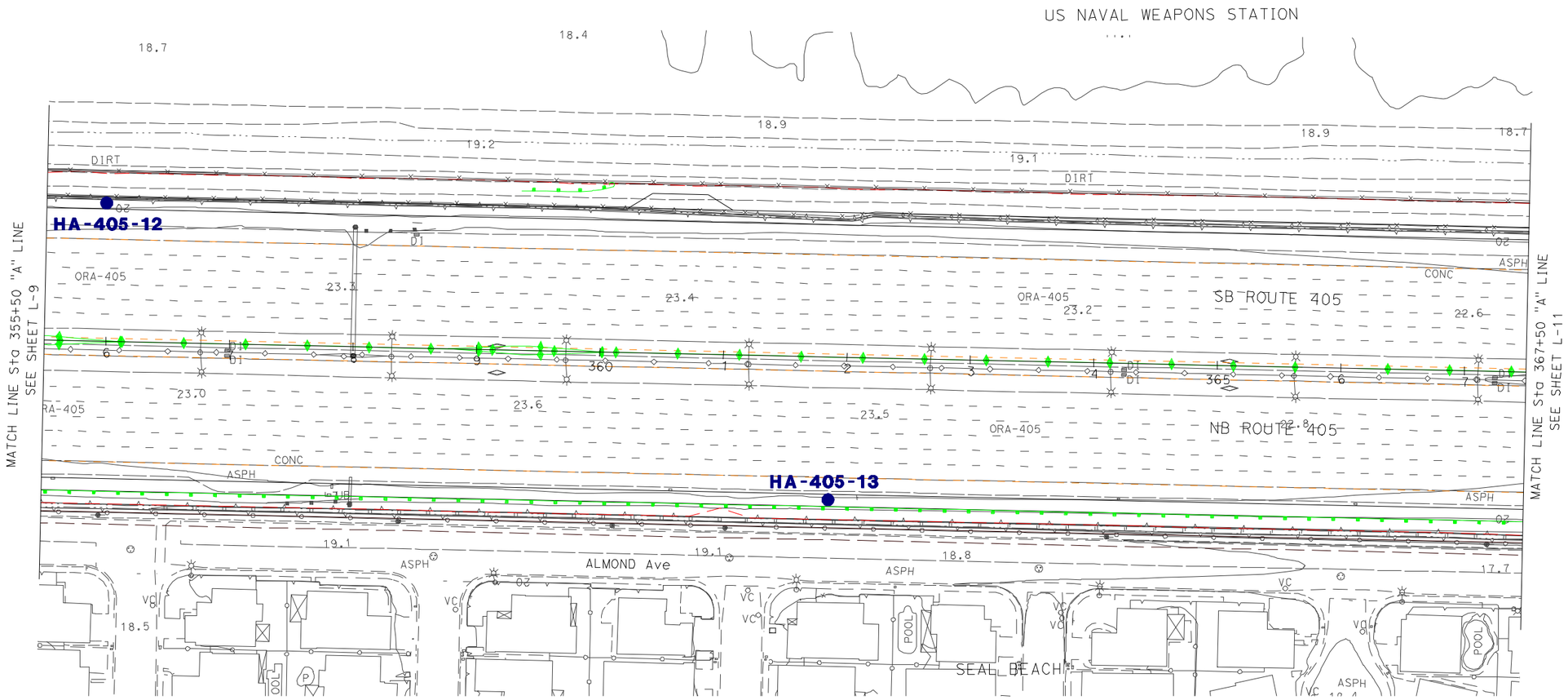

EXPLORATION LOCATION MAP FIGURE 2H LAYOUT

SCALE 1" = 50'

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LEGEND

- LOCATION OF HAND AUGER BORING
- LOCATION OF GEOPROBE
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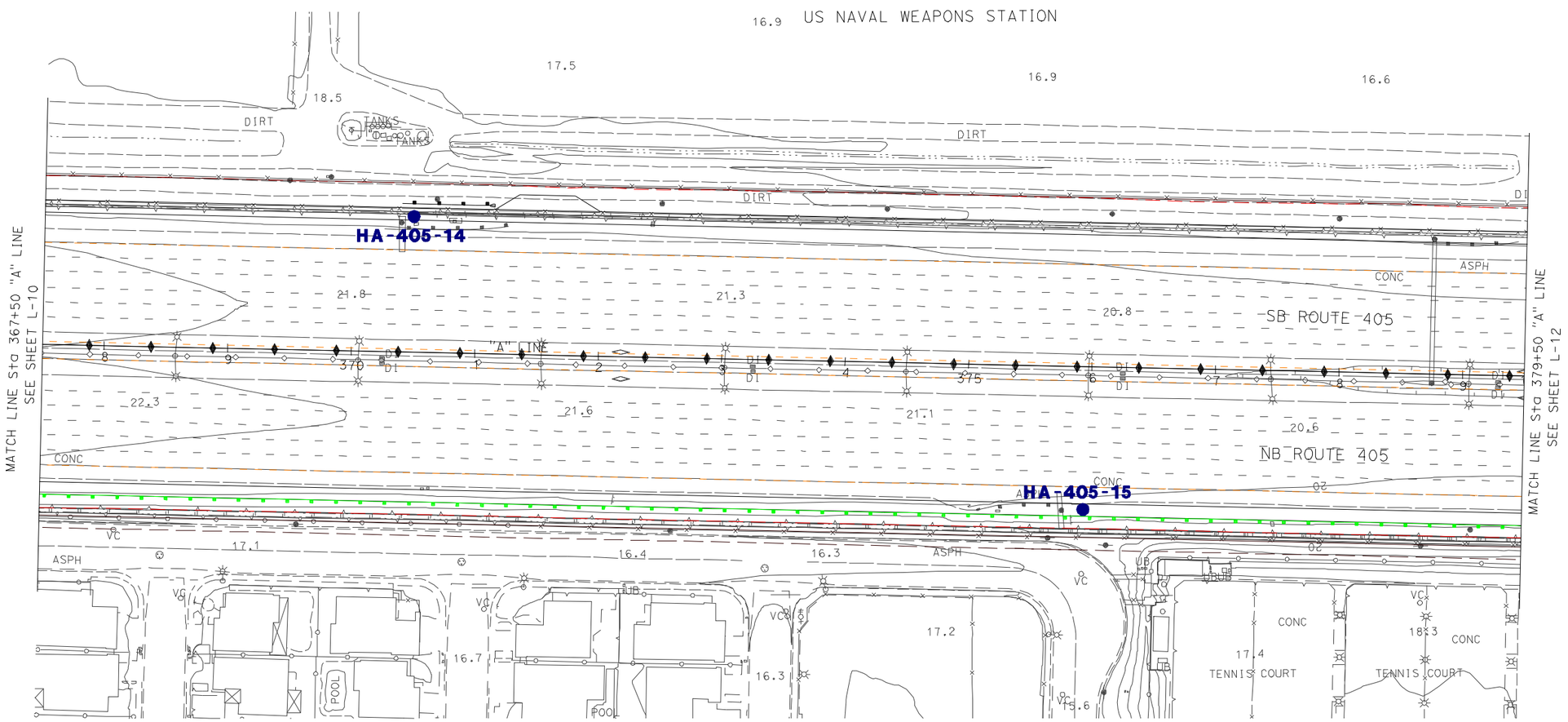

EXPLORATION LOCATION MAP FIGURE 2I LAYOUT

SCALE 1" = 50'

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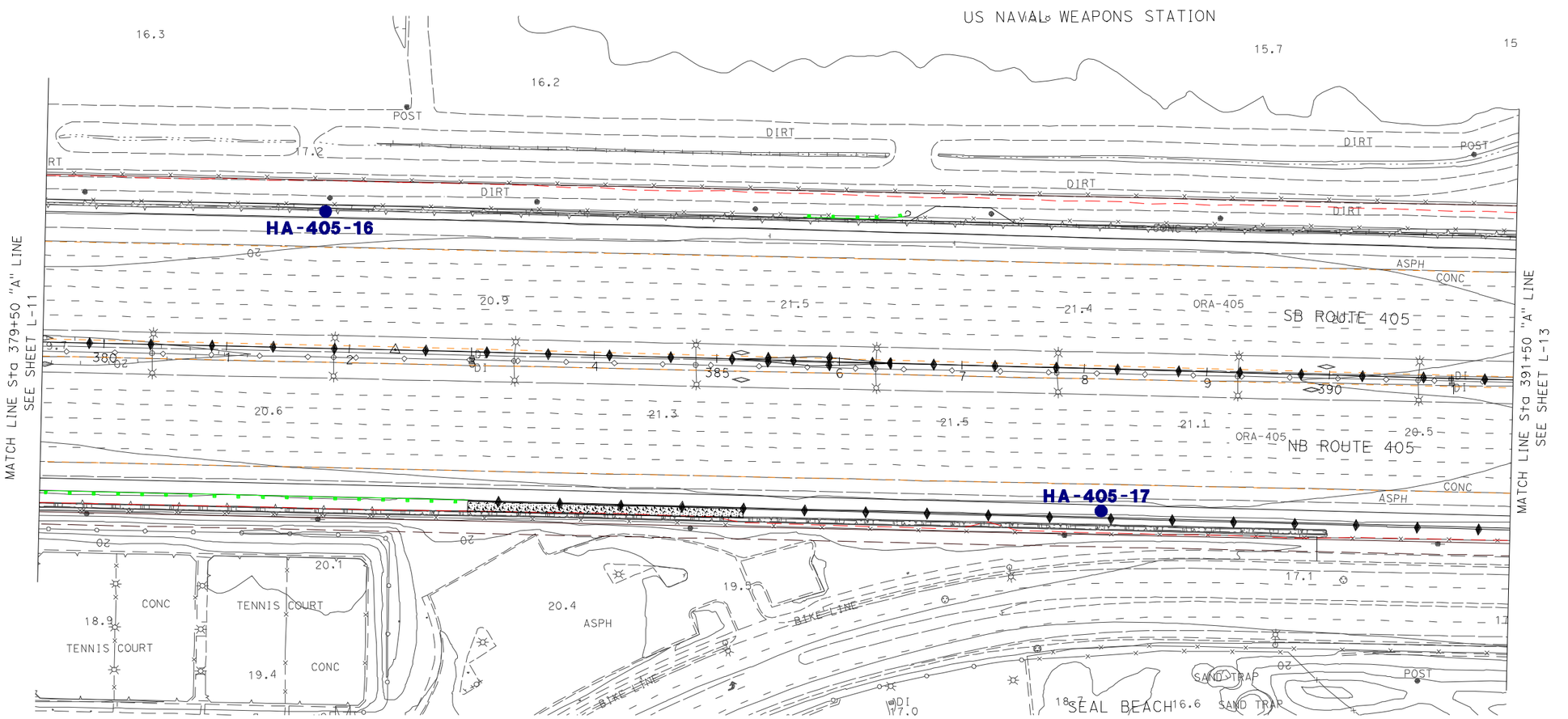

EXPLORATION LOCATION MAP FIGURE 2J LAYOUT

SCALE 1" = 50'

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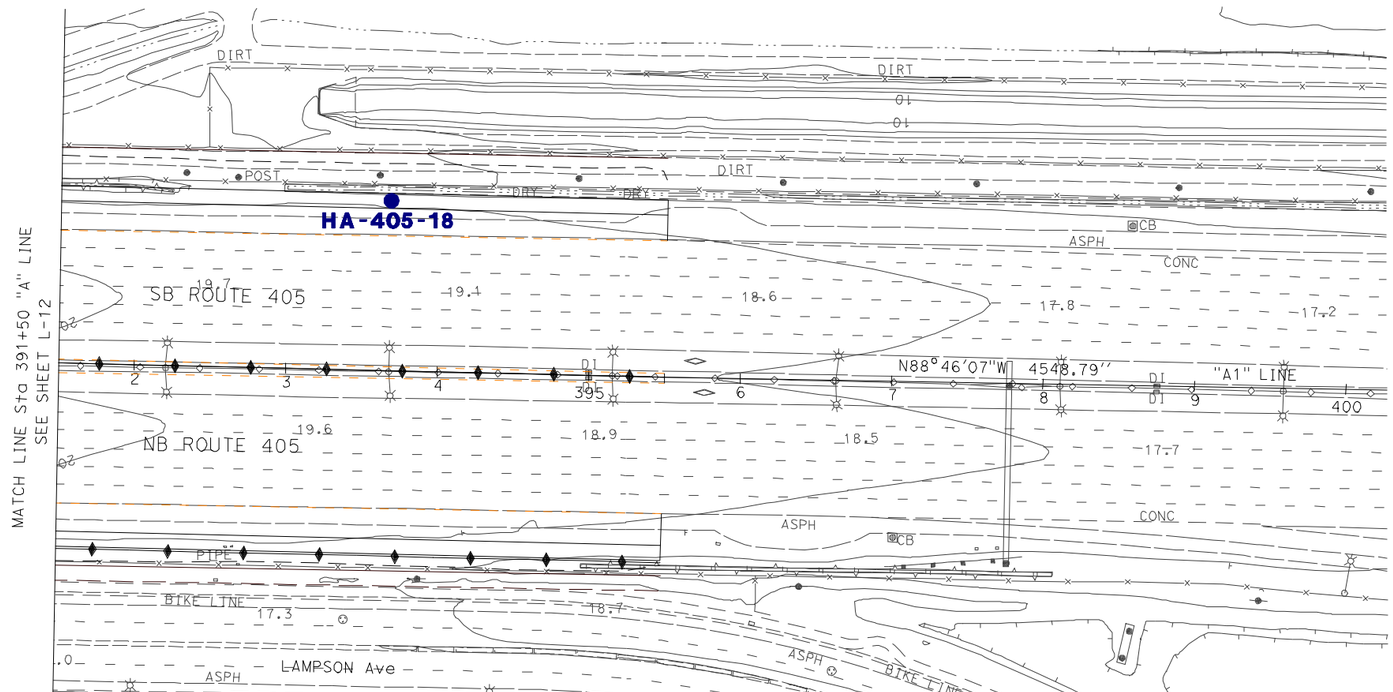

SEAL BEACH

EXPLORATION LOCATION MAP FIGURE 2K LAYOUT

SCALE 1" = 50'

L-13

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GROUP DELTA CONSULTANTS	**GROUP DELTA CONSULTANTS, INC.** ENGINEERS AND GEOLOGISTS 32 MAUCHLY, SUITE B IRVINE , CA 92618 (949) 450-2100
	PROJECT NAME: SR-22/I-405 CONNECTOR IMPROVEMENTS PROJECT NUMBER: I-436-A
	SITE AERIAL MAP **Figure 3**

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

The subsurface conditions at the project site were investigated by Group Delta Consultants, Inc. (GDC) by performing seventeen (17) 2-ft deep hand augers, seven (7) geoprobes and two (2) temporary monitoring wells. The geoprobes were performed to depths of 19 feet to 31 feet below ground surface (bgs). The monitoring wells were installed at depths of 30 and 35 feet bgs. Locations of the hand augers, geoprobes and monitoring wells are presented in Figures 2 and 3. Log of monitoring well and geoprobe borings is presented in Figures A-1 to A-10. Detailed description of the drilling methods and sample collection methods is presented in Section 2.0 of the main report. The subsurface exploration program including location and depth of borings is summarized in Table A-1 below:

Table A-1:
Summary of Field Explorations

Boring Number	Location and Approximate Station	Boring Depth (feet)	Approximate Boring Elevation (feet MSL)	Depth to Groundwater (feet bgs)	Groundwater Elevation (feet MSL)
HA-405-01	SR-22 WB Shoulder "B" Line Station 290+10, Figure 2a	2	31	N/E	N/A
HA-405-02	SR-22 EB Shoulder "H" Line Station 1296+50, Figure 2a	2	28	N/E	N/A
HA-405-03	SR-22 WB Shoulder "H" Line Station 1302+30, Figure 2b	2	27	N/E	N/A
HA-405-04	SR-22 EB Shoulder "H" Line Station 1308+70, Figure 2b	2	44	N/E	N/A
HA-405-06	I-405 SB Shoulder "H" Line Station 1320+40, Figure 2d	2	25	N/E	N/A
HA-405-07	SR-22 WB Shoulder "H" Line Station 1326+50, Figure 2e	2	28	N/E	N/A
HA-405-08	SR-22 WB/I-405N Connector median, "H" Line Station 1332+30, Figure 2f	2	25	N/E	N/A
HA-405-09	SR-22 WB Shoulder "H" Line Station 1338+10, Figure 2f	2	22	N/E	N/A

Boring Number	Location and Approximate Station	Boring Depth (feet)	Approximate Boring Elevation (feet MSL)	Depth to Groundwater (feet bgs)	Groundwater Elevation (feet MSL)
HA-405-10	SR-22 EB Shoulder "A" Line Station 344+20, Figure 2g	2	23	N/E	N/A
HA-405-11	SR-22 WB Shoulder "A" Line Station 349+80, Figure 2g	2	21	N/E	N/A
HA-405-12	SR-22 EB Shoulder "A" Line Station 356+00, Figure 2h	2	23	N/E	N/A
HA-405-13	SR-22 WB Shoulder "H" Line Station 362+00, Figure 2h	2	23	N/E	N/A
HA-405-14	SR-22 EB Shoulder "A" Line Station 370+50, Figure 2l	2	22	N/E	N/A
HA-405-15	SR-22 WB Shoulder "A" Line Station 375+90, Figure 2l	2	20	N/E	N/A
HA-405-16	SR-22 EB Shoulder "A" Line Station 381+90, Figure 2j	2	21	N/E	N/A
HA-405-17	SR-22 WB Shoulder "A" Line Station 388+00, Figure 2j	2	21	N/E	N/A
HA-405-18	SR-22 EB Shoulder "A" Line Station 393+60, Figure 2k	2	20	N/E	N/A
MW-405-01	I-405S/SR-22E Connector Bridge South of the West Abutment, Figure 2d	35	25	10	15
MW-405-02	SB-22W/I-405 N Connector, Figure 2e	30	31	15	16
G-405-01	SR-22 Valley View St. Bridge East of the North Abutment, Figure 2b	20	26	19	7*
G-405-02	SR-22 Valley View St. Bridge East of the South Abutment, Figure 2b	20	25	19	6*

Boring Number	Location and Approximate Station	Boring Depth (feet)	Approximate Boring Elevation (feet MSL)	Depth to Groundwater (feet bgs)	Groundwater Elevation (feet MSL)
G-405-03	SR-22 Valley View St. Bridge West of the North Abutment, Figure 2b	25	27	24	3*
G-405-04	Bolsa Chica Rd.I-405 SB on-ramp, Figure 2c	24	24	22	2*
G-405-05	East of the Los Alisos Ranch LUST, Figure 2c	19	33	N/A	N/A
G-405-06	East of the Los Alisos Ranch LUST, Figure 2c	31	33	27	6*
G-405-07	I-405S/SR-22E Connector Bridge North of the East Abutment, Figure 2d	30	25	24	1*

Note:
HA = Hand Auger
G-Geoprobe
MW = Monitoring Well
N/E= Not Encountered
N/A=Not Available
*=Depth to the groundwater assumed to be less than measured due to a very low soil permeability. Groundwater elevation assumed to be higher than presented. Actual groundwater elevation was measured in monitoring wells MW-405-01 and MW-405-02

List of Figures

The following figures are attached and complete this appendix:

Figure A-1a	Key for Soil Classification
Figure A-1b	Boring Legend
Figures A-2a to A-3	Monitoring Well Logs
Figures A-4a to A-10	Geoprobe Logs

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

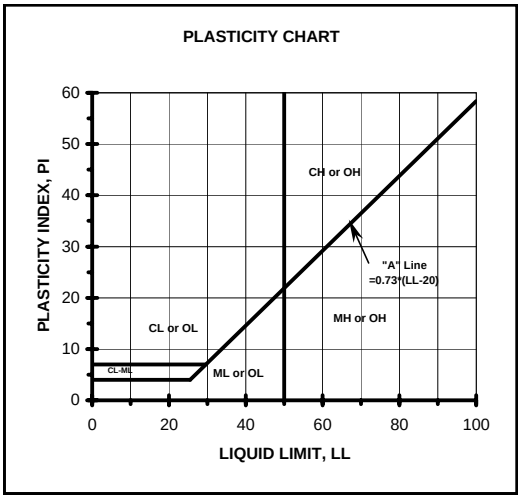
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375-inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME: SR-22/I-405 Connector Improvements	PROJECT NUMBER: I-436-A	SHEET NO.: 1 of 1	BORING: **LEGEND**	
SITE LOCATION: Orange County, California	LOGGED BY: C. Blanco	CHECKED BY: V. Glisic	START: 3/27/2008	FINISH: 4/15/2008
DRILLING COMPANY: Kehoe and Jett	BORING DIA. (in.):	TOTAL DEPTH (ft.): 32.5	GROUND ELEV (ft.):	TOP OF CASING ELEV.:
DEPTH/*ELEV.* GROUND WATER (ft.): ▼ / *na*				
DRILLING EQUIPMENT: CME75 and Geoprobe 6600	CASING TYPE/DIA.:	SCREEN SLOT SIZE:	FILTER PACK TYPE:	GROUT TYPE:
DRILLING METHOD: HSA and Geoprobe	SAMPLING METHOD:	NOTES:		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
5		X									SPT, Tube, Water - Refers to the sampling method as described below SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.		
10		T									TUBE-Geoprobe Plastic Tube Sampler		
15		W									Water-Water Sample		
20													
25													
30													

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 2	MW-405-01

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/14/2009	1/14/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Jett Drilling	6	36.5	25	25	▼ 10.0 / *15.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
CME 75	2-inch PVC	0.02-inch	Silica #3 sand	Cement Grout

DRILLING METHOD	SAMPLING METHOD	NOTES
Hollow Stem Auger	Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
5	20		S-1	3 4 8							**Clayey Sand (SC)** moist, brown, trace Clay (Fill)		Cement Grout
											Silty Sand / Clayey Silt (SM/CL) mixture dense, moist, brown (Fill)		
													Bentonite Chips
													Blank Pipe
											Sandy Clay / Clayey Sand (SC / CL-S) Stiff, wet, grey		Sand
10	15	W	W-1 S-2	5 5 8									
											Clay (CL) soft, wet, grey		
15	10		S-3	2 3 4									Slotted Pipe
											Silt (ML) stiff, wet, grey		
20	5		S-4	6 6 5									
25	0		S-5	3 3 4							soft		
30	-5		S-6	5 7 10							stiff, dark grey		

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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FIGURE A-2a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	2 of 2	**MW-405-01**

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/14/2009	1/14/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Jett Drilling	6	36.5	25	25	▼ 10.0 / *15.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
CME 75	2-inch PVC	0.02-inch	Silica #3 sand	Cement Grout

DRILLING METHOD	SAMPLING METHOD	NOTES
Hollow Stem Auger	Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
35	-10	⊠	S-7	5 6 10							**Silty Clay (CL-ML)** moist, grey, with Siltstone fragments		
40	-15										Bottom of boring at 36.5 ft. bgs. Top 5 ft. was hand augered. Borehole backfilled with monitoring well installed at 35 ft bgs. Groundwater at 10 ft. bgs after well installation. 1-19-09 Well bailed by removing approx. 10 gallons of water from the well. Groundwater after bailing measured at 28 ft. bgs. 1-20-09 Groundwater sampled.		
45	-20												
50	-25												
55	-30												
60	-35												

GDC_BORING_W/WELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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FIGURE A-2b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 2	MW-405-02

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/14/2009	1/14/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Jett Drilling	6	31.5	31	31	▼ 15.0 / *16.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
CME 75	2-inch PVC	0.02-inch	Silica #3 sand	

DRILLING METHOD	SAMPLING METHOD	NOTES
Hollow Stem Auger	Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
0	30										**Sand (SP)** moist, orange brown, fine to medium grained (Fill)		Bentonite Chips
5	25	X	S-1	8 12 14							**Silt / Clayey Silt (ML)** moist, grey **Silty Sand / Sandy Silt (SM/ML)** dense, moist, light brown, with trace Siltstone fragments and Clay (Fill)		Blank Pipe
10	20	X	S-2	7 12 10									
15	15	W X	W-1 S-3	10 8 14							**Silty Sand (SM)** dense, wet, brown		Slotted Pipe Sand
20	10	X	S-4	6 6 10							**Silt / Silty Clay (ML/CL)** stiff, moist-wet, brown		
25	5	X	S-5	4 7 6							**Silt / Sandy Silt (ML)** stiff, moist-wet, brown		
30	0	X	S-6	4 5 5							**Sandy Silt (ML)** medium stiff, wet, brown-gray		
											Bottom of boring at 33.5 ft. bgs		

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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FIGURE A-3a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	2 of 2	**MW-405-02**

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/14/2009	1/14/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Jett Drilling	6	31.5	31	31	▼ 15.0 / *16.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
CME 75	2-inch PVC	0.02-inch	Silica #3 sand	

DRILLING METHOD	SAMPLING METHOD	NOTES
Hollow Stem Auger	Hammer: 140 lbs., Drop: 30 in.	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
35	-5	⊠	S-7	4 4 6							Borehole backfilled with monitoring well installed at 30 ft bgs. Groundwater measured at 15 ft. bgs after well installation. 1-19-09 Well bailed by removing approx. 30 gallons of water from well Groundwater measured at 12 ft. bgs after bailing. 1-20-09 Groundwater sampled.		
40	-10												
45	-15												
50	-20												
55	-25												
60	-30												

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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FIGURE A-3b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 1	G-405-01

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/19/2009	1/19/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Kehoe Testing and Engineering	2	20	26	N/A	▼ 19.0 / *7.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
Geoprobe 6600	N/A	N/A	N/A	N/A

DRILLING METHOD	SAMPLING METHOD	NOTES
Geoprobe	Geoprobe GH60 hammer	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
0	25										No soil samples collected. Borehole not logged.		
5	20												
10	15												
15	10	W									A 4 ft long geoprobe screen water sampler lowered to 20 ft and water sample collected at approximately 19 ft bgs. Water recharge very slow due to the low soil permeability. Sampler removed after collection of the water sample, and actual water level was not measured. Water level assumed to be higher than 19 ft bgs.		
20	5										Borehole completed at 20 ft bgs and backfilled with bentonite chips.		
25	0												
30	-5												

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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FIGURE A-4

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 1	G-405-02

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/19/2009	1/19/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Kehoe Testing and Engineering	2	20	25	N/A	▼ 19.0 / *6.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
Geoprobe 6600	N/A	N/A	N/A	N/A

DRILLING METHOD	SAMPLING METHOD	NOTES
Geoprobe	Geoprobe GH60 hammer	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
5	20										No soil samples collected. Borehole not logged.		
10	15												
15	10												
20	5	W									A 4 ft long geoprobe screen water sampler lowered to 20 ft and water sample collected at approximately 19 ft bgs. Water recharge very slow due to the low soil permeability. Sampler removed after collection of the water sample, and actual water level was not measured. Water level assumed to be higher than 19 ft bgs.		
25	0										Borehole completed at 20 ft bgs and backfilled with bentonite chips.		
30	-5												

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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FIGURE A-5

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 1	G-405-03

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/20/2009	1/20/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Kehoe Testing and Engineering	2	25	27	N/A	▼ 24.0 / *3.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
Geoprobe 6600	N/A	N/A	N/A	N/A

DRILLING METHOD	SAMPLING METHOD	NOTES
Geoprobe	Geoprobe GH60 hammer	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
0	25										No soil samples collected. Borehole not logged.		
5	20												
10	15												
15	10												
20	5										A 4 ft long geoprobe screen water sampler lowered to 25 ft and water sample collected at approximately 24 ft bgs. Water recharge very slow due to the low soil permeability. Sampler removed after collection of the water sample, and actual water level was not measured. Water level assumed to be higher than 24 ft bgs.		
25	0	W									Borehole completed at 25 ft bgs and backfilled with bentonite chips.		
30	-5												

GDC_BORING_WWELL_I-436 PHASE 2 ENVIRO.GPJ_GDC_WELL.GDT_1/27/09

GROUP DELTA CONSULTANTS, INC.
92 Argonaut, Suite 120
Aliso Viejo, CA 92656

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-6

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 1	G-405-04

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/19/2009	1/19/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Kehoe Testing and Engineering	2	24	24	N/A	▼ 22.0 / *2.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
Geoprobe 6600	N/A	N/A	N/A	N/A

DRILLING METHOD	SAMPLING METHOD	NOTES
Geoprobe	Geoprobe GH60 hammer	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
0	20										No soil samples collected. Borehole not logged.		
5	15												
10	10												
15	5												
20	0	W									A 4 ft long geoprobe screen water sampler lowered to 24 ft and water sample collected at approximately 22 ft bgs. Water recharge very slow due to the low soil permeability. Sampler removed after collection of the water sample, and actual water level was not measured. Water level assumed to be higher than 22 ft bgs. Borehole completed at 24 ft bgs and backfilled with bentonite chips.		
25	-5												
30													

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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Aliso Viejo, CA 92656

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-7

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 1	G-405-05

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/16/2009	1/16/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH *ELEV.* GROUND WATER (ft.)
Kehoe Testing and Engineering	2	19	33	N/A	▼ N/A / *na*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
Geoprobe 6600	N/A	N/A	N/A	N/A

DRILLING METHOD	SAMPLING METHOD	NOTES
Geoprobe	Geoprobe GH60 hammer	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
0	30										Sandy Clay to Clayey Sand (CL/SC) with occasional sand lenses.		
5			1										
	25		2										
10			3										
	20		4										
15			5										
			6										
	15		7										
20											Boring completed at 19 ft bgs and backfilled with bentonite chips. Groundwater not encountered.		
	10												
25													
	5												
30													

GDC_BORING_W/WELL_I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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Aliso Viejo, CA 92656

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-8

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 1	G-405-06

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/16/2009	1/16/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Kehoe Testing and Engineering	2	31	33	N/A	▼ 27.0 / *6.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
Geoprobe 6600	N/A	N/A	N/A	N/A

DRILLING METHOD	SAMPLING METHOD	NOTES
Geoprobe	Geoprobe GH60 hammer	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
0	30	T	1								Sandy Clay to Clayey Sand (CL/SC) with occasional sand lenses.		
5	25	T	2										
10	20	T	3										
15	15	T	4										
20	10	T	5										
25	5	T	6										
30		T	7										
		W	8								A 4 ft long geoprobe screen water sampler lowered to 28 ft and water sample collected at approximately 27 ft bgs. Water recharge very slow due to the low soil permeability. Sampler removed after collection of the water sample, and actual water level was not measured. Water level assumed to be higher than 27 ft bgs.		
											Boring completed at 31 ft bgs.		

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-9

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	SHEET NO.	BORING
SR-22/I-405 Connector Improvements	I-436-A	1 of 1	G-405-07

SITE LOCATION	LOGGED BY	CHECKED BY	START	FINISH
Orange County, California	C. Blanco	V. Glisic	1/14/2009	1/20/2009

DRILLING COMPANY	BORING DIA. (in.)	TOTAL DEPTH (ft.)	GROUND ELEV (ft.)	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER (ft.)
Kehoe Testing and Engineering	2	30	25	N/A	▼ 24.0 / *1.0*

DRILLING EQUIPMENT	CASING TYPE/DIA.	SCREEN SLOT SIZE	FILTER PACK TYPE	GROUT TYPE
Geoprobe 6600	N/A	N/A	N/A	N/A

DRILLING METHOD	SAMPLING METHOD	NOTES
Geoprobe	Geoprobe GH60 hammer	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft.)	DRY DENSITY (pcf)	MOISTURE (%)	ATTERBERG LIMITS (LL:PI)	POCKET PEN (tsf)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL GRAPHICS	WELL DIAGRAM
5	20										No soil samples collected. Borehole not logged.		
10	15												
15	10												
20	5												
25	0	W									A 4 ft long geoprobe screen water sampler lowered to 25 ft and water sample collected at approximately 24 ft bgs. Water recharge very slow due to the low soil permeability. Sampler removed after collection of the water sample, and actual water level was not measured. Water level assumed to be higher than 24 ft bgs.		
30	-5										Borehole completed at 30 ft bgs and backfilled with bentonite chips.		

GDC_BORING_WWELL I-436 PHASE 2 ENVIRO.GPJ GDC_WELL.GDT 1/27/09

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Aliso Viejo, CA 92656

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-10

APPENDIX B
LABORATORY TESTING

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Tel: (888) 288-AETL • (818) 845-8200 • Fax: (818) 845-8840 • www.aetlab.com

Ordered By

Group Delta Consultants
32 Mauchly Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attention: Shah Ghanbari

Number of Pages	**10**
Date Received	**01/20/2009**
Date Reported	**01/23/2009**

Job Number	Order Date	Client
51110	01/20/2009	GROUP

Project ID: I-436
Project Name: SR-22 Phase II
Site: G-405-04 SR-22 Phase II
NB Valley on Ramp to 405
G-405-07 NB 405

Enclosed please find results of analyses of 4 water samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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CHAIN OF CUSTODY RECORD

NO 61556

AETL JOB No. 51110

COMPANY: Group Delta
PROJECT MANAGER: Vesna Glisic
COMPANY ADDRESS:
PHONE: 949-450-2100
FAX:
PROJECT NAME: SR-22 Phase II
PROJECT #: I-436
SITE NAME AND ADDRESS: G405047 SR-22 Phase II N/B Valley on ramp to 405 G-405-07 N/B 405
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8260B	M8015G	8015D	ANALYSIS REQUESTED	TEST INSTRUCTIONS & COMMENTS
S-1	G-405-04	51110.01	1-19-09	10:39	water	40ML VOA	HCL	✓	✓	WATER		
S-2							HCL	✓	✓	WATER		
S-3							HCL	✓	✓	WATER		
S-4							HCL	✓	✓	WATER		
S-5				11:05		1 Liter Amber				✓		
S-6	✓	✓	✓	11:19	✓	✓				✓		
7												
S-1	G-405-07	51110.02	1-19-09	1:10	water	40ML VOA	HCL	✓	✓			
S-2							HCL	✓	✓			
S-3							HCL	✓	✓			
S-4							HCL	✓	✓			
S-5				1:15		1 Liter amber				✓		
S-6	✓	✓	✓	1:17	✓	✓				✓		
14												
15												

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	12	PROPERLY COOLED (Y) N / NA	
CUSTODY SEALS Y (N) NA		SAMPLES INTACT (Y) N / NA	
RECEIVED IN GOOD COND. (Y) N		SAMPLES ACCEPTED (Y) N	

TURN AROUND TIME

☐ NORMAL ☒ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER:	Signature: Vesna Glisic Printed Name: Vesna Glisic Date: 1/20/09 Time: 9:55	RELINQUISHED BY: Signature: Printed Name: Date: Time:	RELINQUISHED BY: Signature: Printed Name: Carlos Gonzalez Date: 1/20/09 Time: 1130
RECEIVED BY:	Signature: Printed Name: Carlos Gonzalez Date: 1/20/09 Time: 9:55	RECEIVED BY: Signature: Printed Name: Date: Time:	RECEIVED BY LABORATORY: Signature: Printed Name: Jimmy Date: 1/20/09 Time: 1130

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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CHAIN OF CUSTODY RECORD

№ 61555

COMPANY: Group Delta
PROJECT MANAGER: Vesna Glisic
COMPANY ADDRESS:
PHONE: 949-450-2100
FAX:
PROJECT NAME: SR-22 Phase II
PROJECT #: I-436
SITE NAME AND ADDRESS: W/B SR-22 Phase II Valley View on ramp Shoulder/G-405-01
E/B SR-22 Phase II Valley View on ramp Shoulder/G-405-02
PO #:
AETL JOB No. 51110
Page 2 of 2

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8240B	M 8015G	8015D	TEST INSTRUCTIONS & COMMENTS
1	G-405-02	19-20'	1-19-09	3:20	water	40ML VOA	HCL	✓	✓		51110.03
2								✓	✓		
3								✓	✓		
4								✓	✓		
5				3:25		1 Liter amber				✓	
6				3:37						✓	
7											
8	G-405-01	19-20'	1-19-09	3:50	Water	~~1 Liter amber~~	HCL	✓	✓		51110.04
9						40ML VOA	HCL	✓	✓		
10							HCL	✓	✓		
11							HCL	✓	✓		
12				3:55		1-Liter amber				✓	
13										✓	
14											
15											

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	12	PROPERLY COOLED (Y) N / NA	
CUSTODY SEALS Y (N) NA		SAMPLES INTACT (Y) N / NA	
RECEIVED IN GOOD COND. (Y) N		SAMPLES ACCEPTED (Y) N	

TURN AROUND TIME

☐ NORMAL ☒ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☒ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER:		RELINQUISHED BY:	RELINQUISHED BY:
Signature:		Signature:	Signature:
Printed Name:	Vesna Glisic	Printed Name:	Printed Name: Carlos Gonzalez
Date:	1/20/09 Time: 9:53	Date: Time:	Date: 1/20/09 Time: 1130
RECEIVED BY:	1.	2.	3.
Signature:		Signature:	Signature:
Printed Name:	Carlos Gonzalez	Printed Name:	Printed Name:
Date:	1/20/09 Time: 9:53	Date: Time:	Date: 1/20/09 Time: 1130

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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ANALYTICAL RESULTS

Ordered By

Group Delta Consultants
32 Mauchly
Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attn: Shah Ghanbari

Site

G-405-04 SR-22 Phase II
NB Valley on Ramp to 405
G-405-07 NB 405

Page: **2**

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1

Our Lab I.D.			Method Blank	51110.01	51110.02	51110.03	51110.04
Client Sample I.D.				G-405-04	G-405-07	G-405-02	G-405-01
Date Sampled				01/19/2009	01/19/2009	01/19/2009	01/19/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Acetone	10	10	ND	ND	ND	ND	ND
Benzene	0.5	1.0	ND	ND	ND	ND	ND
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND	ND	ND	ND
Bromochloromethane	0.5	1.0	ND	ND	ND	ND	ND
Bromodichloromethane	0.5	1.0	ND	ND	ND	ND	ND
Bromoform (Tribromomethane)	2.5	5.0	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND	ND	ND	ND
2-Butanone (MEK)	5.0	5.0	ND	ND	ND	ND	ND
n-Butylbenzene	0.5	1.0	ND	ND	ND	ND	ND
sec-Butylbenzene	0.5	1.0	ND	ND	ND	ND	ND
tert-Butylbenzene	0.5	1.0	ND	ND	ND	ND	ND
Carbon Disulfide	0.5	1.0	ND	ND	ND	ND	ND
Carbon tetrachloride	0.5	1.0	ND	ND	ND	ND	ND
Chlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
Chloroethane	1.5	3.0	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	0.5	1.0	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND	ND	ND	ND
2-Chlorotoluene	0.5	1.0	ND	ND	ND	ND	ND
4-Chlorotoluene	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND	ND	ND	ND
Dibromochloromethane	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND	ND	ND	ND
Dibromomethane	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1

Our Lab I.D.			Method Blank	51110.01	51110.02	51110.03	51110.04
Client Sample I.D.				G-405-04	G-405-07	G-405-02	G-405-01
Date Sampled				01/19/2009	01/19/2009	01/19/2009	01/19/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Dichlorodifluoromethane	1.5	3.0	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	0.5	1.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.5	1.0	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.5	1.0	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.5	1.0	ND	ND	ND	ND	ND
1,3-Dichloropropane	0.5	1.0	ND	ND	ND	ND	ND
2,2-Dichloropropane	0.5	1.0	ND	ND	ND	ND	ND
1,1-Dichloropropene	0.5	1.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.5	1.0	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.5	1.0	ND	ND	ND	ND	ND
Ethylbenzene	0.5	1.0	ND	ND	ND	ND	ND
Hexachlorobutadiene	1.5	3.0	ND	ND	ND	ND	ND
2-Hexanone	2.5	5.0	ND	ND	ND	ND	ND
Isopropylbenzene	0.5	1.0	ND	ND	ND	ND	ND
p-Isopropyltoluene	0.5	1.0	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	0.5	1.0	ND	ND	ND	ND	ND
Methylene chloride (DCM)	2.0	4.0	ND	ND	ND	ND	ND
Naphthalene	0.5	1.0	ND	ND	ND	ND	ND
n-Propylbenzene	0.5	1.0	ND	ND	ND	ND	ND
Styrene	0.5	1.0	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	0.5	1.0	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	1.0	ND	ND	ND	ND	ND
Tetrachloroethene	0.5	1.0	ND	ND	ND	ND	ND
Toluene (Methyl benzene)	0.5	1.0	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.5	1.0	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.5	1.0	ND	ND	ND	ND	ND
Trichloroethene	0.5	1.0	ND	ND	ND	ND	ND
Trichlorofluoromethane	0.5	1.0	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	0.5	1.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1

Our Lab I.D.			Method Blank	**51110.01**	**51110.02**	**51110.03**	**51110.04**
Client Sample I.D.				G-405-04	G-405-07	G-405-02	G-405-01
Date Sampled				**01/19/2009**	**01/19/2009**	**01/19/2009**	**01/19/2009**
Date Prepared			**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**
Preparation Method			**5030B**	**5030B**	**5030B**	**5030B**	**5030B**
Date Analyzed			**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
1,2,4-Trimethylbenzene	**0.5**	**1.0**	**ND**	**ND**	**ND**	**ND**	**ND**
1,3,5-Trimethylbenzene	**0.5**	**1.0**	**ND**	**ND**	**ND**	**ND**	**ND**
Vinyl Acetate	**0.5**	**5.0**	**ND**	**ND**	**ND**	**ND**	**ND**
Vinyl chloride (Chloroethene)	**0.5**	**3.0**	**ND**	**ND**	**ND**	**ND**	**ND**
o-Xylene	**0.5**	**1.0**	**ND**	**ND**	**ND**	**ND**	**ND**
m,p-Xylenes	**1.0**	**2.0**	**ND**	**ND**	**ND**	**ND**	**ND**
Our Lab I.D.			Method Blank	**51110.01**	**51110.02**	**51110.03**	**51110.04**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	**75-125**		**98.6**	**97.7**	**96.3**	**94.3**	**93.7**
Dibromofluoromethane	**75-125**		**102**	**101**	**100**	**100**	**99.5**
Toluene-d8	**75-125**		**88.4**	**88.2**	**90.0**	**89.0**	**88.9**

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Attn: Shah Ghanbari

Site

G-405-04 SR-22 Phase II
NB Valley on Ramp to 405
G-405-07 NB 405

Page: **5**

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			Method Blank	51110.01	51110.02	51110.03	51110.04
Client Sample I.D.				G-405-04	G-405-07	G-405-02	G-405-01
Date Sampled				01/19/2009	01/19/2009	01/19/2009	01/19/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			mg/L	mg/L	mg/L	mg/L	mg/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	51110.01	51110.02	51110.03	51110.04
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		105	101	105	106	103

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G-405-04 SR-22 Phase II
NB Valley on Ramp to 405
G-405-07 NB 405

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012009

Our Lab I.D.			Method Blank	**51110.01**	**51110.02**	**51110.03**	**51110.04**
Client Sample I.D.				G-405-04	G-405-07	G-405-02	G-405-01
Date Sampled				**01/19/2009**	**01/19/2009**	**01/19/2009**	**01/19/2009**
Date Prepared			**01/20/2009**	**01/20/2009**	**01/20/2009**	**01/20/2009**	**01/20/2009**
Preparation Method			**3510C**	**3510C**	**3510C**	**3510C**	**3510C**
Date Analyzed			**01/22/2009**	**01/22/2009**	**01/22/2009**	**01/22/2009**	**01/22/2009**
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			mg/L	mg/L	mg/L	mg/L	mg/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	**0.1**	**0.5**	**ND**	**0.545**	**ND**	**ND**	**ND**
TPH as Heavy Hydrocarbons (C23-C40)	**0.1**	**0.5**	**ND**	**ND**	**ND**	**ND**	**ND**
TPH Total as Diesel and Heavy HC.C13-C40	**0.1**	**0.5**	**ND**	**0.545**	**ND**	**ND**	**ND**
Our Lab I.D.			Method Blank	**51110.01**	**51110.02**	**51110.03**	**51110.04**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	**60-125**		**71.9**	**80.6**	**76.9**	**72.2**	**60.2**

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Site

G-405-04 SR-22 Phase II
NB Valley on Ramp to 405
G-405-07 NB 405

Page: **7**

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1; Dup or Spiked Sample: B0121091A1; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit	
Benzene	50.0	55.1	110	50.0	55.9	112	1.80	75-125	<20	
Chlorobenzene	50.0	49.1	98.2	50.0	49.2	98.4	<1	75-125	<20	
1,1-Dichloroethene	50.0	44.8	89.6	50.0	45.2	90.4	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	41.0	82.0	50.0	41.2	82.4	<1	75-125	<20	
Toluene (Methyl benzene)	50.0	46.1	92.2	50.0	46.4	92.8	<1	75-125	<20	
Trichloroethene	50.0	58.9	118	50.0	58.6	117	<1	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	42.7	85.3	50.0	43.1	86.2	1.06	75-125	<20	
Dibromofluoromethane	50.0	51.0	102	50.0	50.6	101	<1	75-125	<20	
Toluene-d8	50.0	42.9	85.8	50.0	43.2	86.3	<1	75-125	<20	

QC Batch No: 0121091A1; Dup or Spiked Sample: B0121091A1; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Benzene	50.0	53.8	108	75-125						
Chlorobenzene	50.0	48.2	96.4	75-125						
1,1-Dichloroethene	50.0	44.6	89.2	75-125						
Methyl-tert-butyl ether (MTBE)	50.0	40.2	80.4	75-125						
Toluene (Methyl benzene)	50.0	46.1	92.2	75-125						
Trichloroethene	50.0	58.3	117	75-125						
LCS										
Chloroform (Trichloromethane)	50.0	57.6	115	75-125						
Ethylbenzene	50.0	45.0	90.0	75-125						
1,1,1-Trichloroethane	50.0	46.6	93.2	75-125						
o-Xylene	50.0	46.6	93.2	75-125						
m,p-Xylenes	100	92.9	92.9	75-125						
Surrogates										
Bromofluorobenzene	50.0	42.8	85.5	75-125						
Dibromofluoromethane	50.0	50.2	100	75-125						

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QUALITY CONTROL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1; Dup or Spiked Sample: B0121091A1; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Toluene-d8	**50.0**	**43.2**	**86.3**	**75-125**						

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Site

G-405-04 SR-22 Phase II
NB Valley on Ramp to 405
G-405-07 NB 405

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/23/2009; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	5.00	5.50	110	5.00	5.05	101	8.5	75-125	<20
Surrogates										
Chlorobenzene	0.00	2.00	1.39	69.3	2.00	1.31	65.5	5.6	60-125	<20

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/23/2009; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	5.00	6.05	121	75-125						
Surrogates										
Chlorobenzene	2.00	1.64	81.9	60-125						

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Site

G-405-04 SR-22 Phase II
NB Valley on Ramp to 405
G-405-07 NB 405

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51110	01/20/2009	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109; Dup or Spiked Sample: B012109; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	0.500	0.500	100	0.500	0.510	102	2.0	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0535	107	0.0500	0.0590	118	9.8	75-125	<20

QC Batch No: 012109; Dup or Spiked Sample: B012109; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.510	102	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0560	112	75-125						

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Attention: Vesna Glisic

Number of Pages	**30**
Date Received	**01/20/2009**
Date Reported	**01/29/2009**

Job Number	Order Date	Client
51136	01/20/2009	GROUP

Project ID: I-436
Project Name: SR-22 Phase II

Enclosed please find results of analyses of 5 water samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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CHAIN OF CUSTODY RECORD

№ 56271

AETL JOB No. 51136

COMPANY: Group Delta
PROJECT MANAGER: Vesna G
COMPANY ADDRESS: 32 Mauchly, Irvine CA 92618-2336
PHONE: 949-244-1345
FAX:
PROJECT NAME: SR-22 Phase II
PROJECT #: I-436
SITE NAME AND ADDRESS:
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.
1	G 405-#3	51136.01	1-20-09	11:21	Water	4X40mL VOA	HCL
2	↓ ↓	~~51136.09~~ (N)		11:36		2X1LT Amber	ice
3	MW 405-#2	51136.02		10:20		4X40mL VOA	HCL
4	↓ ↓			10:36		2X1LT Amber	ice
5	MW 405-#1	51136.03		10:55		4X40mL VOA	HCL
6	↓ ↓			MAM		2X1LT Amber	ice
7	MW 605-1	51136.04		1:48		4X40 mL VOA	HCL
8	↓ ↓			1:53-1:56		4X1LT amber	ice
9	↓ ↓			2 PM		1-250mL P	ice
10	↓ ↓			2:05		1-125mL P	ice
11	G 605-1	51136.05	↓	1:21		4X40mL VOA	HCL
12	↓ ↓			2:56-58		4X1liter amber	ice
13	↓ ↓			3:05		1-250mL P	ice
14	↓ ↓		↓	↓ ↓	↓	1-125mL P	ice
15							

ANALYSIS REQUESTED

8260B	M 8015G	8015D	8270C	8081A	8082	~~6010B~~ (200.8)	150.1
X	X						
		X					
X	X						
		X					
X	X						
		X					
X	X						
		X	X	X	X		
						X	
							X
X	X						
		X	X	X	X		
						X	
							X

TEST INSTRUCTIONS & COMMENTS:

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	38	PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT Y / N / NA	
RECEIVED IN GOOD COND. Y / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☒ NORMAL ☒ RUSH (ON) ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☒ 3 DAYS (ON)

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	Signature:	Signature:
Printed Name: CHUCK BIANCO	Printed Name:	Printed Name: CARLOS GONZALEZ
Date: 1/20/09 Time: 4:56PM	Date: Time:	Date: 1/20/09 Time: 1905
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY LABORATORY: 3.**
Signature:	Signature:	Signature:
Printed Name: CARLOS GONZALEZ	Printed Name:	Printed Name: Shan Claude
Date: 1/20/09 Time: 4:56	Date: Time:	Date: 1/20/09 Time: 1905

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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ANALYTICAL RESULTS

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Attn: Vesna Glisic
Page: **2**

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2

Our Lab I.D.			Method Blank	51136.01	51136.02	51136.03	51136.04
Client Sample I.D.				G-405-3	MW-405-2	MW-405-1	MW-605-1
Date Sampled				01/20/2009	01/20/2009	01/20/2009	01/20/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Acetone	10	10	ND	ND	ND	ND	ND
Benzene	0.5	1.0	ND	ND	ND	ND	ND
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND	ND	ND	ND
Bromochloromethane	0.5	1.0	ND	ND	ND	ND	ND
Bromodichloromethane	0.5	1.0	ND	ND	ND	ND	ND
Bromoform (Tribromomethane)	2.5	5.0	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND	ND	ND	ND
2-Butanone (MEK)	5.0	5.0	ND	ND	ND	ND	ND
n-Butylbenzene	0.5	1.0	ND	ND	ND	ND	ND
sec-Butylbenzene	0.5	1.0	ND	ND	ND	ND	ND
tert-Butylbenzene	0.5	1.0	ND	ND	ND	ND	ND
Carbon Disulfide	0.5	1.0	ND	ND	ND	ND	ND
Carbon tetrachloride	0.5	1.0	ND	ND	ND	ND	ND
Chlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
Chloroethane	1.5	3.0	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	0.5	1.0	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND	ND	ND	ND
2-Chlorotoluene	0.5	1.0	ND	ND	ND	ND	ND
4-Chlorotoluene	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND	ND	ND	ND
Dibromochloromethane	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND	ND	ND	ND
Dibromomethane	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2

Our Lab I.D.			Method Blank	51136.01	51136.02	51136.03	51136.04
Client Sample I.D.				G-405-3	MW-405-2	MW-405-1	MW-605-1
Date Sampled				01/20/2009	01/20/2009	01/20/2009	01/20/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Dichlorodifluoromethane	1.5	3.0	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	0.5	1.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.5	1.0	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.5	1.0	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	0.5	1.0	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.5	1.0	ND	ND	ND	ND	ND
1,3-Dichloropropane	0.5	1.0	ND	ND	ND	ND	ND
2,2-Dichloropropane	0.5	1.0	ND	ND	ND	ND	ND
1,1-Dichloropropene	0.5	1.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.5	1.0	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.5	1.0	ND	ND	ND	ND	ND
Ethylbenzene	0.5	1.0	ND	ND	ND	ND	ND
Hexachlorobutadiene	1.5	3.0	ND	ND	ND	ND	ND
2-Hexanone	2.5	5.0	ND	ND	ND	ND	ND
Isopropylbenzene	0.5	1.0	ND	ND	ND	ND	ND
p-Isopropyltoluene	0.5	1.0	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	0.5	1.0	ND	ND	ND	ND	ND
Methylene chloride (DCM)	2.0	4.0	ND	ND	ND	ND	ND
Naphthalene	0.5	1.0	ND	ND	ND	ND	ND
n-Propylbenzene	0.5	1.0	ND	ND	ND	ND	ND
Styrene	0.5	1.0	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	0.5	1.0	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	1.0	ND	ND	ND	ND	ND
Tetrachloroethene	0.5	1.0	ND	ND	ND	ND	ND
Toluene (Methyl benzene)	0.5	1.0	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	0.5	1.0	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.5	1.0	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.5	1.0	ND	ND	ND	ND	ND
Trichloroethene	0.5	1.0	ND	ND	ND	ND	ND
Trichlorofluoromethane	0.5	1.0	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	0.5	1.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2

Our Lab I.D.			Method Blank	51136.01	51136.02	51136.03	51136.04
Client Sample I.D.				G-405-3	MW-405-2	MW-405-1	MW-605-1
Date Sampled				01/20/2009	01/20/2009	01/20/2009	01/20/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
1,2,4-Trimethylbenzene	0.5	1.0	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	0.5	1.0	ND	ND	ND	ND	ND
Vinyl Acetate	0.5	5.0	ND	ND	ND	ND	ND
Vinyl chloride (Chloroethene)	0.5	3.0	ND	ND	ND	ND	ND
o-Xylene	0.5	1.0	ND	ND	ND	ND	ND
m,p-Xylenes	1.0	2.0	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	51136.01	51136.02	51136.03	51136.04
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		102	98.1	97.8	94.3	94.6
Dibromofluoromethane	75-125		106	104	103	102	101
Toluene-d8	75-125		87.0	87.2	87.7	87.6	87.3

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2

Our Lab I.D.			51136.05				
Client Sample I.D.			G-605-1				
Date Sampled			01/20/2009				
Date Prepared			01/22/2009				
Preparation Method			5030B				
Date Analyzed			01/22/2009				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	10	10	ND				
Benzene	0.5	1.0	ND				
Bromobenzene (Phenyl bromide)	0.5	1.0	ND				
Bromochloromethane	0.5	1.0	ND				
Bromodichloromethane	0.5	1.0	ND				
Bromoform (Tribromomethane)	2.5	5.0	ND				
Bromomethane (Methyl bromide)	1.5	3.0	ND				
2-Butanone (MEK)	5.0	5.0	ND				
n-Butylbenzene	0.5	1.0	ND				
sec-Butylbenzene	0.5	1.0	ND				
tert-Butylbenzene	0.5	1.0	ND				
Carbon Disulfide	0.5	1.0	ND				
Carbon tetrachloride	0.5	1.0	ND				
Chlorobenzene	0.5	1.0	ND				
Chloroethane	1.5	3.0	ND				
2-Chloroethyl vinyl ether	2.5	5.0	ND				
Chloroform (Trichloromethane)	0.5	1.0	ND				
Chloromethane (Methyl chloride)	1.5	3.0	ND				
2-Chlorotoluene	0.5	1.0	ND				
4-Chlorotoluene	0.5	1.0	ND				
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND				
Dibromochloromethane	0.5	1.0	ND				
1,2-Dibromoethane (EDB)	0.5	1.0	ND				
Dibromomethane	0.5	1.0	ND				
1,2-Dichlorobenzene	0.5	1.0	ND				
1,3-Dichlorobenzene	0.5	1.0	ND				
1,4-Dichlorobenzene	0.5	1.0	ND				

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2

Our Lab I.D.			51136.05				
Client Sample I.D.			G-605-1				
Date Sampled			01/20/2009				
Date Prepared			01/22/2009				
Preparation Method			5030B				
Date Analyzed			01/22/2009				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Dichlorodifluoromethane	1.5	3.0	ND				
1,1-Dichloroethane	0.5	1.0	ND				
1,2-Dichloroethane (EDC)	0.5	1.0	ND				
1,1-Dichloroethene	0.5	1.0	ND				
cis-1,2-Dichloroethene	0.5	1.0	ND				
trans-1,2-Dichloroethene	0.5	1.0	ND				
1,2-Dichloropropane	0.5	1.0	ND				
1,3-Dichloropropane	0.5	1.0	ND				
2,2-Dichloropropane	0.5	1.0	ND				
1,1-Dichloropropene	0.5	1.0	ND				
cis-1,3-Dichloropropene	0.5	1.0	ND				
trans-1,3-Dichloropropene	0.5	1.0	ND				
Ethylbenzene	0.5	1.0	ND				
Hexachlorobutadiene	1.5	3.0	ND				
2-Hexanone	2.5	5.0	ND				
Isopropylbenzene	0.5	1.0	ND				
p-Isopropyltoluene	0.5	1.0	ND				
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND				
Methyl-tert-butyl ether (MTBE)	0.5	1.0	ND				
Methylene chloride (DCM)	2.0	4.0	ND				
Naphthalene	0.5	1.0	ND				
n-Propylbenzene	0.5	1.0	ND				
Styrene	0.5	1.0	ND				
1,1,1,2-Tetrachloroethane	0.5	1.0	ND				
1,1,2,2-Tetrachloroethane	0.5	1.0	ND				
Tetrachloroethene	0.5	1.0	ND				
Toluene (Methyl benzene)	0.5	1.0	ND				
1,2,3-Trichlorobenzene	0.5	1.0	ND				
1,2,4-Trichlorobenzene	0.5	1.0	ND				
1,1,1-Trichloroethane	0.5	1.0	ND				
1,1,2-Trichloroethane	0.5	1.0	ND				
Trichloroethene	0.5	1.0	ND				
Trichlorofluoromethane	0.5	1.0	ND				
1,2,3-Trichloropropane	0.5	1.0	ND				

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2

Our Lab I.D.			**51136.05**				
Client Sample I.D.			G-605-1				
Date Sampled			01/20/2009				
Date Prepared			01/22/2009				
Preparation Method			5030B				
Date Analyzed			01/22/2009				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
1,2,4-Trimethylbenzene	0.5	1.0	ND				
1,3,5-Trimethylbenzene	0.5	1.0	ND				
Vinyl Acetate	0.5	5.0	ND				
Vinyl chloride (Chloroethene)	0.5	3.0	ND				
o-Xylene	0.5	1.0	ND				
m,p-Xylenes	1.0	2.0	ND				
Our Lab I.D.			**51136.05**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		95.0				
Dibromofluoromethane	75-125		103				
Toluene-d8	75-125		88.0				

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			Method Blank	51136.01	51136.02	51136.03	51136.04
Client Sample I.D.				G-405-3	MW-405-2	MW-405-1	MW-605-1
Date Sampled				01/20/2009	01/20/2009	01/20/2009	01/20/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			mg/L	mg/L	mg/L	mg/L	mg/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	51136.01	51136.02	51136.03	51136.04
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		105	98.0	113	107	111

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			**51136.05**				
Client Sample I.D.			G-605-1				
Date Sampled			01/20/2009				
Date Prepared			01/21/2009				
Preparation Method			5030B				
Date Analyzed			01/21/2009				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND				
Our Lab I.D.			**51136.05**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		115				

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012009

Our Lab I.D.			Method Blank	**51136.01**	**51136.02**	**51136.03**	**51136.04**
Client Sample I.D.				G-405-3	MW-405-2	MW-405-1	MW-605-1
Date Sampled				01/20/2009	01/20/2009	01/20/2009	01/20/2009
Date Prepared			01/20/2009	01/20/2009	01/20/2009	01/20/2009	01/20/2009
Preparation Method			3510C	3510C	3510C	3510C	3510C
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/23/2009	01/23/2009
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			mg/L	mg/L	mg/L	mg/L	mg/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	0.1	0.5	ND	ND	ND	ND	ND
TPH as Heavy Hydrocarbons (C23-C40)	0.1	0.5	ND	ND	ND	ND	ND
TPH Total as Diesel and Heavy HC.C13-C40	0.1	0.5	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	**51136.01**	**51136.02**	**51136.03**	**51136.04**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	60-125		71.9	79.6	82.1	82.9	71.9

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012009

Our Lab I.D.			**51136.05**				
Client Sample I.D.			G-605-1				
Date Sampled			01/20/2009				
Date Prepared			01/20/2009				
Preparation Method			3510C				
Date Analyzed			01/23/2009				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Diesel (C13-C22)	0.1	0.5	ND				
TPH as Heavy Hydrocarbons (C23-C40)	0.1	0.5	ND				
TPH Total as Diesel and Heavy HC.C13-C40	0.1	0.5	ND				
Our Lab I.D.			**51136.05**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Chlorobenzene	60-125		77.6				

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8270C, Semivolatile Organic Compounds by GC/MS (SW-846)

QC Batch No: 012209

Our Lab I.D.			Method Blank	51136.04	51136.05		
Client Sample I.D.				MW-605-1	G-605-1		
Date Sampled				01/20/2009	01/20/2009		
Date Prepared			01/22/2009	01/22/2009	01/22/2009		
Preparation Method			3510C	3510C	3510C		
Date Analyzed			01/22/2009	01/22/2009	01/22/2009		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Acenaphthene	5	10	ND	ND	ND		
Acenaphthylene	5	10	ND	ND	ND		
Anthracene	5	10	ND	ND	ND		
Azobenzene	5	10	ND	ND	ND		
Benzidine	5	10	ND	ND	ND		
Benzo(a)anthracene	5	10	ND	ND	ND		
Benzo(a)pyrene	5	10	ND	ND	ND		
Benzo(b)fluoranthene	5	10	ND	ND	ND		
Benzo(g,h,i)perylene	5	10	ND	ND	ND		
Benzo(k)fluoranthene	5	10	ND	ND	ND		
Benzoic Acid	5	10	ND	ND	ND		
Benzyl Alcohol	5	10	ND	ND	ND		
Bis(2-Chloroethoxy)methane	5	10	ND	ND	ND		
Bis(2-Chloroethyl)ether	5	10	ND	ND	ND		
Bis(2-chloroisopropyl) ether	5	10	ND	ND	ND		
Bis(2-ethylhexyl) phthalate	5	10	ND	ND	ND		
4-Bromophenyl phenyl ether	5	10	ND	ND	ND		
Butyl benzyl phthalate	5	10	ND	ND	ND		
4-Chloro-3-methylphenol	5	10	ND	ND	ND		
4-Chloroaniline	5	10	ND	ND	ND		
2-Chloronaphthalene	5	10	ND	ND	ND		
2-Chlorophenol	5	10	ND	ND	ND		
4-Chlorophenyl phenyl ether	5	10	ND	ND	ND		
Chrysene	5	10	ND	ND	ND		
Di-n-butyl phthalate	5	10	ND	ND	ND		
Di-n-octyl phthalate (Dioctyl ester)	5	10	ND	ND	ND		
Dibenzo(a,h)anthracene	5	10	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8270C, Semivolatile Organic Compounds by GC/MS (SW-846)

QC Batch No: 012209

Our Lab I.D.			Method Blank	**51136.04**	**51136.05**		
Client Sample I.D.				MW-605-1	G-605-1		
Date Sampled				01/20/2009	01/20/2009		
Date Prepared			01/22/2009	01/22/2009	01/22/2009		
Preparation Method			3510C	3510C	3510C		
Date Analyzed			01/22/2009	01/22/2009	01/22/2009		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Dibenzofuran	5	10	ND	ND	ND		
1,2-Dichlorobenzene	5	10	ND	ND	ND		
1,3-Dichlorobenzene	5	10	ND	ND	ND		
1,4-Dichlorobenzene	5	10	ND	ND	ND		
3,3'-Dichlorobenzidine	5	10	ND	ND	ND		
2,4-Dichlorophenol	5	10	ND	ND	ND		
Diethyl phthalate (Diethyl ester)	5	10	ND	ND	ND		
Dimethyl phthalate (Dimethyl ester)	5	10	ND	ND	ND		
2,4-Dimethylphenol	5	10	ND	ND	ND		
4,6-Dinitro-2-methylphenol	5	10	ND	ND	ND		
2,4-Dinitrophenol	5	10	ND	ND	ND		
2,4-Dinitrotoluene	5	10	ND	ND	ND		
2,6-Dinitrotoluene (2,6-DNT)	5	10	ND	ND	ND		
1,2-Diphenylhydrazine	5	10	ND	ND	ND		
Fluoranthene	5	10	ND	ND	ND		
Fluorene	5	10	ND	ND	ND		
Hexachlorobenzene	5	10	ND	ND	ND		
Hexachlorobutadiene	5	10	ND	ND	ND		
Hexachlorocyclopentadiene	5	10	ND	ND	ND		
Hexachloroethane	5	10	ND	ND	ND		
Indeno(1,2,3-cd)pyrene	5	10	ND	ND	ND		
Isophorone	5	10	ND	ND	ND		
2-Methylnaphthalene	5	10	ND	ND	ND		
4-Methylphenol	5	10	ND	ND	ND		
2-Methylphenol (2-Cresol)	5	10	ND	ND	ND		
3-Methylphenol (3-Cresol)	5	10	ND	ND	ND		
N-Nitroso-Di-n-propylamine	5	10	ND	ND	ND		
Naphthalene	5	10	ND	ND	ND		
2-Nitroaniline	5	10	ND	ND	ND		
3-Nitroaniline	5	10	ND	ND	ND		
4-Nitroaniline	5	10	ND	ND	ND		
Nitrobenzene (NB)	5	10	ND	ND	ND		
4-Nitrophenol	5	10	ND	ND	ND		
2-Nitrophenol (o-Nitrophenol)	5	10	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8270C, Semivolatile Organic Compounds by GC/MS (SW-846)

QC Batch No: 012209

Our Lab I.D.			Method Blank	**51136.04**	**51136.05**		
Client Sample I.D.				MW-605-1	G-605-1		
Date Sampled				01/20/2009	01/20/2009		
Date Prepared			01/22/2009	01/22/2009	01/22/2009		
Preparation Method			3510C	3510C	3510C		
Date Analyzed			01/22/2009	01/22/2009	01/22/2009		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
N-Nitrosodimethylamine	5	10	ND	ND	ND		
N-nitrosodiphenylamine	5	10	ND	ND	ND		
Pentachlorophenol	5	10	ND	ND	ND		
Phenanthrene	5	10	ND	ND	ND		
Phenol	5	10	ND	ND	ND		
Pyrene	5	10	ND	ND	ND		
1,2,4-Trichlorobenzene	5	10	ND	ND	ND		
2,4,5-Trichlorophenol	5	10	ND	ND	ND		
2,4,6-Trichlorophenol	5	10	ND	ND	ND		
Our Lab I.D.			Method Blank	**51136.04**	**51136.05**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
2-Fluorophenol	25-121		67.4	42.7	44.1		
2-Fluorobiphenyl	30-115		92.1	108	93.3		
Nitrobenzene-d5	23-120		95.3	111	96.0		
Phenol-d5	24-113		40.4	29.9	23.6		
p-Terphenyl-D14	18-137		121	129	124		
2,4,6-Tribromophenol	19-122		106	121	114		

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8081A, Organochlorine Pesticides by GC/ECD

QC Batch No: 012009

Our Lab I.D.			Method Blank	**51136.04**	**51136.05**		
Client Sample I.D.				MW-605-1	G-605-1		
Date Sampled				01/20/2009	01/20/2009		
Date Prepared			01/20/2009	01/20/2009	01/20/2009		
Preparation Method			3510C	3510C	3510C		
Date Analyzed			01/22/2009	01/22/2009	01/22/2009		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Aldrin	0.05	0.10	ND	ND	ND		
Chlordane (Total)	0.50	1.00	ND	ND	ND		
Chlordane (alpha)	0.05	0.10	ND	ND	ND		
4,4'-DDD (DDD)	0.10	0.20	ND	ND	ND		
4,4'-DDE (DDE)	0.10	0.20	ND	ND	ND		
4,4'-DDT (DDT)	0.10	0.20	ND	ND	ND		
Dieldrin	0.10	0.20	ND	ND	ND		
Endosulfan 1	0.05	0.10	ND	ND	ND		
Endosulfan 11	0.10	0.20	ND	ND	ND		
Endosulfan sulfate	0.10	0.20	ND	ND	ND		
Endrin	0.10	0.20	ND	ND	ND		
Endrin aldehyde	0.10	0.20	ND	ND	ND		
Endrin ketone	0.10	0.20	ND	ND	ND		
Chlordane (gamma)	0.05	0.10	ND	ND	ND		
Heptachlor	0.05	0.10	ND	ND	ND		
Heptachlor epoxide	0.05	0.10	ND	ND	ND		
alpha-Hexachlorocyclohexane (Alpha-BHC)	0.05	0.10	ND	ND	ND		
beta-Hexachlorocyclohexane (Betta-BHC)	0.05	0.10	ND	ND	ND		
delta-Hexachlorocyclohexane (Delta-BHC)	0.05	0.10	ND	ND	ND		
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	0.05	0.10	ND	ND	ND		
Methoxychlor	0.50	1.00	ND	ND	ND		
Toxaphene	5.0	10.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8081A, Organochlorine Pesticides by GC/ECD

Our Lab I.D.			Method Blank	51136.04	51136.05		
Surrogates	%Rec.Limit		% Rec.	% Rec.	% Rec.		
Decachlorobiphenyl	30-150		109	110	113		
Tetrachloro-m-xylene	30-150		87.2	84.4	91.0		

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8082, Polychlorinated Biphenyls (PCBs) by GC

QC Batch No: 012009

Our Lab I.D.			Method Blank	**51136.04**	**51136.05**		
Client Sample I.D.				MW-605-1	G-605-1		
Date Sampled				01/20/2009	01/20/2009		
Date Prepared			01/20/2009	01/20/2009	01/20/2009		
Preparation Method			3510C	3510C	3510C		
Date Analyzed			01/20/2009	01/20/2009	01/20/2009		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Aroclor-1016 (PCB-1016)	1.00	5.00	ND	ND	ND		
Aroclor-1221 (PCB-1221)	2.00	10.00	ND	ND	ND		
Aroclor-1232 (PCB-1232)	1.00	5.00	ND	ND	ND		
Aroclor-1242 (PCB-1242)	1.00	5.00	ND	ND	ND		
Aroclor-1248 (PCB-1248)	0.25	2.50	ND	ND	ND		
Aroclor-1254 (PCB-1254)	1.00	5.00	ND	ND	ND		
Aroclor-1260 (PCB-1260)	1.00	5.00	ND	ND	ND		
Aroclor-1262 (PCB-1262)	1.00	5.00	ND	ND	ND		
Aroclor-1268 (PCB-1268)	1.00	5.00	ND	ND	ND		
Our Lab I.D.			Method Blank	**51136.04**	**51136.05**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Tetrachloro-m-xylene	30-150		87.2	84.4	91.0		

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 012509

Our Lab I.D.			Method Blank	51136.04	51136.05		
Client Sample I.D.				MW-605-1	G-605-1		
Date Sampled				01/20/2009	01/20/2009		
Date Prepared			01/25/2009	01/25/2009	01/25/2009		
Preparation Method			3005A	3005A	3005A		
Date Analyzed			01/25/2009	01/25/2009	01/25/2009		
Matrix			Aqueous	Aqueous	Aqueous		
Units			mg/L	mg/L	mg/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Antimony	0.05	0.10	ND	ND	ND		
Arsenic	0.05	0.10	ND	ND	ND		
Barium	0.03	0.05	ND	0.033J	0.054		
Beryllium	0.01	0.05	ND	ND	ND		
Cadmium	0.01	0.05	ND	ND	ND		
Chromium	0.01	0.05	ND	ND	ND		
Cobalt	0.01	0.05	ND	ND	ND		
Copper	0.01	0.05	ND	ND	ND		
Lead	0.05	0.10	ND	ND	ND		
Mercury (By EPA 7470)	0.001	0.002	ND	ND	ND		
Molybdenum	0.01	0.05	ND	ND	0.011J		
Nickel	0.01	0.05	ND	ND	ND		
Selenium	0.05	0.10	ND	ND	ND		
Silver	0.01	0.05	ND	ND	ND		
Thallium	0.05	0.10	ND	ND	ND		
Vanadium	0.03	0.05	ND	ND	ND		
Zinc	0.01	0.05	ND	0.024J	ND		

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 150.1, pH - Electrometric (EPA/600/4-79-020)

QC Batch No: 012109

Our Lab I.D.			Method Blank	51136.04	51136.05		
Client Sample I.D.				MW-605-1	G-605-1		
Date Sampled				01/20/2009	01/20/2009		
Date Prepared			01/21/2009	01/21/2009	01/21/2009		
Preparation Method			150.1	150.1	150.1		
Date Analyzed			01/21/2009	01/21/2009	01/21/2009		
Matrix			Aqueous	Aqueous	Aqueous		
Units			pH unit	pH unit	pH unit		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
pH	0.01	0.01	NA	6.71	7.00		

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 150.1, pH - Electrometric (EPA/600/4-79-020)

QC Batch No: 012109; Dup or Spiked Sample: 51136.04; LCS: Clean Water; LCS Prepared: 01/21/2009; LCS Analyzed: 01/21/2009; Units: pH unit

Analytes	SM Result	SM DUP Result	RPD %	SM RPD % Limit	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit		
pH	6.70	6.71	<1	<15	7.00	7.00	100	80-120		

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 012509; Dup or Spiked Sample: 51030.21; LCS: Clean Water; QC Prepared: 01/25/2009; QC Analyzed: 01/25/2009; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	ND	1.00	0.965	96.5	1.00	0.975	97.5	1.0	80-120	<15
Arsenic	ND	1.00	0.995	99.5	1.00	1.01	101	1.5	80-120	<15
Barium	ND	1.00	0.996	99.6	1.00	0.979	97.9	1.7	80-120	<15
Beryllium	ND	1.00	1.10	110	1.00	1.11	111	<1	80-120	<15
Cadmium	ND	1.00	0.982	98.2	1.00	0.984	98.4	<1	80-120	<15
Chromium	ND	1.00	0.978	97.8	1.00	0.977	97.7	<1	80-120	<15
Cobalt	ND	1.00	0.965	96.5	1.00	0.958	95.8	<1	80-120	<15
Copper	ND	1.00	0.944	94.4	1.00	0.934	93.4	1.1	80-120	<15
Lead	ND	1.00	0.936	93.6	1.00	0.939	93.9	<1	80-120	<15
Mercury (By EPA 7470)	ND	0.0100	0.00842	84.2	0.0100	0.00839	83.9	<1	80-120	<15
Molybdenum	ND	1.00	1.00	100	1.00	1.00	100	<1	80-120	<15
Nickel	ND	1.00	0.956	95.6	1.00	0.953	95.3	<1	80-120	<15
Selenium	ND	1.00	1.03	103	1.00	1.04	104	<1	80-120	<15
Silver	ND	1.00	0.909	90.9	1.00	0.910	91.0	<1	80-120	<15
Thallium	ND	1.00	0.974	97.4	1.00	0.967	96.7	<1	80-120	<15
Vanadium	ND	1.00	1.00	100	1.00	1.00	100	<1	80-120	<15
Zinc	ND	1.00	1.02	102	1.00	1.02	102	<1	80-120	<15

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Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 012509; Dup or Spiked Sample: 51030.21; LCS: Clean Water; QC Prepared: 01/25/2009; QC Analyzed: 01/25/2009; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Antimony	1.00	0.895	89.5	80-120						
Arsenic	1.00	0.941	94.1	80-120						
Barium	1.00	0.936	93.6	80-120						
Beryllium	1.00	1.06	106	80-120						
Cadmium	1.00	0.960	96.0	80-120						
Chromium	1.00	0.930	93.0	80-120						
Cobalt	1.00	0.901	90.1	80-120						
Copper	1.00	0.874	87.4	80-120						
Lead	1.00	0.899	89.9	80-120						
Mercury (By EPA 7470)	0.0100	0.00946	94.6	80-120						
Molybdenum	1.00	0.935	93.5	80-120						
Nickel	1.00	0.906	90.6	80-120						
Selenium	1.00	0.963	96.3	80-120						
Silver	1.00	0.911	91.1	80-120						
Thallium	1.00	0.914	91.4	80-120						
Vanadium	1.00	0.947	94.7	80-120						
Zinc	1.00	0.962	96.2	80-120						

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8081A, Organochlorine Pesticides by GC/ECD

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Aldrin	0.00	0.400	0.400	100	0.400	0.374	93.5	6.7	40-140	<40
4,4'-DDT (DDT)	0.00	1.00	0.981	98.1	1.00	0.961	96.1	2.1	40-140	<40
Dieldrin	0.00	1.00	0.981	98.1	1.00	0.966	96.6	1.5	40-140	<40
Endrin	0.00	1.00	1.02	102	1.00	1.14	114	11.1	40-140	<40
Heptachlor	0.00	0.400	0.377	94.3	0.400	0.365	91.3	3.2	40-140	<40
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	0.00	0.400	0.412	103	0.400	0.412	103	<1	40-140	<40
Surrogates										
Decachlorobiphenyl	0.00	1.00	1.09	109	1.00	1.01	101	7.6	30-150	<20
Tetrachloro-m-xylene	0.00	1.00	0.897	89.7	1.00	0.777	77.7	14.3	30-150	<20

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Aldrin	0.400	0.420	105	40-140						
4,4'-DDT (DDT)	1.00	1.04	104	40-140						
Dieldrin	1.00	1.03	103	40-140						
Endrin	1.00	1.14	114	40-140						
Heptachlor	0.400	0.396	99.0	40-140						
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	0.0400	0.0428	107	40-140						
Surrogates										
Decachlorobiphenyl	1.00	1.12	112	30-150						
Tetrachloro-m-xylene	1.00	0.882	88.2	30-150						

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Project ID: I-436
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AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8082, Polychlorinated Biphenyls (PCBs) by GC

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/20/2009; Units: ug/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Aroclor-1260 (PCB-1260)	0.00	5.00	5.40	108	5.00	5.60	112	3.6	75-125	<20
Surrogates										
Tetrachloro-m-xylene	0.00	1.00	0.863	86.3	1.00	1.00	100	14.7	30-125	<20

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/20/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Aroclor-1260 (PCB-1260)	5.00	6.40	128	75-125						
Surrogates										
Tetrachloro-m-xylene	1.00	0.898	89.8	30-125						

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Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2; Dup or Spiked Sample: B0122091A2; LCS: Clean Water; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit	
Benzene	50.0	56.3	113	50.0	56.2	112	<1	75-125	<20	
Chlorobenzene	50.0	48.3	96.6	50.0	48.6	97.2	<1	75-125	<20	
1,1-Dichloroethene	50.0	43.5	87.0	50.0	41.9	83.8	3.75	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	41.3	82.6	50.0	40.3	80.6	2.45	75-125	<20	
Toluene (Methyl benzene)	50.0	46.0	92.0	50.0	45.9	91.8	<1	75-125	<20	
Trichloroethene	50.0	52.9	106	50.0	56.7	113	6.39	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	42.5	85.0	50.0	42.9	85.9	1.06	75-125	<20	
Dibromofluoromethane	50.0	51.1	102	50.0	51.0	102	<1	75-125	<20	
Toluene-d8	50.0	43.0	86.0	50.0	42.7	85.5	<1	75-125	<20	

QC Batch No: 0122091A2; Dup or Spiked Sample: B0122091A2; LCS: Clean Water; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Benzene	50.0	56.2	112	75-125						
Chlorobenzene	50.0	48.7	97.4	75-125						
1,1-Dichloroethene	50.0	41.5	83.0	75-125						
Methyl-tert-butyl ether (MTBE)	50.0	40.6	81.2	75-125						
Toluene (Methyl benzene)	50.0	46.2	92.4	75-125						
Trichloroethene	50.0	54.1	108	75-125						
LCS										
Chloroform (Trichloromethane)	50.0	56.2	112	75-125						
Ethylbenzene	50.0	45.1	90.2	75-125						
1,1,1-Trichloroethane	50.0	48.0	96.0	75-125						
o-Xylene	50.0	46.9	93.8	75-125						
m,p-Xylenes	100	91.8	91.8	75-125						
Surrogates										
Bromofluorobenzene	50.0	42.7	85.4	75-125						
Dibromofluoromethane	50.0	51.5	103	75-125						

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QUALITY CONTROL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122091A2; Dup or Spiked Sample: B0122091A2; LCS: Clean Water; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Toluene-d8	50.0	43.1	86.2	75-125						

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Page: **27**

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8270C, Semivolatile Organic Compounds by GC/MS (SW-846)

QC Batch No: 012209; Dup or Spiked Sample: B012209; LCS: Clean Water; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Acenaphthene	0.00	100	83.0	83.0	100	83.0	83.0	<1	46-118	<20
4-Chloro-3-methylphenol	0.00	200	208	104	200	191	95.5	8.5	39-98	<20
2-Chlorophenol	0.00	200	186	93.0	200	176	88.0	5.5	27-123	<20
1,4-Dichlorobenzene	0.00	100	77.0	77.0	100	71.0	71.0	8.1	36-97	<20
2,4-Dinitrotoluene	0.00	100	93.0	93.0	100	91.0	91.0	2.2	24-96	<20
N-Nitroso-Di-n-propylamine	0.00	100	93.0	93.0	100	90.0	90.0	3.3	41-116	<20
4-Nitrophenol	0.00	200	68.0	34.0	200	53.0	26.5	24.8	10-80	<20
Pentachlorophenol	0.00	200	208	104	200	193	96.5	7.5	40-125	<20
Phenol	0.00	200	81.0	40.5	200	74.0	37.0	9.0	12-98	<20
Pyrene	0.00	100	105	105	100	106	106	<1	26-127	<20
1,2,4-Trichlorobenzene	0.00	100	85.0	85.0	100	80.0	80.0	6.1	39-98	<20
Surrogates										
2-Fluorophenol	0.00	200	121	60.4	200	108	54.1	11.0	25-121	<20
2-Fluorobiphenyl	0.00	100	91.0	91.0	100	93.4	93.4	2.6	30-115	<20
Nitrobenzene-d5	0.00	100	95.4	95.4	100	91.5	91.5	4.2	23-120	<20
p-Terphenyl-D14	0.00	100	115	115	100	115	115	<1	18-137	<20
Phenol-d5	0.00	200	78.6	39.3	200	70.6	35.3	10.7	24-113	<20
2,4,6-Tribromophenol	0.00	200	220	110	200	208	104	5.6	19-122	<20

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QUALITY CONTROL RESULTS

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: 8270C, Semivolatile Organic Compounds by GC/MS (SW-846)

QC Batch No: 012209; Dup or Spiked Sample: B012209; LCS: Clean Water; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Acenaphthene	100	76.0	76.0	46-118						
4-Chloro-3-methylphenol	200	186	93.0	39-98						
2-Chlorophenol	200	173	86.5	27-123						
1,4-Dichlorobenzene	100	59.0	59.0	36-97						
2,4-Dinitrotoluene	100	81.0	81.0	24-96						
N-Nitroso-Di-n-propylamine	100	91.0	91.0	41-116						
4-Nitrophenol	200	80.0	40.0	10-80						
Pentachlorophenol	200	187	93.5	40-125						
Phenol	200	85.0	42.5	12-98						
Pyrene	100	96.0	96.0	26-127						
1,2,4-Trichlorobenzene	100	66.0	66.0	39-98						
Surrogates										
2-Fluorophenol	200	116	58.1	25-121						
2-Fluorobiphenyl	100	84.8	84.8	30-115						
Nitrobenzene-d5	100	87.9	87.9	23-120						
p-Terphenyl-D14	100	107	107	18-137						
Phenol-d5	200	76.8	38.4	24-113						
2,4,6-Tribromophenol	200	204	102	19-122						

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Page: **29**

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/23/2009; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	5.00	5.50	110	5.00	5.05	101	8.5	75-125	<20
Surrogates										
Chlorobenzene	0.00	2.00	1.39	69.3	2.00	1.31	65.5	5.6	60-125	<20

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/23/2009; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	5.00	6.05	121	75-125						
Surrogates										
Chlorobenzene	2.00	1.64	81.9	60-125						

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Page: **30**

Project ID: I-436
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51136	01/20/2009	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109; Dup or Spiked Sample: B012109; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	0.500	0.500	100	0.500	0.510	102	2.0	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0535	107	0.0500	0.0590	118	9.8	75-125	<20

QC Batch No: 012109; Dup or Spiked Sample: B012109; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.510	102	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0510	102	75-125						

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Number of Pages	**44**
Date Received	**01/20/2009**
Date Reported	**01/27/2009**

Job Number	Order Date	Client
51111	01/20/2009	GROUP

Project ID: I-436A
Project Name: SR-22 Phase II
Site: SR-22/I-405/I-605

Enclosed please find results of analyses of 1 water and 16 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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CHAIN OF CUSTODY RECORD

№ 61570

AETL JOB No. 51111 Page 1 of 2

COMPANY	Group Delta Consultants
PROJECT MANAGER	Vesna Glisic
COMPANY ADDRESS	32 Mauchly Ste B
PHONE	(949) 450-2400
FAX	(949) 450-2108
PROJECT NAME	SR 22 Phase I
PROJECT #	1-436A
SITE NAME AND ADDRESS	SR-22 / I-405 / I-605
PO #	

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8015D	8015G	8260	6010B	TEST INSTRUCTIONS & COMMENTS
1	G-405-6	51111.01	1-16-09	10:10	S	1ft tube		✓	/	/	/	5-6' bgs
2		51111.02		10:12				/	/	/	/	7.5-8.5' bgs
3		51111.03		10:17				/	/	/	/	9.5-10.5' bgs
4		51111.04		10:20				/	/	/	/	12.0-13.0' bgs
5		51111.05		10:25				/	/	/	/	14-15' bgs
6		51111.06		10:28				/	/	/	/	16'-17' bgs
7		51111.07		10:30	↓	↓		/	/	/	/	18-19' bgs
8		51111.08		12:35	W	40mL (HCl) S1	HCl	~~/~~	/	/	~~/~~	27-31' bgs
9						S2	HCl		/	/		
10						S3	HCl		/	/		
11						S4	HCl		/	/		
12				12:40		1L Amber S5		/				
13	↓	↓	↓	13:30	↓	1L Amber S6		/				↓
14												
15												

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	13	PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / (N) / NA		SAMPLES INTACT Y/ N / NA	
RECEIVED IN GOOD COND. (Y) / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☐ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

4 days

See Instructions on page 2 of 2

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Vesna Glisic	Signature:	Signature:
Printed Name: Vesna Glisic	Printed Name:	Printed Name: Carla Gonzalez
Date: 1/20/09 Time: 9:55	Date: Time:	Date: 1/20/09 Time: 11:30
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY LABORATORY: 3.**
Signature:	Signature:	Signature:
Printed Name: Carla Gonzalez	Printed Name:	Printed Name: Thuy.
Date: 1/20/09 Time: 9:55	Date: Time:	Date: 1/20/09 Time: 11:30

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CHAIN OF CUSTODY RECORD

№ 61558

COMPANY: GROUP DELTA CONSULTANTS
PROJECT MANAGER: Vesna Glisic
COMPANY ADDRESS: 32 MAUCHLY Suite B
PHONE: 949-450-2100
FAX: 949-450-2108
PROJECT NAME: SR-22 PHASE II
PROJECT #: 1-436A
SITE NAME AND ADDRESS: SR-22/I-405/I-605
PO #:
AETL JOB No. 51111
Page 2 of 2

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8015D	8015G	8260	6010B	Cam 22 6010B	Hg 7470B	TEST INSTRUCTIONS & COMMENTS
1	G-405-5	51111.09	1-16-09	2:37	S	1FT tube 5-1		/	/	/	/			6-7' ✓
2	↓	51111.10	↓	2:41	↓	↓		/	/	/	/			8-9' ✓
3		51111.11		2:45				/	/	/	/			10-11' ✓
4		51111.12		2:49				/	/	/	/			12-13' ✓
5		51111.13		2:54				/	/	/	/			14-15' ✓
6		51111.14		2:56				/	/	/	/			16-17' ✓
7	↓	51111.15	↓	3:05	↓	↓		/	/	/	/			18-19' ✓
8	MW 605-01	51111.16	1-15-09	11:00	S	Zip Log bag	N	/	/	/	/			drum cuttings
9	MW 605-02	51111.17	1-15-09	14:30	S	Zip Log bag	N	/	/	/	/			drum cuttings
10														
11														The samples should of been
12														picked up on Mon 11/19/09
13														Need the results on
14														Friday 11/23/09
15														

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	9.	PROPERLY COOLED (Y) N / NA	
CUSTODY SEALS Y / (N) / NA		SAMPLES INTACT (Y) N / NA	
RECEIVED IN GOOD COND. (Y) / N		SAMPLES ACCEPTED (Y) N	

TURN AROUND TIME

☐ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

4 days?

	1.	2.	3.
RELINQUISHED BY SAMPLER:	Signature: Vesna Glisic	RELINQUISHED BY: Signature:	RELINQUISHED BY: Signature:
	Printed Name: VESNA GLISIC	Printed Name:	Printed Name:
	Date: 11/20/09 Time: 9:55	Date: Time:	Date: 11/20/09 Time: 1130
RECEIVED BY:	Signature:	Signature:	Signature:
	Printed Name:	Printed Name:	Printed Name:
	Date: 109 Time: 9:55	Date: Time:	Date: 9 Time: 1130

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ANALYTICAL RESULTS

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Site

SR-22/I-405/I-605

Page: **2**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			Method Blank	51111.01	51111.02	51111.03	51111.04
Client Sample I.D.				G-405-6 @ 5.0-6.0'	G-405-6 @ 7.5-8.5'	G-405-6 @ 9.5-10.5'	G-405-6 @ 12.0-13.0'
Date Sampled				01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Acetone	25	50	ND	ND	ND	ND	ND
Benzene	1.0	10.0	ND	ND	ND	ND	ND
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND	ND	ND
Bromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromodichloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromoform (Tribromomethane)	25	50	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	15	30	ND	ND	ND	ND	ND
2-Butanone (MEK)	25	50	ND	ND	ND	ND	ND
n-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
sec-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
tert-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Carbon Disulfide	25	50	ND	ND	ND	ND	ND
Carbon tetrachloride	5.0	10.0	ND	ND	ND	ND	ND
Chlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Chloroethane	15	30	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	50	50	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	15	30	ND	ND	ND	ND	ND
2-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND	ND	ND
Dibromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND	ND	ND
Dibromomethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			Method Blank	51111.01	51111.02	51111.03	51111.04
Client Sample I.D.				G-405-6 @ 5.0-6.0'	G-405-6 @ 7.5-8.5'	G-405-6 @ 9.5-10.5'	G-405-6 @ 12.0-13.0'
Date Sampled				01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Dichlorodifluoromethane	15	30	ND	ND	ND	ND	ND
1,1-Dichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
2,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
Ethylbenzene	1.0	10.0	ND	ND	ND	ND	ND
Hexachlorobutadiene	15	30	ND	ND	ND	ND	ND
2-Hexanone	25	50	ND	ND	ND	ND	ND
Isopropylbenzene	5.0	10.0	ND	ND	ND	ND	ND
p-Isopropyltoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND	ND	ND
Methylene chloride (DCM)	25	50	ND	ND	ND	ND	ND
Naphthalene	5.0	10.0	ND	ND	ND	ND	ND
n-Propylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Styrene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
Tetrachloroethene	5.0	10.0	ND	ND	ND	ND	ND
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
Trichloroethene	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			Method Blank	51111.01	51111.02	51111.03	51111.04
Client Sample I.D.				G-405-6 @ 5.0-6.0'	G-405-6 @ 7.5-8.5'	G-405-6 @ 9.5-10.5'	G-405-6 @ 12.0-13.0'
Date Sampled				01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Trichlorofluoromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Vinyl Acetate	25	50	ND	ND	ND	ND	ND
Vinyl chloride (Chloroethene)	15	30	ND	ND	ND	ND	ND
o-Xylene	1.0	10.0	ND	ND	ND	ND	ND
m,p-Xylenes	1.0	20.0	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	51111.01	51111.02	51111.03	51111.04
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		103	104	124	118	117
Dibromofluoromethane	75-125		97.9	101	104	102	105
Toluene-d8	75-125		128	108	123	126	119

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ANALYTICAL RESULTS

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Client Sample I.D.			G-405-6 @ 14.0-15.0'	G-405-6 @ 16.0-17.0'	G-405-6 @ 18.0-19.0'	G-405-5 @ 6.0-7.0'	G-405-5 @ 8.0-9.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Acetone	25	50	ND	ND	ND	ND	ND
Benzene	1.0	10.0	ND	ND	ND	ND	ND
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND	ND	ND
Bromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromodichloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromoform (Tribromomethane)	25	50	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	15	30	ND	ND	ND	ND	ND
2-Butanone (MEK)	25	50	ND	ND	ND	ND	ND
n-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
sec-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
tert-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Carbon Disulfide	25	50	ND	ND	ND	ND	ND
Carbon tetrachloride	5.0	10.0	ND	ND	ND	ND	ND
Chlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Chloroethane	15	30	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	50	50	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	15	30	ND	ND	ND	ND	ND
2-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND	ND	ND
Dibromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND	ND	ND
Dibromomethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Client Sample I.D.			G-405-6 @ 14.0-15.0'	G-405-6 @ 16.0-17.0'	G-405-6 @ 18.0-19.0'	G-405-5 @ 6.0-7.0'	G-405-5 @ 8.0-9.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Dichlorodifluoromethane	15	30	ND	ND	ND	ND	ND
1,1-Dichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
2,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
Ethylbenzene	1.0	10.0	ND	ND	ND	ND	ND
Hexachlorobutadiene	15	30	ND	ND	ND	ND	ND
2-Hexanone	25	50	ND	ND	ND	ND	ND
Isopropylbenzene	5.0	10.0	ND	ND	ND	ND	ND
p-Isopropyltoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND	ND	ND
Methylene chloride (DCM)	25	50	ND	ND	ND	ND	ND
Naphthalene	5.0	10.0	ND	ND	ND	ND	ND
n-Propylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Styrene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
Tetrachloroethene	5.0	10.0	ND	ND	ND	ND	ND
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
Trichloroethene	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Client Sample I.D.			G-405-6 @ 14.0-15.0'	G-405-6 @ 16.0-17.0'	G-405-6 @ 18.0-19.0'	G-405-5 @ 6.0-7.0'	G-405-5 @ 8.0-9.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/22/2009	01/22/2009	01/22/2009	01/22/2009	01/22/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Trichlorofluoromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Vinyl Acetate	25	50	ND	ND	ND	ND	ND
Vinyl chloride (Chloroethene)	15	30	ND	ND	ND	ND	ND
o-Xylene	1.0	10.0	ND	ND	ND	ND	ND
m,p-Xylenes	1.0	20.0	ND	ND	ND	ND	ND
Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		115	116	109	120	118
Dibromofluoromethane	75-125		102	102	102	105	106
Toluene-d8	75-125		120	122	125	125	123

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			51111.11	51111.12	51111.13		
Client Sample I.D.			G-405-5 @ 10.0-11.0'	G-405-5 @ 12.0-13.0'	G-405-5 @ 14.0-15.0'		
Date Sampled			01/16/2009	01/16/2009	01/16/2009		
Date Prepared			01/22/2009	01/22/2009	01/22/2009		
Preparation Method			5030B	5030B	5030B		
Date Analyzed			01/22/2009	01/22/2009	01/22/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Acetone	25	50	ND	ND	ND		
Benzene	1.0	10.0	ND	ND	ND		
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND		
Bromochloromethane	5.0	10.0	ND	ND	ND		
Bromodichloromethane	5.0	10.0	ND	ND	ND		
Bromoform (Tribromomethane)	25	50	ND	ND	ND		
Bromomethane (Methyl bromide)	15	30	ND	ND	ND		
2-Butanone (MEK)	25	50	ND	ND	ND		
n-Butylbenzene	5.0	10.0	ND	ND	ND		
sec-Butylbenzene	5.0	10.0	ND	ND	ND		
tert-Butylbenzene	5.0	10.0	ND	ND	ND		
Carbon Disulfide	25	50	ND	ND	ND		
Carbon tetrachloride	5.0	10.0	ND	ND	ND		
Chlorobenzene	5.0	10.0	ND	ND	ND		
Chloroethane	15	30	ND	ND	ND		
2-Chloroethyl vinyl ether	50	50	ND	ND	ND		
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND		
Chloromethane (Methyl chloride)	15	30	ND	ND	ND		
2-Chlorotoluene	5.0	10.0	ND	ND	ND		
4-Chlorotoluene	5.0	10.0	ND	ND	ND		
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND		
Dibromochloromethane	5.0	10.0	ND	ND	ND		
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND		
Dibromomethane	5.0	10.0	ND	ND	ND		
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND		
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			51111.11	51111.12	51111.13		
Client Sample I.D.			G-405-5 @ 10.0-11.0'	G-405-5 @ 12.0-13.0'	G-405-5 @ 14.0-15.0'		
Date Sampled			01/16/2009	01/16/2009	01/16/2009		
Date Prepared			01/22/2009	01/22/2009	01/22/2009		
Preparation Method			5030B	5030B	5030B		
Date Analyzed			01/22/2009	01/22/2009	01/22/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND		
Dichlorodifluoromethane	15	30	ND	ND	ND		
1,1-Dichloroethane	5.0	10.0	ND	ND	ND		
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND		
1,1-Dichloroethene	5.0	10.0	ND	ND	ND		
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND		
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND		
1,2-Dichloropropane	5.0	10.0	ND	ND	ND		
1,3-Dichloropropane	5.0	10.0	ND	ND	ND		
2,2-Dichloropropane	5.0	10.0	ND	ND	ND		
1,1-Dichloropropene	5.0	10.0	ND	ND	ND		
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND		
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND		
Ethylbenzene	1.0	10.0	ND	ND	ND		
Hexachlorobutadiene	15	30	ND	ND	ND		
2-Hexanone	25	50	ND	ND	ND		
Isopropylbenzene	5.0	10.0	ND	ND	ND		
p-Isopropyltoluene	5.0	10.0	ND	ND	ND		
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND		
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND		
Methylene chloride (DCM)	25	50	ND	ND	ND		
Naphthalene	5.0	10.0	ND	ND	ND		
n-Propylbenzene	5.0	10.0	ND	ND	ND		
Styrene	5.0	10.0	ND	ND	ND		
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND		
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND		
Tetrachloroethene	5.0	10.0	ND	ND	ND		
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND		
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND		
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND		
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND		
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND		
Trichloroethene	5.0	10.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1

Our Lab I.D.			**51111.11**	**51111.12**	**51111.13**		
Client Sample I.D.			G-405-5 @ 10.0-11.0'	G-405-5 @ 12.0-13.0'	G-405-5 @ 14.0-15.0'		
Date Sampled			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Date Prepared			**01/22/2009**	**01/22/2009**	**01/22/2009**		
Preparation Method			**5030B**	**5030B**	**5030B**		
Date Analyzed			**01/22/2009**	**01/22/2009**	**01/22/2009**		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Trichlorofluoromethane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,2,3-Trichloropropane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,2,4-Trimethylbenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,3,5-Trimethylbenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Vinyl Acetate	**25**	**50**	**ND**	**ND**	**ND**		
Vinyl chloride (Chloroethene)	**15**	**30**	**ND**	**ND**	**ND**		
o-Xylene	**1.0**	**10.0**	**ND**	**ND**	**ND**		
m,p-Xylenes	**1.0**	**20.0**	**ND**	**ND**	**ND**		
Our Lab I.D.			**51111.11**	**51111.12**	**51111.13**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Bromofluorobenzene	**75-125**		**121**	**117**	**116**		
Dibromofluoromethane	**75-125**		**102**	**105**	**102**		
Toluene-d8	**75-125**		**122**	**122**	**120**		

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121093A1

Our Lab I.D.			Method Blank	51111.14	51111.15	51111.16	51111.17
Client Sample I.D.				G-405-5 @ 16.0-17.0'	G-405-5 @ 18.0-19.0'	MW605-01	MW605-02
Date Sampled				01/16/2009	01/16/2009	01/15/2009	01/15/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Acetone	25	50	ND	ND	ND	ND	ND
Benzene	1.0	10.0	ND	ND	ND	ND	ND
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND	ND	ND
Bromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromodichloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromoform (Tribromomethane)	25	50	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	15	30	ND	ND	ND	ND	ND
2-Butanone (MEK)	25	50	ND	ND	ND	ND	ND
n-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
sec-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
tert-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Carbon Disulfide	25	50	ND	ND	ND	ND	ND
Carbon tetrachloride	5.0	10.0	ND	ND	ND	ND	ND
Chlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Chloroethane	15	30	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	50	50	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	15	30	ND	ND	ND	ND	ND
2-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND	ND	ND
Dibromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND	ND	ND
Dibromomethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121093A1

Our Lab I.D.			Method Blank	51111.14	51111.15	51111.16	51111.17
Client Sample I.D.				G-405-5 @ 16.0-17.0'	G-405-5 @ 18.0-19.0'	MW605-01	MW605-02
Date Sampled				01/16/2009	01/16/2009	01/15/2009	01/15/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Dichlorodifluoromethane	15	30	ND	ND	ND	ND	ND
1,1-Dichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
2,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
Ethylbenzene	1.0	10.0	ND	ND	ND	ND	ND
Hexachlorobutadiene	15	30	ND	ND	ND	ND	ND
2-Hexanone	25	50	ND	ND	ND	ND	ND
Isopropylbenzene	5.0	10.0	ND	ND	ND	ND	ND
p-Isopropyltoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND	ND	ND
Methylene chloride (DCM)	25	50	ND	ND	ND	ND	ND
Naphthalene	5.0	10.0	ND	ND	ND	ND	ND
n-Propylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Styrene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
Tetrachloroethene	5.0	10.0	ND	ND	ND	ND	ND
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
Trichloroethene	5.0	10.0	ND	ND	ND	ND	ND

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121093A1

Our Lab I.D.			Method Blank	51111.14	51111.15	51111.16	51111.17
Client Sample I.D.				G-405-5 @ 16.0-17.0'	G-405-5 @ 18.0-19.0'	MW605-01	MW605-02
Date Sampled				01/16/2009	01/16/2009	01/15/2009	01/15/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Trichlorofluoromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Vinyl Acetate	25	50	ND	ND	ND	ND	ND
Vinyl chloride (Chloroethene)	15	30	ND	ND	ND	ND	ND
o-Xylene	1.0	10.0	ND	ND	ND	ND	ND
m,p-Xylenes	1.0	20.0	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	51111.14	51111.15	51111.16	51111.17
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		112	110	114	113	111
Dibromofluoromethane	75-125		108	118	119	120	123
Toluene-d8	75-125		80.5	79.3	79.0	77.3	77.5

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			Method Blank	51111.01	51111.02	51111.03	51111.04
Client Sample I.D.				G-405-6 @ 5.0-6.0'	G-405-6 @ 7.5-8.5'	G-405-6 @ 9.5-10.5'	G-405-6 @ 12.0-13.0'
Date Sampled				01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	51111.01	51111.02	51111.03	51111.04
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		113	105	108	109	115

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Client Sample I.D.			G-405-6 @ 14.0-15.0'	G-405-6 @ 16.0-17.0'	G-405-6 @ 18.0-19.0'	G-405-5 @ 6.0-7.0'	G-405-5 @ 8.0-9.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND	ND	ND	ND
Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		107	113	111	111	108

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			51111.11	51111.12	51111.13	51111.14	51111.15
Client Sample I.D.			G-405-5 @ 10.0-11.0'	G-405-5 @ 12.0-13.0'	G-405-5 @ 14.0-15.0'	G-405-5 @ 16.0-17.0'	G-405-5 @ 18.0-19.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			5030B	5030B	5030B	5030B	5030B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND	ND	ND	ND
Our Lab I.D.			51111.11	51111.12	51111.13	51111.14	51111.15
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		109	112	110	107	109

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			51111.16	51111.17			
Client Sample I.D.			MW605-01	MW605-02			
Date Sampled			01/15/2009	01/15/2009			
Date Prepared			01/21/2009	01/21/2009			
Preparation Method			5030B	5030B			
Date Analyzed			01/21/2009	01/21/2009			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND			
Our Lab I.D.			51111.16	51111.17			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		111	109			

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			Method Blank	**51111.01**	**51111.02**	**51111.03**	**51111.04**
Client Sample I.D.				G-405-6 @ 5.0-6.0'	G-405-6 @ 7.5-8.5'	G-405-6 @ 9.5-10.5'	G-405-6 @ 12.0-13.0'
Date Sampled				**01/16/2009**	**01/16/2009**	**01/16/2009**	**01/16/2009**
Date Prepared			**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**
Preparation Method			**3550B**	**3550B**	**3550B**	**3550B**	**3550B**
Date Analyzed			**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**	**01/21/2009**
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	**5.0**	**10.0**	**ND**	**ND**	**ND**	**ND**	**ND**
TPH as Heavy Hydrocarbons (C23-C40)	**5.0**	**10.0**	**ND**	**ND**	**17.4**	**ND**	**ND**
TPH Total as Diesel and Heavy HC.C13-C40	**5.0**	**10.0**	**ND**	**ND**	**17.4**	**ND**	**ND**
Our Lab I.D.			Method Blank	**51111.01**	**51111.02**	**51111.03**	**51111.04**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	**75-125**		**93.0**	**97.7**	**99.2**	**98.7**	**98.5**

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Client Sample I.D.			G-405-6 @ 14.0-15.0'	G-405-6 @ 16.0-17.0'	G-405-6 @ 18.0-19.0'	G-405-5 @ 6.0-7.0'	G-405-5 @ 8.0-9.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Preparation Method			3550B	3550B	3550B	3550B	3550B
Date Analyzed			01/21/2009	01/21/2009	01/21/2009	01/21/2009	01/21/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	5.0	10.0	ND	ND	ND	ND	ND
TPH as Heavy Hydrocarbons (C23-C40)	5.0	10.0	ND	ND	ND	ND	48.8
TPH Total as Diesel and Heavy HC.C13-C40	5.0	10.0	ND	ND	ND	ND	48.8
Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	75-125		98.5	96.1	97.1	93.3	92.6

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012109

Our Lab I.D.			**51111.11**				
Client Sample I.D.			G-405-5 @ 10.0-11.0'				
Date Sampled			**01/16/2009**				
Date Prepared			**01/21/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/21/2009**				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Diesel (C13-C22)	**5.0**	**10.0**	**ND**				
TPH as Heavy Hydrocarbons (C23-C40)	**5.0**	**10.0**	**28.6**				
TPH Total as Diesel and Heavy HC.C13-C40	**5.0**	**10.0**	**28.6**				
Our Lab I.D.			**51111.11**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Chlorobenzene	**75-125**		**97.3**				

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012209

Our Lab I.D.			Method Blank	**51111.12**	**51111.13**	**51111.14**	**51111.15**
Client Sample I.D.				G-405-5 @ 12.0-13.0'	G-405-5 @ 14.0-15.0'	G-405-5 @ 16.0-17.0'	G-405-5 @ 18.0-19.0'
Date Sampled				**01/16/2009**	**01/16/2009**	**01/16/2009**	**01/16/2009**
Date Prepared			**01/22/2009**	**01/22/2009**	**01/22/2009**	**01/22/2009**	**01/22/2009**
Preparation Method			**3550B**	**3550B**	**3550B**	**3550B**	**3550B**
Date Analyzed			**01/22/2009**	**01/22/2009**	**01/22/2009**	**01/22/2009**	**01/22/2009**
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	**5.0**	**10.0**	**ND**	**ND**	**ND**	**ND**	**ND**
TPH as Heavy Hydrocarbons (C23-C40)	**5.0**	**10.0**	**ND**	**ND**	**ND**	**ND**	**ND**
TPH Total as Diesel and Heavy HC.C13-C40	**5.0**	**10.0**	**ND**	**ND**	**ND**	**ND**	**ND**
Our Lab I.D.			Method Blank	**51111.12**	**51111.13**	**51111.14**	**51111.15**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	**75-125**		**102**	**97.0**	**94.7**	**97.1**	**96.9**

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012209

Our Lab I.D.			**51111.16**	**51111.17**			
Client Sample I.D.			MW605-01	MW605-02			
Date Sampled			**01/15/2009**	**01/15/2009**			
Date Prepared			**01/22/2009**	**01/22/2009**			
Preparation Method			**3550B**	**3550B**			
Date Analyzed			**01/22/2009**	**01/22/2009**			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Diesel (C13-C22)	**5.0**	**10.0**	**76.4**	**ND**			
TPH as Heavy Hydrocarbons (C23-C40)	**5.0**	**10.0**	**658**	**ND**			
TPH Total as Diesel and Heavy HC.C13-C40	**5.0**	**10.0**	**734**	**ND**			
Our Lab I.D.			**51111.16**	**51111.17**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Chlorobenzene	**75-125**		**94.1**	**98.6**			

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-2

Our Lab I.D.			Method Blank	51111.01	51111.02	51111.03	51111.04
Client Sample I.D.				G-405-6 @ 5.0-6.0'	G-405-6 @ 7.5-8.5'	G-405-6 @ 9.5-10.5'	G-405-6 @ 12.0-13.0'
Date Sampled				01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/23/2009	01/23/2009	01/23/2009	01/23/2009	01/23/2009
Preparation Method			3050B	3050B	3050B	3050B	3050B
Date Analyzed			01/23/2009	01/23/2009	01/23/2009	01/23/2009	01/23/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Antimony	1.0	5.0	ND	ND	ND	ND	ND
Arsenic	1.0	5.0	ND	ND	ND	ND	ND
Barium	2.5	5.0	ND	70.0	79.5	59.0	60.5
Beryllium	1.3	2.5	ND	ND	ND	ND	ND
Cadmium	1.3	2.5	ND	ND	ND	ND	ND
Chromium	2.5	5.0	ND	15.7	16.0	12.9	14.9
Cobalt	2.5	5.0	ND	7.55	8.30	7.25	7.30
Copper	2.5	5.0	ND	14.1	13.0	7.35	11.3
Lead	2.5	5.0	ND	3.85J	4.90J	4.45J	3.35J
Mercury (By EPA 7471)	0.1	0.2	ND	ND	ND	ND	ND
Molybdenum	2.5	5.0	ND	ND	ND	ND	ND
Nickel	2.5	5.0	ND	11.6	11.1	8.75	10.5
Selenium	1.0	5.0	ND	ND	ND	ND	ND
Silver	2.5	5.0	ND	ND	ND	ND	ND
Thallium	1.0	5.0	ND	ND	ND	ND	ND
Vanadium	2.5	5.0	ND	34.5	35.4	30.2	34.7
Zinc	2.5	5.0	ND	52.0	56.0	47.8	45.8

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-2

Our Lab I.D.			51111.05	51111.06	51111.07	51111.09	51111.10
Client Sample I.D.			G-405-6 @ 14.0-15.0'	G-405-6 @ 16.0-17.0'	G-405-6 @ 18.0-19.0'	G-405-5 @ 6.0-7.0'	G-405-5 @ 8.0-9.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/23/2009	01/23/2009	01/23/2009	01/23/2009	01/23/2009
Preparation Method			3050B	3050B	3050B	3050B	3050B
Date Analyzed			01/23/2009	01/23/2009	01/23/2009	01/23/2009	01/23/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Antimony	1.0	5.0	ND	ND	ND	ND	ND
Arsenic	1.0	5.0	ND	ND	ND	1.35J	ND
Barium	2.5	5.0	34.3	66.5	95.5	50.0	60.5
Beryllium	1.3	2.5	ND	ND	ND	ND	ND
Cadmium	1.3	2.5	ND	ND	ND	ND	ND
Chromium	2.5	5.0	8.40	14.4	14.5	10.6	12.5
Cobalt	2.5	5.0	4.85J	8.25	8.05	5.70	6.75
Copper	2.5	5.0	3.85J	8.55	10.2	6.85	9.30
Lead	2.5	5.0	ND	ND	ND	ND	6.55
Mercury (By EPA 7471)	0.1	0.2	ND	ND	ND	ND	ND
Molybdenum	2.5	5.0	ND	ND	ND	ND	ND
Nickel	2.5	5.0	5.55	9.75	9.85	7.35	9.45
Selenium	1.0	5.0	ND	ND	ND	ND	ND
Silver	2.5	5.0	ND	ND	ND	ND	ND
Thallium	1.0	5.0	ND	ND	ND	ND	ND
Vanadium	2.5	5.0	20.6	31.6	34.7	29.0	30.5
Zinc	2.5	5.0	27.9	48.5	49.4	34.7	43.4

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-2

Our Lab I.D.			51111.11	51111.12	51111.13	51111.14	51111.15
Client Sample I.D.			G-405-5 @ 10.0-11.0'	G-405-5 @ 12.0-13.0'	G-405-5 @ 14.0-15.0'	G-405-5 @ 16.0-17.0'	G-405-5 @ 18.0-19.0'
Date Sampled			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Date Prepared			01/23/2009	01/23/2009	01/23/2009	01/23/2009	01/23/2009
Preparation Method			3050B	3050B	3050B	3050B	3050B
Date Analyzed			01/23/2009	01/23/2009	01/23/2009	01/23/2009	01/23/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Antimony	1.0	5.0	ND	ND	ND	ND	ND
Arsenic	1.0	5.0	ND	ND	1.40J	ND	ND
Barium	2.5	5.0	52.5	65.0	52.5	67.5	78.5
Beryllium	1.3	2.5	ND	ND	ND	ND	ND
Cadmium	1.3	2.5	ND	ND	ND	ND	ND
Chromium	2.5	5.0	11.2	14.7	13.4	14.3	16.7
Cobalt	2.5	5.0	6.30	8.00	5.90	8.50	9.00
Copper	2.5	5.0	7.65	9.45	8.90	9.90	11.2
Lead	2.5	5.0	3.45J	2.90J	6.20	ND	ND
Mercury (By EPA 7471)	0.1	0.2	ND	ND	ND	ND	ND
Molybdenum	2.5	5.0	ND	ND	ND	ND	ND
Nickel	2.5	5.0	7.85	9.90	8.55	10.3	11.1
Selenium	1.0	5.0	ND	ND	ND	ND	ND
Silver	2.5	5.0	ND	ND	ND	ND	ND
Thallium	1.0	5.0	ND	ND	ND	ND	ND
Vanadium	2.5	5.0	26.7	33.5	27.3	34.1	36.3
Zinc	2.5	5.0	40.1	51.5	39.4	51.0	56.5

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-2

Our Lab I.D.			51111.16	51111.17			
Client Sample I.D.			MW605-01	MW605-02			
Date Sampled			01/15/2009	01/15/2009			
Date Prepared			01/23/2009	01/23/2009			
Preparation Method			3050B	3050B			
Date Analyzed			01/23/2009	01/23/2009			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Antimony	1.0	5.0	ND	ND			
Arsenic	1.0	5.0	1.20J	1.80J			
Barium	2.5	5.0	86.5	81.0			
Beryllium	1.3	2.5	ND	ND			
Cadmium	1.3	2.5	ND	ND			
Chromium	2.5	5.0	19.4	20.5			
Cobalt	2.5	5.0	9.00	9.80			
Copper	2.5	5.0	20.0	16.3			
Lead	2.5	5.0	62.0	5.50			
Mercury (By EPA 7471)	0.1	0.2	ND	ND			
Molybdenum	2.5	5.0	ND	ND			
Nickel	2.5	5.0	12.8	13.9			
Selenium	1.0	5.0	ND	ND			
Silver	2.5	5.0	ND	ND			
Thallium	1.0	5.0	ND	ND			
Vanadium	2.5	5.0	38.2	40.2			
Zinc	2.5	5.0	73.0	57.5			

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1

Our Lab I.D.			Method Blank	51111.08			
Client Sample I.D.				G-405-6			
Date Sampled				01/16/2009			
Date Prepared			01/21/2009	01/21/2009			
Preparation Method			5030B	5030B			
Date Analyzed			01/21/2009	01/21/2009			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Acetone	10	10	ND	ND			
Benzene	0.5	1.0	ND	ND			
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND			
Bromochloromethane	0.5	1.0	ND	ND			
Bromodichloromethane	0.5	1.0	ND	ND			
Bromoform (Tribromomethane)	2.5	5.0	ND	ND			
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND			
2-Butanone (MEK)	5.0	5.0	ND	ND			
n-Butylbenzene	0.5	1.0	ND	ND			
sec-Butylbenzene	0.5	1.0	ND	ND			
tert-Butylbenzene	0.5	1.0	ND	ND			
Carbon Disulfide	0.5	1.0	ND	ND			
Carbon tetrachloride	0.5	1.0	ND	ND			
Chlorobenzene	0.5	1.0	ND	ND			
Chloroethane	1.5	3.0	ND	ND			
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND			
Chloroform (Trichloromethane)	0.5	1.0	ND	ND			
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND			
2-Chlorotoluene	0.5	1.0	ND	ND			
4-Chlorotoluene	0.5	1.0	ND	ND			
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND			
Dibromochloromethane	0.5	1.0	ND	ND			
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND			
Dibromomethane	0.5	1.0	ND	ND			
1,2-Dichlorobenzene	0.5	1.0	ND	ND			
1,3-Dichlorobenzene	0.5	1.0	ND	ND			
1,4-Dichlorobenzene	0.5	1.0	ND	ND			

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1

Our Lab I.D.			Method Blank	**51111.08**			
Client Sample I.D.				G-405-6			
Date Sampled				**01/16/2009**			
Date Prepared			**01/21/2009**	**01/21/2009**			
Preparation Method			**5030B**	**5030B**			
Date Analyzed			**01/21/2009**	**01/21/2009**			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Dichlorodifluoromethane	**1.5**	**3.0**	**ND**	**ND**			
1,1-Dichloroethane	**0.5**	**1.0**	**ND**	**ND**			
1,2-Dichloroethane (EDC)	**0.5**	**1.0**	**ND**	**ND**			
1,1-Dichloroethene	**0.5**	**1.0**	**ND**	**ND**			
cis-1,2-Dichloroethene	**0.5**	**1.0**	**ND**	**ND**			
trans-1,2-Dichloroethene	**0.5**	**1.0**	**ND**	**ND**			
1,2-Dichloropropane	**0.5**	**1.0**	**ND**	**ND**			
1,3-Dichloropropane	**0.5**	**1.0**	**ND**	**ND**			
2,2-Dichloropropane	**0.5**	**1.0**	**ND**	**ND**			
1,1-Dichloropropene	**0.5**	**1.0**	**ND**	**ND**			
cis-1,3-Dichloropropene	**0.5**	**1.0**	**ND**	**ND**			
trans-1,3-Dichloropropene	**0.5**	**1.0**	**ND**	**ND**			
Ethylbenzene	**0.5**	**1.0**	**ND**	**ND**			
Hexachlorobutadiene	**1.5**	**3.0**	**ND**	**ND**			
2-Hexanone	**2.5**	**5.0**	**ND**	**ND**			
Isopropylbenzene	**0.5**	**1.0**	**ND**	**ND**			
p-Isopropyltoluene	**0.5**	**1.0**	**ND**	**ND**			
4-Methyl-2-pentanone (MIBK)	**2.5**	**5.0**	**ND**	**ND**			
Methyl-tert-butyl ether (MTBE)	**0.5**	**1.0**	**ND**	**ND**			
Methylene chloride (DCM)	**2.0**	**4.0**	**ND**	**ND**			
Naphthalene	**0.5**	**1.0**	**ND**	**ND**			
n-Propylbenzene	**0.5**	**1.0**	**ND**	**ND**			
Styrene	**0.5**	**1.0**	**ND**	**ND**			
1,1,1,2-Tetrachloroethane	**0.5**	**1.0**	**ND**	**ND**			
1,1,2,2-Tetrachloroethane	**0.5**	**1.0**	**ND**	**ND**			
Tetrachloroethene	**0.5**	**1.0**	**ND**	**ND**			
Toluene (Methyl benzene)	**0.5**	**1.0**	**ND**	**ND**			
1,2,3-Trichlorobenzene	**0.5**	**1.0**	**ND**	**ND**			
1,2,4-Trichlorobenzene	**0.5**	**1.0**	**ND**	**ND**			
1,1,1-Trichloroethane	**0.5**	**1.0**	**ND**	**ND**			
1,1,2-Trichloroethane	**0.5**	**1.0**	**ND**	**ND**			
Trichloroethene	**0.5**	**1.0**	**ND**	**ND**			
Trichlorofluoromethane	**0.5**	**1.0**	**ND**	**ND**			
1,2,3-Trichloropropane	**0.5**	**1.0**	**ND**	**ND**			

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1

Our Lab I.D.			Method Blank	**51111.08**			
Client Sample I.D.				G-405-6			
Date Sampled				**01/16/2009**			
Date Prepared			**01/21/2009**	**01/21/2009**			
Preparation Method			**5030B**	**5030B**			
Date Analyzed			**01/21/2009**	**01/21/2009**			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
1,2,4-Trimethylbenzene	**0.5**	**1.0**	**ND**	**ND**			
1,3,5-Trimethylbenzene	**0.5**	**1.0**	**ND**	**ND**			
Vinyl Acetate	**0.5**	**5.0**	**ND**	**ND**			
Vinyl chloride (Chloroethene)	**0.5**	**3.0**	**ND**	**ND**			
o-Xylene	**0.5**	**1.0**	**ND**	**ND**			
m,p-Xylenes	**1.0**	**2.0**	**ND**	**ND**			
Our Lab I.D.			Method Blank	**51111.08**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	**75-125**		**98.6**	**98.1**			
Dibromofluoromethane	**75-125**		**102**	**103**			
Toluene-d8	**75-125**		**88.4**	**88.4**			

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012009

Our Lab I.D.			Method Blank	**51111.08**			
Client Sample I.D.				G-405-6			
Date Sampled				**01/16/2009**			
Date Prepared			**01/20/2009**	**01/20/2009**			
Preparation Method			**5030B**	**5030B**			
Date Analyzed			**01/20/2009**	**01/20/2009**			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Gasoline and Light HC. (C4-C12)	**0.005**	**0.010**	**ND**	**ND**			
Our Lab I.D.			Method Blank	**51111.08**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	**75-125**		**114**	**113**			

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012009

Our Lab I.D.			Method Blank	**51111.08**			
Client Sample I.D.				G-405-6			
Date Sampled				**01/16/2009**			
Date Prepared			**01/20/2009**	**01/20/2009**			
Preparation Method			**3510C**	**3510C**			
Date Analyzed			**01/22/2009**	**01/22/2009**			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Diesel (C13-C22)	**0.1**	**0.5**	**ND**	**ND**			
TPH as Heavy Hydrocarbons (C23-C40)	**0.1**	**0.5**	**ND**	**ND**			
TPH Total as Diesel and Heavy HC.C13-C40	**0.1**	**0.5**	**ND**	**ND**			
Our Lab I.D.			Method Blank	**51111.08**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Chlorobenzene	**60-125**		**71.9**	**78.3**			

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1; Dup or Spiked Sample: B0121091A1; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit	
Benzene	50.0	55.1	110	50.0	55.9	112	1.80	75-125	<20	
Chlorobenzene	50.0	49.1	98.2	50.0	49.2	98.4	<1	75-125	<20	
1,1-Dichloroethene	50.0	44.8	89.6	50.0	45.2	90.4	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	41.0	82.0	50.0	41.2	82.4	<1	75-125	<20	
Toluene (Methyl benzene)	50.0	46.1	92.2	50.0	46.4	92.8	<1	75-125	<20	
Trichloroethene	50.0	58.9	118	50.0	58.6	117	<1	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	42.7	85.3	50.0	43.1	86.2	1.06	75-125	<20	
Dibromofluoromethane	50.0	51.0	102	50.0	50.6	101	<1	75-125	<20	
Toluene-d8	50.0	42.9	85.8	50.0	43.2	86.3	<1	75-125	<20	

QC Batch No: 0121091A1; Dup or Spiked Sample: B0121091A1; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Benzene	50.0	53.8	108	75-125						
Chlorobenzene	50.0	48.2	96.4	75-125						
1,1-Dichloroethene	50.0	44.6	89.2	75-125						
Methyl-tert-butyl ether (MTBE)	50.0	40.2	80.4	75-125						
Toluene (Methyl benzene)	50.0	46.1	92.2	75-125						
Trichloroethene	50.0	58.3	117	75-125						
LCS										
Chloroform (Trichloromethane)	50.0	57.6	115	75-125						
Ethylbenzene	50.0	45.0	90.0	75-125						
1,1,1-Trichloroethane	50.0	46.6	93.2	75-125						
o-Xylene	50.0	46.6	93.2	75-125						
m,p-Xylenes	100	92.9	92.9	75-125						
Surrogates										
Bromofluorobenzene	50.0	42.8	85.5	75-125						
Dibromofluoromethane	50.0	50.2	100	75-125						

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QUALITY CONTROL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121091A1; Dup or Spiked Sample: B0121091A1; LCS: Clean Water; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Toluene-d8	**50.0**	**43.2**	**86.3**	**75-125**						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/23/2009; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	5.00	5.50	110	5.00	5.05	101	8.5	75-125	<20
Surrogates										
Chlorobenzene	0.00	2.00	1.39	69.3	2.00	1.31	65.5	5.6	60-125	<20

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/23/2009; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	5.00	6.05	121	75-125						
Surrogates										
Chlorobenzene	2.00	1.64	81.9	60-125						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/20/2009; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	0.500	0.510	102	0.500	0.500	100	2.0	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0520	104	0.0500	0.0525	105	<1	75-125	<20

QC Batch No: 012009; Dup or Spiked Sample: B012009; LCS: Clean Water; QC Prepared: 01/20/2009; QC Analyzed: 01/20/2009; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.470	94.0	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0585	117	75-125						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-2; Dup or Spiked Sample: 51111.01; LCS: Clean Sand; QC Prepared: 01/23/2009; QC Analyzed: 01/23/2009; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	ND	50.0	47.6	95.2	50.0	47.6	95.2	<1	80-120	<15
Arsenic	ND	50.0	53.5	107	50.0	54.0	108	<1	80-120	<15
Barium	70.0	50.0	120	100	50.0	119	98.0	2.0	80-120	<15
Beryllium	ND	50.0	51.0	102	50.0	50.5	101	<1	80-120	<15
Cadmium	ND	50.0	51.5	103	50.0	51.5	103	<1	80-120	<15
Chromium	15.7	50.0	67.7	104	50.0	67.2	103	<1	80-120	<15
Cobalt	7.55	50.0	57.5	99.9	50.0	57.0	98.9	1.0	80-120	<15
Copper	14.1	50.0	68.1	108	50.0	67.6	107	<1	80-120	<15
Lead	3.85	50.0	52.0	96.3	50.0	52.5	97.3	1.0	80-120	<15
Mercury (By EPA 7471)	ND	0.500	0.505	101	0.500	0.505	101	<1	80-120	<15
Molybdenum	ND	50.0	53.5	107	50.0	53.5	107	<1	80-120	<15
Nickel	11.6	50.0	61.0	98.8	50.0	61.0	98.8	<1	80-120	<15
Selenium	ND	50.0	52.0	104	50.0	51.5	103	<1	80-120	<15
Silver	ND	50.0	53.0	106	50.0	52.5	105	<1	80-120	<15
Thallium	ND	50.0	45.6	91.2	50.0	44.8	89.6	1.8	80-120	<15
Vanadium	34.5	50.0	86.5	104	50.0	86.5	104	<1	80-120	<15
Zinc	52.0	50.0	103	102	50.0	102	100	2.0	80-120	<15

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QUALITY CONTROL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-2; Dup or Spiked Sample: 51111.01; LCS: Clean Sand; QC Prepared: 01/23/2009; QC Analyzed: 01/23/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Antimony	**50.0**	**52.5**	**105**	**80-120**						
Arsenic	**50.0**	**53.5**	**107**	**80-120**						
Barium	**50.0**	**55.0**	**110**	**80-120**						
Beryllium	**50.0**	**52.0**	**104**	**80-120**						
Cadmium	**50.0**	**54.0**	**108**	**80-120**						
Chromium	**50.0**	**53.0**	**106**	**80-120**						
Cobalt	**50.0**	**54.0**	**108**	**80-120**						
Copper	**50.0**	**52.0**	**104**	**80-120**						
Lead	**50.0**	**52.5**	**105**	**80-120**						
Mercury (By EPA 7471)	**0.500**	**0.435**	**86.9**	**80-120**						
Molybdenum	**50.0**	**54.0**	**108**	**80-120**						
Nickel	**50.0**	**53.0**	**106**	**80-120**						
Selenium	**50.0**	**55.0**	**110**	**80-120**						
Silver	**50.0**	**52.0**	**104**	**80-120**						
Thallium	**50.0**	**53.0**	**106**	**80-120**						
Vanadium	**50.0**	**53.0**	**106**	**80-120**						
Zinc	**50.0**	**55.0**	**110**	**80-120**						

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121093A1; Dup or Spiked Sample: B0121093A1; LCS: Clean Sand; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	49.8	99.6	50.0	55.0	110	9.9	75-125	<20
Chlorobenzene	0.00	50.0	39.0	78.0	50.0	37.5	75.0	3.9	75-125	<20
1,1-Dichloroethene	0.00	50.0	53.0	106	50.0	57.0	114	7.3	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	52.0	104	50.0	41.1	82.2	23.4	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	43.7	87.4	50.0	57.0	114	26.4	75-125	<20
Trichloroethene	0.00	50.0	56.5	113	50.0	52.5	105	7.3	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	48.0	96.0	50.0	48.5	97.0	1.0	75-125	<20
Dibromofluoromethane	0.00	50.0	54.0	108	50.0	55.5	111	2.7	75-125	<20
Toluene-d8	0.00	50.0	52.0	104	50.0	53.0	106	1.9	75-125	<20

QC Batch No: 0121093A1; Dup or Spiked Sample: B0121093A1; LCS: Clean Sand; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Benzene	50.0	52.1	104	75-125						
Chlorobenzene	50.0	40.6	81.2	75-125						
1,1-Dichloroethene	50.0	55.7	111	75-125						
Methyl-tert-butyl ether (MTBE)	50.0	57.1	114	75-125						
Toluene (Methyl benzene)	50.0	41.9	83.8	75-125						
Trichloroethene	50.0	55.3	111	75-125						
LCS										
Chloroform (Trichloromethane)	50.0	53.5	107	75-125						
Ethylbenzene	50.0	40.3	80.6	75-125						
1,1,1-Trichloroethane	50.0	58.1	116	75-125						
o-Xylene	50.0	44.5	89.0	75-125						
m,p-Xylenes	100	81.8	81.8	75-125						
Surrogates										
Bromofluorobenzene	50.0	48.4	96.8	75-125						
Dibromofluoromethane	50.0	53.1	106	75-125						

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QUALITY CONTROL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0121093A1; Dup or Spiked Sample: B0121093A1; LCS: Clean Sand; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Toluene-d8	**50.0**	**41.2**	**82.4**	**75-125**						

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1; Dup or Spiked Sample: B0122092A1; LCS: Clean Sand; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	40.0	80.0	50.0	38.6	77.2	3.56	75-125	<20
Chlorobenzene	0.00	50.0	51.0	102	50.0	50.0	100	1.98	75-125	<20
1,1-Dichloroethene	0.00	50.0	42.4	84.8	50.0	41.7	83.4	1.66	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	39.7	79.4	50.0	39.1	78.2	1.52	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	50.0	100	50.0	49.2	98.4	1.61	75-125	<20
Trichloroethene	0.00	50.0	39.0	78.0	50.0	38.7	77.4	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	53.5	107	50.0	52.5	105	1.87	75-125	<20
Dibromofluoromethane	0.00	50.0	49.2	98.3	50.0	49.3	98.5	<1	75-125	<20
Toluene-d8	0.00	50.0	57.5	115	50.0	58.0	116	<1	75-125	<20

QC Batch No: 0122092A1; Dup or Spiked Sample: B0122092A1; LCS: Clean Sand; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Benzene	50.0	38.0	76.0	75-125						
Chlorobenzene	50.0	44.9	89.8	75-125						
1,1-Dichloroethene	50.0	43.8	87.6	75-125						
Methyl-tert-butyl ether (MTBE)	50.0	39.0	78.0	75-125						
Toluene (Methyl benzene)	50.0	44.2	88.4	75-125						
Trichloroethene	50.0	37.9	75.8	75-125						
LCS										
Chloroform (Trichloromethane)	50.0	38.3	76.6	75-125						
Ethylbenzene	50.0	45.5	91.0	75-125						
1,1,1-Trichloroethane	50.0	39.7	79.4	75-125						
o-Xylene	50.0	46.7	93.4	75-125						
m,p-Xylenes	100	89.2	89.2	75-125						
Surrogates										
Bromofluorobenzene	50.0	52.6	105	75-125						
Dibromofluoromethane	50.0	50.9	102	75-125						

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QUALITY CONTROL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0122092A1; Dup or Spiked Sample: B0122092A1; LCS: Clean Sand; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Toluene-d8	**50.0**	**57.1**	**114**	**75-125**						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012109; Dup or Spiked Sample: 51111.06; LCS: Clean Sand; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	500	540	108	500	545	109	<1	75-125	<20
Surrogates										
Chlorobenzene	0.00	100	88.1	88.1	100	91.0	91.0	3.2	75-125	<20

QC Batch No: 012109; Dup or Spiked Sample: 51111.06; LCS: Clean Sand; QC Prepared: 01/21/2009; QC Analyzed: 01/22/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	500	590	118	75-125						
Surrogates										
Chlorobenzene	100	92.8	92.8	75-125						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 012209; Dup or Spiked Sample: 51140.03; LCS: Clean Sand; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	500	595	119	500	580	116	2.6	75-125	<20
Surrogates										
Chlorobenzene	0.00	100	91.1	91.1	100	89.2	89.2	2.1	75-125	<20

QC Batch No: 012209; Dup or Spiked Sample: 51140.03; LCS: Clean Sand; QC Prepared: 01/22/2009; QC Analyzed: 01/22/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	500	585	117	75-125						
Surrogates										
Chlorobenzene	100	94.1	94.1	75-125						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51111	01/20/2009	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 012109; Dup or Spiked Sample: B012109; LCS: Clean Sand; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	2.50	2.58	103	2.50	2.55	102	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0540	108	0.0500	0.0535	107	<1	75-125	<20

QC Batch No: 012109; Dup or Spiked Sample: B012109; LCS: Clean Sand; QC Prepared: 01/21/2009; QC Analyzed: 01/21/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	2.50	2.60	104	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0530	106	75-125						

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Number of Pages	**30**
Date Received	**01/15/2009**
Date Reported	**01/23/2009**

Job Number	Order Date	Client
51046	01/15/2009	GROUP

Project ID: I-436A
Project Name: SR-22 Phase II
Site: SR-22/I-405/I-605

Enclosed please find results of analyses of 16 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

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CHAIN OF CUSTODY RECORD

Nº 61539

COMPANY	GROUP DELTA	PROJECT MANAGER	JESNA GLISIC
COMPANY ADDRESS	32 Mauchly Ste B	PHONE	450-2100
		FAX	949 450-2108
PROJECT NAME	SR-22 Phase II	PROJECT #	1-436A
SITE NAME AND ADDRESS	SR-22/I-405/I-605	PO #	

AETL JOB No. 51046 Page 6 of 9

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8081A	8141A	8151A	TEST INSTRUCTIONS & COMMENTS
1	HA-405-01	51046.25	11/4/09	9:18	Soil	1 8oz.		/			
2	HA-405-01	51046.26		9:20		2 8oz		/			
3	HA-405-01	51046.27		9:22		1 8oz	Comp	/			
4	HA-405-02	51046.28		9:48		1		/			
5	HA-405-02	51046.29		9:40		2					hold
6	HA-405-02	51046.30		9:42		1					hold
7	HA-405-03	51046.31		9:52		1		/			
8	HA-405-03	51046.32		9:54		2					hold
9	HA-405-03	51046.33		9:56		1					hold
10	HA-405-04	51046.34		15:24		1		/			
11	HA-405-04	51046.35		15:30		2					hold
12	HA-405-04	51046.36		15:34		1					hold
13	HA-405-06	51046.37		16:05		1		/			
14	HA-405-06	51046.38		16:10		2		/			
15	HA-405-06	51046.39		16:18		1		/			hold

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	15	PROPERLY COOLED (Y) N / NA	
CUSTODY SEALS Y / (N) / NA		SAMPLES INTACT (Y) N / NA	
RECEIVED IN GOOD COND. (Y) N		SAMPLES ACCEPTED (Y) N	

TURN AROUND TIME

☒ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY:	SAMPLER:		
Signature:	Jesna Glisic		Thomas
Printed Name:	JESNA GLISIC		Thomas McBroom
Date:	11/15/09	Time: 12:40	Date: 11-15-09 Time: 1430
RECEIVED BY:	1.	2.	3.
Signature:	Thomas		
Printed Name:	Thomas Robinson		
Date:	11-15-09	Time: 1240	Date: 11/15/09 Time: 1430

RECEIVED BY LABORATORY: 3.

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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SR-22/I-405/I-605

Page: **12**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011609-1

Our Lab I.D.			51046.22	51046.25	51046.26		
Client Sample I.D.			~~HA-605-23-1~~	HA-405-01-1	HA-405-01-2		
Date Sampled			01/14/2009	01/14/2009	01/14/2009		
Date Prepared			01/16/2009	01/16/2009	01/16/2009		
Preparation Method			3550B	3550B	3550B		
Date Analyzed			01/16/2009	01/16/2009	01/16/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			2	2	2		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Aldrin	2.0	4.0	ND	ND	ND		
Chlordane (Total)	2.0	4.0	20.0	2.84J	2.67J		
Chlordane (alpha)	2.0	4.0	7.35	ND	ND		
4,4'-DDD (DDD)	2.0	4.0	4.11	ND	ND		
4,4'-DDE (DDE)	2.0	4.0	7.54	2.69J	6.22		
4,4'-DDT (DDT)	2.0	4.0	46.0	6.86	10.4		
Dieldrin	2.0	4.0	4.24	ND	ND		
Endosulfan 1	2.0	4.0	ND	ND	ND		
Endosulfan 11	2.0	4.0	ND	ND	ND		
Endosulfan sulfate	2.0	4.0	ND	ND	ND		
Endrin	2.0	4.0	ND	ND	ND		
Endrin aldehyde	2.0	4.0	ND	ND	ND		
Endrin ketone	2.0	4.0	ND	ND	ND		
Chlordane (gamma)	2.0	4.0	12.6	ND	ND		
Heptachlor	2.0	4.0	ND	ND	ND		
Heptachlor epoxide	2.0	4.0	ND	ND	ND		
alpha-Hexachlorocyclohexane (Alpha-BHC)	2.0	4.0	ND	ND	ND		
beta-Hexachlorocyclohexane (Betta-BHC)	2.0	4.0	ND	ND	ND		
delta-Hexachlorocyclohexane (Delta-BHC)	2.0	4.0	ND	ND	ND		
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	2.0	4.0	ND	ND	ND		
Methoxychlor	10	20	ND	ND	ND		
Toxaphene	170	340	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			51046.22	51046.25	51046.26		
Surrogates	%Rec.Limit		% Rec.	% Rec.	% Rec.		
Decachlorobiphenyl	30-150		116	117	136		
Tetrachloro-m-xylene	30-150		94.6	117	142		

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011609-1

Our Lab I.D.			**51046.28**				
Client Sample I.D.			HA-405-02-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/16/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/16/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**1.0**	**2.0**	**ND**				
Chlordane (Total)	**1.0**	**2.0**	**ND**				
Chlordane (alpha)	**1.0**	**2.0**	**ND**				
4,4'-DDD (DDD)	**1.0**	**2.0**	**ND**				
4,4'-DDE (DDE)	**1.0**	**2.0**	**1.00J**				
4,4'-DDT (DDT)	**1.0**	**2.0**	**4.36**				
Dieldrin	**1.0**	**2.0**	**ND**				
Endosulfan 1	**1.0**	**2.0**	**ND**				
Endosulfan 11	**1.0**	**2.0**	**ND**				
Endosulfan sulfate	**1.0**	**2.0**	**ND**				
Endrin	**1.0**	**2.0**	**ND**				
Endrin aldehyde	**1.0**	**2.0**	**ND**				
Endrin ketone	**1.0**	**2.0**	**ND**				
Chlordane (gamma)	**1.0**	**2.0**	**ND**				
Heptachlor	**1.0**	**2.0**	**ND**				
Heptachlor epoxide	**1.0**	**2.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**1.0**	**2.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**1.0**	**2.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**1.0**	**2.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**1.0**	**2.0**	**ND**				
Methoxychlor	**5.0**	**10.0**	**ND**				
Toxaphene	**85.0**	**170.0**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51046.28**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**142**				
Tetrachloro-m-xylene	**30-150**		**132**				

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Page: **16**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011609-1

Our Lab I.D.			**51046.31**				
Client Sample I.D.			HA-405-03-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/16/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/16/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			2				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**2.0**	**4.0**	**ND**				
Chlordane (Total)	**2.0**	**4.0**	**7.66**				
Chlordane (alpha)	**2.0**	**4.0**	**3.69J**				
4,4'-DDD (DDD)	**2.0**	**4.0**	**4.60**				
4,4'-DDE (DDE)	**2.0**	**4.0**	**6.21**				
4,4'-DDT (DDT)	**2.0**	**4.0**	**49.8**				
Dieldrin	**2.0**	**4.0**	**ND**				
Endosulfan 1	**2.0**	**4.0**	**ND**				
Endosulfan 11	**2.0**	**4.0**	**ND**				
Endosulfan sulfate	**2.0**	**4.0**	**ND**				
Endrin	**2.0**	**4.0**	**ND**				
Endrin aldehyde	**2.0**	**4.0**	**ND**				
Endrin ketone	**2.0**	**4.0**	**ND**				
Chlordane (gamma)	**2.0**	**4.0**	**3.97J**				
Heptachlor	**2.0**	**4.0**	**ND**				
Heptachlor epoxide	**2.0**	**4.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**2.0**	**4.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**2.0**	**4.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**2.0**	**4.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**2.0**	**4.0**	**ND**				
Methoxychlor	**10**	**20**	**ND**				
Toxaphene	**170**	**340**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51046.31**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**104**				
Tetrachloro-m-xylene	**30-150**		**98.1**				

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Site

SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011609-1

Our Lab I.D.			**51046.34**				
Client Sample I.D.			HA-405-04-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/16/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/16/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**1.0**	**2.0**	**ND**				
Chlordane (Total)	**1.0**	**2.0**	**3.07**				
Chlordane (alpha)	**1.0**	**2.0**	**1.40J**				
4,4'-DDD (DDD)	**1.0**	**2.0**	**ND**				
4,4'-DDE (DDE)	**1.0**	**2.0**	**1.83J**				
4,4'-DDT (DDT)	**1.0**	**2.0**	**10.1**				
Dieldrin	**1.0**	**2.0**	**ND**				
Endosulfan 1	**1.0**	**2.0**	**ND**				
Endosulfan 11	**1.0**	**2.0**	**ND**				
Endosulfan sulfate	**1.0**	**2.0**	**ND**				
Endrin	**1.0**	**2.0**	**ND**				
Endrin aldehyde	**1.0**	**2.0**	**ND**				
Endrin ketone	**1.0**	**2.0**	**ND**				
Chlordane (gamma)	**1.0**	**2.0**	**1.67J**				
Heptachlor	**1.0**	**2.0**	**ND**				
Heptachlor epoxide	**1.0**	**2.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**1.0**	**2.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**1.0**	**2.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**1.0**	**2.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**1.0**	**2.0**	**ND**				
Methoxychlor	**5.0**	**10.0**	**ND**				
Toxaphene	**85.0**	**170.0**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51046.34**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**97.2**				
Tetrachloro-m-xylene	**30-150**		**96.5**				

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011609-1

Our Lab I.D.			**51046.37**				
Client Sample I.D.			HA-405-06-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/16/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/16/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			2				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**2.0**	**4.0**	**ND**				
Chlordane (Total)	**2.0**	**4.0**	**7.73**				
Chlordane (alpha)	**2.0**	**4.0**	**3.41J**				
4,4'-DDD (DDD)	**2.0**	**4.0**	**6.25**				
4,4'-DDE (DDE)	**2.0**	**4.0**	**13.1**				
4,4'-DDT (DDT)	**2.0**	**4.0**	**73.0**				
Dieldrin	**2.0**	**4.0**	**ND**				
Endosulfan 1	**2.0**	**4.0**	**ND**				
Endosulfan 11	**2.0**	**4.0**	**ND**				
Endosulfan sulfate	**2.0**	**4.0**	**ND**				
Endrin	**2.0**	**4.0**	**ND**				
Endrin aldehyde	**2.0**	**4.0**	**ND**				
Endrin ketone	**2.0**	**4.0**	**ND**				
Chlordane (gamma)	**2.0**	**4.0**	**4.32**				
Heptachlor	**2.0**	**4.0**	**ND**				
Heptachlor epoxide	**2.0**	**4.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**2.0**	**4.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**2.0**	**4.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**2.0**	**4.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**2.0**	**4.0**	**ND**				
Methoxychlor	**10**	**20**	**ND**				
Toxaphene	**170**	**340**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51046.37**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**129**				
Tetrachloro-m-xylene	**30-150**		**121**				

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011609-1

Our Lab I.D.			**51046.38**				
Client Sample I.D.			HA-405-06-2				
Date Sampled			**01/14/2009**				
Date Prepared			**01/16/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/16/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**1.0**	**2.0**	**ND**				
Chlordane (Total)	**1.0**	**2.0**	**ND**				
Chlordane (alpha)	**1.0**	**2.0**	**ND**				
4,4'-DDD (DDD)	**1.0**	**2.0**	**ND**				
4,4'-DDE (DDE)	**1.0**	**2.0**	**4.44**				
4,4'-DDT (DDT)	**1.0**	**2.0**	**6.69**				
Dieldrin	**1.0**	**2.0**	**ND**				
Endosulfan 1	**1.0**	**2.0**	**ND**				
Endosulfan 11	**1.0**	**2.0**	**ND**				
Endosulfan sulfate	**1.0**	**2.0**	**ND**				
Endrin	**1.0**	**2.0**	**ND**				
Endrin aldehyde	**1.0**	**2.0**	**ND**				
Endrin ketone	**1.0**	**2.0**	**ND**				
Chlordane (gamma)	**1.0**	**2.0**	**ND**				
Heptachlor	**1.0**	**2.0**	**ND**				
Heptachlor epoxide	**1.0**	**2.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**1.0**	**2.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**1.0**	**2.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**1.0**	**2.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**1.0**	**2.0**	**ND**				
Methoxychlor	**5.0**	**10.0**	**ND**				
Toxaphene	**85.0**	**170.0**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51046.38**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**120**				
Tetrachloro-m-xylene	**30-150**		**127**				

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011609-1; Dup or Spiked Sample: 51046.10; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/17/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Aldrin	0.00	20.0	23.0	115	20.0	23.2	116	<1	40-150	<40
4,4'-DDT (DDT)	0.00	50.0	54.0	108	50.0	55.0	110	1.8	40-150	<40
Dieldrin	0.00	50.0	59.5	119	50.0	60.0	120	<1	40-150	<40
Endrin	0.00	50.0	69.5	139	50.0	70.0	140	<1	40-150	<40
Heptachlor	0.00	20.0	24.4	122	20.0	24.4	122	<1	40-150	<40
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	0.00	20.0	22.2	111	20.0	22.2	111	<1	40-150	<40
Surrogates										
Decachlorobiphenyl	0.00	50.0	65.5	131	50.0	69.5	139	5.9	30-150	<40
Tetrachloro-m-xylene	0.00	50.0	61.5	123	50.0	60.5	121	1.6	30-150	<40

QC Batch No: 011609-1; Dup or Spiked Sample: 51046.10; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/17/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Aldrin	20.0	19.4	97.0	50-150						
4,4'-DDT (DDT)	50.0	46.2	92.4	50-150						
Dieldrin	50.0	51.5	103	50-150						
Endrin	50.0	58.5	117	50-150						
Heptachlor	20.0	20.4	102	50-150						
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	20.0	19.4	97.0	50-150						
Surrogates										
Decachlorobiphenyl	50.0	59.0	118	30-150						
Tetrachloro-m-xylene	50.0	52.5	105	30-150						

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909; Dup or Spiked Sample: 51047.11; LCS: Clean Sand; QC Prepared: 01/19/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Aldrin	0.00	20.0	24.2	121	20.0	25.4	127	4.8	40-150	<40
4,4'-DDT (DDT)	0.00	50.0	58.0	116	50.0	60.5	121	4.2	40-150	<40
Dieldrin	0.00	50.0	61.5	123	50.0	64.5	129	4.8	40-150	<40
Endrin	0.00	50.0	70.0	140	50.0	73.0	146	4.2	40-150	<40
Heptachlor	0.00	20.0	25.4	127	20.0	26.4	132	3.9	40-150	<40
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	0.00	20.0	23.0	115	20.0	24.0	120	4.3	40-150	<40
Surrogates										
Decachlorobiphenyl	0.00	50.0	67.0	134	50.0	70.0	140	4.4	30-150	<40
Tetrachloro-m-xylene	0.00	50.0	58.0	116	50.0	60.0	120	3.4	30-150	<40

QC Batch No: 011909; Dup or Spiked Sample: 51047.11; LCS: Clean Sand; QC Prepared: 01/19/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Aldrin	20.0	20.2	101	50-150						
4,4'-DDT (DDT)	50.0	49.1	98.2	50-150						
Dieldrin	50.0	52.5	105	50-150						
Endrin	50.0	61.0	122	50-150						
Heptachlor	20.0	21.8	109	50-150						
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	20.0	20.0	100	50-150						
Surrogates										
Decachlorobiphenyl	50.0	51.0	102	30-150						
Tetrachloro-m-xylene	50.0	49.1	98.2	30-150						

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8141A), Organophosphorus Compounds by GC

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/16/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Bolstar (Sulprofos)	0.00	2,500	2,750	110	2,500	2,750	110	<1	40-140	<30
Ethoprop	0.00	2,500	2,830	113	2,500	2,780	111	1.8	40-140	<30
Phorate (Phosphorodithioic acid)	0.00	2,500	2,800	112	2,500	2,780	111	<1	40-140	<30
Ronnel	0.00	2,500	3,050	122	2,500	3,050	122	<1	40-140	<30

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/16/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Bolstar (Sulprofos)	250	290	116	40-140						
Ethoprop	250	290	116	40-140						
Phorate (Phosphorodithioic acid)	250	288	115	40-140						
Ronnel	250	318	127	40-140						

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SR-22/I-405/I-605

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51046	01/15/2009	GROUP

Method: (8151A), Chlorinated Herbicides by GC

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
2,4,5-T	0.00	500	500	100	500	525	105	4.9	50-150	<20
2,4-D	0.00	5,000	4,750	95.0	5,000	5,050	101	6.1	50-150	<20
Dinoseb	0.00	2,500	2,350	94.0	2,500	2,330	93.0	1.1	50-150	<20

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
2,4,5-T	50.0	52.0	104	50-150						
2,4,5-TP	50.0	44.0	88.0	50-150						
2,4-D	500	480	96.0	50-150						
2,4-DB	500	490	98.0	50-150						
Dalapon	1,250	1,050	84.0	50-150						
Dicamba	50.0	62.5	125	50-150						
Dichloroprop	500	415	83.0	50-150						
Dinoseb	250	228	91.0	50-150						
MCPA	50,000	67,500	135	50-150						
MCPP	50,000	43,000	86.0	50-150						

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Number of Pages	**41**
Date Received	**01/15/2009**
Date Reported	**01/26/2009**

Job Number	Order Date	Client
51047	01/15/2009	GROUP

Project ID: I-436A
Project Name: SR-22 Phase II
Site: SR-22/I-405/I-605

Enclosed please find results of analyses of 19 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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CHAIN OF CUSTODY RECORD

№ 61540

AETL JOB No. 51047 Page 7 of 9

COMPANY: GROUP DELTA
PROJECT MANAGER: VESNA GLISIC
COMPANY ADDRESS: 32 Mauchly Ste B
PHONE: 949 450-400
FAX: 949 450-2108
PROJECT NAME: SR-22 Proj II
PROJECT #: 1436A
SITE NAME AND ADDRESS: ~~SR~~ SR-22 / I-405 / I-605
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8081A	8141A	8151A	TEST INSTRUCTIONS & COMMENTS
1	HA-405-01	51047.01	1/14/09	10:04	SOIL	1 8oz		/			
2	HA-405-02	51047.02		10:10		2 8oz					Hold
3	HA-405-03	51047.03		10:12		3					Hold
4	HA-405-04	51047.04		15:50		1		/			
5	HA-405-05	51047.05		15:57		2					Hold
6	HA-405-06	51047.06		16:02		3					Hold
7	HA-405-09	51047.07		10:10		1		/			
8	HA-405-04	51047.08		10:15		2					Hold
9	HA-405-09	51047.09		10:17		3					Hold
10	HA-405-10	51047.10		9:08		1		/	/	/	
11	HA-405-10	51047.11		9:10		2		/			
12	HA-405-10	51047.12		9:13		3					Hold
13	HA-405-11	51047.13		10:26		1		/			
14	HA-405-11	51047.14		10:32		2					Hold
15	HA-405-11	51047.15	↓	10:40	↓	3					Hold

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	15	PROPERLY COOLED (Y) N / NA	
CUSTODY SEALS Y / (N) NA		SAMPLES INTACT (Y) N / NA	
RECEIVED IN GOOD COND. (Y) N		SAMPLES ACCEPTED (Y) N	

TURN AROUND TIME

☒ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER:		RELINQUISHED BY:	RELINQUISHED BY:
Signature:		Signature:	Signature:
Printed Name:	VESNA GLISIC	Printed Name:	Printed Name: THOMAS KOBINSON
Date: / Time:	1/15/09 12:40	Date: / Time:	Date: 1-15-09 Time: 1430
RECEIVED BY:		RECEIVED BY:	RECEIVED BY LABORATORY:
Signature:		Signature:	Signature:
Printed Name:	THOMAS KOBINSON	Printed Name:	Printed Name:
Date: / Time:	1-15-09 1240	Date: / Time:	Date: 01/15/09 Time: 1430

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CHAIN OF CUSTODY RECORD

№ 61541

AETL JOB No. 51047

COMPANY: GROUP DELTA
PROJECT MANAGER: VESNA GLISIC
COMPANY ADDRESS: 32 Mauchly Ste B
PHONE: 949 450 2400
FAX: 949 450 2108
PROJECT NAME: SR-22 Phase II
PROJECT #: 1-436A
SITE NAME AND ADDRESS: SR-22 / I-405 / I-605
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8081A	8141A	8151A	TEST INSTRUCTIONS & COMMENTS
1	HA-405-17	51047.16	1/14/09	15:10	Soil	1 8oz		/	/	/	
2	HA-405-17	51047.17		15:17		1 8oz.		/			
3	HA-405-17	51047.18		15:45		1					hold
4	HA-405-17	51047.19		10:35		1		/			
5	HA-405-17	51047.20		10:34		1					hold
6	HA-405-17	51047.21				1					hold
7	HA-405-14	51047.22		14:57		1		/	/	/	
8	HA-405-14	51047.23		14:58		1		/			
9	HA-405-14	51047.24		15:00		1					hold
10	HA-405-15	51047.25		10:36		1		/			
11	HA-405-15	51047.26		10:47		1					hold
12	HA-405-15	51047.27		10:47		1					hold
13	HA-405-16	51047.28		2:51		1		/	/	/	
14	HA-405-16	51047.29		2:54		1		/			
15	HA-405-16	51047.30	↓	2:56	↓	1					hold

TEST INSTRUCTIONS & COMMENTS

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	15	PROPERLY COOLED (Y) N / NA	
CUSTODY SEALS Y (N) NA		SAMPLES INTACT (Y) N / NA	
RECEIVED IN GOOD COND. (Y) N		SAMPLES ACCEPTED (Y) N	

TURN AROUND TIME

☒ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER:	Signature:	Signature:	Signature:
	Printed Name: VESNA GLISIC	Printed Name:	Printed Name: THOMAS ROBINSON
	Date: 1/15/09 Time: 12:45	Date: Time:	Date: 1-15-09 Time: 1430
RECEIVED BY:	Signature:	Signature:	Signature:
	Printed Name: THOMAS ROBINSON	Printed Name:	Printed Name:
	Date: 1-15-09 Time: 1240	Date: Time:	Date: 01/15/09 Time: 1430

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CHAIN OF CUSTODY RECORD

№ 61542

COMPANY: GROUP DELTA
PROJECT MANAGER: IRENA G
COMPANY ADDRESS: 32 Mauchly Ste B
PHONE: 949 450 2100
FAX: 949 450 2108
PROJECT NAME: SR-22 Phase II
PROJECT #: 1-436-A
SITE NAME AND ADDRESS: SR-22 / I-405 / I-605
PO #:
AETL JOB No. 51047
Page 9 of 9

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.
1	HA-405-17	51047.31	1/14/09		Soil	1 807	
2	HA-405-17	51047.32		10:50		2 807	
3	HA-405-17	51047.33		10:54		1	
4		"					
5	HA-405-18	51047.34		14:36		1	
6	HA-405-18	51047.35		14:39		2	
7	HA-405-18	51047.36		14:45		1	
8							
9	MW-405-1	51047.37		12:10		1	
10	MW-405-2	51047.38		15:57		1	
11							
12							
13							
14							
15			↓		↓		

ANALYSIS REQUESTED

8081 A	8411 A	8151 A	CAM TITLE 22 6010B	VOC 8260B	TPH Diesel M8015D	TPH Gasoline M8015B				TEST INSTRUCTIONS & COMMENTS
/										
										hold
										hold
										hold
/	/	/								
/										
										hold
										hold
			/	/	/	/				
			/	/	/	/				

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	8	PROPERLY COOLED (Y) N / NA	
CUSTODY SEALS Y (N) NA		SAMPLES INTACT (Y) N / NA	
RECEIVED IN GOOD COND. (Y) N		SAMPLES ACCEPTED (Y) N	

TURN AROUND TIME

☒ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER:	Signature:	Signature:	Signature:
	Printed Name: IRENA GLESTC	Printed Name:	Printed Name: THOMAS ROBINSON
	Date: 1/15/09 Time: 12:40	Date: Time:	Date: 1-15-09 Time: 1430
RECEIVED BY:	Signature:	Signature:	Signature:
	Printed Name: THOMAS ROBINSON	Printed Name:	Printed Name: Julius Hermanto
	Date: 1-15-09 Time: 1240	Date: Time:	Date: 01/15/09 Time: 1430

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SR-22/I-405/I-605

Page: **2**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			Method Blank	51047.01	51047.04		
Client Sample I.D.				HA-405-07-1	HA-405-08-1		
Date Sampled				01/14/2009	01/14/2009		
Date Prepared			01/19/2009	01/19/2009	01/19/2009		
Preparation Method			3550B	3550B	3550B		
Date Analyzed			01/19/2009	01/19/2009	01/19/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Aldrin	1.0	2.0	ND	ND	ND		
Chlordane (Total)	1.0	2.0	ND	24.1	11.0		
Chlordane (alpha)	1.0	2.0	ND	10.5	4.78		
4,4'-DDD (DDD)	1.0	2.0	ND	10.2	65.6		
4,4'-DDE (DDE)	1.0	2.0	ND	9.10	106		
4,4'-DDT (DDT)	1.0	2.0	ND	161	1,150		
Dieldrin	1.0	2.0	ND	3.77	2.07		
Endosulfan 1	1.0	2.0	ND	ND	ND		
Endosulfan 11	1.0	2.0	ND	ND	ND		
Endosulfan sulfate	1.0	2.0	ND	ND	ND		
Endrin	1.0	2.0	ND	ND	ND		
Endrin aldehyde	1.0	2.0	ND	ND	ND		
Endrin ketone	1.0	2.0	ND	ND	ND		
Chlordane (gamma)	1.0	2.0	ND	13.6	6.25		
Heptachlor	1.0	2.0	ND	ND	ND		
Heptachlor epoxide	1.0	2.0	ND	ND	ND		
alpha-Hexachlorocyclohexane (Alpha-BHC)	1.0	2.0	ND	ND	ND		
beta-Hexachlorocyclohexane (Betta-BHC)	1.0	2.0	ND	ND	ND		
delta-Hexachlorocyclohexane (Delta-BHC)	1.0	2.0	ND	ND	ND		
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	1.0	2.0	ND	ND	ND		
Methoxychlor	5.0	10.0	ND	ND	ND		
Toxaphene	85.0	170.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			Method Blank	**51047.01**	**51047.04**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Decachlorobiphenyl	**30-150**		**94.6**	**110**	**97.8**		
Tetrachloro-m-xylene	**30-150**		**86.2**	**82.2**	**96.6**		

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SR-22/I-405/I-605

Page: **4**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			**51047.07**				
Client Sample I.D.			HA-405-09-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/19/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/19/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			2				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**2.0**	**4.0**	**ND**				
Chlordane (Total)	**2.0**	**4.0**	**14.3**				
Chlordane (alpha)	**2.0**	**4.0**	**6.43**				
4,4'-DDD (DDD)	**2.0**	**4.0**	**8.74**				
4,4'-DDE (DDE)	**2.0**	**4.0**	**8.53**				
4,4'-DDT (DDT)	**2.0**	**4.0**	**73.9**				
Dieldrin	**2.0**	**4.0**	**2.45J**				
Endosulfan 1	**2.0**	**4.0**	**ND**				
Endosulfan 11	**2.0**	**4.0**	**ND**				
Endosulfan sulfate	**2.0**	**4.0**	**ND**				
Endrin	**2.0**	**4.0**	**ND**				
Endrin aldehyde	**2.0**	**4.0**	**ND**				
Endrin ketone	**2.0**	**4.0**	**ND**				
Chlordane (gamma)	**2.0**	**4.0**	**7.85**				
Heptachlor	**2.0**	**4.0**	**ND**				
Heptachlor epoxide	**2.0**	**4.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**2.0**	**4.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**2.0**	**4.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**2.0**	**4.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**2.0**	**4.0**	**ND**				
Methoxychlor	**10**	**20**	**ND**				
Toxaphene	**170**	**340**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51047.07**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**104**				
Tetrachloro-m-xylene	**30-150**		**86.2**				

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SR-22/I-405/I-605

Page: **6**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			51047.10	51047.11			
Client Sample I.D.			HA-405-10-1	HA-405-10-2			
Date Sampled			01/14/2009	01/14/2009			
Date Prepared			01/19/2009	01/19/2009			
Preparation Method			3550B	3550B			
Date Analyzed			01/19/2009	01/19/2009			
Matrix			Soil	Soil			
Units			ug/Kg	ug/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Aldrin	1.0	2.0	ND	ND			
Chlordane (Total)	1.0	2.0	ND	ND			
Chlordane (alpha)	1.0	2.0	ND	ND			
4,4'-DDD (DDD)	1.0	2.0	1.35J	ND			
4,4'-DDE (DDE)	1.0	2.0	17.8	1.38J			
4,4'-DDT (DDT)	1.0	2.0	10.3	ND			
Dieldrin	1.0	2.0	ND	ND			
Endosulfan 1	1.0	2.0	ND	ND			
Endosulfan 11	1.0	2.0	ND	ND			
Endosulfan sulfate	1.0	2.0	ND	ND			
Endrin	1.0	2.0	ND	ND			
Endrin aldehyde	1.0	2.0	ND	ND			
Endrin ketone	1.0	2.0	ND	ND			
Chlordane (gamma)	1.0	2.0	ND	ND			
Heptachlor	1.0	2.0	ND	ND			
Heptachlor epoxide	1.0	2.0	ND	ND			
alpha-Hexachlorocyclohexane (Alpha-BHC)	1.0	2.0	ND	ND			
beta-Hexachlorocyclohexane (Betta-BHC)	1.0	2.0	ND	ND			
delta-Hexachlorocyclohexane (Delta-BHC)	1.0	2.0	ND	ND			
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	1.0	2.0	ND	ND			
Methoxychlor	5.0	10.0	ND	ND			
Toxaphene	85.0	170.0	ND	ND			

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			51047.10	51047.11			
Surrogates	%Rec.Limit		% Rec.	% Rec.			
Decachlorobiphenyl	30-150		86.1	91.8			
Tetrachloro-m-xylene	30-150		89.5	81.6			

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SR-22/I-405/I-605

Page: **8**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			**51047.13**				
Client Sample I.D.			HA-405-11-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/19/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/19/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			2				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**2.0**	**4.0**	**ND**				
Chlordane (Total)	**2.0**	**4.0**	**39.9**				
Chlordane (alpha)	**2.0**	**4.0**	**18.4**				
4,4'-DDD (DDD)	**2.0**	**4.0**	**10.4**				
4,4'-DDE (DDE)	**2.0**	**4.0**	**5.97**				
4,4'-DDT (DDT)	**2.0**	**4.0**	**143**				
Dieldrin	**2.0**	**4.0**	**3.07J**				
Endosulfan 1	**2.0**	**4.0**	**ND**				
Endosulfan 11	**2.0**	**4.0**	**ND**				
Endosulfan sulfate	**2.0**	**4.0**	**ND**				
Endrin	**2.0**	**4.0**	**ND**				
Endrin aldehyde	**2.0**	**4.0**	**ND**				
Endrin ketone	**2.0**	**4.0**	**ND**				
Chlordane (gamma)	**2.0**	**4.0**	**21.5**				
Heptachlor	**2.0**	**4.0**	**ND**				
Heptachlor epoxide	**2.0**	**4.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**2.0**	**4.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**2.0**	**4.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**2.0**	**4.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**2.0**	**4.0**	**ND**				
Methoxychlor	**10**	**20**	**ND**				
Toxaphene	**170**	**340**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51047.13**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**125**				
Tetrachloro-m-xylene	**30-150**		**87.7**				

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SR-22/I-405/I-605

Page: **10**

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			**51047.16**				
Client Sample I.D.			HA-405-12-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/19/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/19/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**1.0**	**2.0**	**ND**				
Chlordane (Total)	**1.0**	**2.0**	**3.41**				
Chlordane (alpha)	**1.0**	**2.0**	**1.68J**				
4,4'-DDD (DDD)	**1.0**	**2.0**	**12.6**				
4,4'-DDE (DDE)	**1.0**	**2.0**	**44.8**				
4,4'-DDT (DDT)	**1.0**	**2.0**	**143**				
Dieldrin	**1.0**	**2.0**	**ND**				
Endosulfan 1	**1.0**	**2.0**	**ND**				
Endosulfan 11	**1.0**	**2.0**	**ND**				
Endosulfan sulfate	**1.0**	**2.0**	**ND**				
Endrin	**1.0**	**2.0**	**ND**				
Endrin aldehyde	**1.0**	**2.0**	**ND**				
Endrin ketone	**1.0**	**2.0**	**ND**				
Chlordane (gamma)	**1.0**	**2.0**	**1.73J**				
Heptachlor	**1.0**	**2.0**	**ND**				
Heptachlor epoxide	**1.0**	**2.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**1.0**	**2.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**1.0**	**2.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**1.0**	**2.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**1.0**	**2.0**	**ND**				
Methoxychlor	**5.0**	**10.0**	**ND**				
Toxaphene	**85.0**	**170.0**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51047.16**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**95.8**				
Tetrachloro-m-xylene	**30-150**		**100**				

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			**51047.17**				
Client Sample I.D.			HA-405-12-2				
Date Sampled			**01/14/2009**				
Date Prepared			**01/19/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/19/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			2				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**2.0**	**4.0**	**ND**				
Chlordane (Total)	**2.0**	**4.0**	**ND**				
Chlordane (alpha)	**2.0**	**4.0**	**ND**				
4,4'-DDD (DDD)	**2.0**	**4.0**	**ND**				
4,4'-DDE (DDE)	**2.0**	**4.0**	**ND**				
4,4'-DDT (DDT)	**2.0**	**4.0**	**5.18**				
Dieldrin	**2.0**	**4.0**	**ND**				
Endosulfan 1	**2.0**	**4.0**	**ND**				
Endosulfan 11	**2.0**	**4.0**	**ND**				
Endosulfan sulfate	**2.0**	**4.0**	**ND**				
Endrin	**2.0**	**4.0**	**ND**				
Endrin aldehyde	**2.0**	**4.0**	**ND**				
Endrin ketone	**2.0**	**4.0**	**ND**				
Chlordane (gamma)	**2.0**	**4.0**	**ND**				
Heptachlor	**2.0**	**4.0**	**ND**				
Heptachlor epoxide	**2.0**	**4.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**2.0**	**4.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**2.0**	**4.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**2.0**	**4.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**2.0**	**4.0**	**ND**				
Methoxychlor	**10**	**20**	**ND**				
Toxaphene	**170**	**340**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51047.17**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**89.6**				
Tetrachloro-m-xylene	**30-150**		**109**				

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			51047.19	51047.22	51047.23		
Client Sample I.D.			HA-405-13-1	HA-405-14-1	HA-405-14-2		
Date Sampled			01/14/2009	01/14/2009	01/14/2009		
Date Prepared			01/19/2009	01/19/2009	01/19/2009		
Preparation Method			3550B	3550B	3550B		
Date Analyzed			01/19/2009	01/19/2009	01/19/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Aldrin	1.0	2.0	ND	ND	ND		
Chlordane (Total)	1.0	2.0	5.36	18.1	4.84		
Chlordane (alpha)	1.0	2.0	2.91	8.20	2.15		
4,4'-DDD (DDD)	1.0	2.0	2.17	11.7	1.28J		
4,4'-DDE (DDE)	1.0	2.0	1.76J	12.8	4.47		
4,4'-DDT (DDT)	1.0	2.0	18.5	126	12.3		
Dieldrin	1.0	2.0	2.33	4.59	ND		
Endosulfan 1	1.0	2.0	ND	ND	ND		
Endosulfan 11	1.0	2.0	ND	ND	ND		
Endosulfan sulfate	1.0	2.0	ND	ND	ND		
Endrin	1.0	2.0	ND	ND	ND		
Endrin aldehyde	1.0	2.0	ND	ND	ND		
Endrin ketone	1.0	2.0	ND	ND	ND		
Chlordane (gamma)	1.0	2.0	2.45	9.87	2.69		
Heptachlor	1.0	2.0	ND	ND	ND		
Heptachlor epoxide	1.0	2.0	ND	ND	ND		
alpha-Hexachlorocyclohexane (Alpha-BHC)	1.0	2.0	ND	ND	ND		
beta-Hexachlorocyclohexane (Betta-BHC)	1.0	2.0	ND	ND	ND		
delta-Hexachlorocyclohexane (Delta-BHC)	1.0	2.0	ND	ND	ND		
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	1.0	2.0	ND	ND	ND		
Methoxychlor	5.0	10.0	ND	ND	ND		
Toxaphene	85.0	170.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			51047.19	51047.22	51047.23		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Decachlorobiphenyl	**30-150**		**115**	**123**	**104**		
Tetrachloro-m-xylene	**30-150**		**107**	**111**	**112**		

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			**51047.25**				
Client Sample I.D.			HA-405-15-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/19/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/19/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			2				
Analytes	**MDL**	**PQL**	**Results**				
Aldrin	**2.0**	**4.0**	**ND**				
Chlordane (Total)	**2.0**	**4.0**	**20.4**				
Chlordane (alpha)	**2.0**	**4.0**	**8.53**				
4,4'-DDD (DDD)	**2.0**	**4.0**	**7.30**				
4,4'-DDE (DDE)	**2.0**	**4.0**	**28.4**				
4,4'-DDT (DDT)	**2.0**	**4.0**	**97.0**				
Dieldrin	**2.0**	**4.0**	**3.97J**				
Endosulfan 1	**2.0**	**4.0**	**ND**				
Endosulfan 11	**2.0**	**4.0**	**ND**				
Endosulfan sulfate	**2.0**	**4.0**	**ND**				
Endrin	**2.0**	**4.0**	**ND**				
Endrin aldehyde	**2.0**	**4.0**	**ND**				
Endrin ketone	**2.0**	**4.0**	**ND**				
Chlordane (gamma)	**2.0**	**4.0**	**11.9**				
Heptachlor	**2.0**	**4.0**	**ND**				
Heptachlor epoxide	**2.0**	**4.0**	**ND**				
alpha-Hexachlorocyclohexane (Alpha-BHC)	**2.0**	**4.0**	**ND**				
beta-Hexachlorocyclohexane (Betta-BHC)	**2.0**	**4.0**	**ND**				
delta-Hexachlorocyclohexane (Delta-BHC)	**2.0**	**4.0**	**ND**				
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	**2.0**	**4.0**	**ND**				
Methoxychlor	**10**	**20**	**ND**				
Toxaphene	**170**	**340**	**ND**				

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			**51047.25**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Decachlorobiphenyl	**30-150**		**142**				
Tetrachloro-m-xylene	**30-150**		**110**				

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			51047.28	51047.29	51047.31		
Client Sample I.D.			HA-405-16-1	HA-405-16-2	HA-405-17-1		
Date Sampled			01/14/2009	01/14/2009	01/14/2009		
Date Prepared			01/19/2009	01/19/2009	01/19/2009		
Preparation Method			3550B	3550B	3550B		
Date Analyzed			01/19/2009	01/19/2009	01/19/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Aldrin	1.0	2.0	ND	ND	ND		
Chlordane (Total)	1.0	2.0	6.75	3.41	6.73		
Chlordane (alpha)	1.0	2.0	3.06	1.79J	3.06		
4,4'-DDD (DDD)	1.0	2.0	6.01	2.81	2.88		
4,4'-DDE (DDE)	1.0	2.0	4.47	1.96J	8.72		
4,4'-DDT (DDT)	1.0	2.0	29.2	9.15	33.6		
Dieldrin	1.0	2.0	1.21J	ND	1.36J		
Endosulfan 1	1.0	2.0	ND	ND	ND		
Endosulfan 11	1.0	2.0	ND	ND	ND		
Endosulfan sulfate	1.0	2.0	ND	ND	ND		
Endrin	1.0	2.0	ND	ND	ND		
Endrin aldehyde	1.0	2.0	ND	ND	ND		
Endrin ketone	1.0	2.0	ND	ND	ND		
Chlordane (gamma)	1.0	2.0	3.69	1.62J	3.67		
Heptachlor	1.0	2.0	ND	ND	ND		
Heptachlor epoxide	1.0	2.0	ND	ND	ND		
alpha-Hexachlorocyclohexane (Alpha-BHC)	1.0	2.0	ND	ND	ND		
beta-Hexachlorocyclohexane (Betta-BHC)	1.0	2.0	ND	ND	ND		
delta-Hexachlorocyclohexane (Delta-BHC)	1.0	2.0	ND	ND	ND		
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	1.0	2.0	ND	ND	ND		
Methoxychlor	5.0	10.0	ND	ND	ND		
Toxaphene	85.0	170.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			51047.28	51047.29	51047.31		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Decachlorobiphenyl	**30-150**		**108**	**103**	**131**		
Tetrachloro-m-xylene	**30-150**		**112**	**111**	**112**		

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909

Our Lab I.D.			51047.34	51047.35			
Client Sample I.D.			HA-405-18-1	HA-405-18-2			
Date Sampled			01/14/2009	01/14/2009			
Date Prepared			01/19/2009	01/19/2009			
Preparation Method			3550B	3550B			
Date Analyzed			01/19/2009	01/19/2009			
Matrix			Soil	Soil			
Units			ug/Kg	ug/Kg			
Dilution Factor			2	2			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Aldrin	2.0	4.0	ND	ND			
Chlordane (Total)	2.0	4.0	8.50	4.51			
Chlordane (alpha)	2.0	4.0	3.26J	ND			
4,4'-DDD (DDD)	2.0	4.0	ND	ND			
4,4'-DDE (DDE)	2.0	4.0	4.84	4.66			
4,4'-DDT (DDT)	2.0	4.0	39.8	19.0			
Dieldrin	2.0	4.0	2.26J	ND			
Endosulfan 1	2.0	4.0	ND	ND			
Endosulfan 11	2.0	4.0	ND	ND			
Endosulfan sulfate	2.0	4.0	ND	ND			
Endrin	2.0	4.0	ND	ND			
Endrin aldehyde	2.0	4.0	ND	ND			
Endrin ketone	2.0	4.0	ND	ND			
Chlordane (gamma)	2.0	4.0	5.24	2.61J			
Heptachlor	2.0	4.0	ND	ND			
Heptachlor epoxide	2.0	4.0	ND	ND			
alpha-Hexachlorocyclohexane (Alpha-BHC)	2.0	4.0	ND	ND			
beta-Hexachlorocyclohexane (Betta-BHC)	2.0	4.0	ND	ND			
delta-Hexachlorocyclohexane (Delta-BHC)	2.0	4.0	ND	ND			
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	2.0	4.0	ND	ND			
Methoxychlor	10	20	ND	ND			
Toxaphene	170	340	ND	ND			

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

Our Lab I.D.			51047.34	51047.35			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Decachlorobiphenyl	**30-150**		**122**	**106**			
Tetrachloro-m-xylene	**30-150**		**108**	**103**			

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8141A), Organophosphorus Compounds by GC

QC Batch No: 011609

Our Lab I.D.			Method Blank	**51047.10**	**51047.16**		
Client Sample I.D.				HA-405-10-1	HA-405-12-1		
Date Sampled				**01/14/2009**	**01/14/2009**		
Date Prepared			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Preparation Method			**3550B**	**3550B**	**3550B**		
Date Analyzed			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Azinphos-methyl	**50**	**50**	**ND**	**ND**	**ND**		
Bolstar (Sulprofos)	**50**	**50**	**ND**	**ND**	**ND**		
Chloropyrifos (Dursban)	**50**	**50**	**ND**	**ND**	**ND**		
Coumaphos	**50**	**50**	**ND**	**ND**	**ND**		
Demeton-O & S	**50**	**50**	**ND**	**ND**	**ND**		
Diazinon	**50**	**50**	**ND**	**ND**	**ND**		
Dichlorvos (DDVP, Diclorovos)	**50**	**50**	**ND**	**ND**	**ND**		
Disulfoton	**50**	**50**	**ND**	**ND**	**ND**		
Ethoprop	**50**	**50**	**ND**	**ND**	**ND**		
Fensulfothion	**50**	**50**	**ND**	**ND**	**ND**		
Fenthion	**50**	**50**	**ND**	**ND**	**ND**		
Merphos	**50**	**50**	**ND**	**ND**	**ND**		
Methyl parathion (Parathion methyl)	**50**	**50**	**ND**	**ND**	**ND**		
Mevinphos	**100**	**100**	**ND**	**ND**	**ND**		
Naled	**100**	**100**	**ND**	**ND**	**ND**		
Phorate (Phosphorodithioic acid)	**50**	**50**	**ND**	**ND**	**ND**		
Ronnel	**50**	**50**	**ND**	**ND**	**ND**		
Tetrachlorvinphos (Stirophos)	**50**	**50**	**ND**	**ND**	**ND**		
Tokuthion (Prothiofos)	**50**	**50**	**ND**	**ND**	**ND**		
Trichloronate	**50**	**50**	**ND**	**ND**	**ND**		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8141A), Organophosphorus Compounds by GC

Our Lab I.D.			Method Blank	**51047.10**	**51047.16**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Tributylphosphate	**40-140**		**65.0**	**67.0**	**69.0**		

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8141A), Organophosphorus Compounds by GC

QC Batch No: 011609

Our Lab I.D.			51047.22	51047.28	51047.34		
Client Sample I.D.			HA-405-14-1	HA-405-16-1	HA-405-18-1		
Date Sampled			01/14/2009	01/14/2009	01/14/2009		
Date Prepared			01/16/2009	01/16/2009	01/16/2009		
Preparation Method			3550B	3550B	3550B		
Date Analyzed			01/16/2009	01/16/2009	01/16/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			10	10	10		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Azinphos-methyl	500	500	ND	ND	ND		
Bolstar (Sulprofos)	500	500	ND	ND	ND		
Chloropyrifos (Dursban)	500	500	ND	ND	ND		
Coumaphos	500	500	ND	ND	ND		
Demeton-O & S	500	500	ND	ND	ND		
Diazinon	500	500	ND	ND	ND		
Dichlorvos (DDVP, Diclorovos)	500	500	ND	ND	ND		
Disulfoton	500	500	ND	ND	ND		
Ethoprop	500	500	ND	ND	ND		
Fensulfothion	500	500	ND	ND	ND		
Fenthion	500	500	ND	ND	ND		
Merphos	500	500	ND	ND	ND		
Methyl parathion (Parathion methyl)	500	500	ND	ND	ND		
Mevinphos	1000	1000	ND	ND	ND		
Naled	1000	1000	ND	ND	ND		
Phorate (Phosphorodithioic acid)	500	500	ND	ND	ND		
Ronnel	500	500	ND	ND	ND		
Tetrachlorvinphos (Stirophos)	500	500	ND	ND	ND		
Tokuthion (Prothiofos)	500	500	ND	ND	ND		
Trichloronate	500	500	ND	ND	ND		

Comment(s):
51047.22: Analyzed under dilution due to matrix interference 51047.28: Analyzed under dilution due to matrix interference 51047.34: Analyzed under dilution due to matrix interference

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8141A), Organophosphorus Compounds by GC

Our Lab I.D.			51047.22	51047.28	51047.34		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Tributylphosphate	40-140		70.0	69.0	71.0		

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8151A), Chlorinated Herbicides by GC

QC Batch No: 011609

Our Lab I.D.			Method Blank	51047.10	51047.16	51047.22	51047.28
Client Sample I.D.				HA-405-10-1	HA-405-12-1	HA-405-14-1	HA-405-16-1
Date Sampled				01/14/2009	01/14/2009	01/14/2009	01/14/2009
Date Prepared			01/16/2009	01/16/2009	01/16/2009	01/16/2009	01/16/2009
Preparation Method			3550B	3550B	3550B	3550B	3550B
Date Analyzed			01/19/2009	01/19/2009	01/19/2009	01/19/2009	01/19/2009
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
2,4,5-T	20	20	ND	ND	ND	ND	ND
2,4,5-TP	20	20	ND	ND	ND	ND	ND
2,4-D	200	200	ND	ND	ND	ND	ND
2,4-DB	200	200	ND	ND	ND	ND	ND
Dalapon	500	500	ND	ND	ND	ND	ND
Dicamba	20	20	ND	ND	ND	ND	ND
Dichloroprop	200	200	ND	ND	ND	ND	ND
Dinoseb	100	100	ND	ND	ND	ND	ND
MCPA	20000	20000	ND	ND	ND	ND	ND
MCPP	20000	20000	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	51047.10	51047.16	51047.22	51047.28
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
DCAA	50-150		114	107	106	114	103

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8151A), Chlorinated Herbicides by GC

QC Batch No: 011609

Our Lab I.D.			**51047.34**				
Client Sample I.D.			HA-405-18-1				
Date Sampled			**01/14/2009**				
Date Prepared			**01/16/2009**				
Preparation Method			**3550B**				
Date Analyzed			**01/19/2009**				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
2,4,5-T	**20**	**20**	**ND**				
2,4,5-TP	**20**	**20**	**ND**				
2,4-D	**200**	**200**	**ND**				
2,4-DB	**200**	**200**	**ND**				
Dalapon	**500**	**500**	**ND**				
Dicamba	**20**	**20**	**ND**				
Dichloroprop	**200**	**200**	**ND**				
Dinoseb	**100**	**100**	**ND**				
MCPA	**20000**	**20000**	**ND**				
MCPP	**20000**	**20000**	**ND**				
Our Lab I.D.			**51047.34**				
Surrogates	**%Rec.Limit**		**% Rec.**				
DCAA	**50-150**		**120**				

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0116093A2

Our Lab I.D.			Method Blank	51047.37	51047.38		
Client Sample I.D.				MW-405-1	MW-405-2		
Date Sampled				01/14/2009	01/14/2009		
Date Prepared			01/16/2009	01/16/2009	01/16/2009		
Preparation Method			5035A	5035A	5035A		
Date Analyzed			01/16/2009	01/16/2009	01/16/2009		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Acetone	25	50	ND	ND	ND		
Benzene	1.0	10.0	ND	ND	ND		
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND		
Bromochloromethane	5.0	10.0	ND	ND	ND		
Bromodichloromethane	5.0	10.0	ND	ND	ND		
Bromoform (Tribromomethane)	25	50	ND	ND	ND		
Bromomethane (Methyl bromide)	15	30	ND	ND	ND		
2-Butanone (MEK)	25	50	ND	ND	ND		
n-Butylbenzene	5.0	10.0	ND	ND	ND		
sec-Butylbenzene	5.0	10.0	ND	ND	ND		
tert-Butylbenzene	5.0	10.0	ND	ND	ND		
Carbon Disulfide	25	50	ND	ND	ND		
Carbon tetrachloride	5.0	10.0	ND	ND	ND		
Chlorobenzene	5.0	10.0	ND	ND	ND		
Chloroethane	15	30	ND	ND	ND		
2-Chloroethyl vinyl ether	50	50	ND	ND	ND		
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND		
Chloromethane (Methyl chloride)	15	30	ND	ND	ND		
2-Chlorotoluene	5.0	10.0	ND	ND	ND		
4-Chlorotoluene	5.0	10.0	ND	ND	ND		
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND		
Dibromochloromethane	5.0	10.0	ND	ND	ND		
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND		
Dibromomethane	5.0	10.0	ND	ND	ND		
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND		
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND		
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0116093A2

Our Lab I.D.			Method Blank	**51047.37**	**51047.38**		
Client Sample I.D.				MW-405-1	MW-405-2		
Date Sampled				**01/14/2009**	**01/14/2009**		
Date Prepared			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Preparation Method			**5035A**	**5035A**	**5035A**		
Date Analyzed			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Dichlorodifluoromethane	**15**	**30**	**ND**	**ND**	**ND**		
1,1-Dichloroethane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,2-Dichloroethane (EDC)	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,1-Dichloroethene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
cis-1,2-Dichloroethene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
trans-1,2-Dichloroethene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,2-Dichloropropane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,3-Dichloropropane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
2,2-Dichloropropane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,1-Dichloropropene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
cis-1,3-Dichloropropene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
trans-1,3-Dichloropropene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Ethylbenzene	**1.0**	**10.0**	**ND**	**ND**	**ND**		
Hexachlorobutadiene	**15**	**30**	**ND**	**ND**	**ND**		
2-Hexanone	**25**	**50**	**ND**	**ND**	**ND**		
Isopropylbenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
p-Isopropyltoluene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
4-Methyl-2-pentanone (MIBK)	**25**	**50**	**ND**	**ND**	**ND**		
Methyl-tert-butyl ether (MTBE)	**2.0**	**10.0**	**ND**	**ND**	**ND**		
Methylene chloride (DCM)	**25**	**50**	**ND**	**ND**	**ND**		
Naphthalene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
n-Propylbenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Styrene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,1,1,2-Tetrachloroethane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,1,2,2-Tetrachloroethane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Tetrachloroethene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Toluene (Methyl benzene)	**1.0**	**10.0**	**ND**	**ND**	**ND**		
1,2,3-Trichlorobenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,2,4-Trichlorobenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,1,1-Trichloroethane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,1,2-Trichloroethane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Trichloroethene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Trichlorofluoromethane	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,2,3-Trichloropropane	**5.0**	**10.0**	**ND**	**ND**	**ND**		

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ANALYTICAL RESULTS

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0116093A2

Our Lab I.D.			Method Blank	**51047.37**	**51047.38**		
Client Sample I.D.				MW-405-1	MW-405-2		
Date Sampled				**01/14/2009**	**01/14/2009**		
Date Prepared			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Preparation Method			**5035A**	**5035A**	**5035A**		
Date Analyzed			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Matrix			Soil	Soil	Soil		
Units			ug/Kg	ug/Kg	ug/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
1,2,4-Trimethylbenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
1,3,5-Trimethylbenzene	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Vinyl Acetate	**25**	**50**	**ND**	**ND**	**ND**		
Vinyl chloride (Chloroethene)	**15**	**30**	**ND**	**ND**	**ND**		
o-Xylene	**1.0**	**10.0**	**ND**	**ND**	**ND**		
m,p-Xylenes	**1.0**	**20.0**	**ND**	**ND**	**ND**		
Our Lab I.D.			Method Blank	**51047.37**	**51047.38**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Bromofluorobenzene	**75-125**		**116**	**116**	**117**		
Dibromofluoromethane	**75-125**		**106**	**110**	**111**		
Toluene-d8	**75-125**		**106**	**101**	**99.5**		

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 011609

Our Lab I.D.			Method Blank	**51047.37**	**51047.38**		
Client Sample I.D.				MW-405-1	MW-405-2		
Date Sampled				**01/14/2009**	**01/14/2009**		
Date Prepared			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Preparation Method			**5030B**	**5030B**	**5030B**		
Date Analyzed			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Matrix			Soil	Soil	Soil		
Units			mg/Kg	mg/Kg	mg/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
TPH as Gasoline and Light HC. (C4-C12)	**0.100**	**1.000**	**ND**	**ND**	**ND**		
Our Lab I.D.			Method Blank	**51047.37**	**51047.38**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Bromofluorobenzene	**75-125**		**101**	**103**	**106**		

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 011609

Our Lab I.D.			Method Blank	**51047.37**	**51047.38**		
Client Sample I.D.				MW-405-1	MW-405-2		
Date Sampled				**01/14/2009**	**01/14/2009**		
Date Prepared			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Preparation Method			**3550B**	**3550B**	**3550B**		
Date Analyzed			**01/16/2009**	**01/16/2009**	**01/16/2009**		
Matrix			Soil	Soil	Soil		
Units			mg/Kg	mg/Kg	mg/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
TPH as Diesel (C13-C22)	**5.0**	**10.0**	**ND**	**ND**	**ND**		
TPH as Heavy Hydrocarbons (C23-C40)	**5.0**	**10.0**	**ND**	**ND**	**ND**		
TPH Total as Diesel and Heavy HC.C13-C40	**5.0**	**10.0**	**ND**	**ND**	**ND**		
Our Lab I.D.			Method Blank	**51047.37**	**51047.38**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Chlorobenzene	**75-125**		**89.1**	**95.8**	**95.2**		

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-1

Our Lab I.D.			Method Blank	51047.37	51047.38		
Client Sample I.D.				MW-405-1	MW-405-2		
Date Sampled				01/14/2009	01/14/2009		
Date Prepared			01/23/2009	01/23/2009	01/23/2009		
Preparation Method			3050B	3050B	3050B		
Date Analyzed			01/23/2009	01/23/2009	01/23/2009		
Matrix			Soil	Soil	Soil		
Units			mg/Kg	mg/Kg	mg/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Antimony	1.0	5.0	ND	ND	ND		
Arsenic	1.0	5.0	ND	1.30J	ND		
Barium	2.5	5.0	ND	70.0	88.5		
Beryllium	1.3	2.5	ND	ND	ND		
Cadmium	1.3	2.5	ND	ND	ND		
Chromium	2.5	5.0	ND	16.5	20.1		
Cobalt	2.5	5.0	ND	8.30	9.70		
Copper	2.5	5.0	ND	12.0	15.1		
Lead	2.5	5.0	ND	5.45	3.30J		
Mercury (By EPA 7471)	0.1	0.2	ND	ND	ND		
Molybdenum	2.5	5.0	ND	ND	ND		
Nickel	2.5	5.0	ND	11.6	13.1		
Selenium	1.0	5.0	ND	ND	ND		
Silver	2.5	5.0	ND	ND	ND		
Thallium	1.0	5.0	ND	ND	ND		
Vanadium	2.5	5.0	ND	33.6	42.4		
Zinc	2.5	5.0	ND	50.5	61.5		

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SR-22/I-405/I-605

Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-1; Dup or Spiked Sample: 51057.05; LCS: Clean Sand; QC Prepared: 01/23/2009; QC Analyzed: 01/23/2009; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	ND	50.0	56.0	112	50.0	56.5	113	<1	80-120	<15
Arsenic	ND	50.0	58.0	116	50.0	59.5	119	2.6	80-120	<15
Barium	28.7	50.0	86.7	116	50.0	86.2	115	<1	80-120	<15
Beryllium	ND	50.0	56.5	113	50.0	56.5	113	<1	80-120	<15
Cadmium	ND	50.0	57.5	115	50.0	58.0	116	<1	80-120	<15
Chromium	3.25	50.0	60.8	115	50.0	60.8	115	<1	80-120	<15
Cobalt	2.70	50.0	59.7	114	50.0	60.2	115	<1	80-120	<15
Copper	2.55	50.0	60.6	116	50.0	60.6	116	<1	80-120	<15
Lead	ND	50.0	56.0	112	50.0	57.0	114	1.8	80-120	<15
Mercury (By EPA 7471)	ND	0.500	0.570	114	0.500	0.575	115	<1	80-120	<15
Molybdenum	ND	50.0	58.0	116	50.0	58.5	117	<1	80-120	<15
Nickel	ND	50.0	58.5	117	50.0	59.0	118	<1	80-120	<15
Selenium	ND	50.0	58.0	116	50.0	59.0	118	1.7	80-120	<15
Silver	ND	50.0	57.0	114	50.0	57.5	115	<1	80-120	<15
Thallium	ND	50.0	53.5	107	50.0	55.5	111	3.7	80-120	<15
Vanadium	11.0	50.0	68.5	115	50.0	69.0	116	<1	80-120	<15
Zinc	20.4	50.0	77.4	114	50.0	77.9	115	<1	80-120	<15

QC Batch No: 012309-1; Dup or Spiked Sample: 51057.05; LCS: Clean Sand; QC Prepared: 01/23/2009; QC Analyzed: 01/23/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Antimony	50.0	52.5	105	80-120						
Arsenic	50.0	55.0	110	80-120						
Barium	50.0	56.0	112	80-120						
Beryllium	50.0	53.5	107	80-120						
Cadmium	50.0	55.5	111	80-120						
Chromium	50.0	54.0	108	80-120						
Cobalt	50.0	55.0	110	80-120						
Copper	50.0	53.0	106	80-120						
Lead	50.0	54.0	108	80-120						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 012309-1; Dup or Spiked Sample: 51057.05; LCS: Clean Sand; QC Prepared: 01/23/2009; QC Analyzed: 01/23/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Mercury (By EPA 7471)	**0.500**	**0.510**	**102**	**80-120**						
Molybdenum	**50.0**	**55.0**	**110**	**80-120**						
Nickel	**50.0**	**54.5**	**109**	**80-120**						
Selenium	**50.0**	**56.0**	**112**	**80-120**						
Silver	**50.0**	**53.5**	**107**	**80-120**						
Thallium	**50.0**	**54.5**	**109**	**80-120**						
Vanadium	**50.0**	**54.5**	**109**	**80-120**						
Zinc	**50.0**	**56.5**	**113**	**80-120**						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8081A), Organochlorine Pesticides by GC

QC Batch No: 011909; Dup or Spiked Sample: 51047.11; LCS: Clean Sand; QC Prepared: 01/19/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Aldrin	0.00	20.0	24.2	121	20.0	25.4	127	4.8	40-150	<40
4,4'-DDT (DDT)	0.00	50.0	58.0	116	50.0	60.5	121	4.2	40-150	<40
Dieldrin	0.00	50.0	61.5	123	50.0	64.5	129	4.8	40-150	<40
Endrin	0.00	50.0	70.0	140	50.0	73.0	146	4.2	40-150	<40
Heptachlor	0.00	20.0	25.4	127	20.0	26.4	132	3.9	40-150	<40
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	0.00	20.0	23.0	115	20.0	24.0	120	4.3	40-150	<40
Surrogates										
Decachlorobiphenyl	0.00	50.0	67.0	134	50.0	70.0	140	4.4	30-150	<40
Tetrachloro-m-xylene	0.00	50.0	58.0	116	50.0	60.0	120	3.4	30-150	<40

QC Batch No: 011909; Dup or Spiked Sample: 51047.11; LCS: Clean Sand; QC Prepared: 01/19/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Aldrin	20.0	20.2	101	50-150						
4,4'-DDT (DDT)	50.0	49.1	98.2	50-150						
Dieldrin	50.0	52.5	105	50-150						
Endrin	50.0	61.0	122	50-150						
Heptachlor	20.0	21.8	109	50-150						
gamma-Hexachlorocyclohexane (Gamma-BHC, Lindane)	20.0	20.0	100	50-150						
Surrogates										
Decachlorobiphenyl	50.0	51.0	102	30-150						
Tetrachloro-m-xylene	50.0	49.1	98.2	30-150						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8141A), Organophosphorus Compounds by GC

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/16/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Bolstar (Sulprofos)	0.00	2,500	2,750	110	2,500	2,750	110	<1	40-140	<30
Ethoprop	0.00	2,500	2,830	113	2,500	2,780	111	1.8	40-140	<30
Phorate (Phosphorodithioic acid)	0.00	2,500	2,800	112	2,500	2,780	111	<1	40-140	<30
Ronnel	0.00	2,500	3,050	122	2,500	3,050	122	<1	40-140	<30

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/16/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Bolstar (Sulprofos)	250	290	116	40-140						
Ethoprop	250	290	116	40-140						
Phorate (Phosphorodithioic acid)	250	288	115	40-140						
Ronnel	250	318	127	40-140						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8151A), Chlorinated Herbicides by GC

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
2,4,5-T	0.00	500	500	100	500	525	105	4.9	50-150	<20
2,4-D	0.00	5,000	4,750	95.0	5,000	5,050	101	6.1	50-150	<20
Dinoseb	0.00	2,500	2,350	94.0	2,500	2,330	93.0	1.1	50-150	<20

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/19/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
2,4,5-T	50.0	52.0	104	50-150						
2,4,5-TP	50.0	44.0	88.0	50-150						
2,4-D	500	480	96.0	50-150						
2,4-DB	500	490	98.0	50-150						
Dalapon	1,250	1,050	84.0	50-150						
Dicamba	50.0	62.5	125	50-150						
Dichloroprop	500	415	83.0	50-150						
Dinoseb	250	228	91.0	50-150						
MCPA	50,000	67,500	135	50-150						
MCPP	50,000	43,000	86.0	50-150						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0116093A2; Dup or Spiked Sample: B0116093A2; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/17/2009; Units: ug/Kg

Analytes	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit	
Benzene	50.0	40.3	80.6	50.0	42.3	84.6	4.84	75-125	<20	
Chlorobenzene	50.0	41.6	83.2	50.0	43.4	86.8	4.24	75-125	<20	
1,1-Dichloroethene	50.0	39.5	79.0	50.0	39.6	79.2	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	47.9	95.8	50.0	49.3	98.6	2.88	75-125	<20	
Toluene (Methyl benzene)	50.0	40.7	81.4	50.0	42.1	84.2	3.38	75-125	<20	
Trichloroethene	50.0	41.9	83.8	50.0	43.7	87.4	4.21	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	51.4	103	50.0	49.8	99.5	3.40	75-125	<20	
Dibromofluoromethane	50.0	49.8	99.5	50.0	50.7	101	1.51	75-125	<20	
Toluene-d8	50.0	47.2	94.4	50.0	46.4	92.7	1.80	75-125	<20	

QC Batch No: 0116093A2; Dup or Spiked Sample: B0116093A2; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/17/2009; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
Benzene	50.0	52.4	105	75-125						
Chlorobenzene	50.0	47.5	95.0	75-125						
1,1-Dichloroethene	50.0	56.4	113	75-125						
Methyl-tert-butyl ether (MTBE)	50.0	55.8	112	75-125						
Toluene (Methyl benzene)	50.0	49.6	99.2	75-125						
Trichloroethene	50.0	54.0	108	75-125						
LCS										
Chloroform (Trichloromethane)	50.0	56.3	113	75-125						
Ethylbenzene	50.0	50.0	100	75-125						
1,1,1-Trichloroethane	50.0	52.7	105	75-125						
o-Xylene	50.0	49.8	99.6	75-125						
m,p-Xylenes	100	99.5	99.5	75-125						
Surrogates										
Bromofluorobenzene	50.0	49.3	98.7	75-125						
Dibromofluoromethane	50.0	50.6	101	75-125						
Toluene-d8	50.0	46.2	92.4	75-125						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 011609; Dup or Spiked Sample: 51047.37; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/17/2009; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	500	555	111	500	575	115	3.5	75-125	<20
Surrogates										
Chlorobenzene	0.00	100	85.0	85.0	100	88.1	88.1	3.6	75-125	<20

QC Batch No: 011609; Dup or Spiked Sample: 51047.37; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/17/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	500	570	114	75-125						
Surrogates										
Chlorobenzene	100	88.1	88.1	75-125						

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Project ID: I-436A
Project Name: SR-22 Phase II

AETL Job Number	Submitted	Client
51047	01/15/2009	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/16/2009; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	2.50	2.48	99.0	2.50	2.45	98.0	1.0	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0555	111	0.0500	0.0595	119	7.0	75-125	<20

QC Batch No: 011609; Dup or Spiked Sample: B011609; LCS: Clean Sand; QC Prepared: 01/16/2009; QC Analyzed: 01/16/2009; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	2.50	2.53	101	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0520	104	75-125						

APPENDIX C

ACM and LPB Investigation Reports for Bridges 55-331 and 55-332

PANACEA, INC.
Environmental Services
17315 Studebaker Road, Suite 300 • Cerritos, CA 90703 • 562.860.2869 • Fax: 562.860.6297

January 21, 2009

Ms. Vesna Glisic
Group Delta Consultants
92 Argonaut, Suite 120
Aliso Viejo, CA 92656

via email
VesnaG@GroupDelta.com

SUBJECT: Asbestos Survey for Bridge Nos. 55-331 (EB SR-22/SB I-405) and 55-332 (Chica OC/Valley View OC) Located in Southern California

As you requested and authorized, Panacea, Inc. (Panacea) personnel conducted an asbestos survey for the above-referenced structures. The survey was limited to assessing the presence/absence of asbestos on the bridges.

The following documents are attached to this letter report:

- Photographs of suspect, sampled materials;
- Copies of the laboratory analytical report and chain-of-custody record; and
- Asbestos survey summary table, which presents detailed descriptions of materials sampled, sample locations, and laboratory analytical results.

The estimated quantity presented in this report tables is intended for discussion and management purposes only. The actual square footage of asbestos-containing materials (ACM) should be verified by qualified contractors prior to bidding and/or abatement.

OBJECTIVE

The objective of the work was to assess the likelihood that asbestos is present/absence in concentrations greater than 1 percent in suspect and readily accessible construction materials on the subject bridges.

ASBESTOS SURVEY RESULTS

The survey was conducted on January 14, 2009, by a Certified Site Surveillance Technician (CSST) from Panacea. Bulk samples of accessible, suspect materials were collected and submitted to Forensic Analytical Laboratory in Rancho Dominguez, California, for analysis using polarize light microscopy (PLM).

The potential ACM observed included expansion joint, sealant, gasket, and concrete. A total of 20 samples were collected and tested by the laboratory.

Based on the scope of work, site observations, accessibility of the materials and areas, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the professional judgment of Panacea personnel, the presence, location, and estimated quantity of identified ACM are as follows:

PRESENCE	LOCATION	ESTIMATED AREA
BRIDGE NO. 55-331		
Sealant , gray	Assumed to be present under various bolt washers on rails. Each area/spot was estimated to be ~4" x 4".	~260 spots
Gasket, dark gray	Assumed to be present under various rail balusters. Each area/spot was estimated to be ~12" x 12".	~130 spots
BRIDGE NO. 55-332		
Sealant , gray	Assumed to be present under various bolt washers on rails. Each area/spot was estimated to be ~4" x 4".	~160 spots
Gasket, dark gray	Assumed to be present under various rail balusters. Each area/spot was estimated to be ~12" x 12".	~80 spots

Note:

1. ~ = approximately.

CONCLUSIONS

Based on the information obtained during this survey, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the professional judgment of Panacea personnel, the following conclusions were made:

- There is a high likelihood that asbestos is present in concentrations greater than 1 percent in the sealant and gasket materials on the bridges. Both materials were judged to be a nonfriable and good condition.

- Friable ACM and nonfriable ACM that could become friable should be removed prior to renovation or demolition.

- Outside contractors and tenants working on the bridges should be notified regarding the presence, locations, and quantities of all ACM. Applicable notification laws should be followed.

- The owner should obtain an "asbestos-free certification" from any contractors installing or removing building/structural materials and should notify the maintenance staff to use only "asbestos-free" products for any repair and maintenance work.

- No judgment was made for inaccessible construction materials or materials that had not been sampled and analyzed.

LIMITATIONS

The judgments and conclusions described in this report pertain to conditions judged to be present or applicable at the time the work was performed. Future conditions may differ from those described herein, and this report is not intended for use in future evaluations of the site unless an update is conducted by a Certified Asbestos Consultant (CAC).

Certain materials not sampled may contain asbestos in concentrations greater than 1 percent. These materials include electrical wrapping, materials inside electrical fixtures, brake shoes, and other construction materials that may be hidden behind components. However, these materials are judged to have a very low likelihood of containing greater than 1 percent asbestos.

Although personnel who conducted the survey are certified under the Asbestos Hazard Emergency Response Act (AHERA) and an accredited laboratory performed the analyses, the asbestos survey described herein may not identify all ACM onsite. Possible reasons for this include inaccessible structure features, unavailability of as-built drawings (specifying all materials used in the structure), practical limitations as to the number of samples that can be collected, and analytical method used (PLM). Furthermore, although a sample was collected from each material that appeared to be different (based on color and texture), homogeneity of content of similar materials cannot be guaranteed because similarity of color and texture does not assure that the same ingredients were used in their manufacturing. It is possible that of two apparently similar materials, one may contain asbestos and one may not. Therefore, additional sampling and testing may be necessary to provide a higher confidence level regarding the presence of ACM in the structure.

Services performed by Panacea were conducted in a manner consistent with state-of-the-industry practices, recognizing that even the most comprehensive survey may not detect all ACM in the structure. Therefore, Panacea cannot act as an insurer or certify that the site is free of asbestos. If you have any questions regarding this letter report, please feel free to contact me at your convenience.

Very truly yours,
PANACEA, INC.

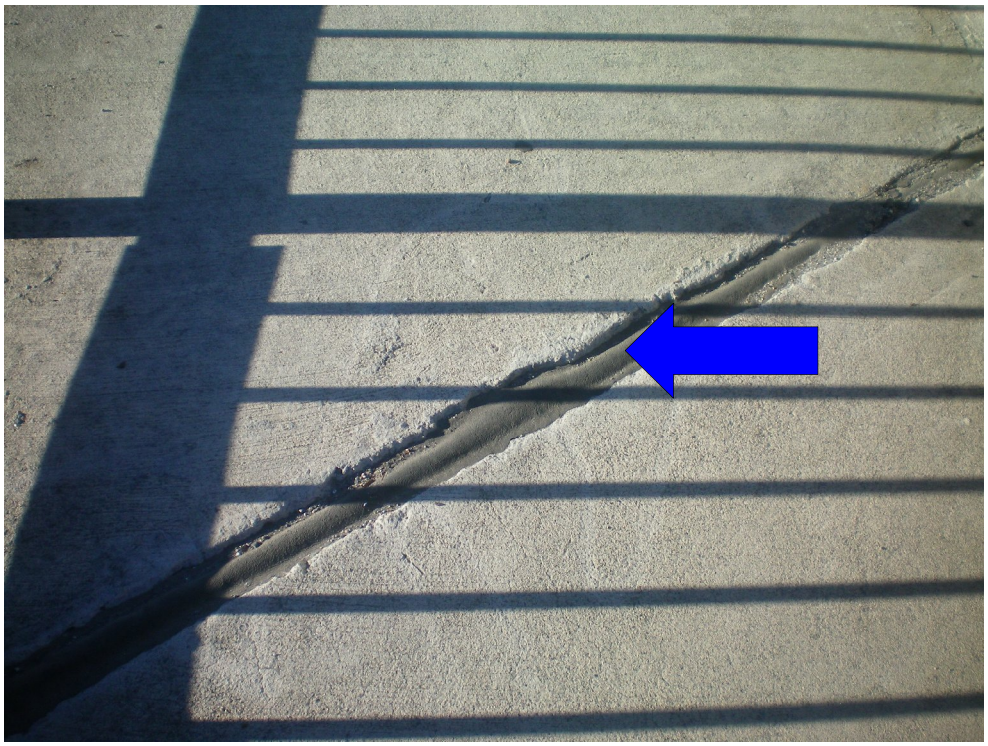
Hsin H. Chou, CIH, REA II, CAC
Certification No. 92-0389

ATTACHMENTS:

- Photographs
- Asbestos Survey Summary Table
- Laboratory Analytical Report and Chain-of-Custody Record

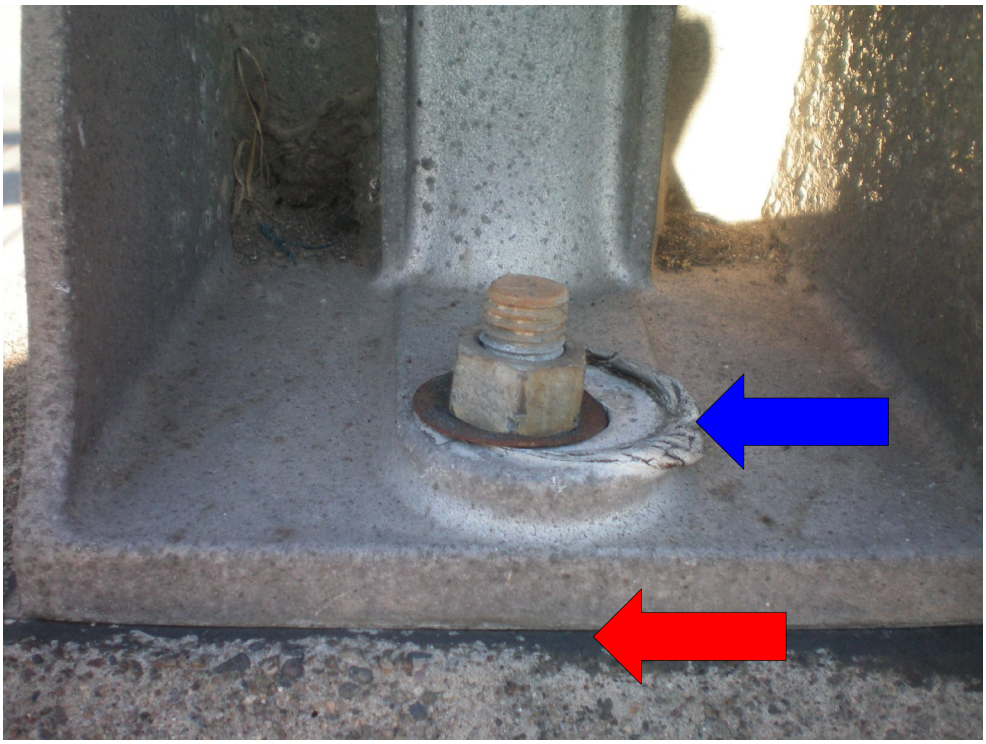
PHOTOGRAPHS

PHOTOGRAPH 1: Concrete Material.



PHOTOGRAPH 2: Expansion Joint.

PHOTOGRAPHS



PHOTOGRAPH 3: Gasket (Red Arrow) and Sealant (Blue Arrow).

ASBESTOS SURVEY SUMMARY TABLE

Bridge Nos. 55-331 and 55-332

Sample No.	Description of Material	Sample Location	Analytical Results
OA090114-B-001	Expansion joint, 2", dark gray, and white	Bridge 55-332, southeastern portion, in between concrete and/or asphalt road	ND
OA090114-B-002	Expansion joint, 2", dark gray, and white	Bridge 55-332, southwestern portion, in between concrete and/or asphalt road	ND
OA090114-B-003	Expansion joint, 2", dark gray, and white	Bridge 55-332, southwestern portion, in between concrete and/or asphalt road	ND
OA090114-B-004	Sealant, gray	Bridge 55-332, southeastern portion, on rail bolt washer	5% CH
OA090114-B-005	Sealant, gray	Bridge 55-332, southern portion, on rail bolt washer	5% CH
OA090114-B-006	Sealant, gray	Bridge 55-332, southwestern portion, on rail bolt washer	5% CH
OA090114-B-007	Concrete, gray	Bridge 55-332, southeastern portion	ND
OA090114-B-021	Expansion joint, 2", dark gray, and white	Bridge 55-331, southwestern portion, in between concrete and/or asphalt road	ND
OA090114-B-022	Expansion joint, 2", dark gray, and white	Bridge 55-331, southern portion, in between concrete and/or asphalt road	ND
OA090114-B-023	Expansion joint, 2", dark gray, and white	Bridge 55-331, southeastern portion, in between concrete and/or asphalt road	ND
OA090114-B-024	Sealant, gray	Bridge 55-331, southwestern portion, on rail bolt washer	5% CH
OA090114-B-025	Sealant, gray	Bridge 55-331, southern portion, on rail bolt washer	5% CH
OA090114-B-026	Sealant, gray	Bridge 55-331, southeastern portion, on rail bolt washer	5% CH
OA090114-B-027	Gasket, dark gray	Bridge 55-331, southwestern portion, under rail baluster	75% CH
OA090114-B-028	Gasket, dark gray	Bridge 55-331, southern portion, under rail baluster	75% CH
OA090114-B-029	Gasket, dark gray	Bridge 55-331, southeastern portion, under rail baluster	75% CH
OA090114-B-030	Concrete, gray	Bridge 55-331, southeastern portion	ND
OA090114-B-055	Sealant, dark gray	Bridge 55-332, southeastern portion, on rail bolt washer	75% CH
OA090114-B-056	Sealant, dark gray	Bridge 55-332, southern portion, on rail bolt washer	75% CH
OA090114-B-057	Sealant, dark gray	Bridge 55-332, southwestern portion, on rail bolt washer	75% CH

NOTES:

1. ND = none detected for asbestos.
2. CH = chrysotile asbestos.

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Panacea Inc.
Mr. Hsin Chou
17315 Studebaker Rd.
Suite 300
Cerritos, CA 90703

Client ID: 5572
Report Number: B120577
Date Received: 01/16/09
Date Analyzed: 01/19/09
Date Printed: 01/19/09
First Reported: 01/19/09

Job ID/Site: C09-668, Freeway 22 6 Bridges

Date(s) Collected: 01/14/2009

FASI Job ID: 5572
Total Samples Submitted: 57
Total Samples Analyzed: 57

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
OA090114 -B -1	50492893						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -2	50492894						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -3	50492895						
Layer: Dark Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -4	50492896						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -5	50492897						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -6	50492898						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -7	50492899						
Layer: Grey Cementitious Material			**ND**				
Layer: Light Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

2959 Pacific Commerce Drive, Rancho Dominguez, CA 90221 / Telephone: (310) 763-2374 (888) 813-9417 / Fax: (310) 763-8684

Client Name: Panacea Inc.

Report Number: B120577
Date Printed: 01/19/09

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
OA090114 -B -8	50492900						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -9	50492901						
Layer: Dark Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -10	50492902						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -11	50492903						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
OA090114 -B -12	50492904						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
OA090114 -B -13	50492905						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
OA090114 -B -14	50492906						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -15	50492907						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -16	50492908						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -17	50492909						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					

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Client Name: Panacea Inc.

Report Number: B120577
Date Printed: 01/19/09

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
OA090114 -B -18	50492910						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -19	50492911						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -20	50492912						
Layer: Grey Cementitious Material			**ND**				
Layer: Light Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -21	50492913						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -22	50492914						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -23	50492915						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -24	50492916						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -25	50492917						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -26	50492918						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					

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Client Name: Panacea Inc.

Report Number: B120577
Date Printed: 01/19/09

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
OA090114 -B -27	50492919						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -28	50492920						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -29	50492921						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -30	50492922						
Layer: Grey Cementitious Materials			**ND**				
Layer: Light Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -31	50492923						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -32	50492924						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -33	50492925						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -34	50492926						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -35	50492927						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					

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Client Name: Panacea Inc.

Report Number: B120577
Date Printed: 01/19/09

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
OA090114 -B -36	50492928						
Layer: Silver Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (5%)**					
OA090114 -B -37	50492929						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -38	50492930						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -39	50492931						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -40	50492932						
Layer: Grey Cementitious Materials			**ND**				
Layer: Light Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -41	50492933						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -42	50492934						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -43	50492935						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -44	50492936						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -45	50492937						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					

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Client Name: Panacea Inc.

Report Number: B120577
Date Printed: 01/19/09

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
OA090114 -B -46	50492938						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -47	50492939						
Layer: Grey Cementitious Materials			**ND**				
Layer: Light Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -48	50492940						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -49	50492941						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -50	50492942						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -51	50492943						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -52	50492944						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -53	50492945						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -54	50492946						
Layer: Grey Cementitious Materials			**ND**				
Layer: Light Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
OA090114 -B -55	50492947						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					

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Report Number: B120577

Client Name: Panacea Inc. **Date Printed:** 01/19/09

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
OA090114 -B -56	50492948						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					
OA090114 -B -57	50492949						
Layer: Dark Grey Semi-Fibrous Material		Chrysotile	**75 %**				
Total Composite Values of Fibrous Components:		**Asbestos (75%)**					

Steven Takahashi, Laboratory Supervisor, Rancho Dominguez Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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CHAIN OF CUSTODY RECORD

PANACEA, INC.
Project Manager: Hsin chou
17315 **Studebaker** Road, Suite 300
Cerritos, CA 90703
Tel. (562) 860-2869
Fax **(562)**860-6297

Date: 1/15/09
Page: 1 of: 3
Project No.: C09-668
Project Name: Freeway 22 & Bridges
Sampled By: Omar Argueta
Shipped To: For. Ana. by: Fedex

SAMPLE NUMBER	SAMPLING DATE / TIME	PRESERVATION METHOD	CONTAINER TYPE/SIZE	SAMPLE MATRIX	ANALYSES REQUIRED PLM	
OAC90114-B-1	1/14/09	None	Sealed	Bulk	✓	
-2						
-3						
-4						
-5						
-6						
-7						
-8						
-9						
-10						
-11						
-12						
-13						
-14						
-15						
-16						
-17						
-18						
-19						
-20						

TOTAL NUMBER OF SAMPLES 20 1DAY TAT per Hsin DC

COMMENTS: Return signed chain-of-custody forms with final report(s). Email the report to Lorraina at lvalencia@panenv.com
FTM = floor tile and mastic; FNM = linoleum **and mastic,** CBM = **cove** ***base*** and mastic;
CTM = ceiling tile and mastic; DWJ = wallboard **and** joint compound, ML = other multiple-layered materials.

Relinquished By:	Omar Argueta	Company:	Panacea, Inc	Date: 1/15/09	Time: 1200
Received By:	J Carrillo	Company:	FAL	Date: 01/16/09	Time: 10:30 AM I/E
Relinquished By:		Company:		Date:	Time:
Received By:		Company:		Date:	Time:
Relinquished By:		Company:		Date:	Time:
Received By:		Company:		Date:	Time:

Revision : 07-09-28

CHAIN OF CUSTODY RECORD

PANACEA, INC.
Project Manager: Hsin Chao
17315 Studebaker Road, Suite 300
Cerritos, CA **90703**
Tel. **(562) 860-2869**
Fax (562)860-6297

Date: 1/15/09
Page: 2 of: 3
Project NO.: C09-668
Project Name:
Sampled By: Omar Arqueta
Shipped To: Fot. Ana. by: FedEx

SAMPLE NUMBER	SAMPLING DATE / TIME	PRESERVATION METHOD	CONTAINER TYPE/SIZE	SAMPLE MATRIX	ANALYSES REQUIRED PLM	
OA090114-B-21	1/14/09	None	Sealed	Bulk	✓	
-22						
-23						
-24						
-25						
26						
-27						
-28						
-29						
-30						
-31						
-32						
-33						
-34						
-35						
-36						
-37						
-38						
-39						
-40						

TOTAL NUMBER OF SAMPLES _____ 1 Day TAT

COMMENTS: Return signed chain-of-custody forms with final report(s) Email the report to Lorraina at lvalencia@panenv.com
FTM = floor tile and mastic; LNM = linoleum *and* mastic; CBM = cove base and mastic;
CTM = ceiling tile and mastic; DWJ = wallboard and joint compound; ML = other multiple-layered materials.

Relinquished By:	Omar Arqueta	Company:	Panacea, Inc.	Date: 1/15/09	Time: 1700
Received By:	J Carrillo	Company:	EAS1	Date: 01/16/09	Time: 10:30 am PT
Relinquished By:		Company:		Date:	Time:
Received By:		Company:		Date:	Time:
Relinquished By:		Company:		Date:	Time:
Received By:		Company:		**Date:**	Time:

Revision 07-09-28

CHAIN OF CUSTODY RECORD

PANACEA, INC.
Project Manager: Hsin chou
17315 Studebaker Road, Suite 300
Cerritos, CA 90703
Tel. (562) 860-2869
Fax (562) **860-6297**

Date: 1/15/09
Page: 3 of: 3
Project No.: 09-668
Project Name: Freeway 22 6 Bridges
Sampled By: Omar Argueta
Shipped To: For Ana. by: FedEx

SAMPLE NUMBER	SAMPLING DATE / TIME	PRESERVATION METHOD	CONTAINER TYPE/SIZE	SAMPLE MATRIX	ANALYSES REQUIRED PLM	
OA090114-41	1/14/09	None	Sealed	Bulk	✓	
-42						
-43						
-44						
-45						
-46						
-47						
-48						
-49						
-50						
-51						
-52						
-53						
-54						
-55						
-56						
-57						

TOTAL NUMBER OF SAMPLES 17 1 DAY TAT

COMMENTS: Return **signed** chain-of-custody forms wrth final report(s). Email the report to Lorraina **at** lvalencia@panenv.com
FTM = floor tile and mastic: LNM = linoleum and mastic, CBM = cove base and mastic;
CTM = ceiling tile and mastic; DWJ = wallboard and joint compound; ML = other multiple-layered materials.

Relinquished By:	[signature]	Company: Panacea, Inc.	Date: 1/15/09	Time: 1200	
Received By:	[signature]	Company: FAS I	Date: 01/16/09	Time: 10:30 AM	F/E
Relinquished By:		Company:	Date:	Time:	
Received By:		Company:	Date:	Time:	
Relinquished By:		Company:	Date:	Time:	
Received By:		Company:	Date:	Time:	

PANACEA, INC.
Environmental Services
17315 Studebaker Road, Suite 300 • Cerritos, CA 90703 • 562.860.2869 • Fax: 562.860.6297

January 23, 2009

Ms. Vesna Glisic
Group Delta Consultants
92 Argonaut, Suite 120
Aliso Viejo, CA 92656

via email
VesnaG@GroupDelta.com

SUBJECT: Paint Chip Testing for Lead Concentrations on Bridge No. 55-331 (EB SR-22/SB I-405) Located in Southern California

As you requested and authorized, Panacea, Inc. (Panacea) personnel conducted paint chip (bulk) testing for lead concentrations at the above-referenced structure. The purpose of this testing was to evaluate the lead concentrations in the paint. The samples were collected January 14, 2009, from the bridge.

It is our understanding that the bridge is not zoned for residential and/or commercial building usage; therefore, Panacea is not required to submit Form 8552 "Lead Hazard Evaluation Form" to the California Department of Public Health (DPH) upon completion of this report. If our understanding is different than Caltrans' policy, then please let us know.

The estimated quantity presented in this report is intended for discussion and management purposes only. The actual square footage of lead material should be verified by qualified contractors prior to bidding and/or abatement.

GUIDELINES AND TERMINOLOGY FOR LEAD

LEAD-BASED PAINT AND LEAD-CONTAINING PAINT DEFINITIONS

In 1978, the Consumer Product Safety Commission (CPSC) established a maximum lead content in paint of less than 0.06 percent by weight in a dry film of newly applied paint (U.S. Department of Housing and Urban Development [HUD], 1995). HUD specifies that lead-based paint (LBP) exists when paint contains lead equal to or greater than 1.0 milligram per square centimeter (mg/cm^2) by area or 0.5 percent by weight (HUD, 1995). California Department of Public Health (DPH) adopted HUD's LBP definitions in the Title 17, California Code of Regulations (CCR), Section 35033.

Typically, the area concentrations are based on field x-ray fluorescence (XRF) analysis, while the weight concentrations are based on one of several laboratory analytical methods such as atomic absorption spectrometry (AAS) and inductively coupled plasma-atomic emission spectrometry (ICP-AES).

The definitions used in this report are as follows:

- LBP (greater than or equal to 0.5 percent by weight) – The HUD and DPH definitions are the generally accepted industry standards for determining the presence or absence of LBP. Therefore, HUD and DPH definitions are used as the evaluation criteria for LBP in this report.

- Lead-Containing Paint (LCP) – This definition is used for coatings containing detectable lead concentrations below 0.5 percent by weight but greater than or equal to 0.06 percent.

- Non-LBP – This definition is used for coatings containing lead concentrations below CPSC's maximum lead content of 0.06 percent by weight.

LEAD-CONTAINING HAZARDOUS WASTE

Regulation 22 CCR 66261.24 states that when representative samples of a waste exhibit certain toxic characteristics then the waste is considered hazardous. Lead-containing waste (LCW) is regulated as a hazardous waste if it exhibits one of the three threshold concentrations: total threshold limit concentration (TTLC), soluble threshold limit concentration (STLC), and/or Toxic Characteristic Leaching Procedures (TCLP). Interpretations of the waste concentrations are presented below.

- TTLC equal to or greater than 1,000 milligrams per kilogram (mg/kg) (or 0.1 percent)

  The TTLC for lead is 1,000 mg/kg. If the sample concentration is at or above 1,000 mg/kg, then the represented material/waste when demolished will be considered as a California hazardous waste.

  Additional TCLP analysis is required to determine whether the California-regulated waste is a Resource Conservation and Recovery Act (RCRA) hazardous waste. If the TCLP result is at or above 5 milligrams per liter (mg/L) of solution, then the waste is a California-regulated and RCRA hazardous waste. If the TCLP is below 5 mg/L, then the waste is considered to be a California-regulated waste but a non-RCRA hazardous waste.

- TTLC between 50 and 1,000 mg/kg (or 0.005 to 0.1 percent)

  If the sample concentration is between 50 and 1,000 mg/kg, then additional testing using the California-mandated waste extraction test (WET) can be conducted to further characterize the STLC of the waste. The STLC for lead is 5 mg/L. At or above 5 mg/L of lead, the material would need to be disposed of as a California hazardous waste. Below 5 mg/L of lead, the waste is considered as construction debris or nonhazardous waste.

If the sample concentration is between 100 to 1,000 mg/kg, then additional testing using the TCLP can be conducted to further characterize the TCLP of the waste. The TCLP for lead is 5 mg/L. At or above 5 mg/L of lead, the material is classified as RCRA hazardous waste. Below 5 mg/L of lead, the waste is considered as non-RCRA hazardous waste; however, the STLC analysis is still required to determine if the waste is a California-regulated waste.

- TTLC less than 50 mg/kg (or 0.005 percent)

  If the sample concentrations are less than 50 mg/kg, then the waste is considered as construction debris or nonhazardous waste.

WORKER EXPOSURE STANDARDS

Due to the growing concerns related to workplace lead exposure, the Federal Occupational Safety and Health Administration (OSHA) promulgated a lead standard for the construction industry in Title 29, Code of Federal Regulations (CFR), Part 1926.62 (29 CFR 1926.62), on May 4, 1993 (OSHA, 1993). The California Division of Occupational Safety and Health (DOSH) adopted and revised the OSHA standard under CCR, Title 8, Section 1532.1 (8 CCR 1532.1) (DOSH, 1997). Under 29 CFR 1926.62 and 8 CCR 1532.1, lead is defined as metallic lead, all inorganic lead compounds, and organic lead soaps. Lead paint is included in this regulation; however, it is not defined with any given concentration.

DOSH established exposure levels for lead in the construction industry at an action level (AL) of 30 micrograms of lead per cubic meter (µg/m^3) of air and a permissible exposure level (PEL) of 50 µg/m^3, calculated as an 8-hour time-weighted average (TWA) (DOSH, 1997). For certain construction activities involving lead paint, OSHA requires that an employer treat employees as if they were exposed to lead at a certain level and implement employee protective measures until exposure assessment using air sampling indicates otherwise. These activities and assumed levels of exposure are summarized in the table below.

ACTIVITIES	ASSUMED LEVELS OF EXPOSURE (ug/m^3)
• Manual demolition of structure • Manual scraping • Manual sanding • Heat gun applications • Power tool cleaning with dust collection systems • Lead-based paint spraying	50 < Exposure < 500

ACTIVITIES	ASSUMED LEVELS OF EXPOSURE (ug/m^3)
• Use of lead containing mortar, lead burning • Rivet busting • Power tool cleaning without dust collection system • Cleanup activities where dry expendable abrasives are used • Abrasive blasting, enclosure movement and removal	Exposure > 500
• Abrasive blasting • Welding • Cutting • Torch burning	Exposure > 2,500

The detection limit of the XRF analyzer is generally considered to be accurate when concentrations of lead in paint are greater than 1.0 mg/cm^2. The accuracy of the laboratory analytical methods is typically expressed in parts per million (or below the CPSC's 0.06 percent by weight). It has been our experience that when an XRF analyzer does not detect lead in paint, a high likelihood exists that the same paint will be reported to contain lead above the detection limits of laboratory analytical methods such as AAS and ICP-AES. OSHA and DOSH regulations are not based on the concentrations in paint but rather on the exposure levels in air and/or blood.

PAINT CHIP SAMPLING RESULTS AND INTERPRETATIONS

A total of two bulk samples of paint were collected by Panacea and submitted to Forensic Analytical Specialties, Inc. (Forensic) for analysis using AAS. The following table presents the sample number, description, location and lead concentration.

SAMPLE NO.	DESCRIPTION	LEAD CONC. (Percent by Weight)	ESTIMATED QUANTITY (Square Feet)	INTERPRE-TATION
RZ090114-LB-2	Off-white paint on asphalt	<0.0007	<400 (multiple 4” off-white strips on the bridge)	non-LBP
RZ090114-LB-3	Yellow paint on asphalt	0.6700	<200 (multiple 4” yellow strips on the bridge)	LBP

Note:

< = less than.

CONCLUSIONS

Based on the information obtained during this survey, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the professional judgment of Panacea personnel, the following conclusions were made:

- Non-LBP (Detectable Lead Concentrations <0.06% by Weight)

  - Off-white paint on the bridge.

- Presence of LCP (Detectable Lead Concentrations <0.5% and ≥0.06% by Weight)

  - None.

- Presence of LBP (Detectable Lead Concentrations >0.5% by Weight)

  - Yellow paint on the bridge.

- **HUD and DPH LBP Regulations** – These regulations are not applicable to this project since the structure is not characterized as a "building".

- **Lead-Containing Hazardous Waste** – Whether a waste is a hazardous waste or not is determined based on representative TTLC, STLC, and TCLP concentrations in waste stream's samples. The representative waste streams should be characterized by the renovation or demolition contractor for proper waste disposal. Without additional waste characterization, there a very high likelihood that the **yellow paint** removed without the asphalt substrate would be characterized as a **hazardous waste** under Paragraph 3 of "Caltrans SSP 15-010," updated English Version March 2008.

- **Worker Protection** – Regardless of the conditions of paint and concentrations of lead, DOSH regulations are applicable because it not based on the concentrations in paint but rather on the exposure levels in air and/or blood. A negative exposure assessment (worker protection evaluation) should be conducted when working in areas with LBP during the renovation/demolition activities.

The trigger for the worker protection is based on the "task" performed. Once a task is triggered, then the contractor is required to do a negative exposure assessment (NEA) along with any engineering control method(s) used (i.e., wetting, localized ventilation, spray foam, etc.). The NEA should be conducted by a qualified individual or company either through an objective evaluation of historical data and/or onsite air monitoring of the task performed.

Alternatively, the contractor may elect to have LBP and/or LCP removed by in-house lead-trained workers under proper personal protection or subcontract the work to a lead-abatement subcontractor.

LIMITATIONS

Certain painted surfaces were not tested because of practical considerations and/or because they were judged to be a minimal potential hazard during renovation or demolition activities. These surfaces can include miscellaneous road signs and/or other structural components that could be removed with minimal disturbance to lead.

Although personnel who conducted the sampling is certified and an accredited laboratory analyzed the sample under quality assurance and control procedures, the testing described herein might not identify all LCP and/or LBP at the site. Possible reasons for this include inaccessible structural features, unavailability of data for the paint used on the structure, practical limitations to the number of tests, limitations of the laboratory methods used. Furthermore, although testing was performed on each painted surface that appeared different, homogeneity or similar paint content is not guaranteed because similarity of color, substrates, and/or components does not ensure that the same amount of lead was used in paint manufacture and application. In addition, topcoats, components, and substrates of similar color could have different undercoats. It is possible that, given two apparently similar paints on similar components and substrates, one might contain lead whereas as the other might not. Therefore, additional sampling and/or testing could be necessary to provide a higher confidence level regarding the presence of lead.

The estimated areas presented in this report are intended for discussion and management purposes only. It is understood and recommended that the actual square footage and material conditions be verified by qualified contractors prior to bidding and/or abating the materials.

The information provided in this report is based on the scope of work authorized by the client, information obtained during the work, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the professional judgment of Panacea personnel.

Services performed by Panacea were conducted in a manner consistent with state-of-the-industry-practices, recognizing that even the most comprehensive testing may not detect all LCP and /or LBP in/on the structure. Therefore, Panacea cannot act as an insurer or certify that the site is free of LCP and/or LBP. Except as expressly set forth herein, no representation or

warranty is included in our report. The services described herein were performed within the limit of the scope of work authorized by the client and the encountered site conditions.

Panacea relied on the information collected during the site visit discussed and/or provided by the client or others to arrive at the conclusions stated herein. Panacea assumes that information provided by others is accurate and makes no assertions as to the accuracy thereof.

REFERENCES

California Division of Occupational Safety and Health (DOSH), 1997. Title 8, California Code of Regulations, Section 1532.1. Revised 1997.

Occupational Safety and Health Administration (OSHA), 1993. Occupational Safety and Health Standards, Title 29, Code of Federal Regulations, Part 1926.62.

U.S. Department of Housing and Urban Development (HUD), 1995. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing. June 1995.

Very truly yours,
PANACEA, INC.

Hsin H. Chou, CIH, REA II
DPH Certification No. 17

ATTACHMENT:

- Laboratory Analytical Report and Chain-of-Custody Record

Forensic Analytical

Final Report

Metals Analysis of Bulks

Panacea Inc.
Mr. Hsin Chou
17315 Studebaker Rd.
Suite 300
Cerritos, CA 90703

Client ID: 5572
Report Number: M100314
Date Received: 01/19/09
Date Analyzed: 01/22/09
Date Printed: 01/22/09
First Reported: 01/22/09

Job ID / Site: C09-668, Freeway 22 6 Bridges

FASI Job ID: 5572

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
RZ090114-LB-1	30339023	Pb	150	mg/kg	7	EPA 3050B/7420
RZ090114-LB-2	30339024	Pb	< 7	mg/kg	7	EPA 3050B/7420
RZ090114-LB-3	30339025	Pb	6700	mg/kg	400	EPA 3050B/7420
RZ090114-LB-4	30339026	Pb	600	mg/kg	30	EPA 3050B/7420
RZ090114-LB-5	30339027	Pb	97	mg/kg	6	EPA 3050B/7420
RZ090114-LB-6	30339028	Pb	60	mg/kg	7	EPA 3050B/7420
RZ090114-LB-7	30339029	Pb	2300	mg/kg	60	EPA 3050B/7420
RZ090114-LB-8	30339030	Pb	15	mg/kg	7	EPA 3050B/7420

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Dave Sandusky, Laboratory Supervisor, Hayward Laboratory

Analytical results and reports are generated by Forensic Analytical at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by Forensic Analytical to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by Forensic Analytical. The client is solely responsible for the use and interpretation of test results and reports requested from Forensic Analytical. Forensic Analytical is not able to assess the degree of hazard resulting from materials analyzed. Forensic Analytical reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. Any modifications that have been made to referenced test methods are documented in Forensic Analytical's Standard Operating Procedures Manual. Sample results have not been blank corrected. Quality control and sample receipt condition were acceptable unless otherwise noted.

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

CHAIN OF CUSTODY RECORD

PANACEA, INC.
Project Manager: Hsin Chiu
17315 Studebaker Road, Suite 300
Cerritos, CA 90703
Tel. (562) 860-2869
Fax (562) 860-6297

Date: 1/15/09
Page: 1 of: 1
Project No.: C09-Lab8
Project Name: Fwy 22 Lc Bridges
Sampled By: Ernest Zamorano
Shipped To: Fr. Ana. by: Fedex

SAMPLE NUMBER	SAMPLING DATE / TIME	PRESERVATION METHOD	CONTAINER TYPE/SIZE	SAMPLE MATRIX	ANALYSES REQUIRED
A2C09C114-LB-1	1/15/09	None	Sealed Bulk	Lead - AAS	
-2					
-3					
-4					
-5					
-6					
-7					
-8					

TOTAL NUMBER OF SAMPLES 8 turnaround

COMMENTS: Return signed chain-of-custody forms with final report(s). Email the report to Lorraina at valencia@panenv.com
FTM = floor tile and mastic; LNM = linoleum and mastic; CBM = cove base and mastic;
CTM = ceiling tile and mastic; DWJ = wallboard and joint compound; MI = other multiple-layered materials

Relinquished By:		Company: Panacea Inc.	Date: 1/15/09	Time:	
Received By:		Company: FALI	Date: 1/16/09	Time: 10:30 am 9/E	
Relinquished By:		Company: FALI	Date: 1/16/09	Time:	
Received By:	F/E	Company: Fali	Date: 1/19/09	Time: 10:30am	
Relinquished By:		Company:	Date:	Time:	
Received By:		Company:	Date:	Time:	

Revised: 07/2008

AERIALLY DEPOSITED LEAD ASSESSMENT REPORT

West County Connectors Project
Orange County, California

Submitted to

California Department of Transportation
District 12
3337 Michelson Drive, Suite 380
Irvine, California 92612

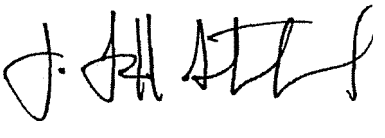
TRC Project No. 151396

March 30, 2009

Prepared by

TRC
21 Technology Drive
Irvine, California 92618
Telephone 949-727-9336
Facsimile 949-727-7399

Ross Surrency, PG
Senior Project Geologist



J. Todd Stanford, REA, REHS, CEM
Principal Scientist

March 30,2009

California Department of Transportation
District 12
3337 Michelson Drive, Suite CN-380
Irvine, California 92612

ATTN: MS. LISA ALVISO
DESIGN OVERSIGHT

SITE: WEST COUNTY CONNECTORS PROJECT
ORANGE COUNTY, CALIFORNIA

RE: AERIALLY DEPOSITED LEAD ASSESSMENT REPORT

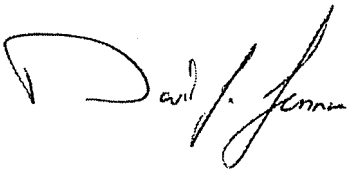
Dear Ms. Alviso:

TRC is pleased to submit this report which summarizes the aerially deposited lead (ADL) study conducted along the SR-22,I-405 and I-605 freeways.

If you have any questions regarding this report, please call me at (949) 727-9336.

Sincerely,

TRC



David Lennon
Senior Project Manager

cc: Ross Lew, TRC

AERIALLY DEPOSITED LEAD
ASSESSMENT REPORT

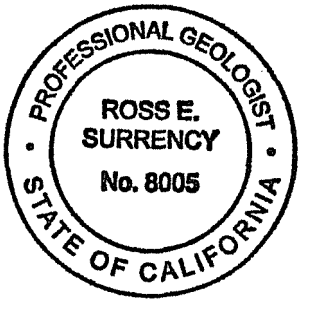
March 30,2009

West County Connectors Project
Orange County, California

Prepared For:

California Department of Transportation
District 12
3337 Michelson Drive, Suite CN-380
Irvine, California

By:



Ross Surrency, PG
Senior Project Geologist

J. Todd Stanford, REA, REHS, CEM
Principal Scientist

TRC
21 Technology Drive
Irvine, California 92618

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1 Vicinity Map
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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

On behalf of the Orange County Transportation Authority (OCTA), TRC conducted testing for aerially deposited lead (ADL) in soil adjacent to an approximately 4.8-mile section of State Route 22 (SR-22), Interstate 405 (I-405), and Interstate 605 (I-605) as part of the West County Connectors Project in Orange County, California. The project will link high occupancy vehicle (HOV) lanes/carpool lanes on the San Diego Freeway (1-405) with those on the Garden Grove Freeway (SR-22) and San Gabriel Freeway (1-605) to create a seamless HOV connection amongst the three freeways. A site vicinity map is presented in Figure 1 and the project limits are presented in Figure 2.

The objective of the soil sampling program was to investigate.for potential shallow subsurface impact by ADL from historic usage of leaded gasoline prior to the excavation work proposed for the West County Connectors Project. This sampling program was conducted to evaluate whether excavated soil generated during the proposed freeway project would require special handling or disposal with respect to ADL. The work was performed in accordance with the TRC ADL Assessment Workplan dated March 12,2008 (TRC, 2008) and under the responsible charge of a California Professional Geologist.

In addition, soil sampling was to be conducted to assess specific areas of concern identified in the Report of Initial Site Assessment (Group Delta, 2008). These areas include 1) a suspected fuel spill located on the northbound I-405 shoulder just south of I-605, 2) patches of dead ice plants at the northbound I-405/Seal Beach Blvd. off ramp, and 3) the Seal Beach Naval Weapons Station (SBNWS) easement located between Valley View St. and Seal Beach Blvd.

1.2 BACKGROUND

I-405 is a major northwest-southeast trending freeway facility that begins at the southern junction with Interstate 5 (I-5) in the city of Lake Forest in Orange County, and continues north to its terminus at the junction with I-5 near San Fernando in Los Angeles County. I-405 is included in the National Highway System. I-405 was approved as a chargeable interstate in 1955. Construction began in 1957, and the first section was opened in 1961. Sections of I-405 west of I-605 were completed before 1965. The newest section was completed in 1969, covering most of Orange County.

The local area adjacent to the project on the north side of the I-405 and east side of the I-605 is predominately residential with some light commercial. An 18-hole golf course exists at the Seal Beach Blvd. exit. The Los Alamitos Army Airfield is located approximately 0.5 miles north of the I-405. The south side of the I-405 from Valley View Street to Seal Beach Blvd. is occupied by the Seal Beach Naval Weapons Station. West of Seal Beach Blvd. to the interchange with the I-605 is a senior living community named Leisure World. There are two local interchanges within the proposed project limits: Valley View Street and Seal Beach Blvd.

1.3 SCOPE OF WORK

The scope of work for this project included collecting soil samples approximately every 400 linear feet over the length of the study area. The samples were analyzed for lead. A statistical evaluation of the laboratory results was performed and is summarized herein. The appropriate soil management methodology will be determined according to the Department of Toxic Substances Control (DTSC) lead contaminated soil variance for the California Department of Transportation (Caltrans) (DTSC 2007). A copy of this document is provided in Appendix A.

A second task in the scope of work included sampling the lane striping and roadway markings within the interchange area for lead based paint. Field instrumentation was used to sample selected striping and roadway markings for lead. The results of this sampling effort are presented in a separate report.

Following the initial ADL sampling activities, additional soil samples were collected in select areas to further assess ADL impacts and to collect additional data on areas proposed for grading. Three areas identified in the Report of Initial Site Assessment (Delta, 2008) were also targeted for additional sampling and analysis.

2.0 PRE-FIELD ACTMTIES

Prior to conducting field work at the site, an encroachment permit was obtained from Caltrans. A site-specific health and safety plan was prepared. Underground Service Alert (USA) was notified to mark the locations of underground utility lines in the area.

3.0 FIELD ACTIVITIES

3.1 SOIL SAMPLING

Soil sample locations were marked in advance with survey markers and orange spray paint. During this time, each sampling location was surveyed with a hand-held global positioning system (GPS) unit. The GPS data is included in Appendix B.

In the study area, one soil boring was advanced approximately every 400 linear feet using direct-push drilling methods to collect subsurface soil samples. Sampling activities were conducted fiom April 21 to May 1,2008. Refer to Figures 3 through 30 for the soil boring locations.

Additional soil sampling was conducted in August and September 2008 to further delineate areas to be graded for ADL and to assess specific areas of concern identified in the Report of Initial Site Assessment (Delta, 2008).

The soil borings were advanced using direct-push technology to a maximum depth of 3.5 feet below grade (fbg). Direct-push borings utilize a 1.5-inch diameter hollow stem rod attached to a hydraulic and percussion drive-point unit with a closed piston sampler. Soil samples were collected inside acetate liners that are placed inside the rod. During direct-push operations, soil samples were collected at the following depths: 0.0-0.5 fbg, 1.0-1.5 fbg, and 2.0-2.5 fbg. At locations near proposed footings or foundations, an additional sample was collected fiom a depth of 3.0-3.5 fbg. Some locations were not accessible with the direct-push rig. At these locations, the soil borings were advanced with a hand auger and the samples were placed in 4-ounce glass jars. Soil borings along the SBNWS easement were advanced using a hand auger due to the presence of two underground gas transmission lines. Soil borings in the dead ice plant area and suspected fuel spill area were also advanced with a hand auger.

The samples were used for laboratory analysis and soil description. The borings were backfilled with native soil and bentonite chips.

3.2 SAMPLE HANDLING

Upon retrieval of the direct-push sampling equipment fiom the ground, the acetate liner containing soil fiom the target interval was removed fiom the core barrel. The liner was then cut into sections corresponding to the sample intervals listed in section 3.1, sealed with Teflon sheeting and capped. Each sample was labeled with the boring number, sample depth, and date and time of collection. After the samples were labeled and documented on the chain of custody record, they were placed in a cooler during transport to a state-certified laboratory for analysis. Soil samples collected with a hand auger were placed in 4-ounce glass jars and labeled with the boring number, sample depth, and date and time of collection.

Chain of custody protocol was followed for all soil samples. The chain of custody form(s) accompanied the samples fiom the sampling locality to the laboratory, providing a continuous record of possession prior to analysis.

Additional sample documentation included daily field logs and site photographs. Photographs are included in Appendix E.

3.3 DECONTAMINATION

Soil sampling equipment was decontaminated prior to advancement at each location by brush scrubbing in a detergent and potable water solution and rinsing twice in clean potable water to avoid cross-contamination between borings. Equipment rinseate blanks were collected daily to verify that contamination was not being introduced to the samples fiom the sampling equipment.

3.4 DISPOSAL

Excess soil generated during sampling activities was used to backfill the boreholes.

Fluids generated during equipment decontamination activities were stored in a Department of Transportation (DOT)-approved drum and transported to the TRC Santa Fe Springs office for temporary storage and subsequent disposal. A copy of the manifest is provided in Appendix F.

4.0 LABORATORY ANALYSIS

4.1 SOIL SAMPLE ANALYSIS

Soil samples were submitted to Advanced Technology Laboratories, a state-certified laboratory, and analyzed for the following:

- Total lead using EPA Method 6010B;
- STLC lead (if total lead results were >50 milligrams per kilogram [mg/kg] and <1,000 mg/kg);
- TCLP lead (if STLC lead results were >5 milligrams per liter (mg/L) and/or total lead was >1,000 mg/kg);
- STLC/DI-Water Lead (on any sample >350 mg/kg and <3,397 mg/kg total lead);
- pH using EPA Method 9040 (on 10% of the samples).

Results of laboratory analysis of soil samples for lead are listed in Table 1. Copies of the official laboratory reports and chain of custody records for soil are provided on compact disc in Appendix D.

Soil samples collected in the suspected fuel spill area were analyzed for the following:

- Total petroleum hydrocarbons as gasoline (TPH-G) and total TPH by EPA Method 8015M;
- Benzene, toluene, ethylbenzene, total xylenes (BTEX) and oxygenates by EPA Method 8260B;

Results of laboratory analysis of soil samples from the suspected fuel spill area are listed in Table 2. Copies of the official laboratory reports and chain of custody records are provided on compact disc in Appendix D.

Soil samples collected in the dead ice plant area were analyzed for the following:

- TPH-G by EPA Method 8015M;
- BTEX by EPA Method 8021;
- Volatile organic compounds (VOCs) by EPA Method 8260B;

- Semi-volatile organic compounds (SVOCs) by EPA Method 8270C;
- Pesticides by EPA Method 8141A; and
- Herbicides by EPA Method 8151A.

Results of laboratory analysis of soil samples fiom the dead ice plant area are listed in Tables 3a and 3b. Copies of the official laboratory reports and chain of custody records are provided on compact disc in Appendix D.

In addition to the lead analyses listed above, soil samples collected along the SBNWS easement were analyzed for the following:

- Pesticides by EPA Method 8081A and 8141A;
- Herbicides by EPA Method 8151A; and
- Arsenic by EPA Method 6010B.

Results of laboratory analysis of soil samples from the SBNWS easement are listed in Table 4. Copies of the official laboratory reports and chain of custody records are provided on compact disc in Appendix D.

4.2 QUALITY CONTROL SAMPLES

Quality Assurance/Quality Control (QNQC) samples were collected or prepared to assist in determining data reliability. These QNQC samples included field duplicates, equipment rinseate blanks, and laboratory QNQC samples (for matrix spike [MS] and matrix spike duplicates [MSDs]). QNQC samples were collected using the same procedures as the collection of the target sample.

Field Duplicates. The field duplicate is an independent soil sample collected as close as possible to the original sample fiom the same source and is used to document sampling precision. Field duplicates were labeled and packaged in the same manner as other samples so that the laboratory cannot distinguish between samples and duplicates. Each duplicate was taken using the same sampling and preservation method as the standard samples. Field duplicate samples were collected at a frequency of 10 percent. Laboratory results from the duplicate samples are provided in Table 1.

Equipment Rinseate Blanks. Equipment rinseate blanks were collected to verify that contamination was not introduced to samples fiom the sampling equipment. They were prepared by pouring distilled water over the cleaned sampling equipment and into the sample containers. Equipment rinseate blanks were prepared and labeled in the same manner as the field samples. One equipment rinseate blank was collected per day by each field team.

Laboratory QA/QC Samples. Laboratory QA/QC samples were prepared by the laboratory to perform MS and MSD analyses. An MS is an aliquot of a sample spiked with a known concentration of target analyte(s) and provides a measure of the method accuracy. The MSD is a laboratory split sample of the MS and is used to determine the precision of the method.

5.0 STATISTICAL DATA EVALUATION

This section provides an overview of the statistical evaluation methods, data correlation, and results of the statistical evaluation performed on the samples analyzed as a component of this investigation. All soil samples were analyzed for total lead concentration. In addition, a subset of paired sample data were also analyzed for soluble lead via the Waste Extraction Test Procedure using Citric Acid (STLC WT), Toxicity Characteristic Leaching Procedure (TCLP), and Modified WET using deionized water as an extractant (STLC WET-DI). The statistical evaluation was performed using samples from locations B-1N to B-163N collected in April 2008. Subsequent samples collected in August and September 2008 were not included in the evaluation as the purpose of these was mainly to fill in data gaps. An overview of the number of soil samples analyzed for lead by these various techniques is provided below:

Analytical Method	Number of Samples Analyzed
Total Lead (EPA Method 6010B)	662 (including 63 field duplicates)
Lead (STLC WET)	145
Lead (TCLP)	130
Lead (Modified WET-DI)	72
pH	64
Notes: All STLC WET, TCLP, and STLC WET-DI performed on "paired" samples (i.e., samples also analyzed for total lead).	

5.1 STATISTICAL EVALUATION METHODS

The analytical results of soil samples collected from direct-push soil borings advanced along the study area of I-405 were evaluated statistically in accordance with Caltrans Aerially Deposited Lead Guidance (Caltrans, 2007). The analytical results of the soil sampling are summarized in Table C-1. Charts 1 through 7 in Appendix C include raw data and histograms depicting various raw data and data subsets that were considered for this analysis.

In general, the statistical methods applied to the lead data set were intended to determine the general statistical distribution of the data and to evaluate whether the correlation between total and soluble

concentrations of lead is acceptable according to Caltrans guidance. Descriptive and/or analytical statistical methods were derived for the entire population of soil samples and for various subpopulations of soil samples by depth (e.g., 0 to 0.5 fbg, 1 to 1.5 fbg, 2 to 2.5 fbg, and 3 to 3.5 fbg). In addition, data were also evaluated to determine the correlation between total and soluble lead, as described in Section 5.2.

Upper confidence levels (UCL) of the true mean values for the data were calculated. The UCL values were derived from the Environmental Protection Agency (EPA) statistical program, ProUCL, version 3.0). The UCL method for each data set was based on the underlying distribution of the data. The underlying distribution is performed in descending order by evaluating whether the data exhibit linear, gamma, lognormal, or non-parametric distributions at specified confidence intervals. Descriptive statistics, data distributions, and UCL values for lead analyses performed on the entire data set are provided in Table C-1. Table C-2 provides an overview of the descriptive statistics for soil samples as segregated by depth.

5.2 DATA CORRELATION

The subset of soil samples that were analyzed for total and soluble lead fractions were subjected to correlation and regression analysis. This analysis is performed to evaluate the validity and predictive power of total and soluble lead concentrations. The data used excluded soil samples that did not contain detected concentrations of lead via the STLC method. Additionally, duplicate soil samples were excluded from the correlation and regression analysis if the original sample was also analyzed for both total and soluble lead. This approach is intended to eliminate bias that may be introduced by the use of a surrogate concentration for non-detect values that could alter the relationship between total and soluble lead concentrations. A total of 45 paired samples were retained for determination of correlation coefficient and regression analysis for total and soluble lead (STLC WET). The results of the Total to STLC WET analysis are located in Table C-3. A total of 72 soil samples were analyzed for total lead and soluble lead using deionized water (STLC WET-DI) and only 43 samples contained detectable concentrations of soluble lead. A regression and correlation analysis was also conducted to determine the predictive nature of total lead to estimate soluble lead (STLC WET-DI) concentrations for locations which samples were not collected and analyzed. The results of the Total to STLC WET-DI analysis are located in Table C-4.

A correlation coefficient (R^2) of 0.8 or greater between total lead and soluble lead suggests a moderate to strong positive relationship between total and soluble lead concentrations. The calculated standard deviation values for total lead (Y) and soluble lead (X) used to calculate the correlation coefficient is 431.53 and 47.53, respectively. The correlation coefficient for data included in this analysis is 0.762. The value does not meet the criteria for strong positive relationship, but does suggest a low to moderate positive relationship. Similarly, the R^2 value for the relationship between total and soluble lead using deionized water (STLC WET-DI) is 0.338. This value indicates a very weak positive relationship and cannot be used to infer soluble lead (STLC WET-DI) concentrations.

The regression analysis presented in Table C-3 consists of a graph of paired total and soluble lead concentrations. The regression analysis was performed using a least square, best fit plot of the data. The calculated slope/intercept of the line is for the data using a least square method to estimate a straight line is $y = 7.941x + 56.342$. The regression analysis presented in Table C-4 indicate a set of data points with low positive correlation and generated a line equation of $y = 48.198x + 394.83$.

5.3 STATISTICAL EVALUATION

Soil samples were grouped and segregated by depth and statistical analysis were performed on the total and segregated data sets. Soil samples collected during this investigation were generally collected at depths of 0 to 0.5 fbg, 1.0 to 1.5 fbg, 2.0 to 2.5 fbg, and 3.0 to 3.5 fbg. The 3.0 to 3.5 fbg samples were collected in areas near proposed footings or foundations.

Total lead was detected at a concentration in excess of 50 mg/kg in 145 soil samples and was further analyzed for soluble lead by STLC WET, TCLP, and/or STLC WET-DI. A summary of soil analytical test results is located on Table C-1. Total detected lead concentrations ranged between 3.0 to 2,200 mg/kg. Soluble lead by STLC WET using citric acid ranged between less than 1 to 230 mg/L. Soluble lead by TCLP and STLC WET-DI yielded very similar results with minimum detectable lead concentration at 0.27 and 0.26 mg/L and maximum detectable lead concentration at 30 and 38 mg/L, respectively.

Statistical analyses were performed for each segregated sampling depth levels to determine the upper confidence intervals of the mean for total and soluble lead concentrations. Four segregated layers were considered for these analyses: 0 to 0.5 fbg, 1.0 to 1.5 fbg, 2.0 to 2.5 fbg, and 3.0 to 3.5 fbg. An overview of the statistical analyses for the segregated layers is provided in Table C-2.

For the layer between 0 and 0.5 fbg, the upper 80% and 95% confidence intervals for the population for total lead are 265.86 and 519.60 mg/kg, respectively. These values are based on a non-parametric data distribution and the values were calculated using the Chebyshev 80% and 95% (mean, SD) UCL. For soluble lead (STLC WET), the upper 80% and 95% confidence interval values are 63.28 and 92.27 mg/L, respectively. The data for TCLP was lognormal and used a 95% H-UCL value. The STLC WET-DI data was also non-parametric.

Statistical analysis of the soil samples obtained from the layer between 1.0 and 1.5 fbg yields upper 80% and 95% confidence intervals for total lead of 82.12 and 135.02 mg/kg, respectively. These total lead values are based on a non-parametric data distribution and the values were calculated using the Chebyshev 80% and 95% (mean, SD) UCL. For soluble lead (STLC WET), the upper 95% confidence interval values were based on lognormal distribution in this interval is 39.69. The 80% confidence interval could not be determined with the soluble lead data set. Both TCLP and STLC WET-DI were gamma distributed.

Upper 80% and 95% confidence intervals total lead within the 2.0 and 2.5 fbg layer are 38.79 and 61.05 mgkg, respectively. The total lead values are based on a non-parametric data distribution and the values were calculated using the Chebyshev 80% and 95% (mean, SD) UCL. For soluble lead (STLC WET), the upper 80% and 95% confidence interval values were based on lognormal distribution are 34.14 and 52.41 mg/L, respectively. The TCLP data was non parametric and the STLC WET-DI date was gamrna distributed.

In the last layer, ranging between 3.0 and 3.5 fbg, the upper 80% and 95% confidence intervals total lead are 53.20 and 108.45, respectively. The total lead values are based on a non-parametric data distribution and the values were calculated using the Chebyshev 80% and 95% (mean, SD) UCL. For soluble lead (STLC), the upper 95% confidence interval values were based on gamma distribution is 19.53 mgkg. The 80% confidence interval could not be determined with the data set. The TCLP and STLC WET-DI were non-parametric using Modified –t values.

Presented in Appendix C on Charts 1-6 are histograms of lead concentrations based on the frequency of the concentrations distribution. High frequency of total lead concentration below 50 mgkg indicates that additional extraction studies for most soil samples collect were not necessary. The histogram for soluble lead samples indicates approximately 50% occurrences of lead concentration are between 5 and 50 mg/L.

The results of the statistical analysis indicate that the soil along this portion of the proposed project does contain concentrations of total or soluble lead that would be subject to regulation under CCR Title 2 guidelines. The analytical results for soluble lead via deionized water extraction (STLC WET-DI) indicate that selected segments of soil along the investigation area have significant potential for dissolution or migration from the parent soil. The distribution of total lead detected in the soil profile is consistent with aerially deposited lead, based on the cumulative probability distribution for total lead, located in Chart 7. Relatively high concentrations of total lead observed from the surface levels through the 3.0 fbg soil interface indicate presence of soluble lead also has potential for dissolution and possible migration lower in depth.

Soil management considerations were analyzed using confidence intervals for areas identified with potential soil classifications of Z-2 and Z-3 according to Caltrans soil classification and variance reuse policy. Soils classified as Z-2 require disposal as California hazardous waste when transported offsite for disposal. Soils classified as Z-3 require disposal as a Resource Conservation and Recovery Act (RCRA) hazardous waste at an offsite permitted hazardous waste disposal facility. The confidence intervals depict a method to analyze the depth of soil to remove. Groups 1-3 are based on the proximity of the locations with each other, and Groups 4 and 5 are Z-3 and Z-2 soils, respectively, in localized areas. Figures 1-5 in Appendix C are the corresponding block diagrams used to predict the concentration of total and soluble lead fraction according to depth. The confidence interval analysis and anticipated construction site constraints were used to determine that the soil classifications would be assigned based on the lead concentration found at each depth within each soil boring. In addition, it was determined that

only Z-3 classified soil would be required to be shipped offsite and all other impacted soil could be reused onsite in accordance with the variance policy.

6.0 FINDINGS

6.1 TOTAL LEAD

A total of 923 samples were analyzed for total lead by EPA Method 6010B. Concentrations ranged fiom non-detect to 2,200 mg/kg. There were 214 samples that exceeded 50 mgikg.

6.2 STLCLEAD

A total of 232 samples were analyzed for soluble lead using the Cal WET method (STLC). The samples that exceeded 50 mg/kg for total lead were analyzed by this method. Concentrations ranged fiom non-detect to 230 mg/L.

6.3 STLC DI WATER LEAD

A total of 88 samples were analyzed for soluble lead using the modified Cal WET method with deionized water. Concentrations ranged fiom non-detect to 38 mg/L.

6.4 TCLPLEAD

A total of 1'78 samples were analyzed for soluble lead using the TCLP. Concentrations ranged fiom non-detect to 30 mg/L.

6.5 pH

A total of 64 samples were analyzed for pH using EPA Method 9040. The values for pH ranged fiom 6.49 to 8.62.

6.6 SUSPECTED FUEL SPILL AREA

TPH was detected in all five borings (B-188N to B-192N) advanced in this area at concentrations ranging fiom 10 to 4,300 mg/kg. The maximum concentration was detected in Boring B-188N at a depth of 4.5 to 5.0 fbg. The hydrocarbons detected in this sample were in the C18 to C40 range which is indicative of a heavier end fuel. This same range was observed in the other samples. No TPH-G, BTEX compounds or oxygenates were detected in any of the samples collected in this area. See Figure 31 for sample locations and Table 2 for a summary of laboratory analyses.

6.7 DEAD ICE PLANT AREA

With the exception of metals, no chemicals of concern were identified in the samples collected in the dead ice plant area (Borings B-175N to B-179N). Metals concentrations were compared to industrial preliminary remediation goals (PRGs). The only compound to exceed an industrial PRG was arsenic. Arsenic was detected in every soil sample collected in this area with concentrations ranging from 2.7 to 10 mg/kg. Lead results were compared to the residential PRG as there is no industrial PRG. One sample (B-179N @ 2-2.5 ft.) exceeded the residential PRG for lead (400 mgkg) with a concentration of 430 mgkg. See Figure 32 for sample locations and Tables 3a and 3b for a summary of laboratory analyses.

6.8 SEAL BEACH NAVAL WEAPONS STATION EASEMENT

Arsenic was detected in every soil sample collected along the SBNWS with concentrations ranging from 1.6 to 9.2 mg/kg. The industrial PRG for arsenic is 1.6 mg/kg. See Figures 7 to 14 for SBNWS sample locations and Table 4 for a summary of laboratory analyses.

Organochlorine pesticides were analyzed for in surface soils along the SBNWS. The compound 4,4'-DDD was detected in all but two samples with a maximum concentration of 47 µg/kg which is below the industrial PRG of 7,200 µg/kg. The compound 4,4'-DDE was detected in every sample with a maximum concentration of 270 µg/kg which is below the industrial PRG of 5,100 µg/kg. The compound 4,4'-DDT was detected in every sample with a maximum concentration of 180 µg/kg which is below the industrial PRG of 7,000 µg/kg.

Alpha-chlordane was detected in two surface soil samples at 1.3 and 15 µg/kg. Chlordane and gamma-chlordane were detected in four samples at a maximum concentration of 93 and 17 µg/kg respectively. Of these three compounds, only chlordane has a PRG and the level is 6,500 yglkg.

Organophosphorous pesticides were also analyzed in soil samples collected along the SBNWS. No compounds were detected above laboratory detection levels.

The only herbicide detected was pentachlorophenol at a maximum concentration of 73 µg/kg which is below the industrial PRG of 9,000 µg/kg.

7.0 CONCLUSIONS

7.1 ADL SAMPLING

Soil sampling for ADL was conducted along an approximately 4.8-mile section of freeway encompassing portions of SR-22, I-405 and I-605. A statistical evaluation of the data was performed. Based on this evaluation, each soil sample was classified according to the Caltrans soil classification table. A soil classification was assigned to each depth at a sample location. The following provides a summary of the classifications assigned to sampling locations in the study

area. These classifications are presented in Appendix C, Tables C-6 through C-9, and the affected areas are presented graphically on Figures 3 through 29.

- Unrestricted use: Two hundred and six-(206) sample locations were classified for unrestricted use.
- Y-1: One hundred and three (103) sample location depths were classified as Y-1 for onsite reuse if covered with one foot of non-hazardous soil.
- Y-2: Twenty-one (21) sample location depths were classified as Y-2 for onsite reuse if covered with a pavement structure.
- Z-3: Twenty-two (22) sample locations were classified as Z-3 requiring offsite disposal as a RCRA hazardous waste.

7.2 SUSPECTED FUEL SPILL AREA

Soil sampling was conducted to investigate a possible fuel spill along the northbound I-405 shoulder just south of I-605. TPH was detected in 12 out of 15 soil samples collected indicating that a petroleum release did occur in this area. The TPH concentrations detected are above the Los Angeles Regional Water Quality Control Board (LARWQCB) soil screening levels. Groundwater in this area is anticipated to be relatively shallow (<20 fbg) based on nearby petroleum release cases in GeoTracker.

7.3 DEAD ICE PLANT AREA

Arsenic and lead were found at concentrations above their respective PRGs. No other chemicals of concern were identified above laboratory detections levels. Arsenic is a naturally occurring metal and the concentrations of arsenic detected in this area are within the range of concentrations found in soil in the western United States (United States Geologic Survey, 1984). Only one out of 15 soil samples was found to exceed the residential PRG for lead at a concentration of 430 mg/kg at a depth of 2.0 to 2.5 fbg. The planned use for this area is a freeway on-ramp and will be so for the foreseeable future.

It is unknown what caused the patches of ice plants in this area to die, however, the cause does not appear related to an unauthorized release or disposal of chemicals sampled for during this investigation.

7.4 SEAL BEACH NAVAL WEAPONS STATION EASEMENT

Arsenic was found to exceed the industrial PRG (1.6 mg/kg) in all samples collected along the SBNWS easement. However, arsenic is a naturally occurring metal and the concentrations detected in this area are within the range of concentrations found in soil in the western United States (United States Geologic Survey, 1984).

Organochlorine pesticides also were detected in soil samples collected along the SBNWS easement but at concentrations well below industrial PRGs.

8.0 RECOMMENDATIONS

8.1 ADL

During construction activities, the soil within the study area should be managed according to the Caltrans classification assigned herein. Refer to Figures 3 through 30 which show the affected areas and their corresponding classification.

Soil samples should be taken to confirm contaminated soil has been completely removed from areas requiring offsite disposal. In addition, soil for offsite disposal should be profiled prior to offsite transportation and a uniform hazardous waste manifest should accompany each load of soil to the disposal site. Inspections should be conducted to ensure soil requiring reuse onsite through the variance is managed appropriately and covered with the correct amount of inert material.

8.2 SUSPECTED FUEL SPILL AREA

Since LARWQCB soil screening levels were exceeded for TPH, and groundwater is anticipated to be relatively shallow (<20 fbg), additional soil sampling is recommended in this area to further assess the lateral and vertical extent of TPH concentrations detected during initial sampling.

8.3 DEAD ICE PLANT AREA

No additional assessment or remediation is recommended for this area. Lead impacted soil in this area should be managed in accordance with the procedures for ADL impacted soil excavated during the construction activities.

8.4 SEAL BEACH NAVAL WEAPONS STATION EASEMENT

No additional assessment or remediation is recommended for this area. Lead impacted soil in this area should be managed in accordance with the procedures for ADL impacted soil excavated during the construction activities. The DDT concentrations found in the soil may exceed the acceptance criteria for local class III solid waste landfill facilities. Therefore, DDT impacted soil transported offsite for disposal may require disposal at a class I hazardous waste landfill. DDT impacted soil should be properly profiled and approved for disposal at an offsite landfill facility prior to transportation offsite to ensure that the landfill facility can accept the DDT impacted soil.

9.0 REFERENCES

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United States Geologic Survey, 1984, U.S. Geological Survey Professional Paper 1270: Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States.

The site assessment activities summarized in this report have been conducted in accordance with current practice and the standard of care exercised by geologists and engineers performing similar tasks in this area The work associated with the project was performed under the direct supervision of a professional geologist. No warranty, express or implied, is made regarding the conclusions and professional opinions presented in this report. The .findings and conclusions are based solely upon an analysis of the observed conditions. If actual conditions differ from those described in this report, our office should be notified.

TABLES

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-1N	0.0-0.5	4/23/08	120	13	1.1		
	1.0-1.5	4/23/08	50	3.9			
	2.0-2.5	4/23/08	ND<5.0				
B-2N	0.0-0.5	4/23/08	9.2				8.2
	1.O-1.5	4/23/08	6.3				8.3
	2.0-2.5	4/23/08	ND<5.0				8.3
B-3N	0.0-0.5	4/23/08	120	8.2	0.53		
	1.0-1.5	4/23/08	83	7.2	0.50		
	2.0-2.5	4/23/08	8.4				
B-4N	0.0-0.5	4/22/08	14				8.8
	1.O-1.5	4/22/08	56	5.1	ND<0.25		8.3
	2.0-2.5	4/22/08	11				7.8
B-5N	0.0-0.5	4/23/08	72	5.3	0.57		
	1.0-1.5	4/23/08	5.1				
	2.0-2.5	4/23/08	14				
B-6N	0.0-0.5	4/23/08	300	36	0.81	ND<0.25	
	1.0-1.5	4/23/08	8.6				
	2.0-2.5	4/23/08	ND<5.0				
B-7N	0.0-0.5	4/21/08	24				9.1
	1.0-1.5	4/21/08	54	2.6			8.8
	2.0-2.5	4/21/08	9.3				8.7
B-8N	0.0-0.5	4/21/08	19				
	1.0-1.5	4/21/08	14				
	2.0-2.5	4/21/08	10				
B-9N	0.0-0.5	4/21/08	21				
	1.0-1.5	4/21/08	38				
	2.0-2.5	4/21/08	44				
B-ION	0.0-0.5	4/21/08	57	7.1	ND<0.25		
	1.0-1.5	4/21/08	71	8.9	0.40		
	2.0-2.5	4/21/08	81	16	ND<0.25		
B-11N	0.0-0.5	4/21/08	24				
	1.0-1.5	4/21/08	24				
	2.0-2.5	4/21/08	6.3				
B-12N	0.0-0.5	4/21/08	43				
	1.0-1.5	4/21/08	13				
	2.0-2.5	4/21/08	7.0				
B-13N	0.0-0.5	4/21/08	210	24	1.5		
	1.0-1.5	4/21/08	380	41	1.8	0.81	
	2.0-2.5	--	--				
B-14N	0.0-0.5	4/21/08	ND<5.0				
	1.0-1.5	4/21/08	ND<5.0				
	2.0-2.5	4/21/08	5.6				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-15N	0.0-0.5	4/21/08	12				
	1.0-1.5	4/21/08	ND<5.0				
	2.0-2.5	4/21/08	6.6				
B-15NA	0.0-0.5	duplicate	13				
	1.O-1.5	duplicate	ND<5.0				
	2.0-2.5	duplicate	ND<5.0				
B-16N	0.0-0.5	4/22/08	800	93	1.7	0.55	
	1.0-1.5	4/22/08	630	58	1.7	0.26	
	2.0-2.5	4/22/08	380	41	4.3	0.30	
B-17N	0.0-0.5	4/22/08	900	67	7.3	0.28	
	1.0-1.5	4/22/08	19				
	2.0-2.5	4/22/08	9.4				
	3.0-3.5	4/22/08	NIX5.0				
B-18N	0.0-0.5	4/22/08	440	59	2.4	5.8	
	1.0-1.5	4/22/08	1600	210	1.7	ND<0.25	
	2.0-2.5	4/22/08	7.9				
	3.0-3.5	4/22/08	ND<5.0				
B-19N	0.0-0.5	4/22/08	1800	130	13	ND<0.25	
	1.0-1.5	4/22/08	300	1.2		ND<0.25	
	2.0-2.5	4/22/08	16				
	3.0-3.5	4/22/08	ND<5.0				
B-20N	0.0-0.5	4/22/08	170	14	0.42		
	1.O-1.5	4/22/08	9.5				
	2.0-2.5	4/22/08	160	0.32			
	3.0-3.5	4/22/08	620	68	0.27	ND<0.25	
B-21N	0.0-0.5	4/22/08	850	95	5.9	ND<0.25	
	1.0-1.5	4/22/08	93	3.5			
	2.0-2.5	4/22/08	100	7.9	0.36		
B-22N	0.0-0.5	4/22/08	2200	210	3.8	ND<0.25	
	1.0-1.5	4/22/08	150	13	NIX0.25		
	2.0-2.5	4/22/08	5.7				
B-23N	0.0-0.5	4/22/08	360	120	3.2	NIX0.25	
	1.O-1.5	4/22/08	64	3.8			
	2.0-2.5	4/22/08	28				
B-24N	0.0-0.5	4/22/08	100	8.0	0.46		
	1.O-1.5	4/22/08	48				
	2.0-2.5	4/22/08	5.9				
	3.0-3.5	4/22/08	ND<5.0				
B-24NA	0.0-0.5	duplicate	74	13	0.86		
	1.O-1.5	duplicate	31				
	2.0-2.5	duplicate	26				
	3.0-3.5	duplicate	19				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-25N	0.0-0.5	4/22/08	1300	130	15	0.98	
	1.0-1.5	4/22/08	21				
	2.0-2.5	4/22/08	38				
	3.0-3.5	4/22/08	19	1.3			
B-26N	0.0-0.5	4/22/08	1200	110	3.5	ND<0.25	
	1.O-1.5	4/22/08	60	6.9	0.45		
	2.0-2.5	4/22/08	29				
	3.0-3.5	4/22/08	30	1.3			
B-27N	0.0-0.5	4/22/08	1000	81	8.7	ND<0.25	
	1.O-1.5	4/22/08	22				
	2.0-2.5	4/22/08	18				
	3.0-3.5	4/22/08	ND<5.0				
B-28N	0.0-0.5	4/22/08	600	27	0.93	ND<0.25	
	1.0-1.5	4/22/08	34				
	2.0-2.5	4/22/08	32				
	3.0-3.5	4/22/08	9.0				
B-29N	0.0-0.5	4/22/08	89	81	7.2		
	1.O-1.5	4/22/08	37				
	2.0-2.5	4/22/08	17				
	3.0-3.5	4/22/08	210	15	0.53	ND<0.25	
B-30N	0.0-0.5	4/23/08	230	34	2.2		
	1.O-1.5	4/23/08	45				
	2.0-2.5	4/23/08	61	6.6	0.35		
	3.0-3.5	4/23/08	19				
B-31N	0.0-0.5	4/23/08	730	98	14	0.42	
	1.0-1.5	4/23/08	21				
	2.0-2.5	4/23/08	41				
	3.0-3.5	4/23/08	22	4.7			
B-32N	0.0-0.5	4/23/08	570	80	9.0	ND<0.25	
	1.0-1.5	4/23/08	18				
	2.0-2.5	4/23/08	8.5				
B-33N	0.0-0.5	4/23/08	28				
	1.O-1.5	4/23/08	20				
	2.0-2.5	4/23/08	21				
B-34N	0.0-0.5	4/23/08	110	9.0	0.64		
	1.0-1.5	4/23/08	35				
	2.0-2.5	4/23/08	45				
B-35N	0.0-0.5	4/23/08	48				
	1.0-1.5	4/23/08	62	4.9			
	2.0-2.5	4/23/08	5.5				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-36N	0.0-0.5	4/29/08	2200	210	24	8.3	
	1.0-1.5	4/29/08	350	44	5.0	1.8	
	2.0-2.5	4/29/08	100	5.3	ND<0.25	ND<0.25	
B-36NA	0.0-0.5	duplicate	800	120	13	4.3	
	1.O-1.5	duplicate	420	32	1.7	1.9	
	2.0-2.5	duplicate	290	25	4.6	1.3	
B-37N	0.0-0.5	4/23/08	8.4				
	1.0-1.5	4/23/08	8.3				
	2.0-2.5	4/23/08	13				
B-38N	0.0-0.5	4/23/08	10				
	1.0-1.5	4/23/08	11				
	2.0-2.5	4/23/08	7.2				
B-39N	0.0-0.5	4/28/08	70	6.1	0.42		8.7
	1.0-1.5	4/28/08	280	30	1.2	0.53	8.4
	2.0-2.5	4/28/08	84	4.2			8.4
	3.0-2.5	4/28/08	ND<5.0				8.5
B-40N	0.0-0.5	4/28/08	11				
	1.0-1.5	4/28/08	35				
	2.0-2.5	4/28/08	36				
	3.0-2.5	4/28/08	30	2.0			
B-41N	0.0-0.5	4/24/08	370	36	5.7	1.1	
	1.O-1.5	4/24/08	11				
	2.0-2.5	4/24/08	19				
B-42N	0.0-0.5	4/24/08	58	5.6	0.34		
	1.0-1.5	4/24/08	93	14	0.56		
	2.0-2.5	4/24/08	280	48	2.3	3.0	
B-42NA	0.0-0.5	duplicate	89	6.1	0.53		
	1.0-1.5	duplicate	86	13	0.60		
	2.0-2.5	duplicate	630	44	1.1	4.6	
B-43N	0.0-0.5	4/23/08	12				
	1.0-1.5	4/23/08	63	9.1	0.81		
	2.0-2.5	4/23/08	62	6.0	0.65		
B-44N	0.0-0.5	4/24/08	800	150	19	3.3	
	1.O-1.5	4/24/08	58	7.0	1.2		
	2.0-2.5	4/24/08	560	130	8.0	4.4	
B-45N	0.0-0.5	4/23/08	1800	230	30	38	
	1.O-1.5	4/23/08	790	63	1.2	7.6	
	2.0-2.5	4/23/08	12				
B-46N	0.0-0.5	4/24/08	370	26	1.9	ND<0.25	7.8
	1.0-1.5	4/24/08	26				8.0
	2.0-2.5	4/24/08	81	7.8	0.47		8.0

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-47N	0.0-0.5	4/24/08	38				
	1.O-1.5	4/24/08	83	70	5.5	2.2	
	2.0-2.5	4/24/08	120	47	5.9	0.70	
B-48N	0.0-0.5	4/29/08	5.4				
	1.O-1.5	4/29/08	15				
	2.0-2.5	4/29/08	14				
	3.0-3.5	4/29/08	13				
B-49N	0.0-0.5	4/28/08	ND<5.0				
	1.O-1.5	4/28/08	10				
	2.0-2.5	--	--				
	3.0-3.5	--	--				
B-50N	0.0-0.5	4/25/08	5.7				
	1.0-1.5	4/25/08	11				
	2.0-2.5	4/25/08	110	6.1	0.27	0.48	
	3.0-3.5	4/25/08	6.9				
B-51N	0.0-0.5	4/28/08	8.0				
	1.0-1.5	--	--				
	2.0-2.5	--	--				
B-52N	0.0-0.5	4/29/08	7.7				
	1.0-1.5	4/29/08	12				
	2.0-2.5	4/29/08	16				
	3.0-3.5	4/29/08	62	3.9	ND<0.25	ND<0.25	
B-53N	0.0-0.5	4/29/08	9.1				
	1.0-1.5	4/29/08	6.0				
	2.0-2.5	4/29/08	68	11	0.51		
	3.0-3.5	4/29/08	43	2.2			
B-54N	0.0-0.5	4/24/08	230	26	1.3		
	1.O-1.5	4/24/08	180	2.8	6.3	1.6	
	2.0-2.5	4/24/08	85	4.5	ND<0.25	0.64	
	3.0-3.5	4/24/08	.30	3.9			
B-55N	0.0-0.5	4/29/08	ND<5.0				
	1.O-1.5	4/29/08	12				
	2.0-2.5	4/29/08	17				
	3.0-3.5	4/29/08	18				
B-56N	0.0-0.5	4/29/08	10				
	1.0-1.5	4/29/08	14				
	2.0-2.5	4/29/08	8.4				
	3.0-3.5	4/29/08	7.4				
B-57N	0.0-0.5	4/24/08	300	25	2.7		
	1.0-1.5	4/24/08	6.1				
	2.0-2.5	4/24/08	ND<5.0				
	3.0-3.5	4/24/08	ND<5.0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-58N	0.0-0.5	4/24/08	120	15	0.53		
	1.O-1.5	4/24/08	18				
	2.0-2.5	4/24/08	ND<5.0				
B-59N	0.0-0.5	4/24/08	230	28	0.30		
	1.0-1.5	4/24/08	37				
	2.0-2.5	4/24/08	12				
B-60N	0.0-0.5	4/24/08	240	80	4.5		
	1.0-1.5	4/24/08	ND<5.0				
	1.5-2.0	4/24/08	6.2				
B-61N	0.0-0.5	4/25/08	83	2.5			
	1.0-1.5	4/25/08	110	13	0.88	0.80	
	2.0-2.5	4/25/08	19				
B-62N	0.0-0.5	4/25/08	14				
	1.0-1.5	4/25/08	83	7.6	ND<0.25	ND<0.25	
	2.0-2.4	4/25/08	ND<5.0				
B-62NA	0.0-0.5	duplicate	11				
	1.O-1.5	duplicate	12				
	2.0-2.4	duplicate	ND<5.0				
B-63N	0.0-0.5	4/25/08	1200	120	18	6.6	
	1.0-1.5	4/25/08	5.2				
	2.0-2.5	4/25/08	9.4				
B-64N	0.0-0.5	4/28/08	5.8				
	1.0-1.5	4/28/08	ND<5.0				
	2.0-2.5	4/28/08	ND<5.0				
B-64NA	0.0-0.5	duplicate	10				
	1.O-1.5	duplicate	7.7				
	2.0-2.5	duplicate	9.0				
B-65N	0.0-0.5	4/29/08	38				8.0
	1.0-1.5	4/29/08	6.0				8.0
	2.0-2.5	4/29/08	5.9				8.0
	3.0-3.5	4/29/08	6.3				8.1
B-66N	0.0-0.5	4/29/08	450	44	7.9	0.57	
	1.0-1.5	4/29/08	180	15	0.90	ND<0.25	
	2.0-2.5	4/29/08	17				
	3.0-3.5	4/29/08	ND<5.0				
B-67N	0.0-0.5	4/29/08	67	5.5	0.34		
	1.0-1.5	4/29/08	5.1				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	ND<5.0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-68N	0.0-0.5	4/29/08	56	3.7			
	1.0-1.5	4/29/08	7.4				
	2.0-2.5	4/29/08	6.8				
	3.0-3.5	4/29/08	6.1				
B-69N	0.0-0.5	4/25/08	6.2				
	1.0-1.5	4/25/08	19				
	2.0-2.5	4/25/08	6.3				
	3.0-3.5	4/25/08	5.2				
B-70N	0.0-0.5	4/25/08	ND<5.0				
	1.0-1.5	4/25/08	66	9.0	2.8	0.33	
	2.0-2.5	4/25/08	ND<5.0				
	3.0-3.5	4/25/08	6.3				
B-71N	0.0-0.5	4/24/08	5.4				
	1.0-1.5	4/24/08	18				
	2.0-2.5	4/25/08	W 5 . 0				
	3.0-3.5	4/25/08	5.6				
B-71NA	0.0-0.5	duplicate	ND<5.0				8.8
	1.0-1.5	duplicate	100	15	ND<0.25		7.5
	2.0-2.5	duplicate	ND<5.0				7.9
	3.0-3.5	duplicate	ND<5.0				8.3
B-72N	0.0-0.5	4/28/08	93	5.2	0.43		
	1.0-1.5	4/28/08	ND<5.0				
	2.0-2.5	4/28/08	ND<5.0				
	3.0-3.5	4/28/08	ND<5.0				
B-73N	0.0-0.5	4/29/08	44				
	1.O-1.5	4/29/08	NDC5.0				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	5.7				
B-74N	0.0-0.5	4/29/08	43				
	1.0-1.5	4/29/08	ND<5.0				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	5.4				
B-75N	0.0-0.5	4/29/08	34				
	1.0-1.5	4/29/08	18				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	ND<5.0				
B-76N	0.0-0.5	4/29/08	ND<5.0				
	1.0-1.5	4/29/08	5.1				
	2.0-2.5	4/29/08	9.9				
	3.0-3.5	4/29/08	19	W 0 . 2 5	ND<0.25	ND<0.25	

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-77N	0.0-0.5	4/29/08	260	23	1.8	1.9	
	1.0-1.5	4/29/08	17				
	2.0-2.5	4/29/08	5.3				
	3.0-3.5	4/29/08	W 5 . 0				
B-78N	0.0-0.5	4/29/08	W 5 . 0				
	1.0-1.5	4/29/08	6.3				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	47	W 0 . 2 5	ND<0.25	W 0 . 2 5	
B-79N	0.0-0.5	4/29/08	10				
	1.0-1.5	4/29/08	35				
	2.0-2.5	4/29/08	250	ND<0.25	0.36	ND<0.25	
	3.0-3.5	4/29/08	ND<5.0				
B-80N	0.0-0.5	4/28/08	W 5 . 0				
	1.0-1.5	4/28/08	W 5 . 0				
	2.0-2.5	4/28/08	ND<5.0				
	3.0-3.5	4/28/08	ND<5.0				
B-81S	0.0-0.5	4/21/08	740	80	3.8	0.80	7.1
	1.0-1.5	4/21/08	18				7.7
	2.0-2.5	4/21/08	ND<5.0				8.2
	3.0-3.5	4/21/08	5.2				8.1
B-82S	0.0-0.5	4/21/08	W 5 . 0				
	1.0-1.5	4/21/08	W 5 . 0				
	2.0-2.5	4/21/08	W 5 . 0				
	3.0-3.5	4/21/08	W 5 . 0				
B-83S	0.0-0.5	4/21/08	W 5 . 0				
	1.0-1.5	4/21/08	W 5 . 0				
	2.0-2.5	4/21/08	ND<5.0				
	3.0-3.5	4/21/08	W 5 . 0				
B-84S	0.0-0.5	4/21/08	W 5 . 0				
	1.0-1.5	4/21/08	ND<5.0				
	2.0-2.5	4/21/08	W 5 . 0				
	3.0-3.5	4/21/08	ND<5.0				
B-85S	0.0-0.5	4/21/08	W 5 . 0				
	1.0-1.5	4/21/08	W 5 . 0				
	2.0-2.5	4/21/08	ND<5.0				
	3.0-3.5	4/21/08	W 5 . 0				
B-86S	0.0-0.5	4/21/08	ND<5.0				
	1.0-1.5	4/21/08	ND<5.0				
	2.0-2.5	4/21/08	W 5 . 0				
	3.0-3.5	4/21/08	5.8				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-87S	0.0-0.5	4/21/08	16				
	1.0-1.5	4/21/08	W 5 . 0				
	2.0-2.5	4/21/08	ND<5.0				
	3.0-3.5	4/21/08	ND<5.0				
B-87SA	0.0-0.5	duplicate	5.1				
	1.0-1.5	duplicate	ND<5.0				
	2.0-2.5	duplicate	ND<5.0				
	3.0-3.5	duplicate	W 5 . 0				
B-88S	0.0-0.5	4/21/08	7.4				
	1.0-1.5	4/21/08	W 5 . 0				
	2.0-2.5	4/21/08	W 5 . 0				
	3.0-3.5	4/21/08	5.0				
B-89S	0.0-0.5	4/21/08	ND<5.0				
	1.0-1.5	4/21/08	ND<5.0				
	2.0-2.5	4/21/08	ND<5.0				
	3.0-3.5	4/21/08	ND<5.0				
B-90S	0.0-0.5	4/21/08	ND<5.0				
	1.0-1.5	4/21/08	ND<5.0				
	2.0-2.5	4/21/08	5.2				
	3.0-3.5	4/21/08	ND<5.0				
B-91S	0.0-0.5	4/22/08	ND<5.0				
	1.0-1.5	4/22/08	5.7				
	2.0-2.5	4/22/08	ND<5.0				
	3.0-3.5	4/22/08	ND<5.0				
B-91SA	0.0-0.5	duplicate	5.3				
	1.O-1.5	duplicate	5.1				
	2.0-2.5	duplicate	5.8				
	3.0-3.5	duplicate	ND<5.0				
B-92S	0.0-0.5	4/22/08	ND<5.0				
	1.O-1.5	4/22/08	ND<5.0				
	2.0-2.5	4/22/08	ND<5.0				
	3.0-3.5	4/22/08	ND<5.0				
B-93S	0.0-0.5	4/22/08	7.0				
	1.0-1.5	4/22/08	ND<5.0				
	2.0-2.5	4/22/08	ND<5.0				
	3.0-3.5	4/22/08	ND<5.0				
B-94S	0.0-0.5	4/22/08	84	13	W 0 . 2 5		8.6
	1.0-1.5	4/22/08	140	1.7	ND<0.25		8.0
	2.0-2.5	4/22/08	19				8.2
	3.0-3.5	4/22/08	7.8	0.37	ND<0.25	0.29	7.9

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-94S-2	0.0-0.5	4/22/08	W 5 . 0				
	1.0-1.5	4/22/08	W 5 . 0				
	2.0-2.5	4/22/08	W 5 . 0				
	3.0-3.5	4/22/08	ND<5.0				
B-95S	0.0-0.5	4/22/08	W 5 . 0				
	1.O-1.5	4/22/08	ND<5.0				
	2.0-2.5	4/22/08	ND<5.0				
	3.0-3.5	4/22/08	ND<5.0				
B-96S	0.0-0.5	4/22/08	560	49	1.2	2.6	
	1.0-1.5	4/22/08	330	32	3.1	1.6	
	2.0-2.5	4/22/08	ND<5.0				
	3.0-3.5	4/22/08	140	ND<0.25	ND<0.25	ND<0.25	
B-97S	0.0-0.5	4/22/08	ND<5.0				
	1.O-1.5	4/22/08	64	W 0 . 2 5			
	2.0-2.5	4/22/08	ND<5.0				
	3.0-3.5	4/22/08	ND<5.0				
B-98S	0.0-0.5	4/22/08	6.8				
	1.0-1.5	4/22/08	5.2				
	2.0-2.5	4/22/08	6.4				
	3.0-3.5	4/22/08	5.0				
B-99S	0.0-0.5	4/22/08	ND<5.0				
	1.0-1.5	4/22/08	W 5 . 0				
	2.0-2.5	4/22/08	ND<5.0				
	3.0-3.5	4/22/08	ND<5.0				
B-102S	0.0-0.5	4/23/08	190	20	0.66		
	1.0-1.5	4/23/08	100	7.1	0.38		
	2.0-2.5	4/23/08	ND<5.0				
	3.0-3.5	4/23/08	W 5 . 0				
B-102SA	0.0-0.5	duplicate	100	13	0.75		
	1.O-1.5	duplicate	64	2.6			
	2.0-2.5	duplicate	ND<5.0				
	3.0-3.5	duplicate	ND<5.0				
B-103S	0.0-0.5	4/23/08	ND<5.0				8.3
	1.0-1.5	4/23/08	5.1				8.4
	2.0-2.5	4/23/08	8.6				8.4
	3.0-3.5	4/23/08	ND<5.0				8.8
B-104S	0.0-0.5	4/25/08	7.8				
	1.0-1.5	4/25/08	W 5 . 0				
	2.0-2.5	4/25/08	ND<5.0				
	3.0-3.5	4/25/08	W 5 . 0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-105S	0.0-0.5	4/23/08	ND<5.0				
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	ND<5.0				
	3.0-3.5	4/23/08	17		ND<0.25	0.61	
B-106S	0.0-0.5	4/23/08	ND<5.0				
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	7.1				
	3.0-3.5	4/23/08	ND<5.0				
B-107S	0.0-0.5	4/23/08	5.3				
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	NIk5.0				
	3.0-3.5	4/23/08	6.6				
B-108S	0.0-0.5	4/23/08	ND<5.0				
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	9.9				
	3.0-3.5	4/23/08	ND<5.0				
B-109S	0.0-0.5	4/23/08	31				
	1.0-1.5	4/23/08	29				
	2.0-2.5	4/23/08	50	4.3			
	3.0-3.5	4/23/08	15		ND<0.25	ND<0.25	
B-110S	0.0-0.5	4/23/08	23				
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	5.3				
	3.0-3.5	4/23/08	ND<5.0				
B-I11S	0.0-0.5	4/23/08	14				
	1.O-1.5	4/23/08	9.1				
	2.0-2.5	4/23/08	6.3				
	3.0-3.5	4/23/08	5.1				
B-112S	0.0-0.5	4/24/08	12				8.2
	1.0-1.5	4/24/08	13				7.9
	2.0-2.5	4/24/08	31				8.1
	3.0-3.5	4/24/08	6.5				8.0
B-112SA	0.0-0.5	duplicate	9.5				
	1.0-1.5	duplicate	15				
	2.0-2.5	duplicate	17				
	3.O-3.5	duplicate	7.7				
B-113S	0.0-0.5	4/23/08	120	7.0	0.33		
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	7.2				
	3.0-3.5	4/23/08	5.8				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-114S	0.0-0.5	4/23/08	ND<5.0				
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	11				
	3.0-3.5	4/23/08	5.5				
B-115S	0.0-0.5	4/23/08	34				
	1.0-1.5	4/23/08	32				
	2.0-2.5	4/23/08	5.2				
	3.0-3.5	4/23/08	6.5				
B-116S	0.0-0.5	4/23/08	43				
	1.0-1.5	4/23/08	130	11	0.63		
	2.0-2.5	4/23/08	78	6.3	W 0 . 2 5	0.26	
	3.0-3.5	4/23/08	ND<5.0				
B-117S	0.0-0.5	4/23/08	41				
	1.O-1.5	4/23/08	14				
	2.0-2.5	4/23/08	6.9				
	3.0-3.5	4/23/08	7.0				
B-118S	0.0-0.5	4/23/08	27				
	1.O-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	6.0				
	3.0-3.5	4/23/08	ND<5.0				
B-119S	0.0-0.5	4/23/08	17				
	1.0-1.5	4/23/08	ND<5.0				
	2.0-2.5	4/23/08	9.6				
	3.0-3.5	4/23/08	7.2				
B-120S	0.0-0.5	4/24/08	14				
	1.0-1.5	4/24/08	ND<5.0				
	2.0-2.5	4/24/08	ND<5.0				
	3.0-3.5	4/24/08	41	W 0 . 2 5	ND<0.25	0.32	
B-121S	0.0-0.5	4/24/08	140	4.9			
	1.0-1.5	4/24/08	31				
	2.0-2.5	4/24/08	5.4				
	3.0-3.5	4/24/08	ND<5.0				
B-122S	0.0-0.5	4/24/08	27				
	1.O-1.5	4/24/08	39				
	2.0-2.5	4/24/08	29				
	3.0-3.5	4/24/08	ND<5.0				
B-123S	0.0-0.5	4/24/08	190	37	1.0		
	1.0-1.5	4/24/08	24				
	2.0-2.5	4/24/08	37				
	3.0-3.5	4/24/08	8.8		ND<0.25	ND<0.25	

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-124S	0.0-0.5	4/24/08	1100	12	0.33	0.91	
	1.0-1.5	4/24/08	25				
	2.0-2.5	4/24/08	20				
	3.0-3.5	4/24/08	ND<5.0				
B-125S	0.0-0.5	4/24/08	120	4.0			
	1.0-1.5	4/24/08	39				
	2.0-2.5	4/24/08	85	6.7	D0.25	0.27	
	3.0-3.5	4/24/08	5.5				
B-126S	0.0-0.5	4/24/08	140	8.2	0.66		
	1.0-1.5	4/24/08	11				
	2.0-2.5	4/24/08	D5.0				
	3.0-3.5	4/24/08	6.6				
B-127S	0.0-0.5	4/24/08	15				
	1.0-1.5	4/24/08	ND<5.0				
	2.0-2.5	4/24/08	ND<5.0				
	3.0-3.5	4/24/08	ND<5.0				
B-128S	0.0-0.5	4/24/08	1100	130	0.86	0.65	
	1.O-1.5	4/24/08	93	11	0.79		
	2.0-2.5	4/24/08	ND<5.0				
	3.0-3.5	4/24/08	ND<5.0				
B-129S	0.0-0.5	4/24/08	ND<5.0				
	1.0-1.5	4/24/08	D5.0				
	2.0-2.5	4/24/08	ND<5.0				
	3.0-3.5	4/24/08	ND<5.0				
B-130S	0.0-0.5	4/24/08	ND<5.0				
	1.0-1.5	4/24/08	ND<5.0				
	2.0-2.5	4/24/08	24				
	3.0-3.5	4/24/08	ND<5.0				
B-131S	0.0-0.5	4/24/08	ND<5.0				
	1.0-1.5	4/24/08	ND<5.0				
	2.0-2.5	4/24/08	21				
	3.0-3.5	4/24/08	ND<5.0				
B-132S	0.0-0.5	4/24/08	89	12	0.88		
	1.0-1.5	4/24/08	42				
	2.0-2.5	4/24/08	8.8				
	3.0-3.5	4/24/08	1400	6.2	ND<0.25	D0.25	
B-132SA	0.0-0.5	duplicate	68	7.6	0.89		7.9
	1.0-1.5	duplicate	68	4.3			7.8
	2.0-2.5	duplicate	11				8.4
	3.0-3.5	duplicate	49		ND<0.25	ND<0.25	7.9

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-133S	0.0-0.5	4/24/08	W 5 . 0				
	1.0-1.5	4/24/08	ND<5.0				
	2.0-2.5	4/24/08	5.8				
	3.0-3.5	4/24/08	W 5 . 0				
B-134S	0.0-0.5	4/24/08	ND<5.0				
	1.0-1.5	4/24/08	W 5 . 0				
	2.0-2.5	4/24/08	9.0				
	3.0-3.5	4/24/08	ND<5.0				
B-135S	0.0-0.5	4/25/08	ND<5.0				
	1.0-1.5	4/25/08	W 5 . 0				
	2.0-2.5	4/25/08	ND<5.0				
	3.0-3.5	4/25/08	ND<5.0				
B-136S	0.0-0.5	4/28/08	270	23	1.5		
	1.0-1.5	4/28/08	77	4.7			
	2.0-2.5	4/28/08	170	10	1.3	0.91	
	3.0-3.5	4/28/08	16		ND<0.25	W 0 . 2 5	
B-137S	0.0-0.5	4/25/08	33				8.4
	1.0-1.5	4/25/08	6.1				8.7
	2.0-2.5	4/25/08	7.4				8.7
	3.0-3.5	4/25/08	ND<5.0				9.3
B-137SA	0.0-0.5	duplicate	130	4.0			
	1.0-1.5	duplicate	ND<5.0				
	2.0-2.5	duplicate	5.4				
	3.0-3.5	duplicate	5.8				
B-138S	0.0-0.5	4/28/08	100	11	1.4		
	1.0-1.5	4/28/08	110	14	1.8		
	2.0-2.5	4/28/08	14				
	3.0-3.5	4/28/08	ND<5.0				
B-139S	0.0-0.5	4/25/08	40				
	1.0-1.5	4/25/08	7.4				
	2.0-2.5	4/25/08	W 5 . 0				
	3.0-3.5	4/25/08	18		ND<0.25	ND<0.25	
B-140S	0.0-0.5	4/28/08	710	97	11	2.1	
	1.0-1.5	4/28/08	340	19	1.5	1.3	
	2.0-2.5	4/28/08	54	1.1	ND<0.25	W 0 . 2 5	
	3.0-3.5	4/28/08	5.3				
B-141S	0.0-0.5	4/29/08	W 5 . 0				
	1.0-1.5	4/29/08	ND<5.0				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	W 5 . 0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-142S	0.0-0.5	4/25/08	ND<5.0				
	1.0-1.5	4/25/08	ND<5.0				
	2.0-2.5	4/25/08	ND<5.0				
	3.0-3.5	4/25/08	ND<5.0				
B-143S	0.0-0.5	4/29/08	5.6				
	1.0-1.5	4/29/08	ND<5.0				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	ND<5.0				
B-144S	0.0-0.5	4/29/08	NIX5.0				
	1.0-1.5	4/29/08	ND<5.0				
	2.0-2.5	4/29/08	ND<5.0				
	3.0-3.5	4/29/08	ND<5.0				
B-145S	0.0-0.5	4/29/08	93	8.8	0.53		
	1.O-1.5	4/29/08	70	7.7	0.32		
	2.0-2.5	4/29/08	14				
	3.0-3.5	4/29/08	5.2				
B-145SA	0.0-0.5	duplicate	110	10	0.65		7.6
	1.O-1.5	duplicate	100	6.1	0.54		7.3
	2.0-2.5	duplicate	23				8.3
	3.O-3.5	duplicate	5.8				8.3
B-146S	0.0-0.5	4/25/08	170	11	ND<0.25		
	1.O-1.5	4/25/08	6.6				
	2.0-2.5	4/25/08	16				
	3.0-3.5	4/25/08	6.5				
B-147S	0.0-0.5	4/25/08	24				
	1.O-1.5	4/25/08	26				
	2.0-2.5	4/25/08	24	.			
	3.0-3.5	4/25/08	6.0				
B-148S	0.0-0.5	4/25/08	7.5				
	1.0-1.5	4/25/08	ND<5.0				
	2.0-2.5	4/25/08	120	0.65	ND<0.25	0.37	
	3.0-3.5	4/25/08	5.9				
B-149S	0.0-0.5	4/25/08	NIX5.0				
	1.0-1.5	4/25/08	NIX5.0				
	2.0-2.5	4/25/08	NIX5.0				
	3.0-3.5	4/25/08	16		ND<0.25	NIX0.25	
B-150N	0.0-0.5	5/1/08	1300	170	ND<0.25	10	
	1.0-1.5	5/1/08	8.7				
	2.0-2.5	5/1/08	ND<5.0				
	3.0-3.5	5/1/08	ND<5.0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-151N	0.0-0.5	5/1/08	100	10	0.55		8.0
	1.0-1.5	5/1/08	72	8.5	0.65		8.0
	2.0-2.5	5/1/08	7				8.0
	3.0-3.5	5/1/08	5.8				8.5
B-151NA	0.0-0.5	duplicate	92	11	0.75		
	1.O-1.5	duplicate	32				
	2.0-2.5	duplicate	5.6				
	3.0-3.5	duplicate	6.3				
B-152N	0.0-0.5	5/1/08	30				
	1.0-1.5	5/1/08	36				
	2.0-2.5	5/1/08	54	1.4			
	3.0-3.5	5/1/08	--	--			
B-153N	0.0-0.5	5/1/08	340	32	0.71		
	1.0-1.5	5/1/08	180	25	1.8		
	2.0-2.5	5/1/08	12				
	3.0-3.5	5/1/08	ND<5.0				
B-154S	0.0-0.5	4/28/08	60	7.7	0.54		8.2
	1.O-1.5	4/28/08	22				8.2
	2.0-2.5	4/28/08	5.1				8.0
	3.0-3.5	4/28/08	W 5 . 0				8.5
B-154SA	0.0-0.5	duplicate	63	7.2	0.76		
	1.O-1.5	duplicate	49				
	2.0-2.5	duplicate	ND<5.0				
	3.0-3.5	duplicate	ND<5.0				
B-155S	0.0-0.5	4/28/08	6.8				
	1.0-1.5	4/28/08	W 5 . 0				
	2.0-2.5	4/28/08	ND<5.0				
	3.0-3.5	4/28/08	W 5 . 0				
B-156S	0.0-0.5	4/28/08	W 5 . 0				
	1.0-1.5	4/28/08	W 5 . 0				
	2.0-2.5	4/28/08	5.2				
	3.0-3.5	4/28/08	ND<5.0				
B-157S	0.0-0.5	4/28/08	29				
	1.O-1.5	4/28/08	ND<5.0				
	2.0-2.5	4/28/08	ND<5.0				
	3.0-3.5	4/28/08	ND<5.0				
B-158S	0.0-0.5	4/28/08	78	5.2	0.37		
	1.0-1.5	4/28/08	7.6				
	2.0-2.5	4/28/08	5.1				
	3.0-3.5	4/28/08	W 5 . 0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-159S	0.0-0.5	4/28/08	24				
	1.0-1.5	4/28/08	23				
	2.0-2.5	4/28/08	ND<5.0				
	3.0-3.5	4/28/08	ND<5.0				
B-160S	0.0-0.5	4/28/08	56	6.2	0.50		
	1.O-1.5	4/28/08	38				
	2.0-2.5	--	--				
	3.0-3.5	--	--				
B-161S	0.0-0.5	4/25/08	36				
	1.0-1.5	4/25/08	7.2				
	2.0-2.5	4/25/08	ND<5.0				
	3.0-3.5	4/25/08	5.3				
B-161SA	0.0-0.5	duplicate	9.8				7.4
	1.0-1.5	duplicate	ND<5.0				6.1
	2.0-2.5	duplicate	ND<5.0				6.4
	3.0-3.5	duplicate	ND<5.0				7.7
B-l62N	0.0-0.5	5/1/08	110	8.9	0.61		
	1.0-1.5	5/1/08	ND<5.0				
	2.0-2.5	5/1/08	ND<5.0				
	3.0-3.5	5/1/08	ND<5.0				
B-163N	0.0-0.5	5/1/08	200	25	2.6		
	1.0-1.5	5/1/08	97	12	1.3		
	2.0-2.5	5/1/08	14				
	3.0-3.5	5/1/08	ND<5.0				
B-164N	0.0-0.5	8/29/08	10				
B-164NA	0.0-0.5	duplicate	6.3				
B-165N	0.0-0.5	8/29/08	81	1.2			
B-166N	0.0-0.5	8/28/08	70	2.3			
B-167N	0.0-0.5	8/28/08	19				
B-168N	0.0-0.5	8/28/08	36				
B-169N	0.0-0.5	8/28/08	170	17	ND<0.25		
B-170N	0.0-0.5	8/28/08	30				
B-171N	0.0-0.5	8/29/08	330	22	0.63		
B-171NA	0.0-0.5	duplicate	430	28	0.59	0.28	
B-172N	0.0-0.5	8/28/08	210	12	0.80		
	1.O-1.5	8/28/08	130	9.9	0.78		
	2.0-2.5	8/28/08	22				
B-173N	0.0-0.5	8/28/08	23				
	1.0-1.5	8/28/08	130	11	1.2		
	2.0-2.5	8/28/08	160	13	1.0		

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-174N	0.0-0.5	8/28/08	25				
	1.0-1.5	8/28/08	58	4.1			
	2.0-2.5	8/28/08	64	3.4			
B-180N	0.0-0.5	8/25/08	85	0.81			
B-181N	0.0-0.5	8/25/08	80	5.0	ND<0.25		
B-l82N	0.0-0.5	8/25/08	200	15	NIX0.25		
	1.O-1.5	8/25/08	21				
B-183N	0.0-0.5	8/26/08	53	3.3			
B-184N	0.0-0.5	8/25/08	74	2.6			
	1.O-1.5.	8/25/08	13				
	2.0-2.5	8/25/08	7.0				
B-185N	0.0-0.5	8/26/08	ND<5.0				
B-186N	0.0-0.5	8/25/08	7.9				
B-187N	0.0-0.5	8/26/08	8.8				
	1.O-1.5	8/26/08	6.3				
B-193N	0.0-0.5	8/26/08	32				
B-194N	0.0-0.5	8/26/08	18				
B-195N	0.0-0.5	9/2/08	NIX5.0				
	1.0-1.5	9/2/08	NIX5.0				
	2.0-2.5	9/2/08	NIX5.0				
B-l96N	0.0-0.5	9/2/08	5.1				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	NIX5.0				
B-197N	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	NIX5.0				
B-198N	0.0-0.5	9/2/08	NIX5.0				
	1.0-1.5	9/2/08	NIX5.0				
	2.0-2.5	9/2/08	NIX5.0				
B-199N	0.0-0.5	9/2/08	6.0				
	1.0-1.5	9/2/08	7.0				
	2.0-2.5	9/2/08	NIX5.0				
B-200N	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	51	1.6			
	2.0-2.5	9/2/08	NIX5.0				
B-201N	0.0-0.5	9/2/08	120	28	0.64		
	1.O-1.5	9/2/08	210	14	0.72		
	2.0-2.5	9/2/08	120	24	1.2		
B-202N	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-202NA	0.0-0.5	duplicate	ND<5.0				
	1.0-1.5	duplicate	ND<5.0				
	2.0-2.5	duplicate	ND<5.0				
B-203N	0.0-0.5	8/28/08	340	27	3.2		
	1.0-1.5	8/28/08	12				
	2.0-2.5	8/28/08	43				
B-204N	0.0-0.5	8/27/08	510	41	1.6	1.4	
	1.0-1.5	8/27/08	ND<5.0				
	2.0-2.5	8/27/08	8.2				
B-205N	0.0-0.5	8/27/08	1,100	80	5.5	0.32	
	1.O-1.5	8/27/08	790	28	1.4	ND<0.25	
	2.0-2.5	8/27/08	250	12	0.44		
B-206N	0.0-0.5	8/27/08	290	24	0.35		
	1.O-1.5	8/27/08	17				
	2.0-2.5	8/27/08	5.6				
B-207N	0.0-0.5	8/27/08	61	8.3	ND<0.25		
	1.O-1.5	8/27/08	7.3				
	2.0-2.5	8/27/08	6.8				
B-208N	0.0-0.5	8/29/08	97	6.0	W 0 . 2 5		
	1.O-1.5	8/29/08	16				
	2.0-2.5	8/29/08	72	3.3			
B-209N	0.0-0.5	8/27/08	500	15	0.63	ND<0.25	
	1.0-1.5	8/27/08	ND<5.0				
	2.0-2.5	8/27/08	W 5 . 0				
B-210S	0.0-0.5	8/27/08	200	14	0.41		
	1.0-1.5	8/27/08	240	16	0.28		
	2.0-2.5	8/27/08	6.0				
B-211S	0.0-0.5	8/27/08	33				
	1.0-1.5	8/27/08	W 5 . 0				
	2.0-2.5	8/27/08	ND<5.0				
B-212S	0.0-0.5	8/27/08	190	12	0.73		
	1.O-1.5	8/27/08	37				
	2.0-2.5	8/27/08	10				
B-213S	0.0-0.5	8/28/08	610	47	2.1	0.32	
	1.O-1.5	8/28/08	7.9				
	2.0-2.5	8/28/08	ND<5.0				
B-214S	0.0-0.5	8/28/08	40				
	1.0-1.5	8/28/08	22				
	2.0-2.5	8/28/08	15				
B-215S	0.0-0.5	8/28/08	26				
	1.O-1.5	8/28/08	8.4				
	2.0-2.5	8/28/08	ND<5.0				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-216S	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				
B-217S	0.0-0.5	9/2/08	W 5 . 0				
	1.0-1.5	9/2/08	W 5 . 0				
	2.0-2.5	9/2/08	ND<5.0				
B-218S	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				
B-218SA	0.0-0.5	9/2/08	W 5 . 0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				
B-219S	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				
B-220S	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				
B-221S	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				
B-222S	0.0-0.5	9/2/08	ND<5.0				
	1.0-1.5	9/2/08	ND<5.0				
	2.0-2.5	9/2/08	ND<5.0				
B-223S	0.0-0.5	9/2/08	ND<5.0				
	1.O-1.5	9/2/08	5.6				
	2.0-2.5	9/2/08	ND<5.0				
B-224S	0.0-0.5	9/3/08	ND<5.0				
	1.0-1.5	9/3/08	ND<5.0				
	2.0-2.5	9/3/08	ND<5.0				
B-225S	0.0-0.5	9/3/08	ND<5.0				
	1.0-1.5	9/3/08	ND<5.0				
	2.0-2.5	9/3/08	W 5 . 0				
B-226S	0.0-0.5	9/8/08	35				
	1.0-1.5	9/8/08	39				
	2.0-2.5	9/8/08	ND<5.0				
B-227S	0.0-0.5	9/3/08	20				
	1.0-1.5	9/3/08	ND<5.0				
	2.0-2.5	9/3/08	ND<5.0				
B-228S	0.0-0.5	9/3/08	5.6				
	1.O-1.5	9/3/08	15				
	2.0-2.5	9/3/08	9.6				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (m g)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-229S	0.0-0.5	9/3/08	1,200	57	1.3	0.60	
	1.O-1.5	9/3/08	320	22	1.3		
	2.0-2.5	9/3/08	680	40	5.2	0.33	
B-230S	0.0-0.5	9/8/08	28				
B-231S	0.0-0.5	9/8/08	9.4				
B-232S	0.0-0.5	9/8/08	24				
B-233S	0.0-0.5	9/8/08	8.7				
B-234N	0.0-0.5	8/26/08	16				
B-234NA	0.0-0.5	duplicate	17				
B-235N	0.0-0.5	8/26/08	12				
B-236N	0.0-0.5	8/26/08	8.7				
B-237S	0.0-0.5	8/28/08	37				
B-237SA	0.0-0.5	duplicate	66	3.6			
B-238S	0.0-0.5	8/29/08	9.4				
B-239S	0.0-0.5	8/29/08	150	3.0			
B-240S	0.0-0.5	8/29/08	19				
B-241S	0.0-0.5	8/29/08	24				
B-242N	0.0-0.5	8/28/08	76	6.7	0.37		
B-243N	0.0-0.5	8/28/08	55	9.7	0.31		
B-244N	0.0-0.5	8/28/08	16				
B-245S	0.0-0.5	8/29/08	75	2.3			
B-246N	0.0-0.5	8/28/08	24				
B-247S	0.0-0.5	8/29/08	860	26	0.46	0.37	
B-248S	0.0-0.5	8/29/08	540	6.4	ND<0.25	0.60	
B-249S	0.0-0.5	8/29/08	150	3.5			
B-250N	0.0-0.5	8/26/08	83	3.7			
B-251S	0.0-0.5	9/3/08	2,500	170	1.8	2.0	
B-252S	0.0-0.5	9/3/08	710	56	1.1	1.5	
B-253S	0.0-0.5	8/27/08	5.5				
	1.0-1.5	8/27/08	ND<5.0				
	2.0-2.5	8/27/08	8.8				
B-254S	0.0-0.5	8/27/08	30				
	1.O-1.5	8/27/08	8.9				
	2.0-2.5	8/27/08	ND<5.0				
B-255S	0.0-0.5	8/27/08	16				
	1.O-1.5	8/27/08	7.8				
	2.0-2.5	8/27/08	7.1				
B-256S	0.0-0.5	8/29/08	54	3.9			
B-256SA	0.0-0.5	duplicate	77	3.5			
B-257S	0.0-0.5	9/4/08	69	0.34			
	1.O-1.5	9/4/08	19				
	2.0-2.5	9/4/08	28				

Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-258S	0.0-0.5	9/4/08	120	0.78			
	1.0-1.5	9/4/08	59	ND<0.25			
	2.0-2.5	9/4/08	7.2				
B-259S	0.0-0.5	9/4/08	110	ND<0.25			
	1.O-1.5	9/4/08	49	ND<0.25			
	2.0-2.5	9/4/08	8.4				
B-260S	0.0-0.5	9/4/08	52	ND<0.25			
	1.O-1.5	9/4/08	12				
	2.0-2.5	9/4/08	13				
B-261S	0.0-0.5	9/4/08	150	0.44			
	1.0-1.5	9/4/08	52	ND<0.25			
	2.0-2.5	9/4/08	6.5				
B-262S	0.0-0.5	9/4/08	55	4.2			
	1.O-1.5	9/4/08	45				
	2.0-2.5	9/4/08	5.4				
B-263S	0.0-0.5	9/4/08	57	2.7			
	1.0-1.5	9/4/08	24				
	2.0-2.5	9/4/08	6.5				
B-264S	0.0-0.5	9/4/08	63	2.1			
	1.0-1.5	9/4/08	21				
	2.0-2.5	9/4/08	15				
B-264S	0.0-0.5	duplicate	39				
	1.O-1.5	duplicate	15				
	2.0-2.5	duplicate	15				
B-265S	0.0-0.5	9/4/08	46				
	1.0-1.5	9/4/08	34				
	2.0-2.5	9/4/08	19				
B-266S	0.0-0.5	9/4/08	39				
	1.0-1.5	9/4/08	41				
	2.0-2.5	9/4/08	7.6				
B-267S	0.0-0.5	9/4/08	34				
	1.O-1.5	9/4/08	30				
	2.0-2.5	9/4/08	31				
B-268S	0.0-0.5	9/4/08	32				
	1.0-1.5	9/4/08	22				
	2.0-2.5	9/4/08	23				
B-269S	0.0-0.5	9/4/08	43				
	1.0-1.5	9/4/08	16				
	2.0-2.5	9/4/08	7.4				
B-270S	0.0-0.5	9/4/08	17				
	1.0-1.5	9/4/08	37				
	2.0-2.5	9/4/08	23				

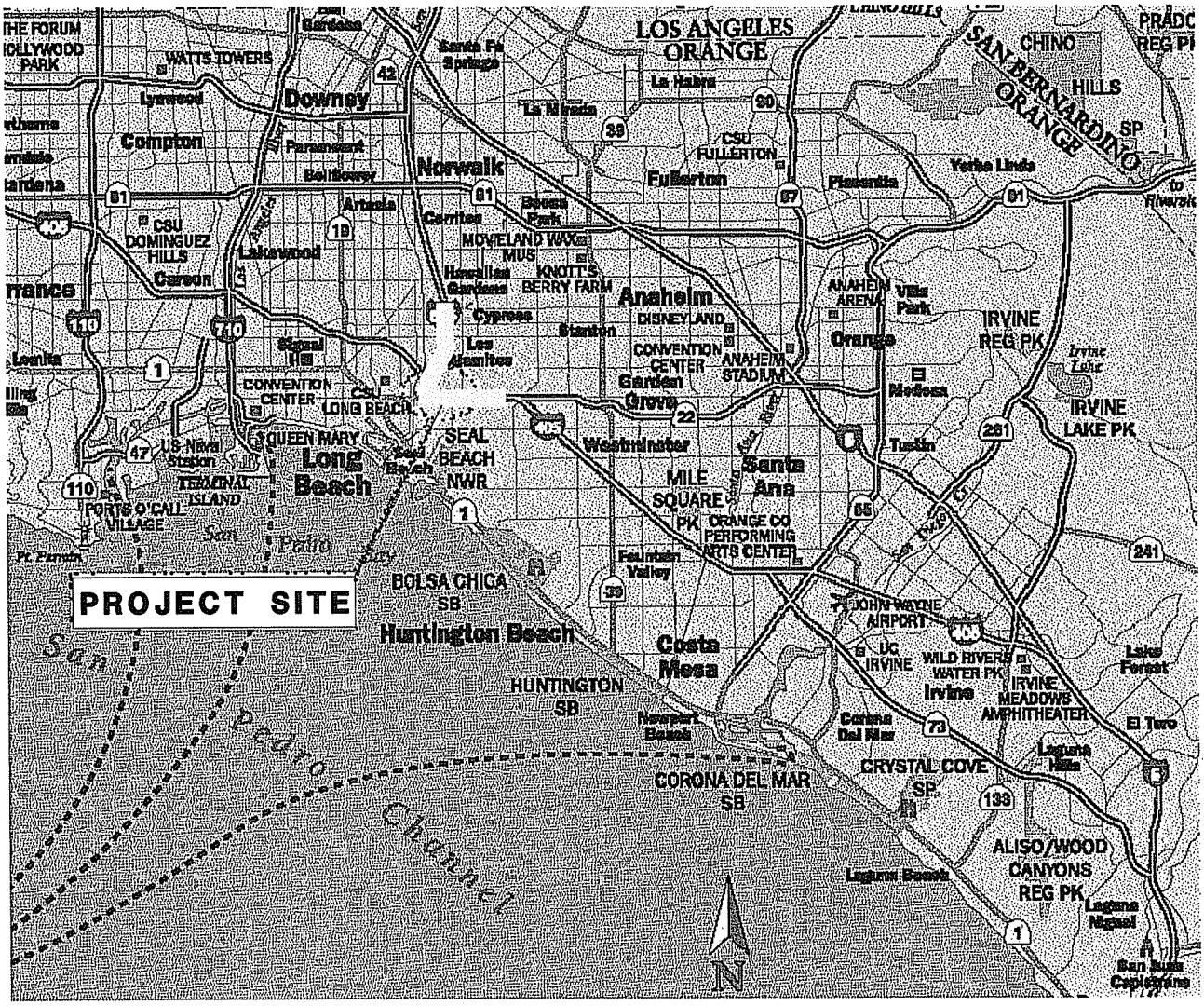
Table 1

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Caltrans I-405 ADL Study

Sample Number	Depth (fbg)	Date Sampled	Total Lead (mg/kg)	STLC Lead (mg/L)	TCLP Lead (mg/L)	STLC DI Water Lead (mg/L)	pH
B-271S	0.0-0.5	9/4/08	44				
	1.0-1.5	9/4/08	8.4				
	2.0-2.5	9/4/08	3.5				
B-272S	0.0-0.5	9/5/08	36				
	1.0-1.5	9/5/08	4.3				
	2.0-2.5	9/5/08	5.4				
B-272S	0.0-0.5	duplicate	42				
	1.0-1.5	duplicate	4.7				
	2.0-2.5	duplicate	4.6				
B-273S	0.0-0.5	9/5/08	56	2.7			
	1.0-1.5	9/5/08	30				
	2.0-2.5	9/5/08	7.2				
B-274S	0.0-0.5	9/5/08	59	3.2			
	1.0-1.5	9/5/08	5.0				
	2.0-2.5	9/5/08	5.3				
B-275S	0.0-0.5	9/5/08	60	2.5			
	1.0-1.5	9/5/08	30				
	2.0-2.5	9/5/08	3.7				
B-276S	0.0-0.5	9/5/08	36				
	1.0-1.5	9/5/08	26				
	2.0-2.5	9/5/08	6.1				
B-277S	0.0-0.5	9/5/08	40				
	1.0-1.5	9/5/08	8.8				
	2.0-2.5	9/5/08	4.8				
B-278S	0.0-0.5	9/5/08	24				
	1.0-1.5	9/5/08	22				
	2.0-2.5	9/5/08	27				
B-279S	0.0-0.5	9/5/08	27				
	1.0-1.5	9/5/08	34				
	2.0-2.5	9/5/08	13				
B-280S	0.0-0.5	9/5/08	83	4.4			
	1.0-1.5	9/5/08	92	5.3	0.33		
	2.0-2.5	9/5/08	22				
B-280S	0.0-0.5	duplicate	71	4.5			
	1.0-1.5	duplicate	54	2.6			
	2.0-2.5	duplicate	160	1.6			

Notes:
fbg = feet below grade
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
ND = not detected; see official laboratory report for detection limits
J = laboratory estimated result
-- = not collected

FIGURES



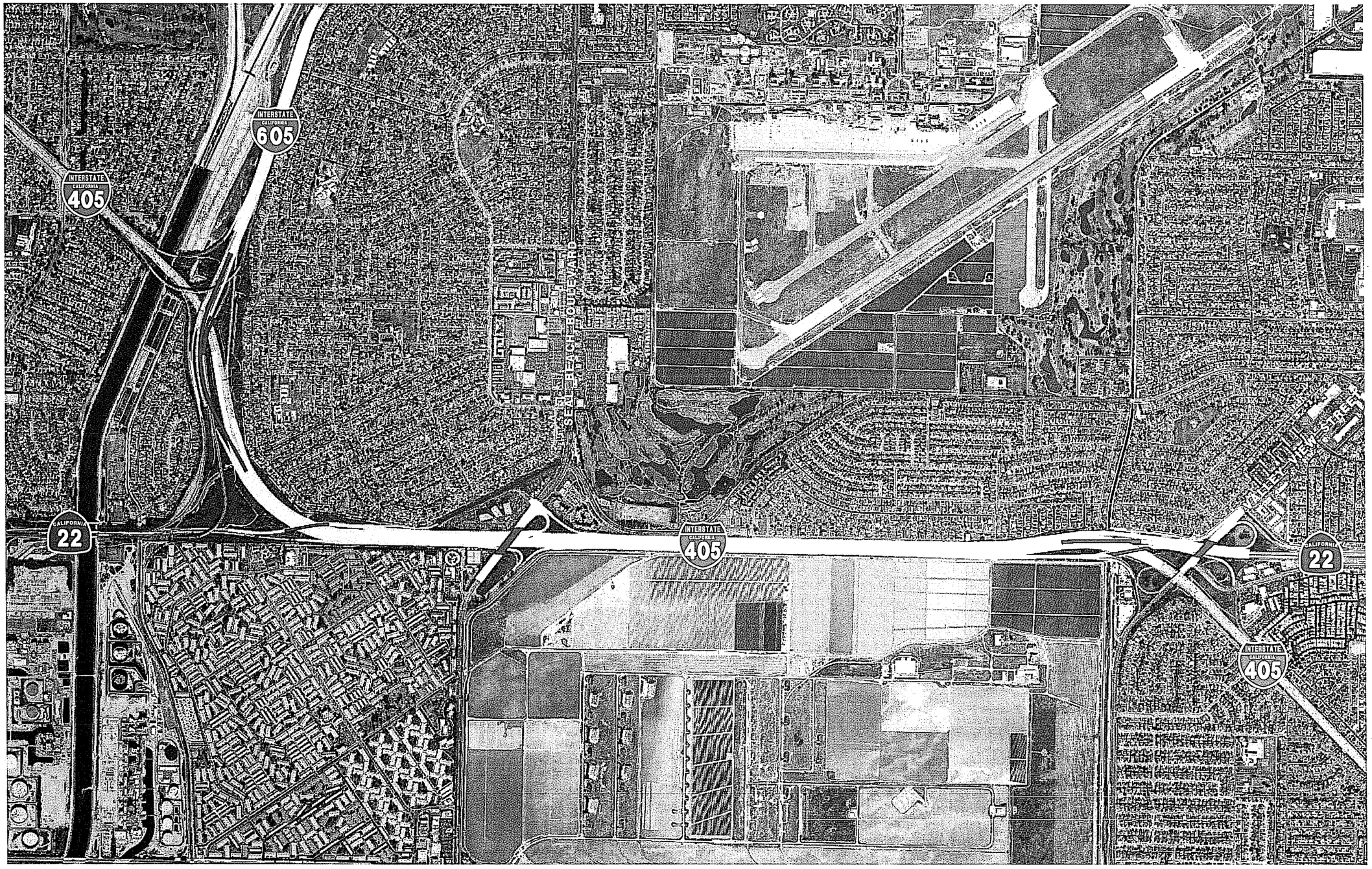
PROJECT: 151396

FACILITY:

WEST COUNTY
CONNECTORS PROJECT
SEAL BEACH, CALIFORNIA

VICINITY MAP

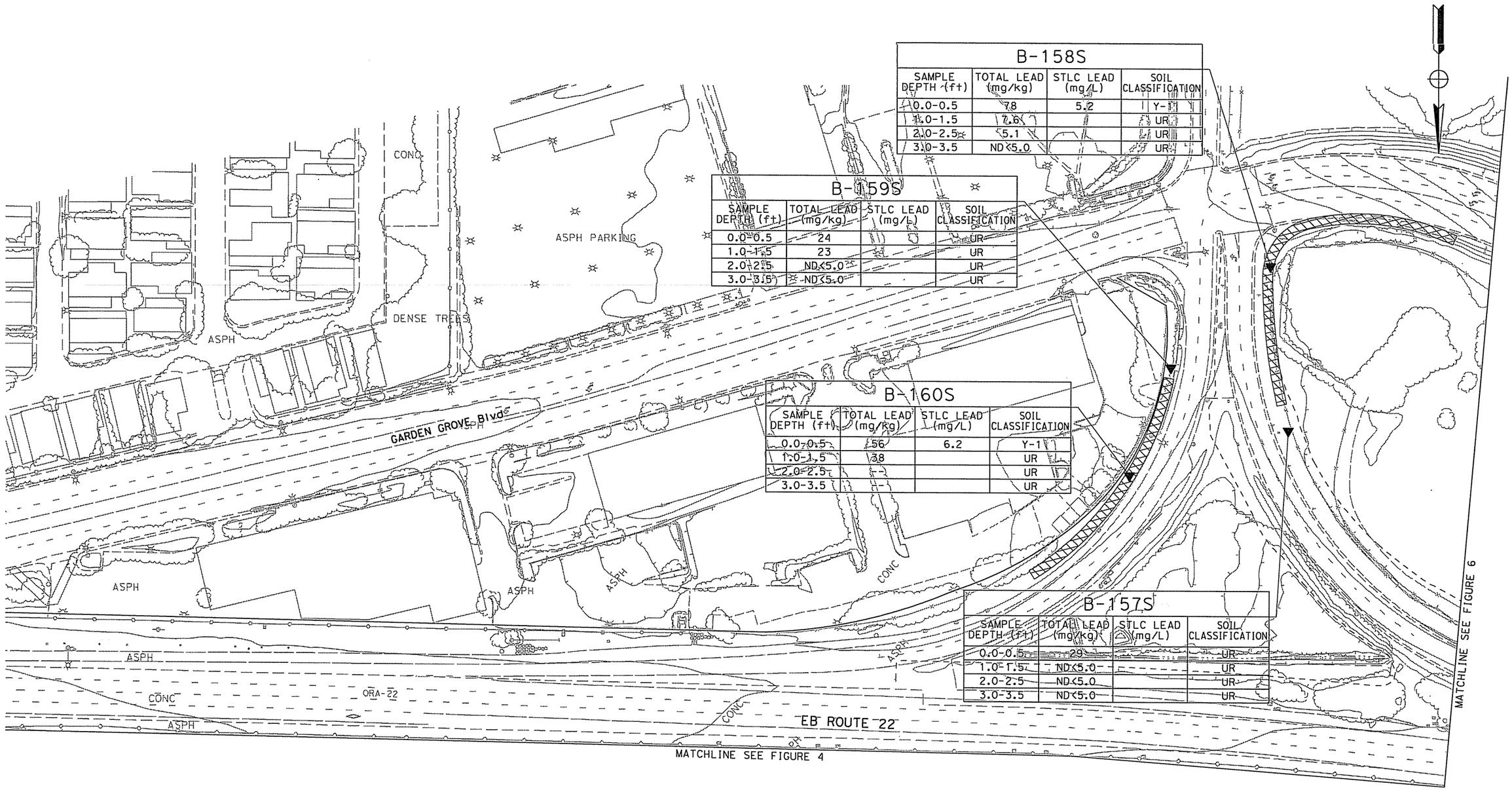
FIGURE 1



TRC

FIGURE 2
WEST COUNTY CONNECTORS
PROJECT LIMITS

WEST COUNTY CONNECTORS
22 405 605
Get Connected



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligroms per kilogram
mg/L = Milligroms per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-003.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 3

MATCHLINE SEE FIGURE 3

WB ROUTE 22

ORA-22

CONC

ASPH

POOL

DENSE TREES

VALLEY VIEW St

MATCHLINE FIGURE 5

B-4N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	14		UR
1.0-1.5	56	5.1	Y-1
2.0-2.5	11		UR

B-5N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	72	5.3	Y-1
1.0-1.5	5.1		UR
2.0-2.5	14		UR

B-3N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	120	8.2	Y-1
1.0-1.5	83	7.2	Y-1
2.0-2.5	8.4		UR

B-2N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	9.2		UR
1.0-1.5	6.3		UR
2.0-2.5	ND<5.0		UR

B-1N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	120	13	Y-1
1.0-1.5	50	3.9	UR
2.0-2.5	ND<5.0		UR

B-7N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	24		UR
1.0-1.5	54	2.6	UR
2.0-2.5	9.3		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed

ft = Feet

mg/kg = Milligrams per kilogram

mg/L = Milligrams per liter

ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

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DGN FILE => ...\CAD\Exhibits\ADL\ADL-004.dgn

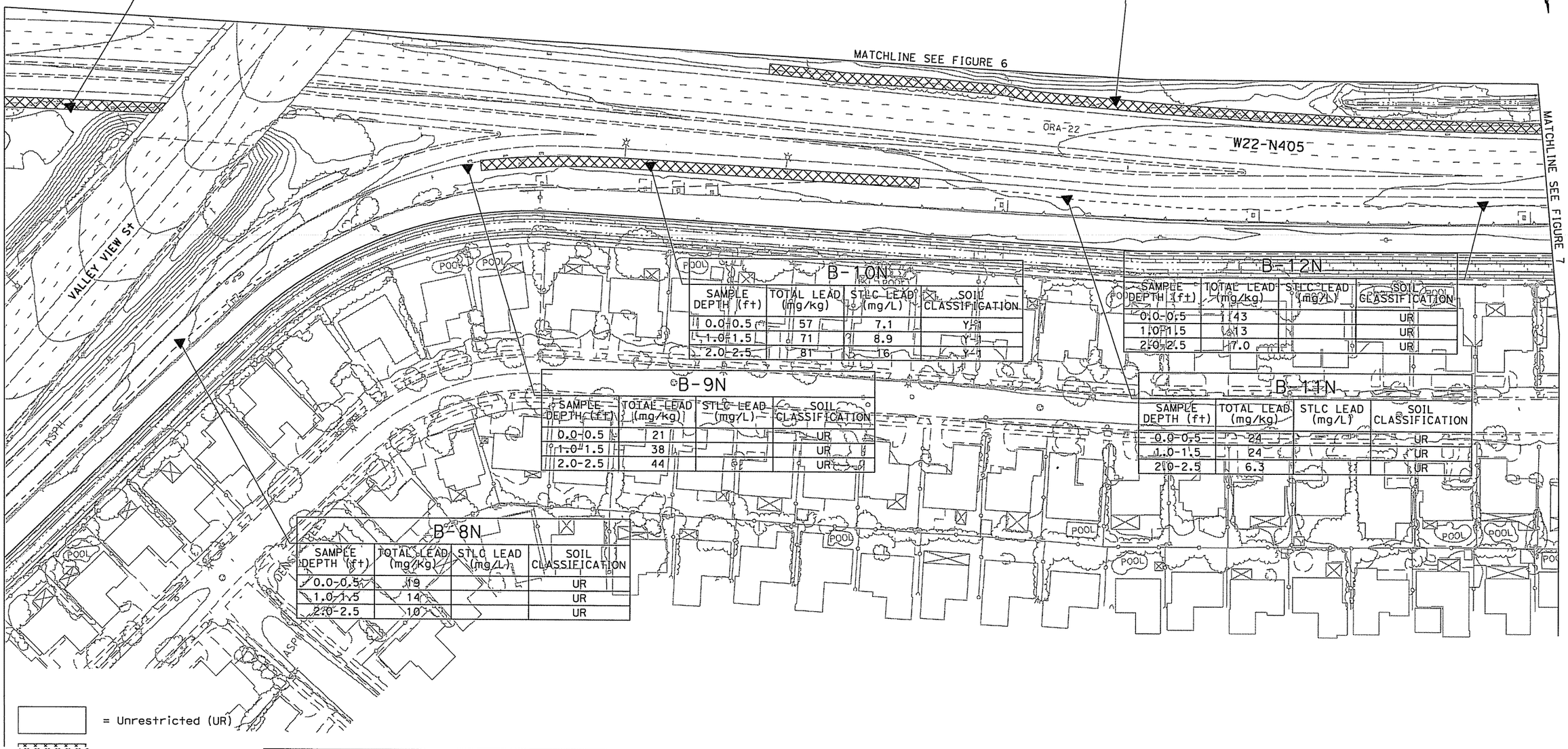
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 4



B-6N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	300	36	Y-1
1.0-1.5	8.6		UR
2.0-2.5	ND<5.0		UR

R-171N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	430	28	Y-1

B-10N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	57	7.1	Y-1
1.0-1.5	71	8.9	Y-1
2.0-2.5	81	16	Y-1

B-12N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	143		UR
1.0-1.5	13		UR
2.0-2.5	7.0		UR

B-9N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	21		UR
1.0-1.5	38		UR
2.0-2.5	44		UR

B-11N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	24		UR
1.0-1.5	24		UR
2.0-2.5	6.3		UR

B-8N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	19		UR
1.0-1.5	14		UR
2.0-2.5	10		UR

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'
0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-005.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 5

B-161S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	36		UR
1.0-1.5	7.2		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	5.3		UR

B-150N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1300	170	Y-2
1.0-1.5	8.7		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-166N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	70	2.3	UR

B-165N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	81	1.2	UR

B-164N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	10		UR

B-155S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	6.8		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-145S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	93	8.8	Y-1
1.0-1.5	70	7.7	Y-1
2.0-2.5	14		UR
3.0-3.5	5.2		UR

B-151N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	100	10	Y-1
1.0-1.5	72	8.5	Y-1
2.0-2.5	7.0		UR
3.0-3.5	5.8		UR

B-149S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	16		UR

B-168N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	36		UR

B-167N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	19		UR

B-169N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	170	17	Y-1

B-156S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	5.2		UR
3.0-3.5	ND<5.0		UR

B-154S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	60	7.7	Y-1
1.0-1.5	22		UR
2.0-2.5	5.1		UR
3.0-3.5	ND<5.0		UR

B-152N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	30		UR
1.0-1.5	36		UR
2.0-2.5	54	1.4	UR
3.0-3.5	--		

NB ROUTE 405

SB ROUTE 405

"A" LINE

VALLEY VIEW ST

S405-E22

MATCHLINE SEE FIGURE 5

MATCHLINE SEE FIGURE 7

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-006.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 6

B-148S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	7.5		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	120	0.65	UR
3.0-3.5	5.9		UR

B-280S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	83	4.4	UR
1.2-1.5	92	5.3	Y-1
2.0-2.5	160	1.6	UR

B-279S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	27		UR
1.2-1.5	34		UR
2.0-2.5	13		UR

B-140S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	710	97	Z-3
1.0-1.5	340	19	Y-2
2.0-2.5	54	1.1	UR
3.0-3.5	5.3		UR

B-278S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	24		UR
1.2-1.5	22		UR
2.0-2.5	27		UR

B-144S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-143S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	5.6		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-254S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	30		UR
1.2-1.5	8.9		UR
2.0-2.5	ND		UR

B-255S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	16		UR
1.2-1.5	7.8		UR
2.0-2.5	7.1		UR

B-147S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	24		UR
1.0-1.5	26		UR
2.0-2.5	24		UR
3.0-3.5	6.0		UR

B-146S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	170	11	Y-1
1.0-1.5	6.6	1	UR
2.0-2.5	16	2	UR
3.0-3.5	6.5		UR

B-139S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	40		UR
1.0-1.5	7.4		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	18		UR

B-253S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	5.5		UR
1.0-1.5	ND		UR
2.0-2.5	8.8		UR

B-170N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	30		UR

B-162N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	110	8.9	Y-1
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-14N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	5.6		UR

B-277S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	40		UR
1.2-1.5	8.8		UR
2.0-2.5	4.8		UR

B-13N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	210	24	Y-1
1.0-1.5	380	41	Y-2

B-153N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	340	32	Y-1
1.0-1.5	180	25	Y-1
2.0-2.5	12		UR
3.0-3.5	ND<5.0		UR

B-163N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	200	25	Y-1
1.0-1.5	97	12	Y-1
2.0-2.5	14		UR
3.0-3.5	ND<5.0		UR

B-15N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	12		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	6.6		UR

MATCHLINE SEE FIGURE 6

MATCHLINE SEE FIGURE 8

MATCHLINE SEE FIGURE 5

S405-E22

W22-N405

SB ROUTE 405

NB ROUTE 405

"A" LINE

ORA-405

ASPH

CONC

DENSE TREES

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => tivong
DGN => C:\DOE\Exhibits\ADL\ADL-007.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT
ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 7

B-138S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	100	11	Y-1
1.0-1.5	110	14	Y-1
2.0-2.5	14		UR
3.0-3.5	ND<5.0		UR

B-275S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	60	2.5	Y-1
1.0-1.5	30		UR
2.0-2.5	3.7		UR

B-136S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	270	23	Y-1
1.0-1.5	77	4.7	Y-1
2.0-2.5	170	10	Y-1
3.0-3.5	16		UR

B-132S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	89	12	Y-1
1.0-1.5	42		UR
2.0-2.5	8.8		UR
3.0-3.5	1400	6.2	Y-1

B-131S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	21		UR
3.0-3.5	ND<5.0		UR

B-276S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	36		UR
1.0-1.5	26		UR
2.0-2.5	6.1		UR

B-274S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	59	3.2	Y-1
1.0-1.5	5		UR
2.0-2.5	5.3		UR

B-133S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	5.8		UR
3.0-3.5	ND<5.0		UR

B-134S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	9.0		UR
3.0-3.5	ND<5.0		UR

B-137S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	33		UR
1.0-1.5	6.1		UR
2.0-2.5	7.4		UR
3.0-3.5	ND<5.0		UR

B-17N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	900	67	Z-3
1.0-1.5	19		UR
2.0-2.5	9.4		UR
3.0-3.5	ND<5.0		UR

B-18N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	440	59	Y-2
1.0-1.5	1600	210	Y-1
2.0-2.5	7.9		UR
3.0-3.5	ND<5.0		UR

B-16N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	800	93	Y-2
1.0-1.5	630	58	Y-1
2.0-2.5	380	41	Y-1

B-135S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-19N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1800	130	Z-3
1.0-1.5	300	1.2	UR
2.0-2.5	16		UR
3.0-3.5	ND<5.0		UR

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'
0 25 50 100

DGNFILE => src:\cadd\exhibits\ADL\ADL-008.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 8

B-272S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	42		UR
1.0-1.5	4.7		UR
2.0-2.5	5.4		UR

B-129S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-128S

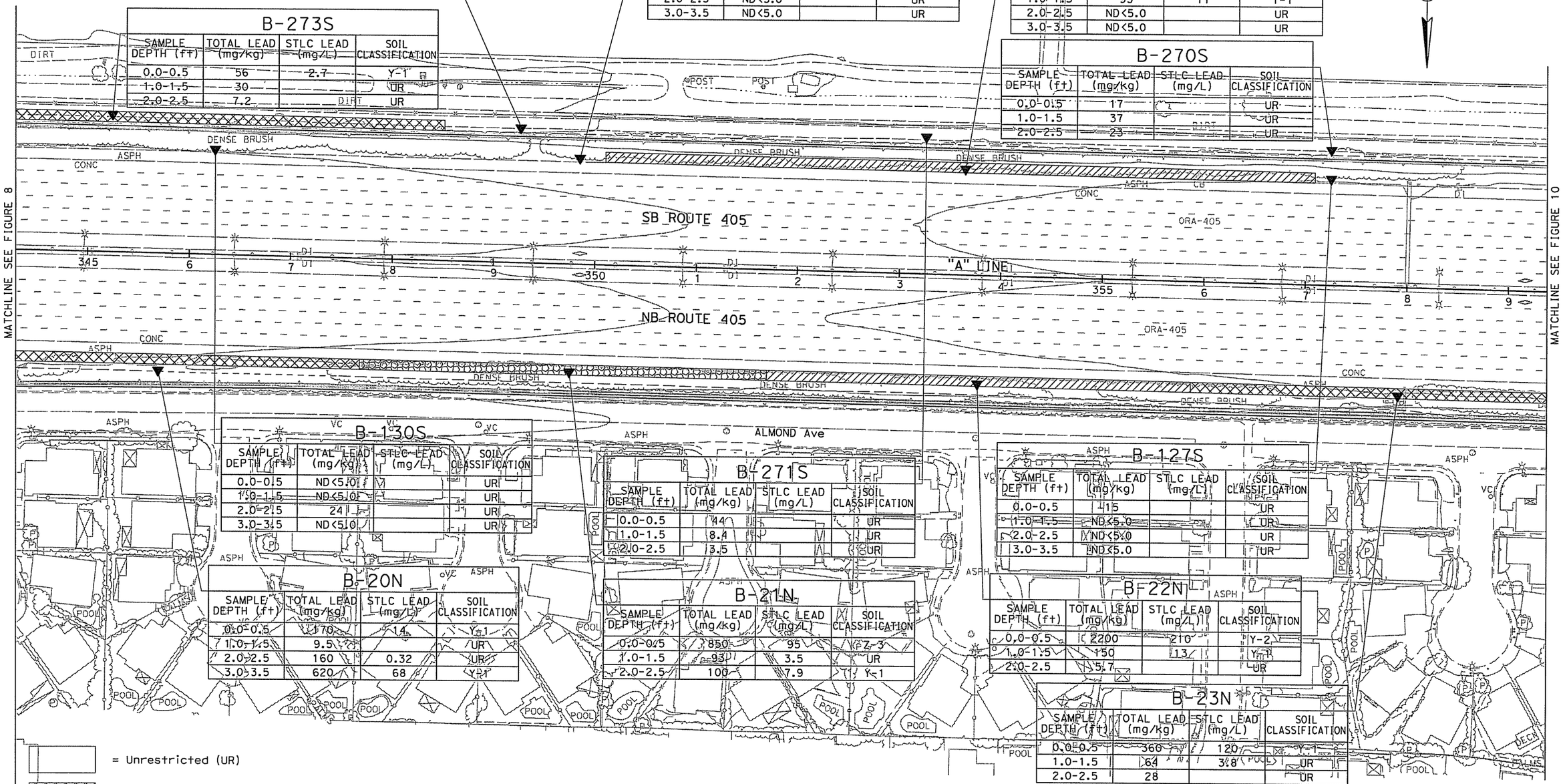
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1100	130	Y-2
1.0-1.5	93	11	Y-1
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-273S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	56	2.7	Y-1
1.0-1.5	30		UR
2.0-2.5	7.2		UR

B-270S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	17		UR
1.0-1.5	37		UR
2.0-2.5	23		UR



B-130S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	24		UR
3.0-3.5	ND<5.0		UR

B-271S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	44		UR
1.0-1.5	8.4		UR
2.0-2.5	3.5		UR

B-127S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	115		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-20N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	170	14	Y-1
1.0-1.5	9.5		UR
2.0-2.5	160	0.32	UR
3.0-3.5	620	68	Y-1

B-21N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	850	95	Z-3
1.0-1.5	93	3.5	UR
2.0-2.5	100	7.9	Y-1

B-22N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	2200	210	Y-2
1.0-1.5	150	13	Y-1
2.0-2.5	5.7		UR

B-23N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	360	120	Y-2
1.0-1.5	64	3.8	UR
2.0-2.5	28		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-009.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 9

B-126S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	140	8.2	Y-1
1.0-1.5	11		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	6.6		UR

B-123S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	190	37	Y-1
1.0-1.5	24		UR
2.0-2.5	37		UR
3.0-3.5	8.8		UR

B-266S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	39		UR
1.0-1.5	41		UR
2.0-2.5	7.6		UR

B-125S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	120	4.0	UR
1.0-1.5	39		UR
2.0-2.5	85	6.7	Y-1
3.0-3.5	5.5		UR

B-124S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1100	12	Y-2
1.0-1.5	25		UR
2.0-2.5	20		UR
3.0-3.5	ND<5.0		UR

B-122S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	27		UR
1.0-1.5	39		UR
2.0-2.5	29		UR
3.0-3.5	ND<5.0		UR

B-24N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	100	8.0	Y-1
1.0-1.5	48		UR
2.0-2.5	59		UR
3.0-3.5	ND<5.0		UR

B-25N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1300	130	Z-3
1.0-1.5	21		UR
2.0-2.5	38		UR
3.0-3.5	19	1.3	UR

B-26N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1200	110	Y-1
1.0-1.5	60	6.9	Y-1
2.0-2.5	29		UR
3.0-3.5	30	1.3	UR

B-269S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	43		UR
1.0-1.5	16		UR
2.0-2.5	7.4		UR

B-268S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	32		UR
1.0-1.5	22		UR
2.0-2.5	23		UR

B-267S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	34		UR
1.0-1.5	30		UR
2.0-2.5	31		UR

B-27N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1000	81	Z-3
1.0-1.5	22		UR
2.0-2.5	18		UR
3.0-3.5	ND<5.0		UR

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'
0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-010.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 10

B-121S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	140	4.9	UR
1.0-1.5	31		UR
2.0-2.5	5.4		UR
3.0-3.5	ND<5.0		UR

B-120S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	14		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	41	ND<0.25	UR

B-264S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	63	2.1	Y-1
1.0-1.5	21		UR
2.0-2.5	15		UR

B-119S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	17	16.2	UR
1.0-1.5	ND<5.0		UR
2.0-2.5	9.6		UR
3.0-3.5	7.2		UR

B-262S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	55	4.2	Y-1
1.0-1.5	45		UR
2.0-2.5	5.4		UR

B-118S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	27		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	6.0		UR
3.0-3.5	ND<5.0		UR

B-263S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	57	2.7	Y-1
1.0-1.5	24		UR
2.0-2.5	6.5		UR

B-28N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	600	27	UR
1.0-1.5	34		UR
2.0-2.5	32		UR
3.0-3.5	9.0		UR

B-265S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	46		UR
1.0-1.5	34		UR
2.0-2.5	19		UR

B-29N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	89	81	Z-3
1.0-1.5	37		UR
2.0-2.5	17		UR
3.0-3.5	210	15	Y-1

B-30N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	230	34	Y-1
1.0-1.5	45		UR
2.0-2.5	61	6.6	Y-1
3.0-3.5	19		UR

MATCHLINE SEE FIGURE 10

MATCHLINE SEE FIGURE 12

SB-ROUTE 405

"A" LINE

NB-ROUTE 405

ALMOND Ave

LAMPSON Ave

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-011.dgn

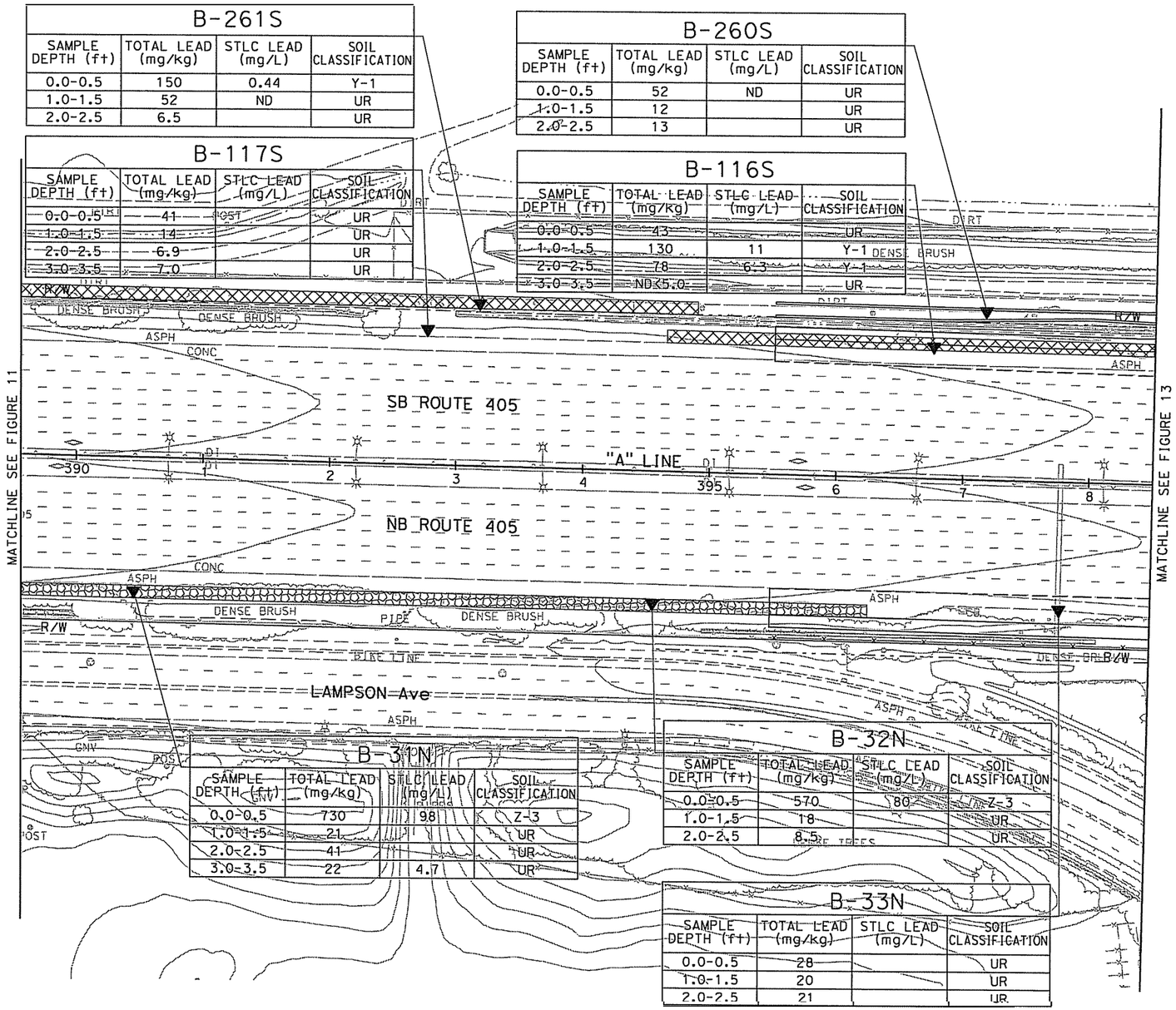
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 11



B-261S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	150	0.44	Y-1
1.0-1.5	52	ND	UR
2.0-2.5	6.5		UR

B-260S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	52	ND	UR
1.0-1.5	12		UR
2.0-2.5	13		UR

B-117S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	41		UR
1.0-1.5	14		UR
2.0-2.5	6.9		UR
3.0-3.5	7.0		UR

B-116S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	43		UR
1.0-1.5	130	11	Y-1
2.0-2.5	78	6.3	Y-1
3.0-3.5	ND<5.0		UR

B-31N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	730	98	Z-3
1.0-1.5	21		UR
2.0-2.5	41		UR
3.0-3.5	22	4.7	UR

B-32N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	570	80	Z-3
1.0-1.5	18		UR
2.0-2.5	8.5		UR

B-33N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	28		UR
1.0-1.5	20		UR
2.0-2.5	21		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

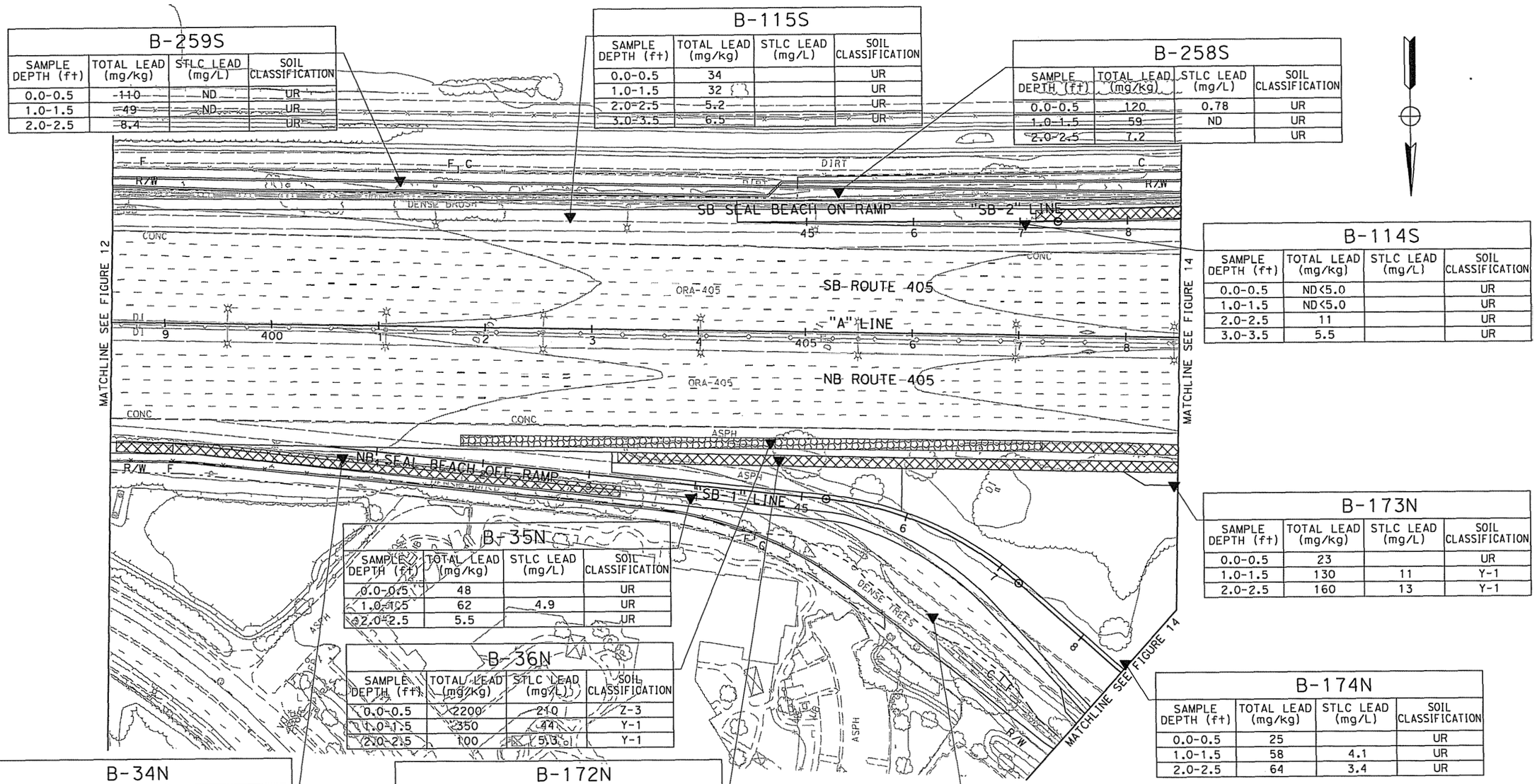
USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-012.dgn

PROJECT: 151396

FACILITY: WEST COUNTY CONVEYORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 12



B-259S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	110	ND	UR
1.0-1.5	49	ND	UR
2.0-2.5	8.4		UR

B-115S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	34		UR
1.0-1.5	32		UR
2.0-2.5	5.2		UR
3.0-3.5	6.5		UR

B-258S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	120	0.78	UR
1.0-1.5	59	ND	UR
2.0-2.5	7.2		UR

B-114S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	11		UR
3.0-3.5	5.5		UR

B-173N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	23		UR
1.0-1.5	130	11	Y-1
2.0-2.5	160	13	Y-1

B-35N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	48		UR
1.0-1.5	62	4.9	UR
2.0-2.5	5.5		UR

B-36N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	2200	210	Z-3
1.0-1.5	350	44	Y-1
2.0-2.5	100	5.3	Y-1

B-174N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	25		UR
1.0-1.5	58	4.1	UR
2.0-2.5	64	3.4	UR

B-34N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	110	9.0	Y-1
1.0-1.5	35		UR
2.0-2.5	45		UR

B-172N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	210	12	Y-1
1.0-1.5	130	9.9	Y-1
2.0-2.5	22		UR

B-37N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	8.4		UR
1.0-1.5	8.3		UR
2.0-2.5	13		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

DGNFILE => smb:\tcon\exhibits\ADL\ADL-013.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 13

B-113S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	120	7.0	Y-1
1.0-1.5	ND<5.0		UR
2.0-2.5	7.2		UR
3.0-3.5	5.8		UR

B-181N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	80	5.0	Y-1

B-38N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	10		UR
1.0-1.5	11		UR
2.0-2.5	7.2		UR

B-257S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	69	0.34	UR
0.0-0.5	19		UR
0.0-0.5	28		UR

B-248S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	540	6.4	Z-2

B-43N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	12		UR
1.0-1.5	63	9.1	Y-1
2.0-2.5	62	6.0	Y-1

B-247S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	860	26	Y-1

B-112S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	12		UR
1.0-1.5	13		UR
2.0-2.5	31		UR
3.0-3.5	6.5		UR

B-42N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	58	5.6	Y-1
1.0-1.5	93	14	Y-1
2.0-2.5	280	48	Y-2

B-180N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	85	0.81	UR

B-249S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	150	3.5	UR

B-39N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	70	6.1	Y-1
1.0-1.5	280	30	Y-2
2.0-2.5	84	4.2	URP
3.0-3.5	ND<5.0		UR

B-41N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	370	36	Z-3
1.0-1.5	11		UR
2.0-2.5	19		UR

B-44N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	800	150	Z-3
1.0-1.5	58	7.0	Y-1
2.0-2.5	560	130	Z-3

B-40N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	11		UR
1.0-1.5	35		UR
2.0-2.5	36		UR
3.0-3.5	30	2.0	UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-014.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 14

B-111S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	14		UR
1.0-1.5	9.1		UR
2.0-2.5	6.3		UR
3.0-3.5	5.1		UR

B-108S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	9.9		UR
3.0-3.5	ND<5.0		UR

B-109S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	31		UR
1.0-1.5	29		UR
2.0-2.5	50	4.3	Y-1
3.0-3.5	15		UR

B-110S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	23		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	5.3		UR
3.0-3.5	ND<5.0		UR

B-45N

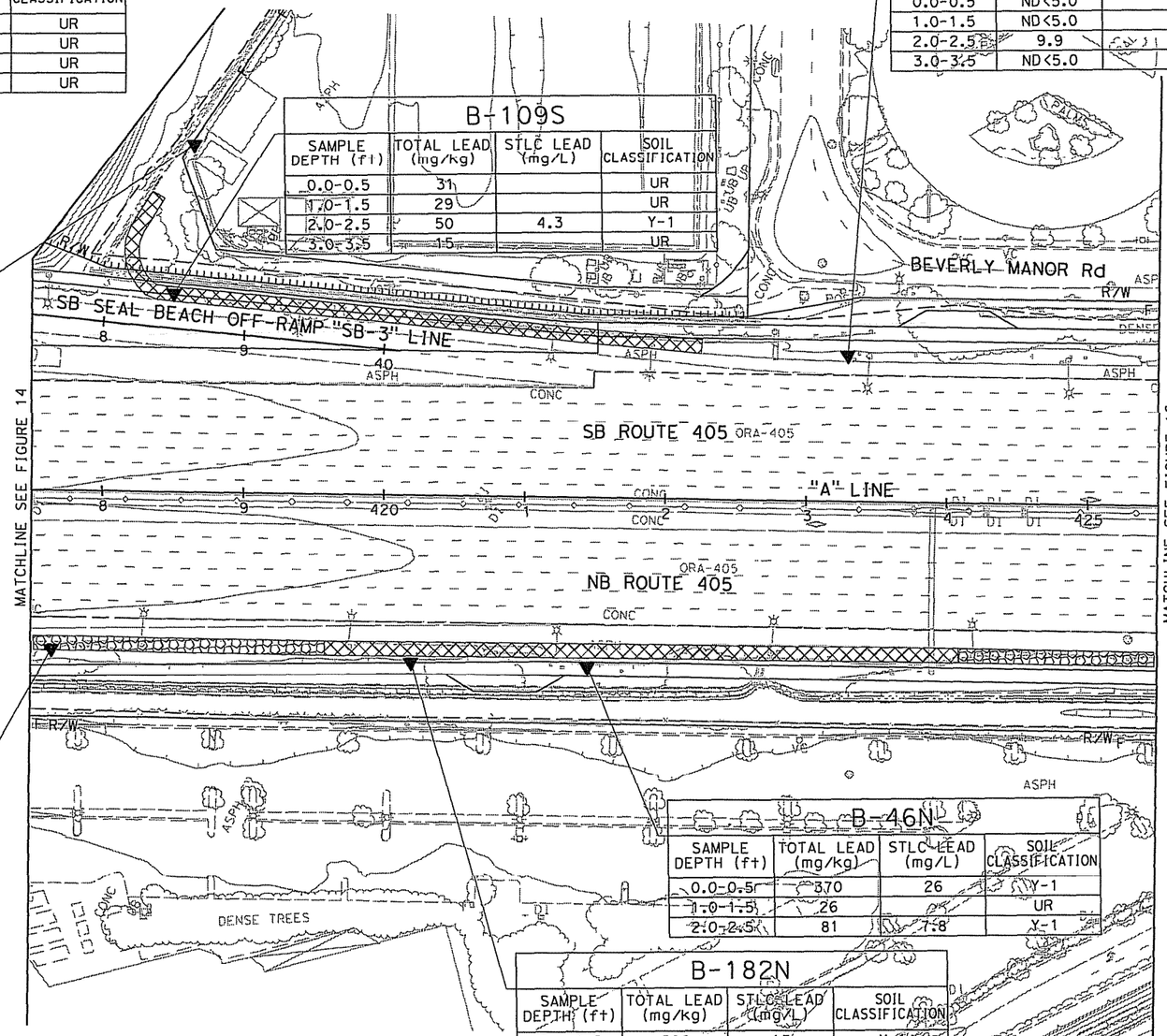
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1800	230	Z-3
1.0-1.5	790	63	Y-2
2.0-2.5	12		UR

B-46N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	370	26	Y-1
1.0-1.5	26		UR
2.0-2.5	81	7.8	Y-1

B-182N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	200	15	Y-1
1.0-1.5	21		UR



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-015.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 15

B-107S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	5.3		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-106S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	7.1		UR
3.0-3.5	ND<5.0		UR

B-105S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	17		UR

B-47N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	38		UR
1.0-1.5	83	70	Z-3
2.0-2.5	120	47	Z-3

B-50N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	5.7		UR
1.0-1.5	11		UR
2.0-2.5	110	61	Y-1
3.0-3.5	6.9		UR

B-104S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	7.8		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-48N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	5.4		UR
1.0-1.5	15		UR
2.0-2.5	14		UR
3.0-3.5	13		UR

B-51N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	8.0		UR

B-49N

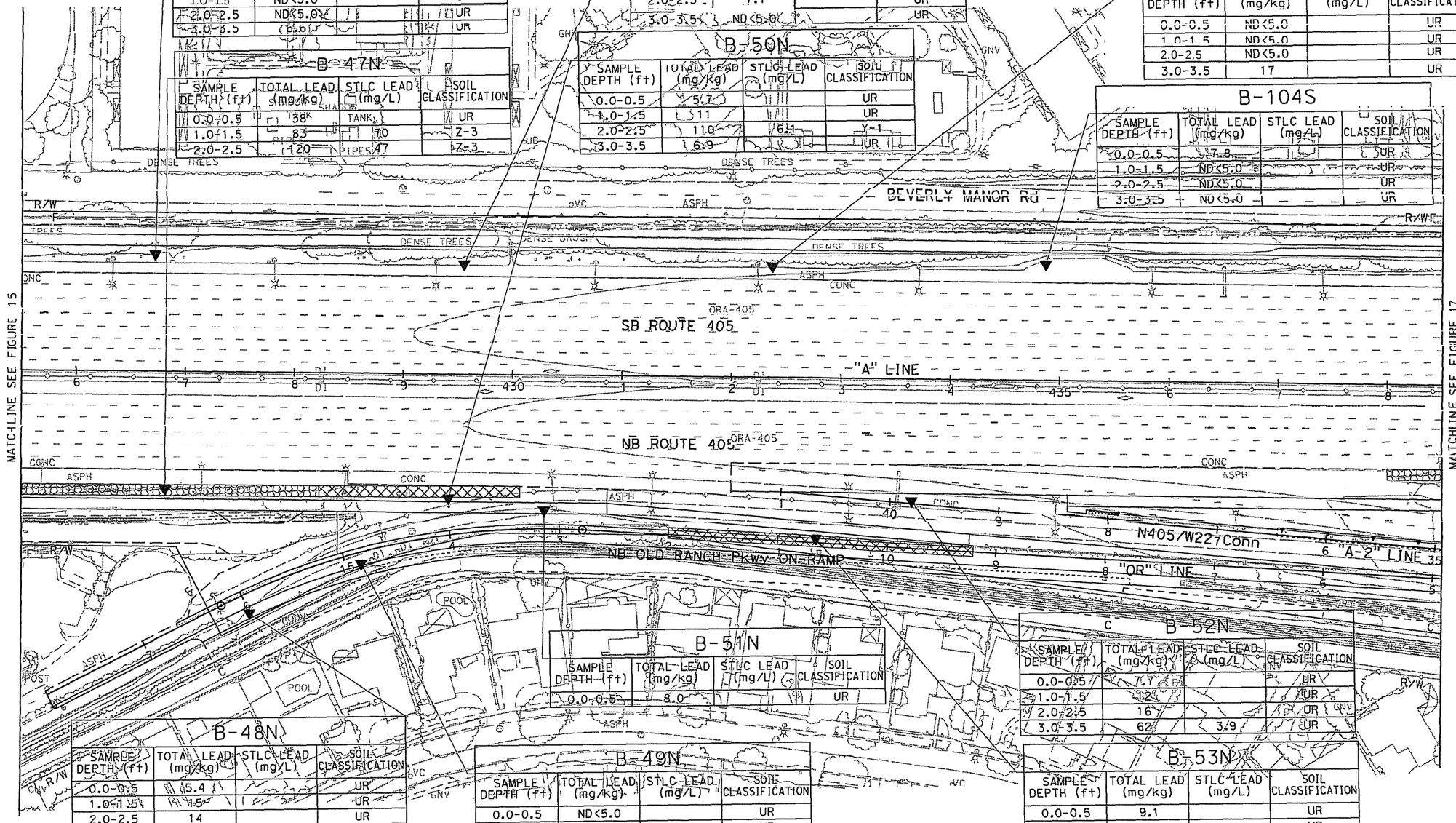
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	10		UR

B-52N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	7.7		UR
1.0-1.5	12		UR
2.0-2.5	16		UR
3.0-3.5	62	3.9	UR

B-53N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	9.1		UR
1.0-1.5	6.0		UR
2.0-2.5	68	11	Y-1
3.0-3.5	43	2.2	UR



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'
0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-016.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 16

B-103S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	5.1		UR
2.0-2.5	8.6		UR
3.0-3.5	ND<5.0		UR

B-102S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	190	20	Y-1
1.0-1.5	100	7.1	Y-1
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-57N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	300	25	Y-1
1.0-1.5	6.1		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-98S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	6.8		UR
1.0-1.5	5.2		UR
2.0-2.5	6.4		UR
3.0-3.5	5.0		UR

B-99S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-185N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR

B-183N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	53	3.3	UR

B-24S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	24		UR

B-184N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	74	2.6	UR
1.0-1.5	13		UR
2.0-2.5	7.0		UR

B-55N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	12		UR
2.0-2.5	17		UR
3.0-3.5	18		UR

B-97S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	64	ND<0.25	UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-186N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	67.9		UR

B-54N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	230	26	Y-1
1.0-1.5	180	2.8	Z-3
2.0-2.5	85	4.5	Y-2
3.0-3.5	30	3.9	UR

B-56N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	10		UR
1.0-1.5	14		UR
2.0-2.5	8.4		UR
3.0-3.5	7.4		UR

B-96S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	560	49	Y-2
1.0-1.5	330	32	Y-2
2.0-2.5	ND<5.0		UR
3.0-3.5	140	ND<0.25	UR

B-58N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	120	15	Y-1
1.0-1.5	18		UR
2.0-2.5	ND<5.0		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-017.dgn

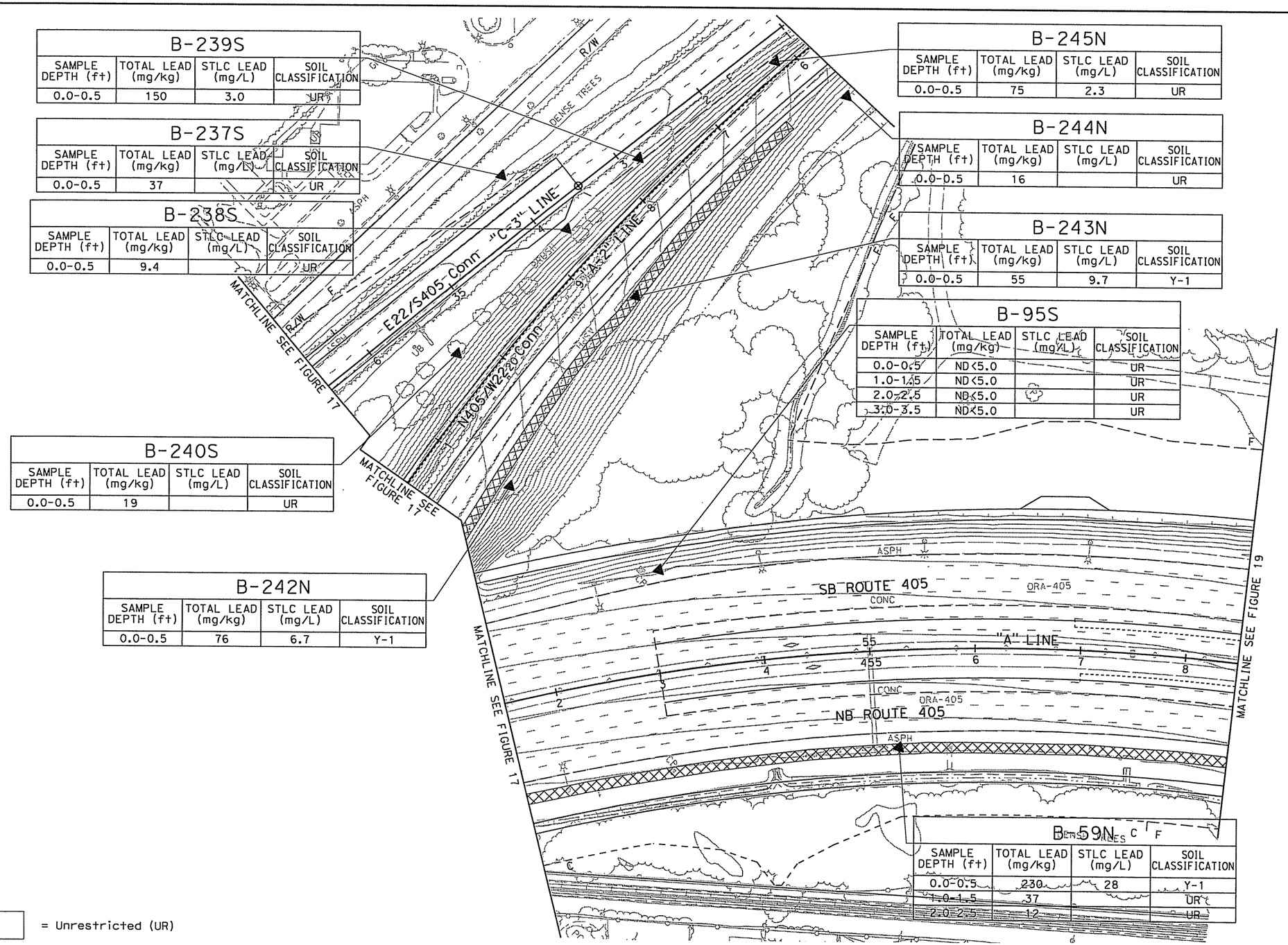
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 17



B-239S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	150	3.0	UR

B-237S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	37		UR

B-238S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	9.4		UR

B-240S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	19		UR

B-242N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	76	6.7	Y-1

B-245N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	75	2.3	UR

B-244N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	16		UR

B-243N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	55	9.7	Y-1

B-95S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-59N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	230	28	Y-1
1.0-1.5	37		UR
2.0-2.5	12		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laborotory detection limits

SCALE: 1"=100'
0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-018.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 18

B-93S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	7.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-62N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	14		UR
1.0-1.5	83	7.6	Y-1
2.0-2.5	ND<5.0		UR

B-251S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	2500	170	Y-2

B-60N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	240	80	Y-1
1.0-1.5	ND<5.0		UR
2.0-2.5	6.2		UR

B-65N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	38		UR
1.0-1.5	6.0		UR
2.0-2.5	5.9		UR
3.0-3.5	6.3		UR

B-252S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	710	56	Y-2

B-90S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	5.2		UR
3.0-3.5	ND<5.0		UR

B-92S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-89S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-227S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	20		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR

B-91S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	5.7		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-61N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	83	2.5	UR
1.0-1.5	110	13	Y-2
2.0-2.5	19		UR

B-66N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	450	44	Z-3
1.0-1.5	180	15	Y-1
2.0-2.5	17		UR
3.0-3.5	ND<5.0		UR

B-187N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	8.8		UR
1.0-1.5	6.3		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-019.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 19

B-88S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	7.4		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	5.0		UR

B-87S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	16		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-233S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	8.7		UR

B-86S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	5.8		UR

B-232S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	24		UR

B-94S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	84	13	Y-1
1.0-1.5	140	1.7	UR
2.0-2.5	19		UR
3.0-3.5	7.8	0.37	UR

B-231S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	9.4		UR

B-230S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	28		UR

B-67N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	67	5.5	Y-1
1.0-1.5	5.1		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-63N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1200	120	Z-3
1.0-1.5	5.2		UR
2.0-2.5	9.4		UR

B-68N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	56	3.7	UR
1.0-1.5	7.4		UR
2.0-2.5	6.8		UR
3.0-3.5	6.1		UR

B-69N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	6.2		UR
1.0-1.5	19		UR
2.0-2.5	6.3		UR
3.0-3.5	5.2		UR

S605/S405 Conn

405/605 HOV Conn

"B-2" LINE

"A-1" LINE

E22/N605 1Conn

E22/N405 6Conn

"C-1" LINE

"C-2" LINE

"A" LINE

"A-3" LINE

N405/N605 2Conn

SB ROUTE 405

NB ROUTE 405

MATCHLINE SEE FIGURE 19

MATCHLINE SEE FIGURE 22

MATCHLINE SEE FIGURE 21

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed

ft = Feet

mg/kg = Milligrams per kilogram

mg/L = Milligrams per liter

ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-020.dgn

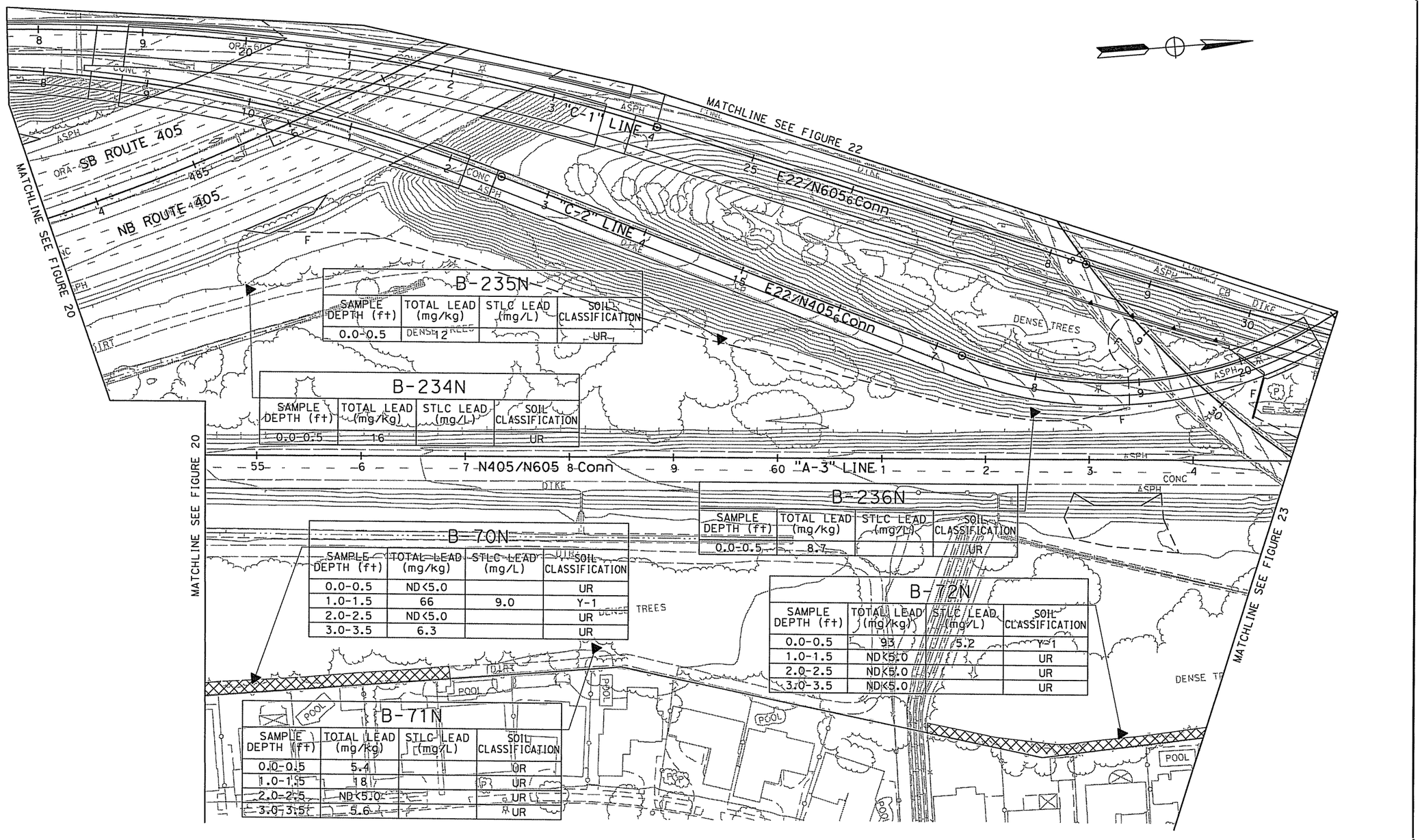
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 20



= Unrestricted (UR)

Y-1

= Y-2

= Z-3

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'
0 25 50 100

USERNAME => smallvong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-021.dgn

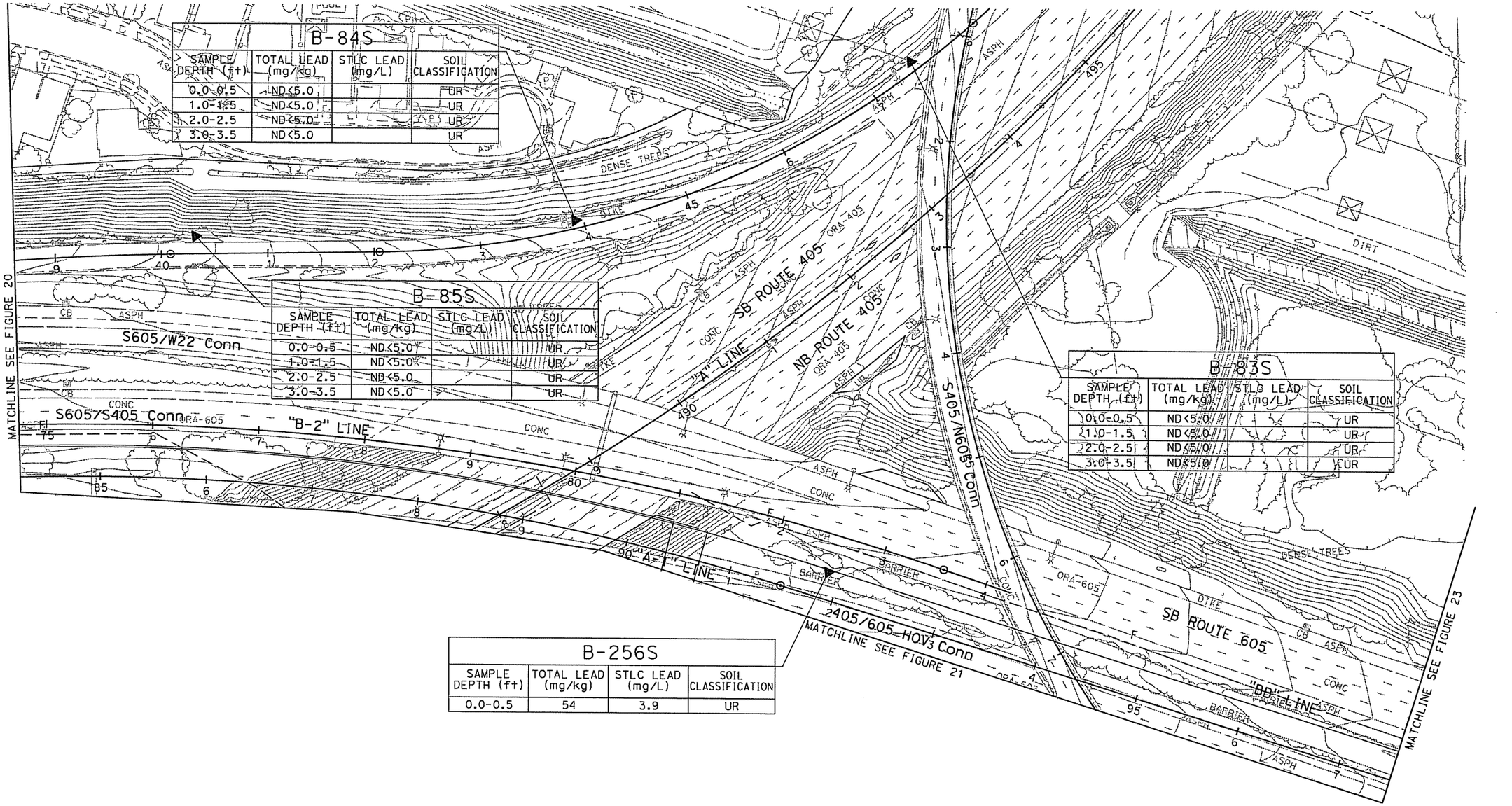
TRC

PROJECT: 151396

FACILITY:
CONNECTORS PROJECT
ORANGE COUNTY,
CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 21



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

DGN FILE => src:\cadd\exhibits\ADL\ADL-022.dgn

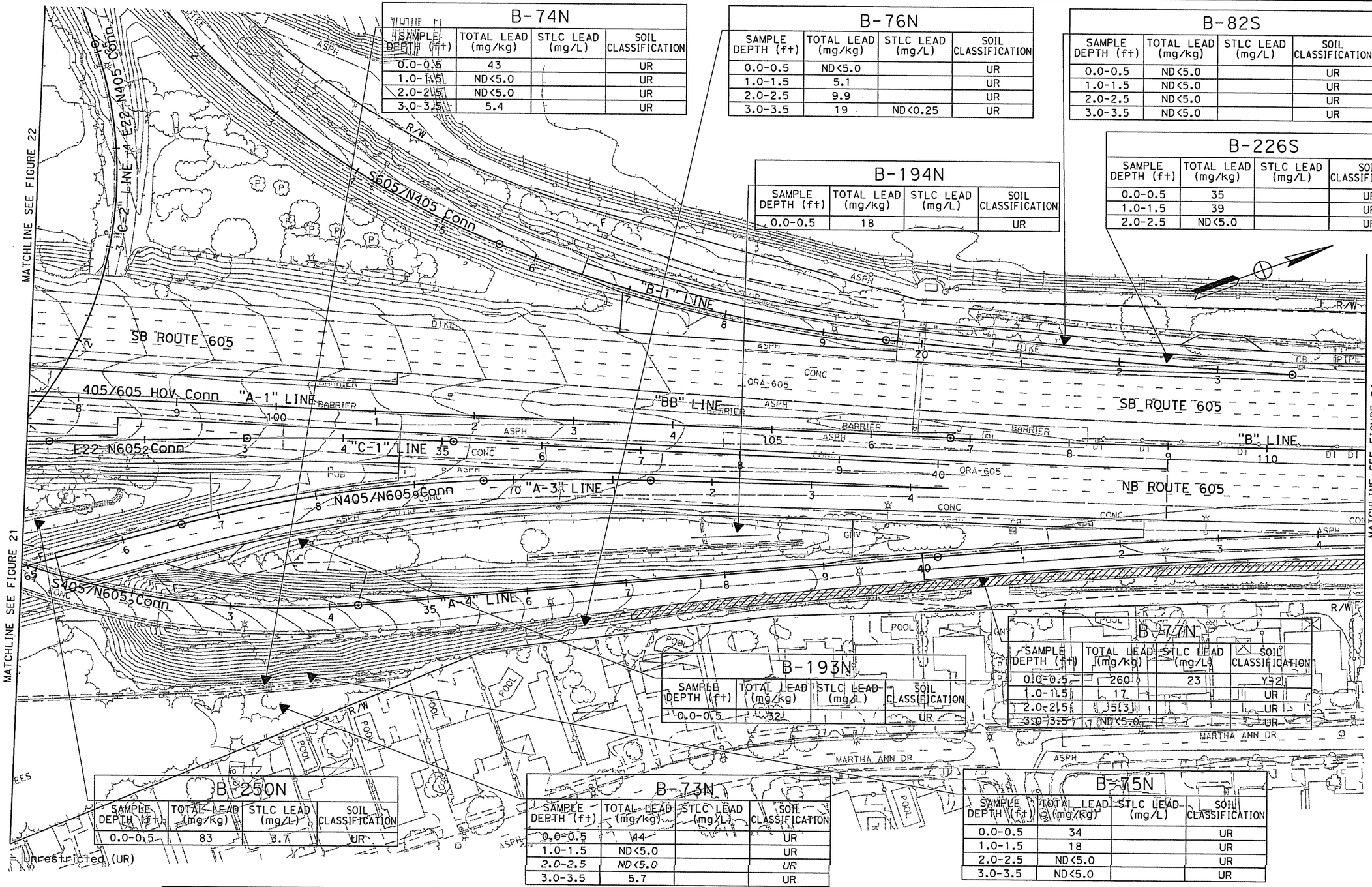
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 22



B-74N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	43		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	5.4		UR

B-76N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	5.1		UR
2.0-2.5	9.9		UR
3.0-3.5	19	ND<0.25	UR

B-82S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

B-194N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	18		UR

B-226S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	35		UR
1.0-1.5	39		UR
2.0-2.5	ND<5.0		UR

B-193N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	32		UR

B-77N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	260	23	Y-2
1.0-1.5	17		UR
2.0-2.5	5.3		UR
3.0-3.5	ND<5.0		UR

B-250N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	83	3.7	UR

B-73N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	44		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	5.7		UR

B-75N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	34		UR
1.0-1.5	18		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-023.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

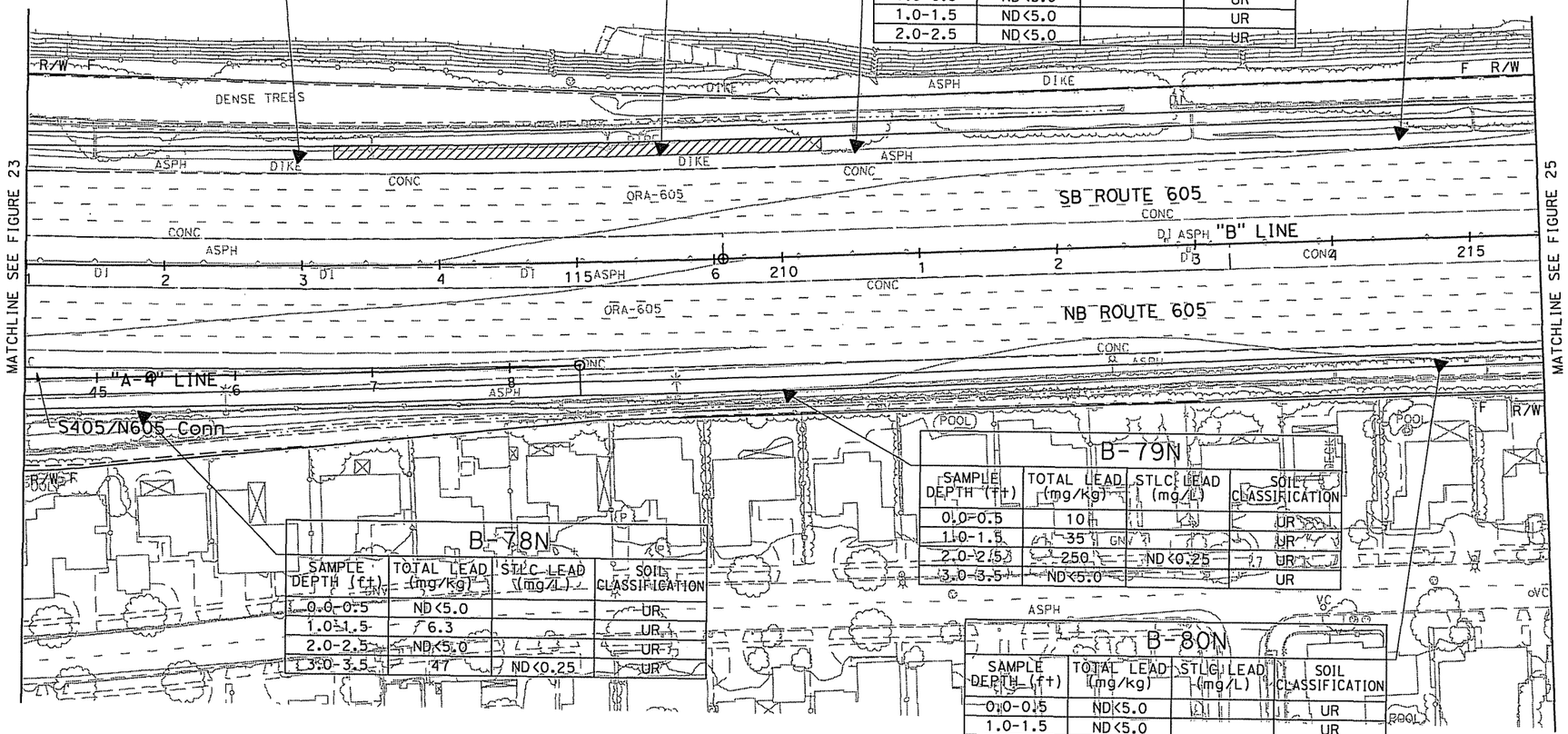
FIGURE 23

B-225S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR

B-81S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	740	80	Y-2
1.0-1.5	18		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	5.2		UR

B-224S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR

B-223S			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	5.6		UR
2.0-2.5	ND<5.0		UR



B-78N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	6.3		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	47	ND<0.25	UR

B-79N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	10		UR
1.0-1.5	35		UR
2.0-2.5	250	ND<0.25	UR
3.0-3.5	ND<5.0		UR

B-80N			
SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR
3.0-3.5	ND<5.0		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed

ft = Feet

mg/kg = Milligrams per kilogram

mg/L = Milligrams per liter

ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-024.dgn

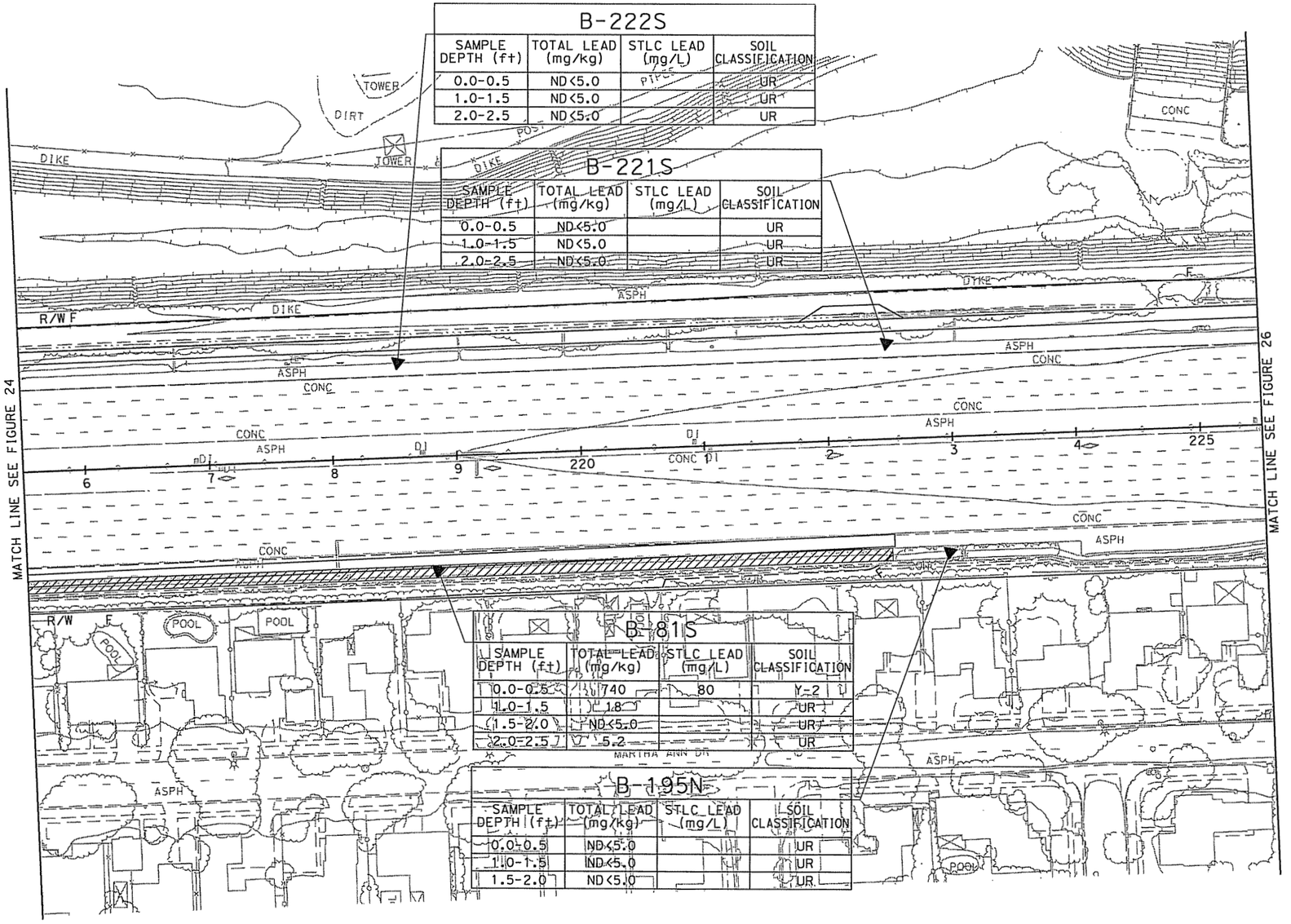
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 24



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-025.dgn

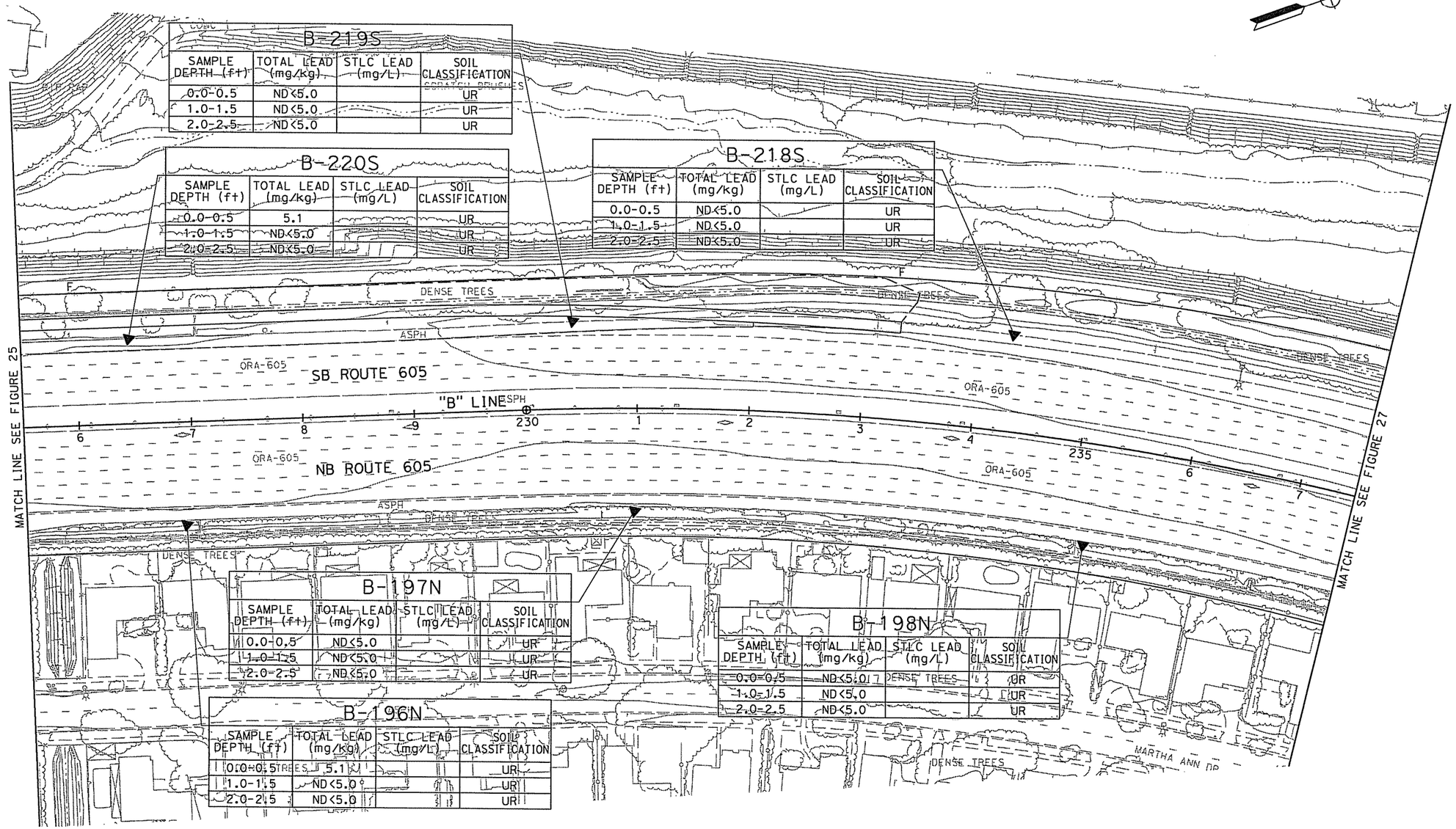
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 25



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-026.dgn

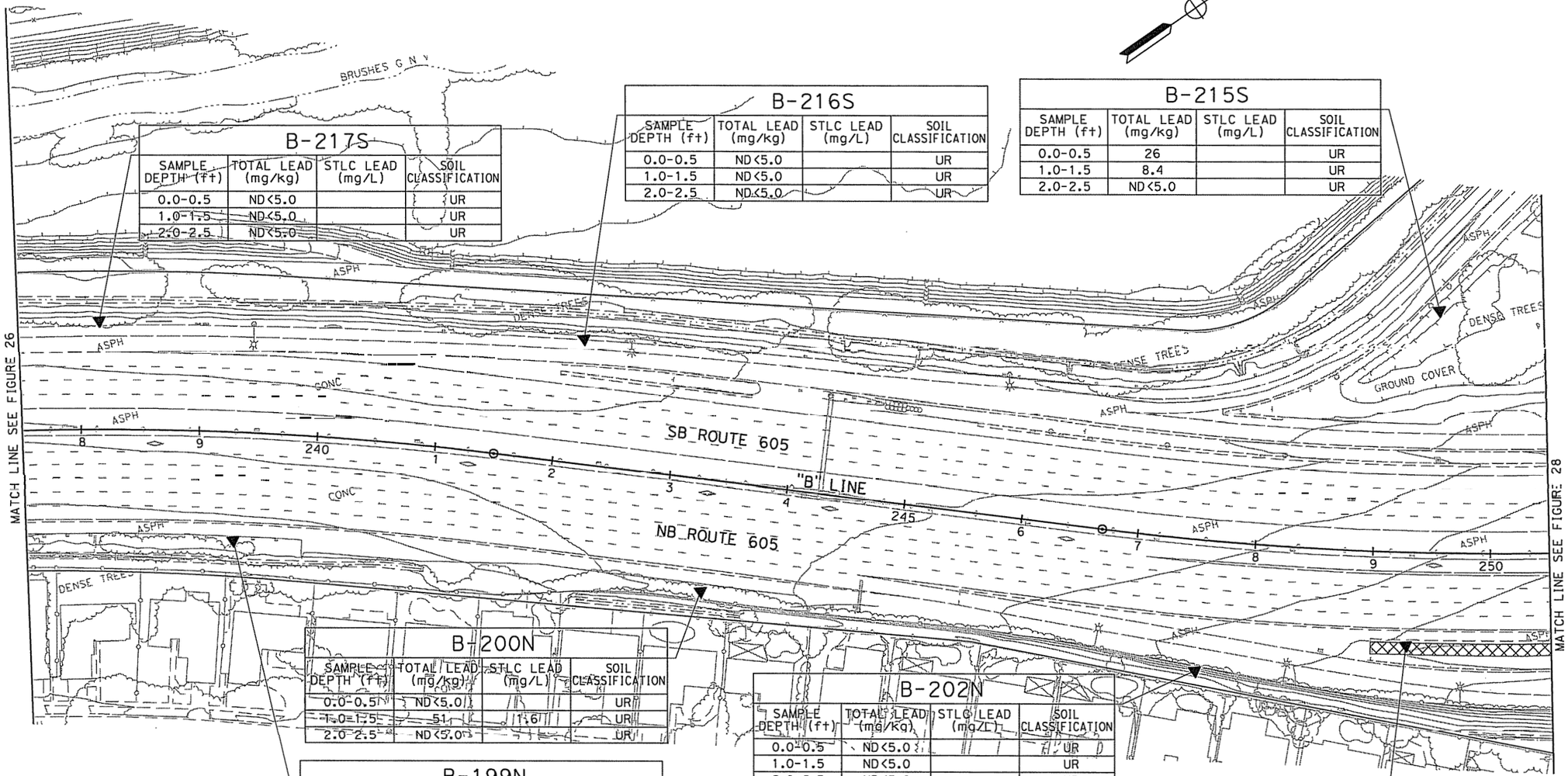
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 26



B-217S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR

B-216S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR

B-215S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	26		UR
1.0-1.5	8.4		UR
2.0-2.5	ND<5.0		UR

B-200N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	51	1.6	UR
2.0-2.5	ND<5.0		UR

B-202N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	ND<5.0		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR

B-199N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	6.0		UR
1.0-1.5	7.0		UR
2.0-2.5	ND<5.0		UR

B-203N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	340	27	Y-1
1.0-1.5	12		UR
2.0-2.5	43		UR

= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => smalivong
DGN FILE => ...\CAD\Exhibits\ADL\ADL-027.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 27

B-213S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	610	47	Y-1
1.0-1.5	7.9		UR
2.0-2.5	ND<5.0		UR

B-214S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	40		UR
1.0-1.5	22		UR
2.0-2.5	15		UR

B-211S

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	33		UR
1.0-1.5	ND<5.0		UR
2.0-2.5	ND<5.0		UR

B-206N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	290	24	Y-1
1.0-1.5	17		UR
2.0-2.5	5.6		UR

B-205N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	1100	80	Z-3
1.0-1.5	790	28	Y-1
2.0-2.5	250	1.2	Y-1

B-204N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	510	41	Y-2
1.0-1.5	ND<5.0		UR
2.0-2.5	8.2		UR

B-207N

SAMPLE DEPTH (ft)	TOTAL LEAD (mg/kg)	STLC LEAD (mg/L)	SOIL CLASSIFICATION
0.0-0.5	61	8.3	Y-1
1.0-1.5	7.3		UR
2.0-2.5	6.8		UR

GROUND COVER
ASPH
CONC
ORA-605
SB ROUTE 605
NB ROUTE 605
"B" LINE
255
260
DENSE TREES
GNV
R/W
MATCH LINE SEE FIGURE 27
MATCH LINE SEE FIGURE 29

= Unrestricted (UR)
= Y-1
= Y-2
= Z-3

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligroms per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'
0 25 50 100

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DGN FILE => ...\CAD\Exhibits\ADL\ADL-028.dgn

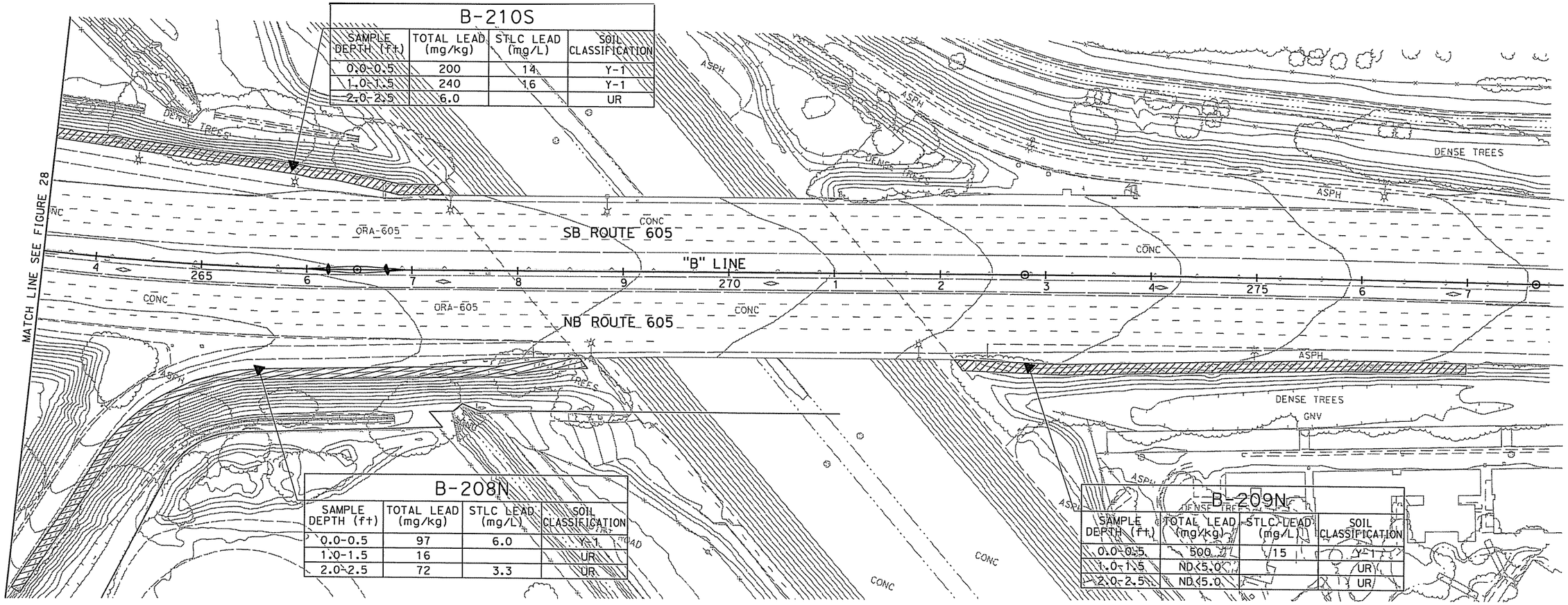
TRC

PROJECT: 151398

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 28



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:
-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

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DGN FILE => ...\CAD\Exhibits\ADL\ADL-029.dgn

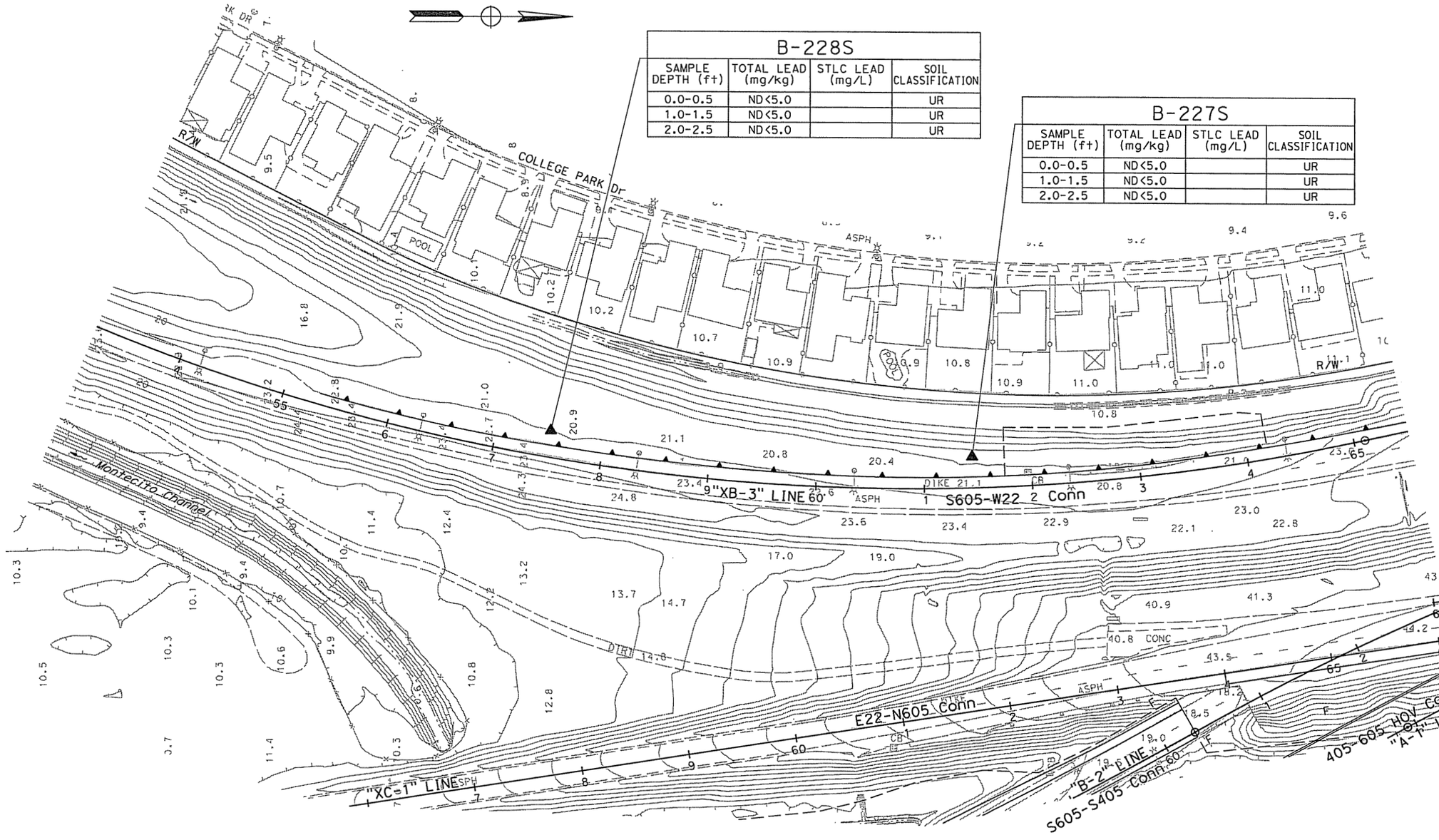
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 29



= Unrestricted (UR)

= Y-1

= Y-2

= Z-3

LEGEND:

-- = Not analyzed
ft = Feet
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => pwbrown
DGN FILE => ...\CAD\Exhibits\ADL\ADL-030.dgn

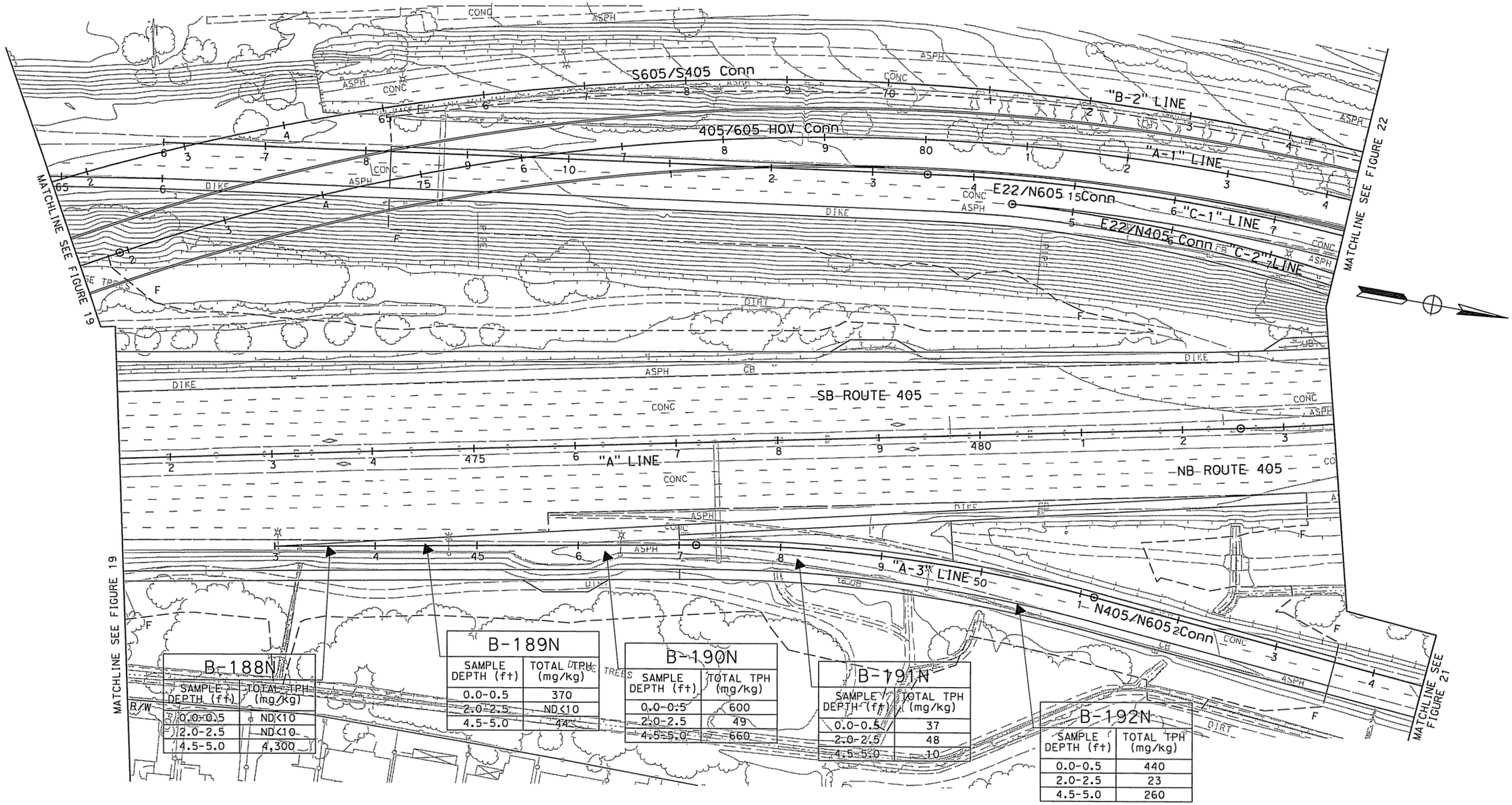
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 30



B-188N	
SAMPLE DEPTH (ft)	TOTAL TPH (mg/kg)
0.0-0.5	ND<10
2.0-2.5	ND<10
4.5-5.0	4,300

B-189N	
SAMPLE DEPTH (ft)	TOTAL TPH (mg/kg)
0.0-0.5	370
2.0-2.5	ND<10
4.5-5.0	44

B-190N	
SAMPLE DEPTH (ft)	TOTAL TPH (mg/kg)
0.0-0.5	600
2.0-2.5	49
4.5-5.0	660

B-191N	
SAMPLE DEPTH (ft)	TOTAL TPH (mg/kg)
0.0-0.5	37
2.0-2.5	48
4.5-5.0	10

B-192N	
SAMPLE DEPTH (ft)	TOTAL TPH (mg/kg)
0.0-0.5	440
2.0-2.5	23
4.5-5.0	260

LEGEND:

ft = Feet
mg/kg = Milligrams per kilogram
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => pwbcrowd
DGN FILE => ...\CAD\Exhibits\ADL\ADL-031.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SUSPECTED FUEL SPILL AREA SAMPLE LOCATION MAP

FIGURE 31

B-176N

SAMPLE DEPTH (ft)	TPH-G (mg/kg)	BTEX (ug/kg)	VOCs (ug/kg)	SVOCs (ug/kg)	PESTICIDES (ug/kg)	HERBICIDES (ug/kg)
0.0-0.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
2.0-2.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
4.5-5.0	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND

B-179N

SAMPLE DEPTH (ft)	TPH-G (mg/kg)	BTEX (ug/kg)	VOCs (ug/kg)	SVOCs (ug/kg)	PESTICIDES (ug/kg)	HERBICIDES (ug/kg)
0.0-0.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
2.0-2.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
4.5-5.0	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND

B-175N

SAMPLE DEPTH (ft)	TPH-G (mg/kg)	BTEX (ug/kg)	VOCs (ug/kg)	SVOCs (ug/kg)	PESTICIDES (ug/kg)	HERBICIDES (ug/kg)
0.0-0.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
2.0-2.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
4.5-5.0	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND

B-178N

SAMPLE DEPTH (ft)	TPH-G (mg/kg)	BTEX (ug/kg)	VOCs (ug/kg)	SVOCs (ug/kg)	PESTICIDES (ug/kg)	HERBICIDES (ug/kg)
0.0-0.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
2.0-2.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
4.5-5.0	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND

B-177N

SAMPLE DEPTH (ft)	TPH-G (mg/kg)	BTEX (ug/kg)	VOCs (ug/kg)	SVOCs (ug/kg)	PESTICIDES (ug/kg)	HERBICIDES (ug/kg)
0.0-0.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
2.0-2.5	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND
4.5-5.0	ND<1.0	ND<5.0	ND<5.0	ND	ND<5.0	ND

LEGEND:

ft = Feet
mg/kg = Milligrams per kilogram
ug/kg = Micrograms per kilogram
ND = Not detected above laboratory detection limits

SCALE: 1"=100'

0 25 50 100

USERNAME => pwbrown
DGN FILE => ...\CAD\Exhibits\ADL\ADL-032.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

DEAD ICE PLANT AREA SAMPLE LOCATION MAP

FIGURE 32

APPENDIX: A

DTSC VARIANCE FOR CALTRANS DISTRICT 12

Department of Toxic Substances Control

Linda S. **Adams**
Secretary for
Environmental Protection

Maureen F. Gorsen, Director
1001 "I" Street
P.O. Box 806
Sacramento, California 95812-0806

Arnold Schwarzenegger
Governor

January 31, 2007

Ms. Cindy Quon,
District Director
Department of Transportation, District 12
State of California
3337 Michelson Drive, Suite 380
Irvine, California 92612-8894

LEAD CONTAMINATED SOIL VARIANCE MODIFICATION, CALTRANS DISTRICT 12

Dear Ms. Quon,

The Department of Toxic Substances Control (DTSC) issued a lead contaminated soil variance (variance number 00-H-VAR-07) to Caltrans, District 12 on September 22, 2000. The variance allows Caltrans to manage and dispose onsite aerially contaminated lead soils during roadway construction. The variance, which was originally scheduled to expire on September 22, 2005, was granted extensions by DTSC. The extensions allowed Caltrans to operate using the variance of September 22, 2000 until June 30, 2007. Once the extensions expire, Caltrans is no longer able to manage and dispose of applicable lead contaminated soil onsite.

Over the past year, DTSC has been working with Caltrans Headquarters to renew this variance. Although we have made progress on the variance renewal, it looks as if the renewal work will not be completed by the end of extension date, especially taking into consideration Caltrans requirement for six months prior notification. Currently, DTSC and Caltrans are still trying to resolve the maximum allowable level of extractible lead for the new variance. DTSC understands that while work toward the variance renewal continues, Caltrans has construction projects that will require the use of this variance. Therefore, DTSC is modifying the variance 00-H-VAR-07 to extend the expiration date to June 30, 2008 to allow Caltrans to use the variance while the variance renewal processing is completed. Please note, this variance expiration extension is granted with the expectation that a good faith effort is shown by Caltrans to proceed with the variance renewal. DTSC has the authority to revoke a variance at any time.

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This letter formally modifies the variance 00-H-VAR-07 issued to Caltrans District 12 and shall be attached as addendum to the existing variance.

If you have any questions or comments regarding this letter, please contact Michael Choe of my staff at (916) 322-5308.

Sincerely,

Jan Radimsky, P.E., Chief
Program Support Branch
Hazardous Waste Management Program

cc: Kim Christmann, Senior Engineering Geologist
Caltrans - Division of Environmental Analysis
Environmental Engineering Processes - Hazardous Waste
1120 N Street, MS 27
Sacramento, California 95814

David Wright, Chief
Permit Program Development Section
Department of Toxic Substances Control
Hazardous Waste Management Program
P.O. Box 806
1001 "I" Street, 12th Floor
Sacramento, California 95812-0806

California Environmental Protection Agency
Department of Toxic Substances Control

VARIANCE

Applicant Names:

Mr. Ken Nelson, Acting District Director
State of California
Department of Transportation, District 12
(Caltrans)
3347 Michelson Drive
Irvine, California 92612

Variance No. 00-H-VAR-07

Effective Date: September 22, 2000

Expiration Date: September 22, 2005

Modification History:

Pursuant to Section 25143 of the California Health and Safety Code, the Department of Toxic Substances Control hereby issues the attached Variance consisting of 8 pages to Department of Transportation District 12.

Frederick S. Moss
Chief, Permitting Division
Department of Toxic Substances Control

Date: 9/22/00

VARIANCE

1. INTRODUCTION.

1.1 Pursuant to Section 25143, Chapter 6.5, Division 20 of the Health and Safety Code (HSC), the California Department of Toxic Substances Control (DTSC) grants a variance to the applicant below for waste considered hazardous solely because of its contaminant concentrations and as further specified herein.

1.2 DTSC hereby grants a variance only from the requirements specified herein and only in accordance with all terms and conditions specified herein.

2. IDENTIFYING INFORMATION.

APPLICANT/OWNER/OPERATOR

Mr. Ken Nelson, Acting District Director
State of California
Department of Transportation, District 12 (Caltrans)
3347 Michelson Drive
Irvine, California 92612

3. TYPE OF VARIANCE.

Generation, Manifest, Transportation, Storage and Disposal

4. ISSUANCE AND EXPIRATION DATES.

DATE ISSUED: September 22,2000 EXPIRATION DATE: September 22,2005.

5. APPLICABLE STATUTES AND REGULATIONS. The hazardous waste that is the subject of this variance is fully regulated under HSC, Section 25100, et seq. and Title 22 of the California Code of Regulations (CCR) Division 4.5 except as specifically identified in Section 8 of this variance.

6. DEFINITION. For the purposes of this variance, waste that meets the criteria in paragraphs a) and b) of section 9 below, shall be referred to as "lead-contaminated soil(s)".

7. FINDINGS/DETERMINATIONS. DTSC has determined that the variance applicant meets the requirements set forth in HSC Section 25143 for a variance from specific regulatory requirements as outlined in Section 8 of this variance. The specific determinations and findings made by DTSC are as follows:

a) Caltrans intends to excavate, stockpile, transport, bury and cover large volumes

of soil associated with highway construction projects throughout the State. In the more urbanized highway corridors this soil is contaminated with lead, primarily due to historic emissions from automobile exhausts. In situ testing has shown the uppermost two feet of soil have been found to contain concentrations of lead in excess of regulatory thresholds. However, DTSC has prepared a risk assessment that shows that soil contaminated with low concentrations of lead can be managed in a way that presents no significant risk to human health and the environment.

b) The lead-contaminated soil will be placed only in Caltrans rights of way. Based on concentration levels, the wastes will be covered with a minimum thickness of one (1) foot of non-hazardous soil or asphalt cover and will always be five (5) feet above the highest groundwater elevation. Caltrans will assure that proper health and safety procedures will be followed for workers. This includes any persons engaged in maintenance work in areas where the waste has been buried and covered.

c) DTSC finds and requires that the lead contaminated soil excavated, stockpiled, transported, buried and covered is a non-RCRA hazardous waste, and that the hazardous waste management activity is insignificant as a potential hazard to human health and safety and the environment, when managed in accordance with the conditions, limitations and other requirements specified in this variance.

8. PROVISIONS SUBJECT TO VARIANCE.

DTSC, subject to all terms and conditions herein, waives the hazardous waste management requirements of Title 22, CCR, sections 66264.250 through 66264.259, 22 CCR 662681 through 66268.9, 22 CCR 66262.10, 22 CCR 66262.12, 22 CCR 66262.20, 22 CCR 66262.30 through 66262.34, 22 CCR 66262.40 through 66262.42, 22 CCR 66263.10 through 66263.18 and 22 CCR 66263.20 through 66263.23 for the generation, transportation, manifesting, storage and land disposal of hazardous waste. These management requirements are waived only provided all other requirements of this variance are complied with at Caltrans construction projects in the Caltrans District specified in section 2 above.

9. SPECIFICATIONS OF THE CONDITIONS, LIMITATIONS, OR OTHER REQUIREMENTS. The owner/operator shall be subject to the following conditions:

a) Caltrans shall manage all soil contaminated with lead at concentrations such that it is considered a hazardous waste pursuant to HSC 25117 and 22 CCR, Div 4.5, Chapter 11, unless the contaminant concentrations and management practices meet the following conditions:

1. Soil containing 500 ug/l extractible lead or less (based on a modified waste extraction test using deionized water as the extractant) and 350 ppm or less total lead may be used as fill provided that the lead-contaminated soil is placed a minimum of five (5) feet above the maximum water table elevation and covered with at least one (1) foot of nonhazardous soil, The limit on total lead within shall be the

following: Total parts per million (ppm) lead shall be at or below the statutory limits in effect when the soil is used as fill or the risk based limit of **1496 mg/kg,** whichever is less. On the effective date of this variance, HSC section **25157.8** limits total lead concentrations to 350 ppm. That section may be amended **and/or expire in** the future. Additionally, other parts of relevant statutes may be added or 'amended in the future to include lead limits applicable to this variance.

2. Soil containing more than **500 ug/l** and less than **50 mg/l extractible** lead (based on a modified waste extraction test using deionized water as the extractant) and 350 or less ppm total lead may be used as fill provided that the lead-contaminated soils are placed a minimum of five (5) feet above the maximum water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans. Caltrans shall comply with the lead limits discussed in paragraph a) **1** above.

3. Contaminated soil with a pH **< 5.0** shall only be used as fill material only under the paved portion of the roadway.

b) Caltrans will implement appropriate health and safety procedures to protect its employees and the public, and to prevent or minimize exposure to potentially hazardous substances. A project-specific health and safety plan must be prepared and implemented. The monitoring and exposure standards shall be based on Construction Standards in **Title** 22, CCR section **1532.1.**

c) All lead-contaminated soil that cannot be buried and covered within the same Caltrans corridor from where it originated shall be managed as a hazardous waste.

d) Lead-contaminated soil will not be moved outside the designated corridor boundaries (see paragraph q) below).

e) Lead-contaminated soil shall not be buried in areas where it will be in contact with groundwater or surface water.

9 Lead-contaminated soil shall be buried and covered only in locations that are protected from erosion resulting from storm water run-on and run-off.

g) The lead-contaminated soil shall be buried and covered in a manner that will prevent accidental or deliberate breach of the asphalt, concrete, **and/or** cover soil.

h) The presence of lead-contaminated soil will be incorporated into the projects' as-built drawings. The as-built **drawings** shall be annotated with the location, representative analytical data, and volume of lead-contaminated soil. The as-built drawings shall also state the depth of the cover. These as-built drawings shall be retained by Caltrans until its rights-of-way or property ownership are relinquished.

I) Caltrans shall ensure that no other hazardous wastes, other than the lead-contaminated

soil, are placed in the burial areas.

j) Lead-contaminated soil shall not be buried within ten (10) feet of culverts or locations subject to frequent worker exposure.

k) Excavated lead-contaminated soil not placed into the designated area (fill area, roadbed area) by the end of the working day shall be stockpiled and covered with sheets of polyethylene or at least one foot of non-hazardous soil. The lead contaminated soil, while stockpiled or under transport, shall be protected from contacting surface water and being dislodged or transported by wind or storm water. The stockpile covers shall be inspected at least once a week and within 24 hours after rainstorms.

l) Caltrans shall ensure that all stockpiling of lead contaminated soil remains within the specified corridor. Stockpiling of lead-contaminated soil outside the area of contamination is in direct violation of land disposal restrictions and is prohibited.

m) Caltrans shall conduct confirmatory sampling, if appropriate, of any stockpile area after removal of the lead- contaminated soil to ensure that contamination has not been left behind or has not migrated from the stockpiled material to the surrounding soils. Caltrans shall ensure that test results are kept with Caltrans project records located at the District office or a subsequent permanent location and are available to DTSC upon request.

n) Caltrans shall stockpile lead-contaminated soil only on high ground (i.e. no sump areas or low points) which will not be affected by surface water run-on or run-off.

o) Caltrans shall not stockpile soil in an environmentally sensitive area.

p) Caltrans shall ensure that run-off which has come into contact with stockpiled lead-contaminated soil will not flow to storm drains, inlets, or waters of the state.

q) Caltrans may move lead-contaminated soil from one Caltrans project to another Caltrans project so long as the lead-contaminated soil remains within the same designated Caltrans corridor. Caltrans shall record this movement of lead- contaminated soil by using a bill of lading. The bill of fading must contain: 1) US DOT description including shipping name, hazard class and ID number; 2) handling codes; 3) quantity of material; 4) volume of material; and 5) any specific handling instructions. The bill of lading shall be referenced in and kept on file with the project's as-built drawings. Lead-contaminated soil must be kept covered during transportation.

r) For each specific corridor where this variance is to be implemented, all of the following information will be submitted in writing to DTSC at least five (5) days before construction of any project begins:

1. a plan drawing designating the boundaries of the corridor where lead-contaminated soils will be excavated, stockpiled, buried and covered;

2. a list of the Caltrans projects that the corridor encompasses;

3. a list of Caltrans contractors that will be conducting any phase of work on any project affected by this variance;

4. duration of corridor construction;

5. location where sampling and analytical data used to make lead concentration level determinations are kept (e.g. a particular Caltrans project file);

6. name and phone number (please include area code) of project resident engineer and project manager;

7. location where Caltrans and contractor health and safety records are kept;

8. location of project special provisions (including page or section number) for soil excavation, transportation, stockpile, burial and placement of cover material;

9. location of project drawings (including drawing page number) for soil excavation, burial and placement of cover in plan and cross section (For example, 'The project plans are located at the resident engineer's office located at 5th and Main Streets, City of Fresno,. See pages xxxxx of contract xxxx");

10. If a Caltrans project within the corridor is added, changed or deleted, Caitrans must update the information provided to DTSC five (5) days before construction begins; and

11. The type of environmental document for each project, date of adoption, document title, Clearing House number and where the document is available for review. A copy of the Notice of Exemption for any project shall be submitted to the DTSC Headquarters Project Manager within five (5) days of signing.

s) Changes in location of lead-contaminated soil placement, quantities or protection measures (field changes) will be noted in the resident engineer's project log within five (5) days of the field change.

t) Caltrans shall ensure that field changes are in compliance with the requirements of this variance.

u) If areas subject to the terms of this variance are sold, relinquished or abandoned (including roadways), all future property owners shall be notified in writing in advance by Caltrans of the requirements of this variance, and Caltrans shall provide the owner with a copy of the variance. A copy of such a notice shall be sent to and contain the corridor location and project. Caltrans shall also disclose to the new owner the location of areas where lead contaminated soil has been buried. Future property owners will be subject to the same requirements as Caltrans retains the right to modify or revoke this variance

pursuant to HSC 25143 upon a change of ownership or at any other time.

v) For the purposes of informing the public about instances where the variance is implemented, Caltrans shall:

1. Maintain current fact sheets at all Caltrans resident engineer offices and the Caltrans District office. Caltrans shall make the fact sheets available to anyone expressing an interest in variance-related work.

2. Maintain a binder(s) containing copies of all reports submitted to DTSC at the District office. Caltrans shall ensure that the binders are readily accessible to the public.

3. Carry out the following actions when it identifies additional projects:

(A) Notify the public via a display advertisement in a newspaper of general circulation in that area.

(B) Update and distribute the fact sheet to the mailing list and repository locations.

w) Caltrans implementation of this variance shall comply with all applicable state policies for water quality control, water quality control plans, waste discharge requirements (including storm water permits), and others issued by the State Water Resources Control Board or a California Regional Water Quality Control Board.

x) This variance is applicable only to soil considered hazardous because of aerially-deposited lead contamination. The variance is not applicable to any other hazardous waste.

y) Lead-contaminated soil may be buried only in areas where access is limited or where lead-contaminated soil is covered and contained by a pavement structure.

1) Dust containing lead-contaminated soil must be controlled. Water or dust palliative may be applied to control dust. If visible dust migration occurs, all excavation, stockpiling and truck loading and burying must be stopped. The granting of this variance confers no relief on Caltrans from compliance with the laws, regulations and requirements enforced by any local air district or the California Air Resources Board.

2) Sampling and analysis is required to show the lead contaminated soil meets the variance criteria specified in a). All sampling and analysis must be done according to U.S. EPA subsection SW-846.

z) All correspondence shall be directed to the following office:

Frederick S. Moss, Chief
Permitting Division
Department of Toxic Substances Control
400 P Street, 4th Floor
P.O. Box 806
Sacramento, CA 95812-0806

Attn: Caltrans Lead Variance Notification Unit

10. DISCLAIMER.

10.1 The issuance of this variance does not relieve Caltrans of the responsibility for compliance with Division 20, Chapter 6.5, HSC, or the regulations adopted thereunder, and any other laws and regulations other than those specifically identified in Section 8 of this variance. Caltrans is subject to all terms and conditions herein. The granting of this variance confers no relief from compliance with any federal, state or local requirements other than those specifically provided herein.

10.2 The issuance of this variance does not release Caltrans from any liability associated with the handling of hazardous waste, except as specifically provided herein and subject to all terms and conditions of this variance.

11. VARIANCE MODIFICATION OR REVOCATION. This variance is subject to review at the discretion of DTSC and may be modified or revoked at any time pursuant to Health and Safety Code section 25143.

12. CEQA DETERMINATION. DTSC adopted a Negative Declaration on September 22,2000.

Approved:

9/22/00
Date

Frederick S. Moss, Chief
Permitting Division
Hazardous Waste Management Program
Department of Toxic Substances Control

APPENDIX B

GPS DATA

APPENDIX B
GPS DATA
Caltrans 1-405 ADL Study

Boring No.	Easting	Northing
B-1N	404054.6649	3737758.4974
B-2N	404126.6113	3737759.5147
B-3N	404152.7635	3737690.4331
B-4N	404196.9084	3737637.0091
B-5N	404089.8436	3737647.0158
B-6N	403975.9267	3737656.7412
B-7N	404010.7608	3737780.9043
B-8N	403948.9995	3737728.8996
B-9N	403860.0853	3737683.6814
B-10N	403806.1896	3737687.0500
B-11N	403684.0626	3737706.0288
B-12N	403561.5338	3737716.9403
B-13N	403435.8562	3737723.4746
B-14N	403311.6224	3737716.2706
B-15N	403192.0726	3737705.1905
B-16N	403071.0820	3737685.3444
B-17N	402949.2731	3737668.2991
B-18N	402827.3608	3737659.4146
B-19N	402704.0903	3737659.0032
B-20N	402580.8430	3737663.5932
B-21N	402457.2247	3737662.5299
B-22N	402334.7929	3737664.4654
B-23N	402208.5277	3737666.2362
B-24N	402083.4379	3737667.0854
B-25N	401954.7318	3737668.8239
B-26N	401832.5695	3737672.1974
B-27N	401709.3191	3737672.9571
B-28N	401587.4294	3737674.2072
B-29N	401463.0242	3737675.1323
B-30N	401339.1506	3737676.7605
B-31N	401217.0576	3737680.3559
B-32N	401092.3902	3737680.3610
B-33N	400994.3754	3737681.9988
B-34N	400906.3406	3737690.4177
B-35N	400806.9630	3737701.8189
B-36N	400784.0009	3737686.0567
B-37N	400737.9946	3737735.9494
B-38N	400645.3509	3737806.9623
B-39N	400556.3221	3737817.1685
B-41N	400560.5285	3737758.4551
B-42N	400636.5461	3737758.9230
B-43N	400627.2171	3737693.6670
B-44N	400530.5427	3737693.8010
B-45N	400389.2086	3737694.3729
B-46N	400273.1747	3737698.2816
B-47N	400109.6955	3737696.8132
B-48N	400086.5709	3737731.8174

APPENDIX B
GPS DATA
Caltrans I-405 ADL Study

Boring No.	Easting	Northing
B-49N	400055.2312	3737718.1178
B-50N	400030.5765	3737699.7629
B-51N	400004.0518	3737703.2109
B-52N	399901.6184	3737700.9792
B-53N	399928.5384	3737711.6608
B-54N	399748.3087	3737697.5834
B-55N	399729.6305	3737725.1556
B-56N	399631.0161	3737739.7444
B-57N	399575.9914	3737707.1776
B-58N	399396.2341	3737780.5154
B-59N	399298.6868	3737843.7053
B-60N	399213.5538	3737939.1635
B-61N	399158.7024	3738037.5699
B-62N	399120.7680	3738151.9207
B-63N	399092.4632	3738269.5104
B-65N	399145.5176	3738063.5008
B-66N	399142.0015	3738171.9447
B-67N	399131.4206	3738293.3396
B-68N	399125.8016	3738409.2754
B-69N	399127.4201	3738528.5029
B-70N	399129.0844	3738649.4416
B-71N	399127.1370	3738766.8641
B-72N	399163.1081	3738918.8364
B-73N	399154.4489	3739036.1493
B-74N	399144.2754	3739033.7805
B-75N	399148.1632	3739047.4109
B-76N	399153.7488	3739133.4287
B-77N	399183.7342	3739253.5954
B-78N	399224.1964	3739391.9055
B-79N	399266.5483	3739528.4348
B-80N	399307.5616	3739667.0042
B-81S	399209.9203	3739518.0327
B-82S	399126.3354	3739300.4086
B-83S	398822.6462	3738873.0875
B-84S	398860.9168	3738773.9598
B-85S	398857.2982	3738665.1562
B-86S	398859.4597	3738538.3839
B-87S	398878.9132	3738422.9805
B-88S	398907.5360	3738298.5088
B-89S	398929.4664	3738185.9064
B-90S	398930.8496	3738052.8780
B-91S	399042.6071	3738171.8585
B-92S	399061.5128	3738168.6971
B-93S	399081.3209	3738089.4377
B-94S	398992.6696	3738479.0707
B-94S	399145.7105	3737937.0684
B-95S	399314.0327	3737760.2019

APPENDIX B
GPS DATA
Caltrans I-405 ADL Study

Boring No.	Easting	Northing
B-96S	399425.5691	3737697.9053
B-97S	399535.9306	3737660.9086
B-98S	399388.9373	3737658.4530
B-99S	399390.0772	3737644.0430
B-102S	399683.8870	3737641.9687
B-103S	399747.2868	3737638.1471
B-104S	399863.5102	3737635.0438
B-105S	399939.6921	3737635.3613
B-106S	400025.5538	3737634.3173
B-107S	400111.6973	3737631.1968
B-108S	400216.1782	3737630.6558
B-I09S	400361.9772	3737617.1937
B-I12S	400549.3132	3737573.5287
B-113S	400647.3756	3737619.6516
B-114S	400711.1657	3737623.4507
B-115S	400841.1016	3737621.3891
B-116S	401024.9400	3737618.9128
B-117S	401146.6185	3737616.2748
B-118S	401268.1607	3737617.0397
B-119s	401389.7221	3737615.0008
B-120S	401512.2901	3737613.0779
B-121S	401633.4772	3737610.8400
B-122S	401756.3357	3737609.0015
B-123S	401880.5802	3737608.2381
B-124S	401915.1671	3737606.7609
B-125S	402019.5915	3737606.2083
B-126S	402126.7473	3737604.5199
B-127S	402228.9452	3737604.0551
B-128S	402338.7124	3737602.6869
B-129S	402454.4147	3737600.3475
B-130S	402564.0788	3737599.2203
B-I31S	402670.7097	3737595.4781
B-133S .	402849.8195	3737594.1986
B-134S	402918.8260	3737592.1910
B-135S	402977.2421	3737616.0218
B-136S	402997.0969	3737592.7674
B-137S	403065.5967	3737628.3530
B-138S	403058.3684	3737592.0297
B-139S	403177.1847	3737641.3761
B-140S	403119.1042	3737589.6953
B-142S	402780.6562	3737595.2911
B-143S	403391.9120	3737586.5841
B-144S	403495.8725	3737573.0083
B-145S	403551.4990	3737501.8564
B-146S	403401.4639	3737635.4061
B-148S	403507.4123	3737608.3260
B-149s	403626.9314	3737564.7443

APPENDIX B
GPS DATA
Caltrans I-405 ADL Study

Boring No.	Easting	Northing
B-150N	403689.2035	3737587.9748
B-151N	403606.0515	3737628.4347
B-152N	403548.9381	3737661.2578
B-153N	403441.1418	3737678.8658
B-I54S	403684.4592	3737644.6065
B-155s	403775.8979	3737630.7628
B-156S	403917.5254	3737600.7195
B-157S	404041.6386	3737517.4666
B-158S	404047.4489	3737467.0852
B-I59S	404077.6086	3737498.4978
B-160S	404090.0830	3737531.6977
B-I61S	403735.1251	3737447.7273
B-162N	403435.0990	3737692.8877
B-163N	403321.7477	3737698.1417
B-164N	403878.1429	3737556.0033
B-165N	403840.6497	3737551.0084
B-166N	403686.0453	3737597.7168
B-167N	403721.1632	3737628.4385
B-168N	403620.5407	3737633.7074
B-169N	403554.3078	3737670.6477
B-170N	403490.7853	3737695.8511
B-171N	403667.4818	3737677.8770
B-172N	400781.6994	3737691.1498
B-173N	400669.1026	3737698.2511
B-174N	400683.0631	3737749.2197
B-175N	400658.0034	3737718.1352
B-I76N	400607.0168	3737748.0538
B-177N	400603.5895	3737751.8962
B-178N	400602.0770	3737768.8828
B-179N	400600.5207	3737774.0161
B-180N	400534.7917	3737705.9824
B-182N	400311.3015	3737697.2300
B-I83N	399695.2432	3737705.0921
B-184N	399625.3917	3737711.1415
B-185N	399545.9423	3737720.6208
B-I86N	399451.3343	3737765.2538
B-187N	399117.9423	3738182.7025
B-I88N	399083.5360	3738326.5714
B-189N	399077.3983	3738355.4000
B-190N	399069.6443	3738408.8931
B-191N	399061.2356	3738466.1912
B-192N	399062.3888	3738533.6940
B-193N	399108.3119	3739058.6146
B-194N	399344.1946	3739785.0534
B-195N	399381.3236	3739905.2729
B-196N	399416.7378	3740021.4035
B-197N	399453.9867	3740137.9070

APPENDIX B
GPS DATA
Caltrans I-405 ADL Study

Boring No.	Easting	Northing
B-198N	399503.1836	3740250.5386
B-199N	399569.6927	3740354.7373
B-200N	399649.5597	3740445.9982
B-202N	399736.3674	3740541.3466
B-203N	399766.6329	3740586.8470
B-204N	399803.7685	3740640.8102
B-205N	399873.8420	3740787.9149
B-206N	399919.4324	3740932.6494
B-207N	399954.9924	3740953.9551
B-208N	399934.1755	3741062.6762
B-209N	399927.5439	3741284.8524
B-210S	399874.6774	3741072.0958
B-211S	399847.4293	3740934.6798
B-212S	399788.0078	3740950.8414
B-213S	399809.5167	3740794.4354
B-214S	399746.4918	3740669.8932
B-215S	399700.4428	3740643.6352
B-216S	399581.1883	3740457.2104
B-217S	399507.3978	3740356.0577
B-218S	399446.1220	3740250.7223
B-219S	399402.8956	3740137.9003
B-220S	399367.6202	3740022.0031
B-221S	399331.5590	3739906.3066
B-222S	399296.1887	3739791.5546
B-223S	399259.6708	3739674.2607
B-224S	399225.0431	3739558.5860
B-225S	399186.7964	3739441.1450
B-226S	399141.7188	3739328.5386
B-227S	398932.6629	3738135.1381
B-228S	398921.8592	3738005.6961
B-229S	398583.4938	3737689.7268
B-230S	398967.1867	3738586.2555
B-231S	398953.6811	3738466.9987
B-232S	398935.4361	3738456.8455
B-233S	398923.1131	3738581.3350
B-234N	399014.8913	3738674.0403
B-235N	399039.2458	3738810.3397
B-236N	399067.2749	3738900.3496
B-237S	399266.6039	3737646.9237
B-238S	399263.9273	3737671.1313
B-239S	399234.6480	3737670.9186
B-240S	399311.9983	3737674.8190
B-241S	399392.1664	3737665.7717
B-242N	399327.9281	3737712.8848
B-243N	399263.2734	3737698.9264
B-244N	399178.9541	3737699.9427
B-245S	399186.6703	3737678.3776

APPENDIX B
GPS DATA
Caltrans I-405 ADL Study

Boring No.	Easting	Northing
B-246N	399028.2287	3737712.9969
B-247S	400483.1091	3737530.6265
B-248S	400566.3820	3737627.7550
B-249S	400401.4347	3737546.0383
B-250N	399076.0543	3738983.8407
B-251S	399077.9076	3738047.2850
B-252S	399158.1012	3737910.5380
B-253S	403097.0402	3737618.8720
B-254S	403213.5725	3737622.8511
B-255S	403372.2181	3737633.5249
B-256S	398966.8554	3738838.2152
B-257S	400643.3280	3737609.9461
B-258S	400764.3953	3737614.4456
B-259S	400889.5312	3737611.1535
B-260S	401012.2369	3737610.1512
B-261S	401134.0949	3737609.9125
B-262S	401255.6394	3737605.9714
B-263S	401376.9761	3737604.5519
B-264S	401498.1000	3737603.4399
B-265S	401620.5784	3737600.8029
B-266S	401742.1689	3737599.1869
B-267S	401863.3746	3737597.6134
B-268S	401985.1612	3737595.8297
B-269S	402108.1704	3737594.5725
B-270S	402228.9240	3737592.7158
B-271S	402350.5606	3737590.4624
B-272S	402472.1831	3737589.3110
B-273S	402594.9392	3737586.7700
B-274S	402716.4694	3737585.7908
B-275S	402840.1927	3737583.1129
B-276S	402962.2876	3737582.1608
B-277S	403083.5917	3737578.9409
B-278S	403205.6609	3737578.0386
B-279S	403327.8123	3737575.3941
B-280S	403460.3110	3737576.2935

APPENDIX C

STATISTICAL EVALUATION
SUPPORTING DOCUMENTATION

Chart -1
Histogram and Raw Data Summary 405
Total Lead (All Samples)

Lead Concentration (mglkg)												
120.0	380.0	5.9	35.0	370.0	300.0	2.5	2.5	6.3	8.8	270.0	2.5	7.2
50.0	2.5	2.5	45.0	26.0	6.1	64.0	2.5	5.1	1100.0	77.0	120.0	2.5
2.5	2.5	1300.0	48.0	81.0	2.5	2.5	2.5	12.0	25.0	170.0	5.9	5.3
9.2	5.6	21.0	62.0	38.0	2.5	2.5	2.5	13.0	20.0	16.0	2.5	110.0
6.3	12.0	38.0	5.5	83.0	120.0	6.8	2.5	31.0	2.5	33.0	2.5	2.5
2.5	2.5	19.0	2200.0	120.0	18.0	5.2	2.5	6.5	120.0	6.1	2.5	2.5
120.0	6.6	1200.0	350.0	5.4	2.5	6.4	2.5	120.0	39.0	7.4	16.0	2.5
83.0	800.0	60.0	100.0	15.0	230.0	5.0	2.5	2.5	85.0	2.5	1300.0	200.0
8.4	630.0	29.0	8.4	14.0	37.0	2.5	5.8	7.2	5.5	100.0	8.7	97.0
14.0	380.0	30.0	8.3	13.0	12.0	2.5	16.0	5.8	140.0	110.0	2.5	14.0
56.0	900.0	1000.0	13.0	2.5	240.0	2.5	2.5	2.5	11.0	14.0	2.5	2.5
11.0	19.0	22.0	10.0	10.0	2.5	2.5	2.5	2.5	2.5	2.5	100.0	
72.0	9.4	18.0	11.0	5.7	6.2	190.0	2.5	11.0	6.6	40.0	72.0	
5.1	2.5	2.5	7.2	11.0	83.0	100.0	7.4	5.5	15.0	7.4	7.0	
14.0	440.0	600.0	70.0	110.0	110.0	2.5	2.5	34.0	2.5	2.5	5.8	
300.0	1600.0	34.0	280.0	6.9	19.0	2.5	2.5	32.0	2.5	18.0	30.0	
8.6	7.9	32.0	84.0	8.0	14.0	2.5	5.1	5.2	2.5	710.0	36.0	
2.5	2.5	9.0	2.5	7.7	83.0	2.5	8.6	6.5	1100.0	340.0	54.0	
24.0	1800.0	89.0	11.0	12.0	2.5	2.5	2.5	43.0	93.0	54.0	340.0	
54.0	300.0	37.0	35.0	16.0	1200.0	2.5	7.8	130.0	2.5	5.3	180.0	
9.3	16.0	17.0	36.0	62.0	5.2	2.5	2.5	78.0	2.5	2.5	12.0	
19.0	2.5	210.0	30.0	9.1	9.4	2.5	2.5	2.5	2.5	2.5	2.5	
14.0	170.0	230.0	370.0	6.0	5.8	7.0	2.5	41.0	2.5	2.5	60.0	
10.0	9.5	45.0	11.0	68.0	2.5	2.5	2.5	14.0	2.5	2.5	22.0	
21.0	160.0	61.0	19.0	43.0	2.5	2.5	2.5	6.9	2.5	2.5	5.1	
38.0	620.0	19.0	58.0	230.0	38.0	2.5	2.5	7.0	2.5	2.5	2.5	
44.0	850.0	730.0	93.0	180.0	6.0	84.0	17.0	27.0	2.5	2.5	6.8	
57.0	93.0	21.0	280.0	85.0	5.9	140.0	2.5	2.5	24.0	2.5	2.5	
71.0	100.0	41.0	12.0	30.0	6.3	19.0	2.5	6.0	2.5	5.6	2.5	
81.0	2200.0	22.0	63.0	2.5	450.0	7.8	7.1	2.5	2.5	2.5	2.5	
24.0	150.0	570.0	62.0	12.0	180.0	5.3	2.5	17.0	2.5	2.5	2.5	
24.0	5.7	18.0	800.0	17.0	17.0	2.5	5.3	2.5	21.0	2.5	2.5	
6.3	360.0	8.5	58.0	18.0	2.5	2.5	2.5	9.6	2.5	2.5	5.2	
43.0	64.0	28.0	560.0	10.0	67.0	6.3	2.5	7.2	89.0	2.5	2.5	
13.0	28.0	20.0	1800.0	14.0	5.1	2.5	6.6	14.0	42.0	2.5	29.0	
7.0	100.0	21.0	790.0	8.4	2.5	47.0	2.5	2.5	8.8	2.5	2.5	
210.0	48.0	110.0	12.0	7.4	2.5	10.0	2.5	2.5	1400.0	93.0	2.5	
56.0	2.5	5.2	2.5	2.5	5.4	35.0	9.9	41.0	2.5	70.0	2.5	
7.4	5.4	2.5	5.0	2.5	18.0	250.0	2.5	140.0	2.5	14.0	78.0	
6.8	34.0	2.5	2.5	2.5	2.5	2.5	31.0	31.0	5.8	5.2	7.6	
6.1	18.0	2.5	2.5	2.5	5.6	2.5	29.0	5.4	2.5	170.0	5.1	
6.2	2.5	2.5	2.5	2.5	93.0	2.5	50.0	2.5	2.5	6.6	2.5	
19.0	2.5	2.5	2.5	2.5	2.5	2.5	15.0	27.0	2.5	16.0	24.0	
6.3	2.5	2.5	2.5	2.5	2.5	2.5	23.0	39.0	9.0	6.5	23.0	
5.2	5.1	2.5	2.5	2.5	2.5	740.0	2.5	29.0	2.5	24.0	2.5	
2.5	9.9	2.5	5.2	560.0	44.0	18.0	5.3	2.5	2.5	26.0	2.5	
66.0	19.0	2.5	2.5	330.0	2.5	2.5	2.5	190.0	2.5	24.0	56.0	
2.5	260.0	2.5	2.5	2.5	2.5	43.0	14.0	24.0	2.5	6.0	38.0	
6.3	17.0	2.5	5.7	140.0	5.7	2.5	9.1	37.0	2.5	7.5	36.0	

Bin	*Frequency*
5	206
10	119
30	98
50	43
100	53
500	53
1000	15
More	12

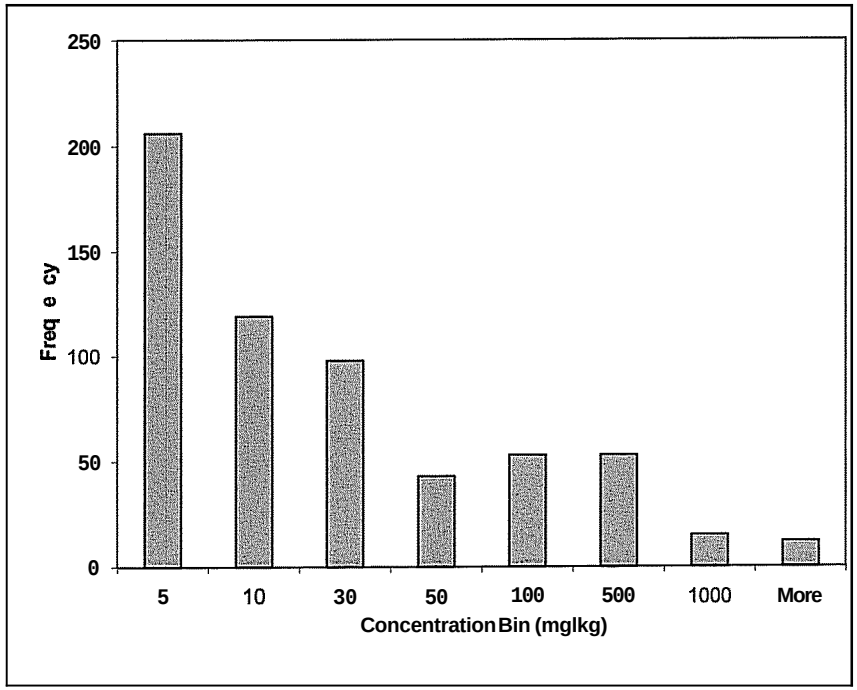
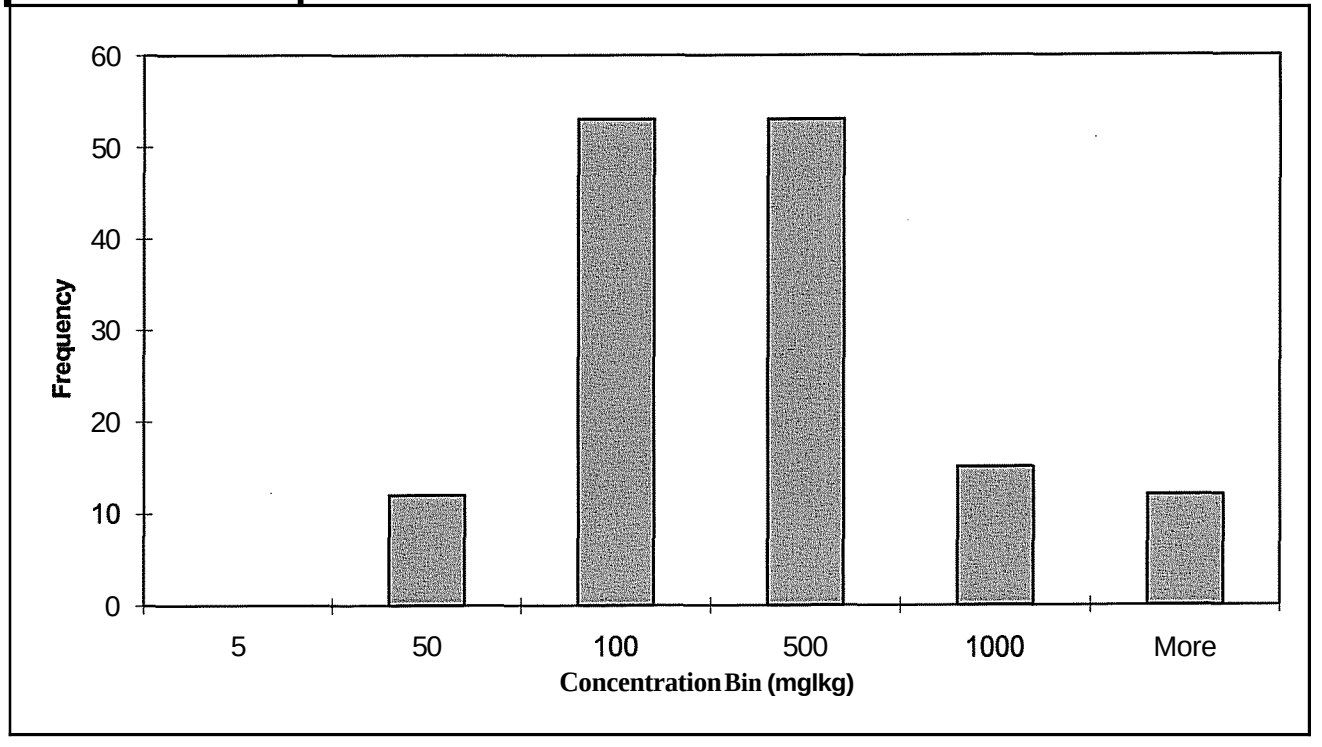


Chart - 2
Histogram and Raw Data Summary 405
Total Lead Samples with Corresponding Soluble Lead Data

Lead Concentration (mg/kg)				
120	360	280	180	140
50	64	63	67	1100
120	100	62	56	93
83	1300	800	66	89
56	19	58	93	1400
72	1200	560	19	270
300	60	1800	260	77
54	30	790	47	170
57	1000	370	250	100
71	600	81	740	110
81	89	83	84	710
210	210	120	140	340
380	230	110	7.8	54
800	61	62	560	93
630	730	68	330	70
380	22	43	140	170
900	570	230	64	120
440	110	180	190	1300
1600	62	85	100	100
1800	2200	30	50	72
300	350	300	120	54
170	100	120	130	340
160	70	230	78	180
620	280	240	41	60
850	84	83	140	78
93	30	110	190	56
100	370	83	1100	110
2200	58	1200	120	200
150	93	450	85	97

Bin	Frequency
5	0
50	12
100	53
500	53
1000	15
More	12

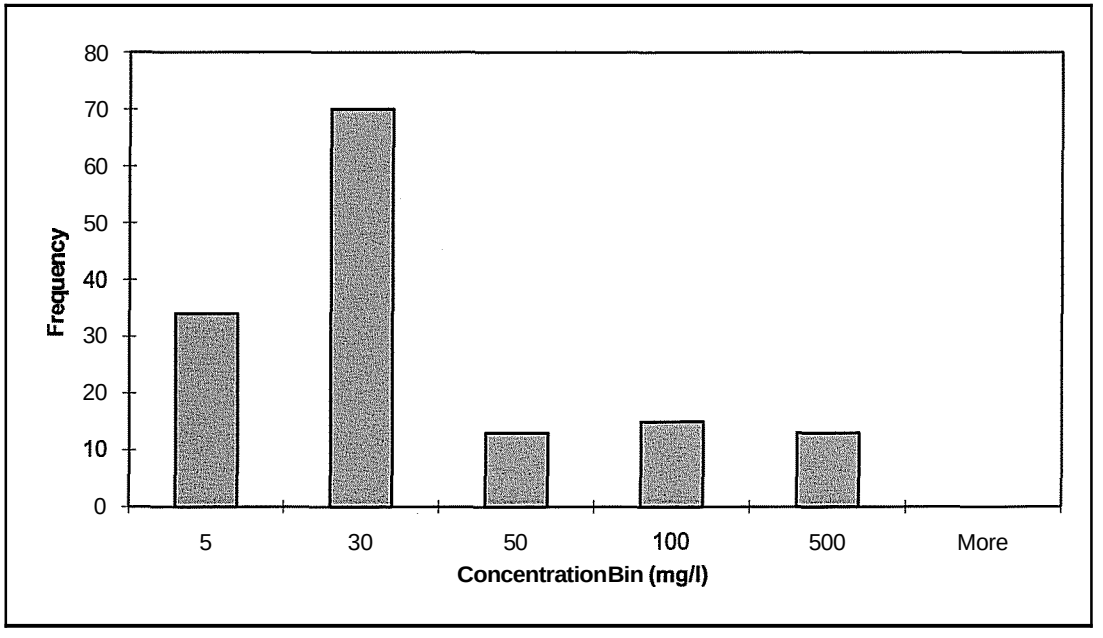


TRC

Chart - 3
Histogram and Raw Data Summary 405
Soluble Lead Samples (STLC)

Soluble Lead Concentration (mg/l)				
13	1.3	26	0.37	0.65
3.9	110	7.8	49	170
8.2	6.9	70	32	10
7.2	1.3	47	0.125	8.5
5.1	81	6.1	0.125	1.4
5.3	27	3.9	20	32
36	81	11	7.1	25
2.6	15	2.2	4.3	7.7
7.1	34	26	7.0	5.2
8.9	6.6	2.8	11	6.2
16	98	4.5	6.3	8.9
24	4.7	3.9	0.125	25
41	80	25	4.9	12
93	9.0	15	37	
58	4.9	28	12	
41	210	80	4.0	
67	44	2.5	6.7	
59	5.3	13	8.2	
210	6.1	7.6	130	
130	30	120	11	
1.2	4.2	44	12	
14	2.0	15	6.2	
0.32	36	5.5	23	
68	5.6	3.7	4.7	
95	14	9.0	10	
3.5	48	5.2	11	
7.9	9.1	0.125	14	
210	6.0	23	97	
13	150	0.125	19	
120	7.0	0.125	1.1	
3.8	130	80	8.8	
8.0	230	13	7.7	
130	63	1.7	11	

Bin	Frequency
5	34
30	70
50	13
100	15
500	13
More	0



TRC

Chart - 4
Histogram and Raw Data Summary 405
Total Lead (All Samples) - ln(x) Transformed

Lead Concentration (mg/kg)											
4.8	6.09	3.71	4.79	7.09	1.63	0.92	0.92	1.65	4.53	0.92	4.09
3.9	7.38	3.09	1.69	1.65	2.29	0.92	0.92	1.87	0.92	0.92	3.09
0.9	2.07	6.35	2.71	2.24	2.94	0.92	1.63	3.76	0.92	0.92	1.63
2.2	0.92	2.89	2.64	1.76	5.56	0.92	2.15	4.87	0.92	0.92	0.92
1.8	7.50	2.14	2.56	0.92	2.83	0.92	0.92	4.36	0.92	0.92	1.92
0.9	5.70	3.33	0.92	0.92	1.67	0.92	2.05	0.92	0.92	0.92	0.92
4.8	2.77	3.00	2.30	3.64	0.92	1.65	0.92	3.71	0.92	0.92	0.92
4.4	0.92	3.04	1.74	1.79	0.92	0.92	0.92	2.64	0.92	0.92	0.92
2.1	5.14	4.70	2.40	1.77	1.84	0.92	0.92	1.93	0.92	1.72	0.92
2.6	2.25	3.56	4.70	1.84	0.92	1.74	0.92	1.95	3.18	0.92	0.92
4.0	5.08	3.81	1.93	6.11	3.85	0.92	0.92	3.30	0.92	0.92	1.65
2.4	6.43	3.87	2.08	5.19	2.30	0.92	0.92	0.92	0.92	0.92	0.92
4.3	6.75	4.13	2.04	2.83	3.56	0.92	2.83	1.79	0.92	0.92	3.37
1.6	4.53	1.70	2.48	0.92	5.52	0.92	0.92	0.92	3.04	0.92	0.92
2.6	4.61	7.70	2.77	4.20	0.92	0.92	0.92	2.83	0.92	0.92	0.92
5.7	7.70	5.86	4.13	1.63	0.92	0.92	1.96	0.92	4.49	0.92	0.92
2.2	5.01	4.61	2.21	0.92	0.92	1.95	0.92	2.26	3.74	4.53	4.36
0.9	1.74	2.13	1.79	0.92	0.92	0.92	1.67	1.97	2.17	4.25	2.03
3.2	5.89	2.12	4.22	4.03	0.92	0.92	0.92	2.64	7.24	2.64	1.63
4.0	4.16	2.56	3.76	2.00	6.61	0.92	0.92	0.92	0.92	1.65	0.92
2.2	3.33	2.30	5.44	1.92	2.89	4.43	1.89	0.92	0.92	5.14	3.18
2.9	4.61	2.40	5.19	1.81	0.92	4.94	0.92	3.71	1.76	1.89	3.14
2.6	3.87	1.97	4.44	1.82	1.65	2.94	0.92	4.94	0.92	2.77	0.92
2.3	1.77	4.25	3.40	2.94	0.92	2.05	2.29	3.43	0.92	1.87	0.92
3.0	0.92	5.63	0.92	1.84	0.92	0.92	0.92	1.69	0.92	3.18	4.03
3.6	7.17	4.43	2.48	1.65	0.92	0.92	3.43	0.92	2.20	3.26	3.64
3.8	3.04	0.92	2.83	0.92	0.92	0.92	3.37	3.30	0.92	3.18	3.58
4.0	3.64	2.40	2.89	4.19	0.92	0.92	3.91	3.66	0.92	1.79	1.97
4.3	2.94	3.56	2.30	0.92	0.92	0.92	2.71	3.37	0.92	2.01	0.92
4.4	7.09	3.58	2.64	1.84	0.92	0.92	3.14	0.92	0.92	0.92	1.67
3.2	4.09	3.40	2.13	1.69	0.92	0.92	0.92	5.25	0.92	4.79	4.70
3.2	3.37	5.91	2.00	2.89	0.92	0.92	1.67	3.18	5.60	1.77	0.92
1.8	3.40	2.40	5.70	0.92	0.92	6.33	0.92	3.61	4.34	0.92	0.92
3.8	6.91	2.94	1.81	1.72	0.92	5.80	2.64	2.17	5.14	0.92	0.92
2.6	3.09	4.06	0.92	4.53	0.92	0.92	2.21	7.00	2.77	0.92	5.30
1.9	2.89	4.53	0.92	0.92	0.92	4.94	1.84	3.22	3.50	2.77	4.57
5.3	0.92	5.63	4.79	0.92	0.92	0.92	1.63	3.00	1.81	7.17	2.64
5.9	6.40	2.48	2.89	0.92	0.92	4.16	2.48	0.92	2.00	2.16	0.92
0.9	3.53	4.14	0.92	3.78	0.92	0.92	2.56	4.79	0.92	0.92	
0.9	3.47	4.13	5.44	0.92	0.92	0.92	3.43	3.66	4.61	0.92	
1.7	2.20	6.68	3.61	0.92	0.92	1.92	1.87	4.44	4.70	4.61	
2.5	4.49	4.06	2.48	1.74	0.92	1.65	4.79	1.70	2.64	4.28	
0.9	3.61	6.33	5.48	3.76	1.76	1.86	0.92	4.94	0.92	1.95	
1.9	2.83	7.50	0.92	0.92	2.77	1.61	1.97	2.40	3.69	1.76	
6.7	5.35	6.67	1.82	0.92	0.92	0.92	1.76	0.92	2.00	3.40	
6.4	5.44	2.48	4.42	1.69	0.92	0.92	0.92	1.89	0.92	3.58	
5.9	3.81	5.91	4.70	3.53	0.92	0.92	0.92	2.71	2.89	3.99	
6.8	4.11	3.26	2.94	2.89	2.00	0.92	2.40	0.92	6.57	5.83	
2.9	2.94	4.39	2.64	0.92	0.92	5.25	1.70	0.92	5.83	5.19	
2.24	6.59	3.64	4.42	0.92	0.92	4.61	3.53	0.92	3.99	2.48	
0.92	3.04	4.42	0.92	0.92	1.61	0.92	3.47	7.00	1.67	0.92	

Bin	*Frequency*
1	204
2	82
3	104
4	79
5	67
More	63

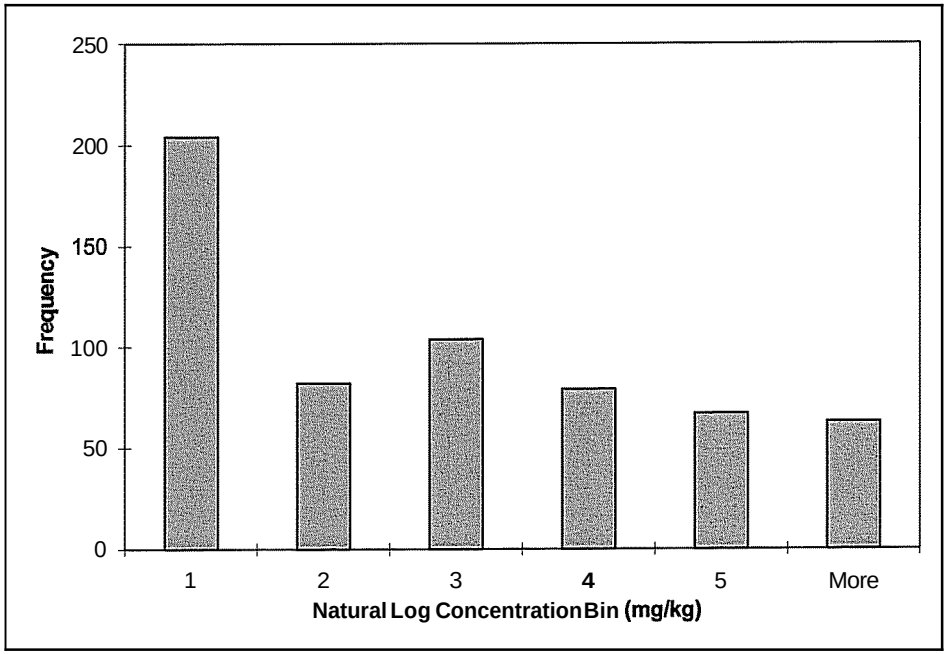


Chart - 5
Histogram and Raw Data Summary 405
Total Lead Samples with Corresponding Soluble Lead Data - ln(x) Transformed

Lead Concentration (mg/kg)		
4.79	5.86	4.94
3.91	4.61	2.05
4.79	4.25	6.33
4.42	5.63	5.80
4.03	4.43	4.94
4.28	3.40	4.16
5.70	5.91	5.25
3.99	4.06	4.61
4.04	4.53	3.91
4.26	5.63	4.79
4.39	4.14	4.87
5.35	4.13	4.36
5.94	6.68	3.71
6.68	4.06	4.94
6.45	6.33	5.25
5.94	7.50	7.00
6.80	6.67	4.79
6.09	5.91	4.44
7.38	4.39	4.94
7.50	4.42	7.00
5.70	4.79	4.53
5.14	4.70	4.49
5.08	4.13	7.24
6.43	4.22	5.60
6.75	3.76	4.34
4.53	5.44	5.14
4.61	5.19	4.61
7.70	4.44	4.70
5.01	3.40	6.57
5.89	5.70	5.83
4.16	4.79	3.99
4.61	5.44	4.53
7.17	5.48	4.25
2.94	4.42	5.14
7.09	4.70	4.79
4.09	4.42	7.17
3.40	7.09	4.61
6.91	6.11	4.28
6.40	5.19	3.99
4.49	4.20	5.83
5.35	4.03	5.19
5.44	4.19	4.09
4.11	4.53	4.36
6.59	2.94	4.03
3.09	5.56	4.70
6.35	3.85	5.30
4.70	5.52	4.57
4.13	6.61	
7.70	4.43	

Bin	*Frequency*
1	0
2	3
3	12
4	67
5	34
More	29

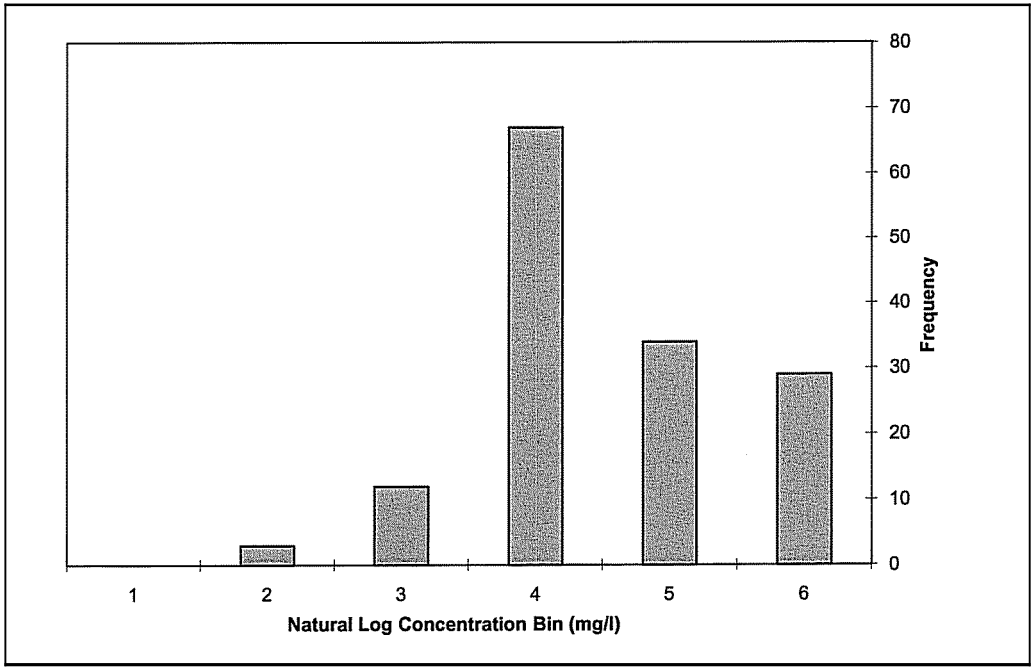


Chart - 6
Histogram and Raw Data Summary
Soluble Lead Samples (STLC) - ln(x) Transformed

Soluble Lead Concentration (mg/l)		
2.56	3.78	0.53
1.36	1.67	-0.99
2.10	1.81	3.89
1.97	3.40	3.47
1.63	1.44	-2.08
1.67	0.69	-2.08
3.58	3.58	3.00
0.96	1.72	1.96
1.96	2.64	1.46
2.19	3.87	1.95
2.77	2.21	2.40
3.18	1.79	1.84
3.71	5.01	-2.08
4.53	1.95	1.59
4.06	4.87	3.61
3.71	5.44	2.48
4.20	4.14	1.39
4.08	3.26	1.90
5.35	2.05	2.10
4.87	4.25	4.87
0.18	3.85	2.40
2.64	1.81	2.48
-1.14	1.36	1.82
4.22	2.40	3.14
4.55	0.79	1.55
1.25	3.26	2.30
2.07	1.03	2.40
5.35	1.50	2.64
2.56	1.36	4.57
4.79	3.22	2.94
1.34	2.71	0.10
2.08	3.33	2.17
4.87	4.38	2.04
0.26	0.92	2.40
4.70	2.56	-0.43
1.93	2.03	5.14
0.26	4.79	2.30
4.39	3.78	2.14
3.30	2.71	0.34
4.39	1.70	3.47
2.71	1.31	3.22
3.53	2.20	2.04
1.89	1.65	1.65
4.58	-2.08	1.82
1.55	3.14	2.19
4.38	-2.08	3.22
2.20	-2.08	2.48
1.59	4.38	
5.35	2.56	

Bin	*Frequency*
1	19
2	36
3	38
4	24
5	22
More	6

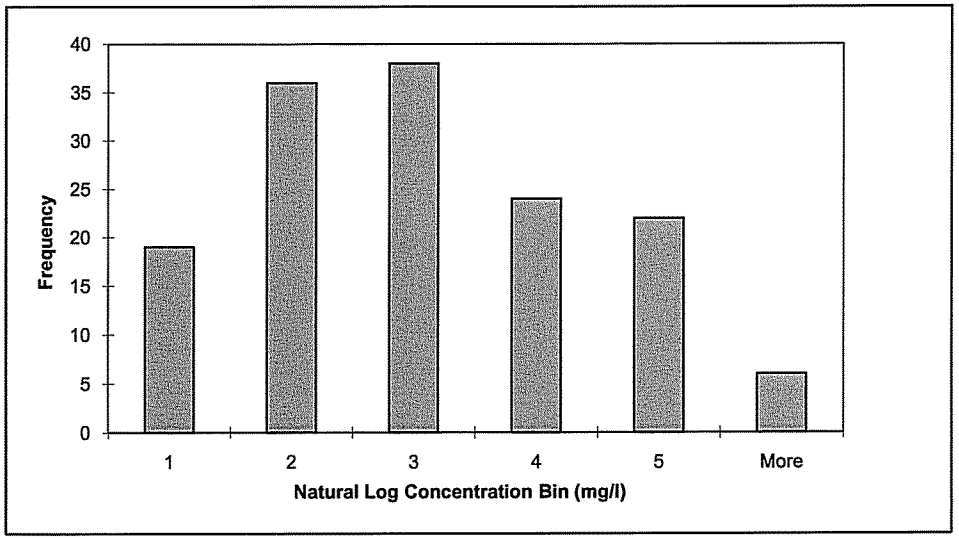


Chart 7
Cumulative Probability Distribution for Total Lead
1405 - Aerially Deposited Lead Investigation

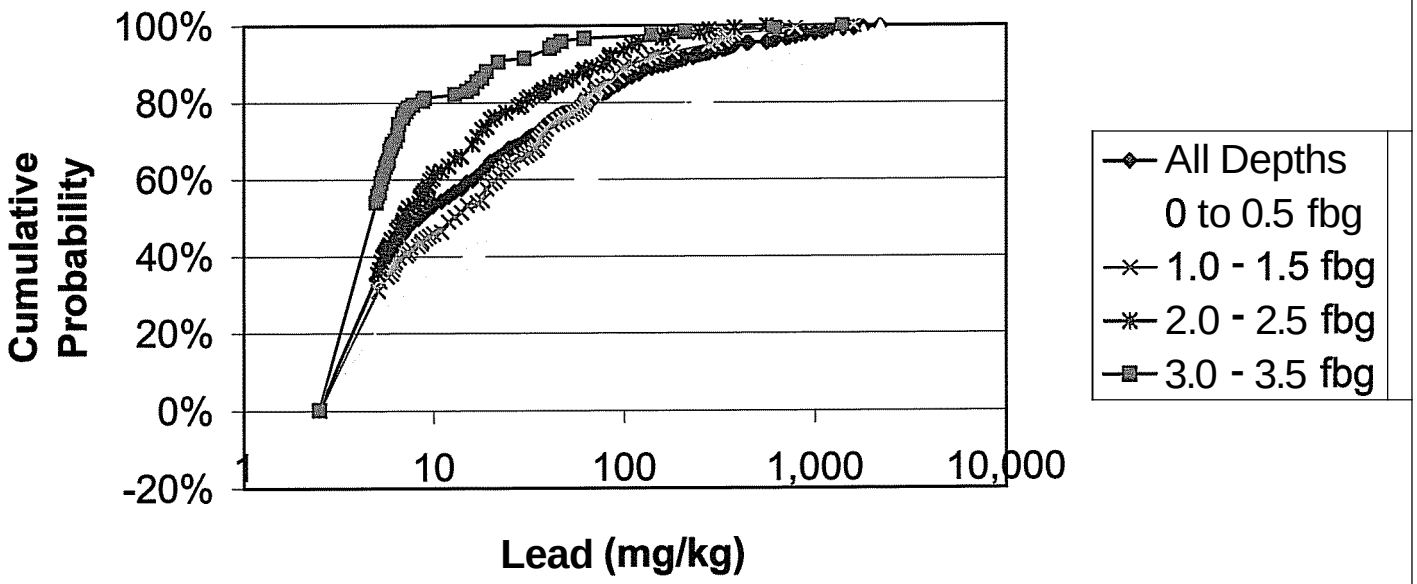


Figure 1

Block Diagrams - 95% UCL for Various Distributions

Hot Areas **Group 1: B-17N, 18N, 19N, 21N, 22N**

Diagram A

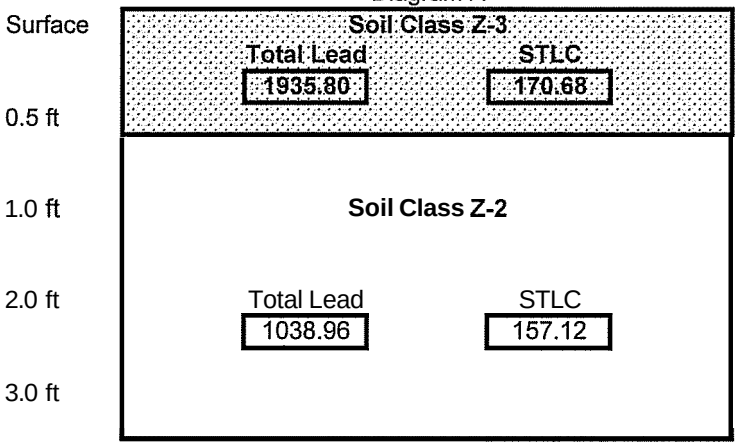


Diagram B

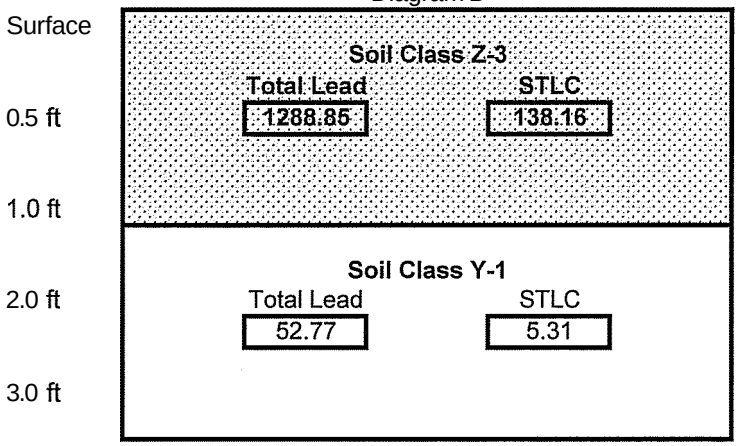


Diagram C

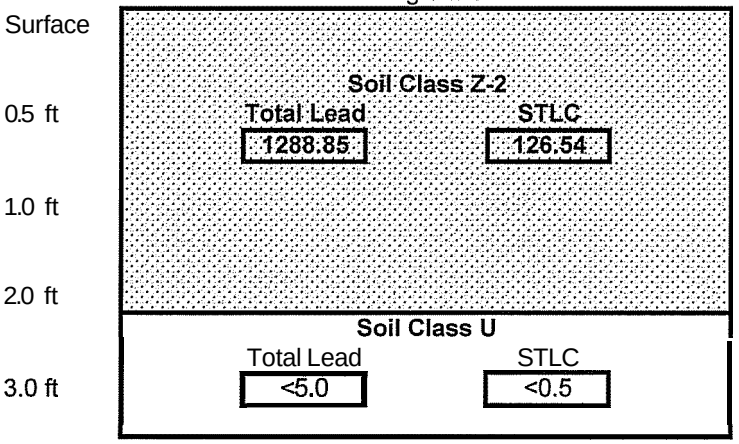
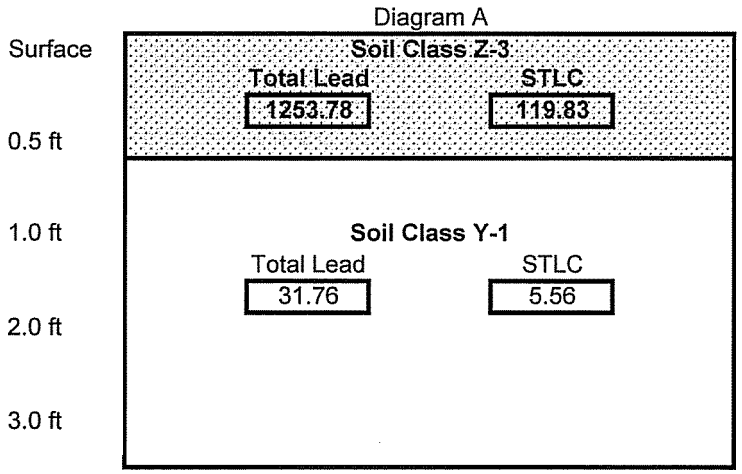


Figure 2

Block Diagrams - 95% UCL for Various Distributions

Hot Areas **Group 2: B-25N, 26N, 27N, 31N, 32N**



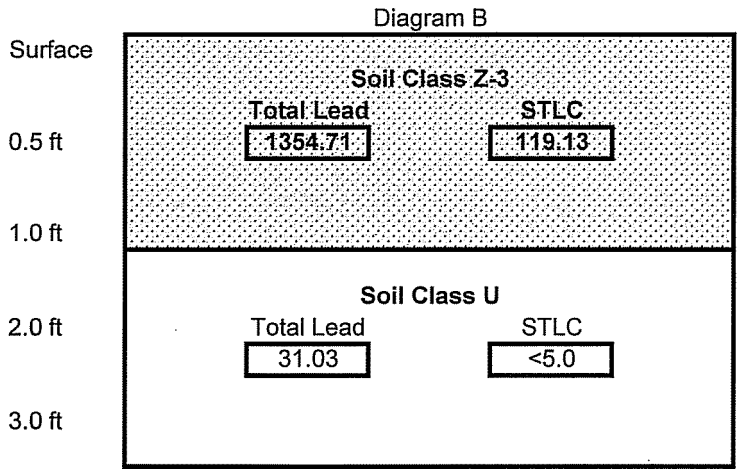
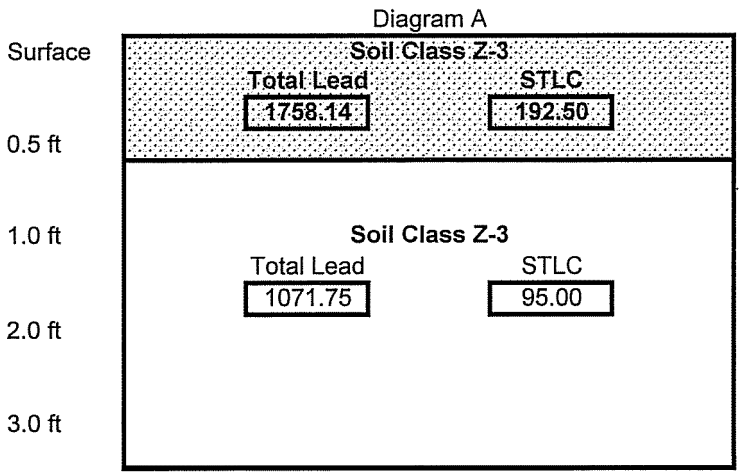
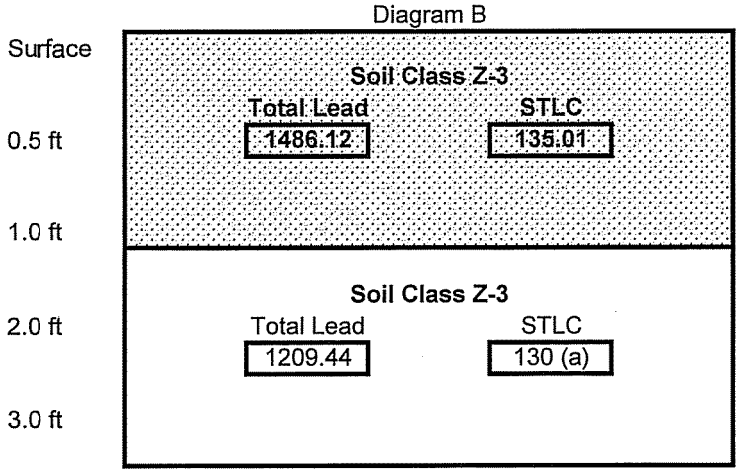


Figure 3

Block Diagrams - 95% UCL for Various Distributions

Hot Areas **Group 3: 41N, 44N, 45N, 66N, 63N**





(a) Concentration from a single sample with Total Lead over 50 mg/kg

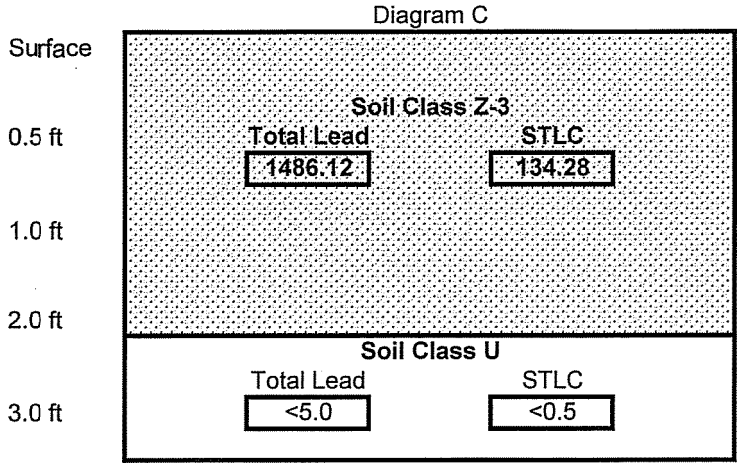
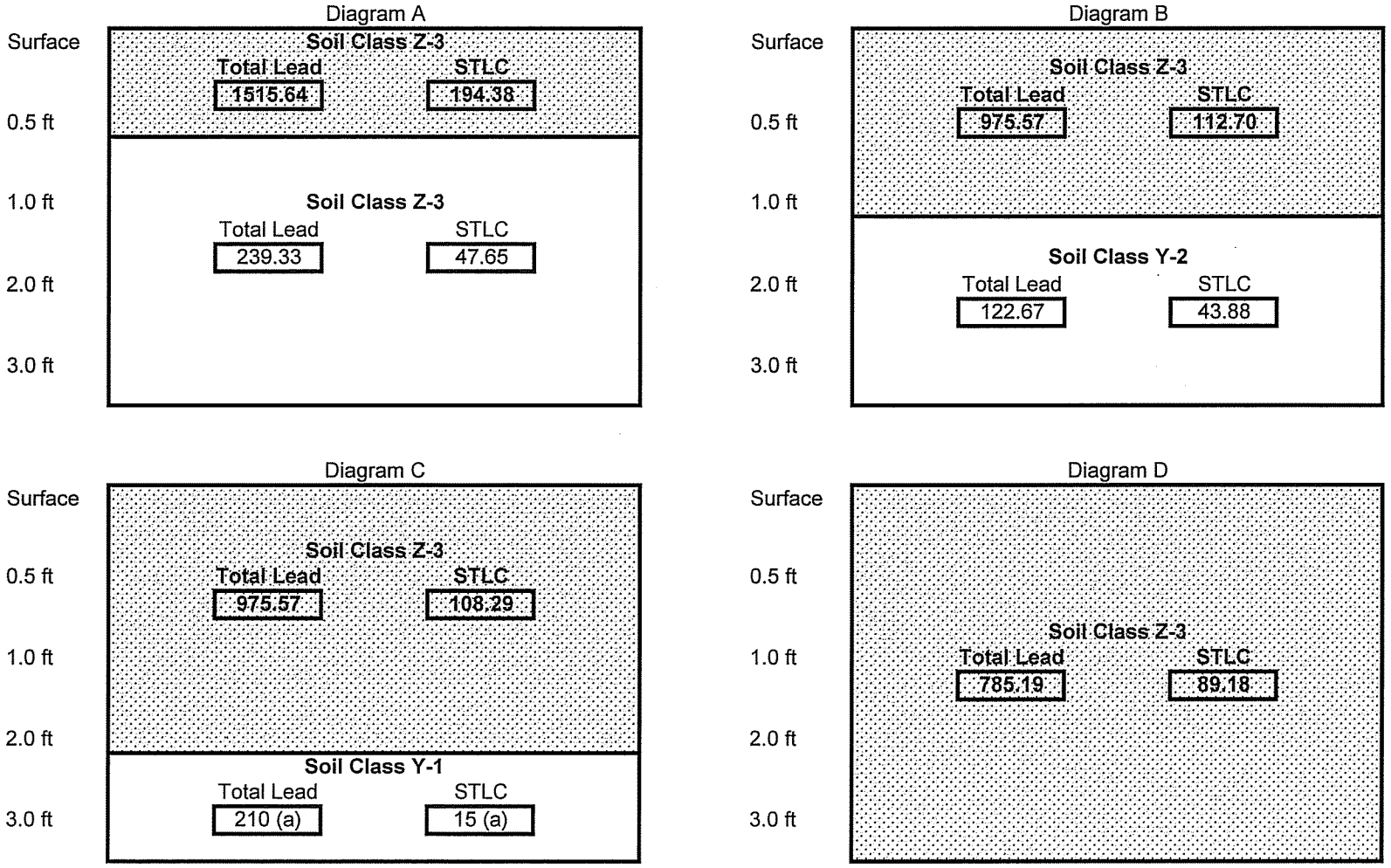


Figure 4

Block Diagrams - 95% UCL for Various Distributions

Hot Areas **Group 4: 29N, 36N, 140S, 47N**

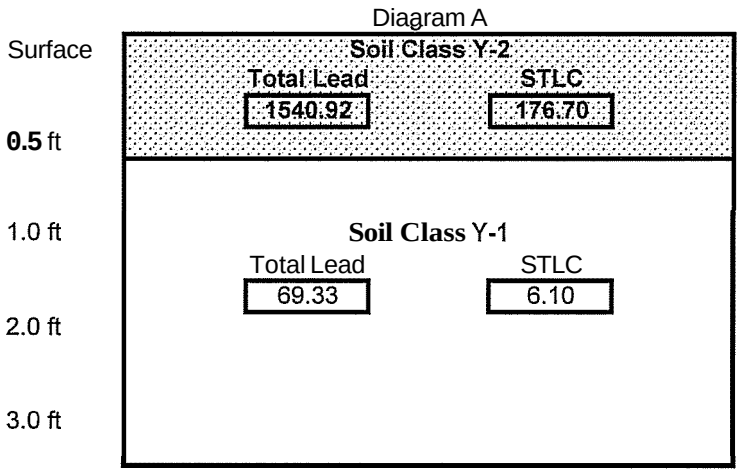


(a) Concentration from a single sample with Total Lead over 50 mg/kg

Figure 5

Block Diagrams - 95% UCL for Various Distributions

Hot Areas **Group 5: 124S, 128S, 132S**



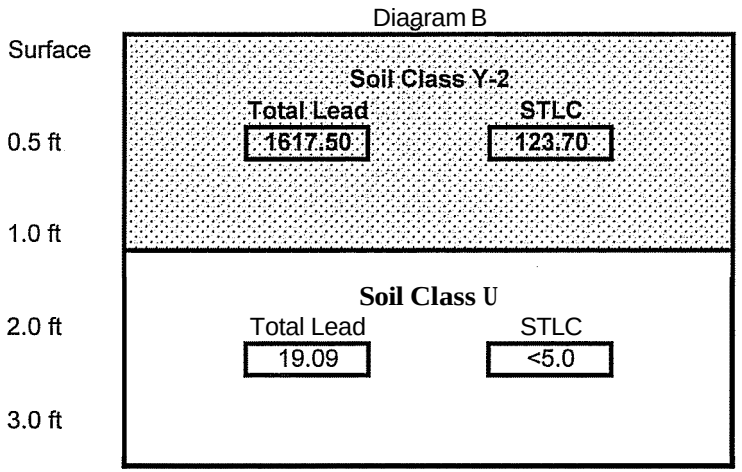


Table C-1
Summary of Soil Analytical Test Results - All Samples
Total Lead, STLC, and TCLP by EPA Test Method 6010B
Caltrans I-405 ADL Study

Parameter	Total Lead (mg/kg)	Total Lead [1] (mg/kg)	Soluble Lead (STLC) (mg/L)	Soluble Lead (TCLP) (mg/L)	Soluble Lead (STLC DI Water) (mg/L)
Number of Samples[2]	599	145	145	130	72
Number of Detections	395	139	139	101	42
Detection Frequency	65.9%	95.9%	95.9%	77.7%	58.3%
Minimum Detected Value	3.00	7.80	0.32	0.27	0.26
Maximum Detected Value	2200.00	2200.00	230.00	30.00	38.00
Mean	82.87	311.66	32.16	2.51	1.66
Median	8.40	120.00	11.00	0.66	0.31
Standard Deviation	248.30	431.47	47.42	4.68	4.78
Coefficient of Variation	2.99	1.38	1.47	1.86	2.80
Data Distribution	Non-Parametric	Non-Parametric	Non-Parametric	Lognormal	Non-Parametric
80% UCL Value	103.17	383.32	40.042	NA	2.794
Basis for 80% UCL	80% Chebyshev	80% Chebyshev	80% Chebyshev	80% H-UCL	80% Chebyshev
95% UCL Value	146.24	535.43	56.76	7.03	5.19
Basis for 95% UCL	97.5% Chebyshev	97.5% Chebyshev	97.5% Chebyshev	95% H-UCL	97.5% Chebyshev

Notes:

[1] - Includes a subset of total lead analyses for samples which were also analyzed for soluble lead
[2] - Data set excludes duplicate samples from analysis unless also analyzed for soluble lead
Non-detect values are included in statistical analyses at a concentration of 1/2 the laboratory detection limit
Data distributions and UCL values derived from ProUCL, Version 3.0
Basis for determining data distribution in descending order, include linear, gamma, lognormal, and non-parametric
NA - Not Applicable

Table C-2
Summary of Soil Analytical Test Results by Sampling Depth
Total Lead, STLC, and TCLP by EPA Test Method 6010B
Caltrans I-405 ADL Study

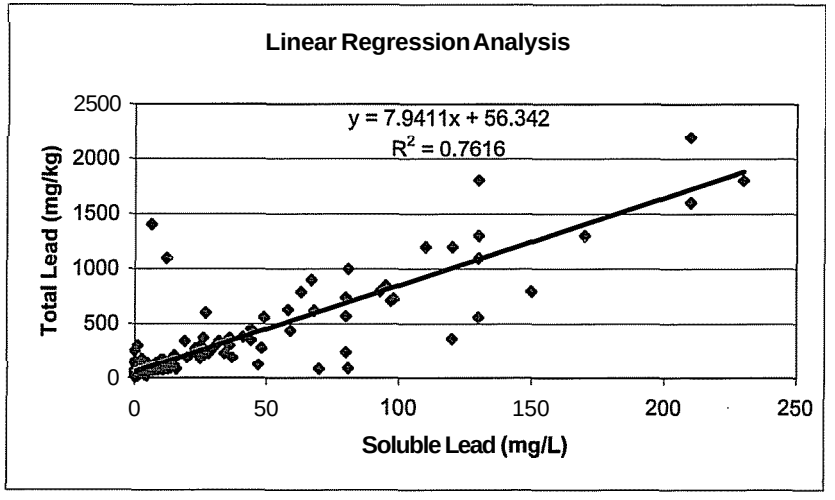
Sampling Depth (cm)	Parameter	Total Lead (mg/kg)	Soluble Lead (STLC) (mg/L)	Soluble Lead (TCLP) (mg/L)	Soluble Lead (STLC DI Water) (mg/L)
0 -0.5 fbg	Number of Samples[2]	162	68	64	28
	Number of Detections	126	32	60	18
	Detection Frequency	77.8%	47.1%	93.8%	64.3%
	Minimum Detected Value	5.30	3.70	0.30	0.28
	Maximum Detected Value	2200.00	230.00	30.00	38.00
	Mean	202.02	49.62	3.96	3.07
	Standard Deviation	406.26	56.32	6.15	7.34
	95% UCL	519.60	92.27	6.66	16.88
	80% UCL	265.86	63.28	NA	5.85
1.0-1.5 fbg	Number of Samples[2]	162	39	31	15
	Number of Detections	112	38	27	11
	Detection Frequency	69.1%	97.4%	87.1%	73.3%
	Minimum Detected Value	5.10	1.20	0.32	0.26
	Maximum Detected Value	1600.00	210.00	6.30	7.60
	Mean	57.20	20.72	1.47	1.28
	Standard Deviation	158.59	35.61	1.56	1.88
	95% UCL	135.02	39.69	2.02	2.340
	80% UCL	82.12	NA	1.73	1.76
2.0 - 2.5 fbg	Number of Samples[2]	157	23	19	13
	Number of Detections	102	22	12	10
	Detection Frequency	65.0%	95.7%	63.2%	76.9%
	Minimum Detected Value	5.10	0.32	0.27	0.26
	Maximum Detected Value	560.00	130.00	8.00	4.40
	Mean	28.30	16.18	1.35	0.90
	Standard Deviation	65.72	28.57	2.25	1.30
	95% UCL	61.05	52.41	6.49	1.70
	80% UCL	38.79	34.14	2.38	1.25
3.0-3.5 fbg	Number of Samples[2]	118	15	15	15
	Number of Detections	55	11	2	3
	Detection Frequency	46.6%	73.3%	13.3%	20.0%
	Minimum Detected Value	3.00	0.37	0.27	0.29
	Maximum Detected Value	1400.00	68.00	0.53	0.61
	Mean	27.17	7.29	0.16	0.18
	Standard Deviation	141.37	17.22	0.11	0.13
	95% UCL	108.45	19.53	0.21	0.25
	80% UCL	53.20	NA	0.19	0.22

Notes:

[2] - Data set excludes duplicate samples from analysis unless also analyzed for soluble lead
Non-detect values are included in statistical analyses at a concentration of 1/2 the laboratory detection limit
Data distributions and UCL values derived from ProUCL, Version 3.0, and exclude ND values
Basis for determining data distribution in descending order, include linear, gamma, lognormal, and non-parametric
NA - Not Applicable

Table C-3
Linear Regression Analysis
Total Lead and Soluble Lead (STLC-WET) by EPA Test Method 6010B
Caltrans I-405 ADL Study

Sample ID	Sample Depth (fbg)	Total Pb (mg/kg) (Y)	WET-Pb (mg/L) (X)	Product of Total and Soluble Lead (X * Y)
B-1N	0.0-0.5	120	13	1560
B-3N	0.0-0.5	120	8.2	984
B-5N	0.0-0.5	72	5.3	381.6
B-6N	0.0-0.5	300	36	10800
B-10N	0.0-0.5	57	7.1	404.7
B-13N	0.0-0.5	210	24	5040
B-16N	0.0-0.5	800	93	74400
B-17N	0.0-0.5	900	67	60300
B-18N	0.0-0.5	440	59	25960
B-19N	0.0-0.5	1800	130	234000
B-20N	0.0-0.5	170	14	2380
B-21N	0.0-0.5	850	95	80750
B-22N	0.0-0.5	2200	210	462000
B-23N	0.0-0.5	360	120	43200
B-24N	0.0-0.5	100	8.0	800
B-25N	0.0-0.5	1300	130	169000
B-26N	0.0-0.5	1200	110	132000
B-27N	0.0-0.5	1000	81	81000
B-28N	0.0-0.5	600	27	16200
B-29N	0.0-0.5	89	81	7209
B-30N	0.0-0.5	230	34	7820
B-31N	0.0-0.5	730	98	71540
B-32N	0.0-0.5	570	80	45600
B-34N	0.0-0.5	110	9.0	990
B-36N	0.0-0.5	2200	210	462000
B-39N	0.0-0.5	70	6.1	427
B-41N	0.0-0.5	370	36	13320
B-42N	0.0-0.5	58	5.6	324.8
B-44N	0.0-0.5	800	150	120000
B-45N	0.0-0.5	1800	230	414000
B-46N	0.0-0.5	370	26	9620
B-54N	0.0-0.5	230	26	5980
B-57N	0.0-0.5	300	25	7500
B-58N	0.0-0.5	120	15	1800
B-59N	0.0-0.5	230	28	6440
B-60N	0.0-0.5	240	80	19200
B-61N	0.0-0.5	83	2.5	207.5
B-63N	0.0-0.5	1200	120	144000
B-66N	0.0-0.5	450	44	19800
B-67N	0.0-0.5	67	5.5	368.5
B-68N	0.0-0.5	56	3.7	207.2
B-72N	0.0-0.5	93	5.2	483.6
B-77N	0.0-0.5	260	23	5980
B-81S	0.0-0.5	740	80	59200
B-94S	0.0-0.5	84	13	1092



	Total Pb (Y)	WET-Pb (X)	X * Y
Mean Concentration	313.2903	32.356875	27954.07994
Standard Deviation (stdev)	432.53	47.53	77513.78
Number of Samples (n)	144	144	144

Calculated R Value	0.873
Calculated R^2 Value	0.762

Calculated Regression Line Values (y = ax + b)	
Slope (a)	7.941
Intercept (b)	56.342

EQUATIONS

r = [(Mean of Pb total and Pb soluble) - (Mean Pb soluble) x (Mean Pb total))] ▮ [(Stdev Pb soluble x (Stdev Pb total))] x n/n-1

Slope (a) = R value x Stdev Pb total / Stdev Pb soluble

Intercept (b) = ((Mean Pb total - slope (a)) x Mean Pb soluble

Notes:

Dataset includes all soil sample pairs that were subjected to laboratory analysis of soluble lead AND which were also analyzed for total lead

Duplicate samples were excluded from analysis if the original sample was also analyzed for total AND soluble lead

Duplicate samples were excluded from analysis if the original sample was also analyzed for total AND soluble lead

Samples that did not contain detected concentrations of soluble lead were excluded from regression analysis

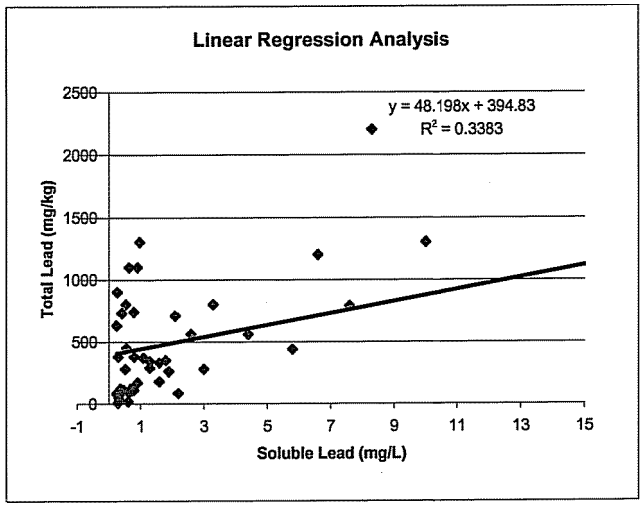
Wet-Pb - Soluble lead as determined by STLC/WET (citric acid extraction method)

B-96S	0.0-0.5	560	49	27440
B-102S	0.0-0.5	190	20	3800
B-113S	0.0-0.5	120	7.0	840
B-121S	0.0-0.5	140	4.9	686
B-123S	0.0-0.5	190	37	7030
B-124S	0.0-0.5	1100	12	13200
B-125S	0.0-0.5	120	4.0	480
B-126S	0.0-0.5	140	8.2	1148
B-128S	0.0-0.5	1100	130	143000
B-132S	0.0-0.5	89	12	1068
B-136S	0.0-0.5	270	23	6210
B-138S	0.0-0.5	100	11	1100
B-140S	0.0-0.5	710	97	68870
B-145S	0.0-0.5	93	8.8	818.4
B-146S	0.0-0.5	170	11	1870
B-150N	0.0-0.5	1300	170	221000
B-151N	0.0-0.5	100	10	1000
B-153N	0.0-0.5	340	32	10880
B-154S	0.0-0.5	60	7.7	462
B-158S	0.0-0.5	78	5.2	405.6
B-160S	0.0-0.5	56	6.2	347.2
B-162N	0.0-0.5	110	8.9	979
B-163N	0.0-0.5	200	25	5000
B-1N	1.0-1.5	50	3.9	195
B-3N	1.0-1.5	83	7.2	597.6
B-4N	1.0-1.5	56	5.1	285.6
B-7N	1.0-1.5	54	2.6	140.4
B-10N	1.0-1.5	71	8.9	631.9
B-13N	1.0-1.5	380	41	15580
B-16N	1.0-1.5	630	58	36540
B-18N	1.0-1.5	1600	210	336000
B-19N	1.0-1.5	300	1.2	360
B-21N	1.0-1.5	93	3.5	325.5
B-22N	1.0-1.5	150	13	1950
B-23N	1.0-1.5	64	3.8	243.2
B-26N	1.0-1.5	60	6.9	414
B-35N	1.0-1.5	62	4.9	303.8
B-36N	1.0-1.5	350	44	15400
B-39N	1.0-1.5	280	30	8400
B-42N	1.0-1.5	93	14	1302
B-43N	1.0-1.5	63	9.1	573.3
B-44N	1.0-1.5	58	7.0	406
B-45N	1.0-1.5	790	63	49770
B-47N	1.0-1.5	83	70	5810
B-54N	1.0-1.5	180	2.8	504
B-61N	1.0-1.5	110	13	1430
B-62N	1.0-1.5	83	7.6	630.8
B-66N	1.0-1.5	180	15	2700
B-70N	1.0-1.5	66	9.0	594
B-94S	1.0-1.5	140	1.7	238
B-96S	1.0-1.5	330	32	10560
B-97S	1.0-1.5	64	0.125	8
B-102S	1.0-1.5	100	7.1	710
B-116S	1.0-1.5	130	11	1430
B-128S	1.0-1.5	93	11	1023
B-138S	1.0-1.5	110	14	1540
B-140S	1.0-1.5	340	19	6460

B-145S	1.0-1.5	70	7.7	539
B-151N	1.0-1.5	72	8.5	612
B-153N	1.0-1.5	180	25	4500
B-163N	1.0-1.5	97	12	1164
B-ION	2.0-2.5	81	16	1296
B-16N	2.0-2.5	380	41	15580
B-20N	2.0-2.5	160	0.32	51.2
B-21N	2.0-2.5	100	7.9	790
B-30N	2.0-2.5	61	6.6	402.6
B-36N	2.0-2.5	100	5.3	530
B-39N	2.0-2.5	84	4.2	352.8
B-42N	2.0-2.5	280	48	13440
B-43N	2.0-2.5	62	6.0	372
B-44N	2.0-2.5	560	130	72800
B-46N	2.0-2.5	81	7.8	631.8
B-47N	2.0-2.5	120	47	5640
B-50N	2.0-2.5	110	6.1	671
B-53N	2.0-2.5	68	11	748
B-54N	2.0-2.5	85	4.5	382.5
B-79N	2.0-2.5	250	0.125	31.25
B-109S	2.0-2.5	50	4.3	215
B-116S	2.0-2.5	78	6.3	491.4
B-125S	2.0-2.5	85	6.7	569.5
B-136S	2.0-2.5	170	10	1700
B-140S	2.0-2.5	54	1.1	59.4
B-148S	2.0-2.5	120	0.65	78
B-152N	2.0-2.5	54	1.4	75.6
B-40N	3.0-3.5	30	2.0	60
B-20N	3.0-3.5	620	68	42160
B-25N	3.0-3.5	19	1.3	24.7
B-26N	3.0-3.5	30	1.3	39
B-29N	3.0-3.5	210	15	3150
B-31N	3.0-3.5	22	4.7	103.4
B-52N	3.0-3.5	62	3.9	241.8
B-53N	3.0-3.5	43	2.2	94.6
B-54N	3.0-3.5	30	3.9	117
B-76N	3.0-3.5	19	0.125	2.375
B-78N	3.0-3.5	47	0.125	5.875
B-94S	3.0-3.5	7.8	0.37	2.886
B-96S	3.0-3.5	140	0.125	17.5
B-120S	3.0-3.5	41	0.125	5.125
B-132S	3.0-3.5	1400	6.2	8680

Table C-4
Linear Regression Analysis
Total Lead and Soluble Lead (WET-DI) by EPA Test Method 6010B
Caltrans I-405 ADL Study

Sample ID	Sample Depth (fbg)	Total Pb (mg/kg) (Y)	WET-DI-Pb (mg/L) (X)	Product of Total and Soluble Lead (X * Y)
B-16N	0.0-0.5	800	0.55	440
B-17N	0.0-0.5	900	0.28	252
B-18N	0.0-0.5	440	5.8	2552
B-25N	0.0-0.5	1300	0.98	1274
B-31N	0.0-0.5	730	0.42	306.6
B-36N	0.0-0.5	2200	8.3	18260
B-41N	0.0-0.5	370	1.1	407
B-44N	0.0-0.5	800	3.3	2640
B-45N	0.0-0.5	1800	38	68400
B-63N	0.0-0.5	1200	6.6	7920
B-66N	0.0-0.5	450	0.57	256.5
B-77N	0.0-0.5	260	1.9	494
B-81S	0.0-0.5	740	0.80	592
B-96S	0.0-0.5	560	2.6	1456
B-124S	0.0-0.5	1100	0.91	1001
B-128S	0.0-0.5	1100	0.65	715
B-140S	0.0-0.5	710	2.1	1491
B-150N	0.0-0.5	1300	10	13000
B-13N	1.0-1.5	380	0.81	307.8
B-16N	1.0-1.5	630	0.26	163.8
B-36N	1.0-1.5	350	1.8	630
B-39N	1.0-1.5	280	0.53	148.4
B-45N	1.0-1.5	790	7.6	6004
B-47N	1.0-1.5	83	2.2	182.6
B-54N	1.0-1.5	180	1.6	288
B-61N	1.0-1.5	110	0.80	88
B-70N	1.0-1.5	66	0.33	21.78
B-96S	1.0-1.5	330	1.6	528
B-140S	1.0-1.5	340	1.3	442
B-16N	2.0-2.5	380	0.30	114
B-36NA	2.0-2.5	290	1.3	377
B-42N	2.0-2.5	280	3.0	840
B-44N	2.0-2.5	560	4.4	2464
B-47N	2.0-2.5	120	0.70	84
B-50N	2.0-2.5	110	0.48	52.8
B-54N	2.0-2.5	85	0.64	54.4
B-116S	2.0-2.5	78	0.26	20.28
B-125S	2.0-2.5	85	0.27	22.95
B-136S	2.0-2.5	170	0.91	154.7
B-148S	2.0-2.5	120	0.37	44.4
B-94S	3.0-3.5	7.8	0.29	2.262
B-105S	3.0-3.5	17	0.61	10.37
B-120S	3.0-3.5	41	0.32	13.12



	Total Pb (Y)	WET-Pb (X)	X * Y
Mean Concentration	526.5767	2.733488	3128.274
Standard Deviation (stdev)	496.30	5.99	10789.34
Number of Samples (n)	43	43	43

Calculated R Value	0.582
Calculated R^2 Value	0.338

Calculated Regression Line Values (y = ax + b)	
Slope (a)	48.198
Intercept (b)	394.829

EQUATIONS

r = [(Mean of Pb total and Pb soluble) - (Mean Pb soluble) x (Mean Pb total))] / [(Stdev Pb soluble x (Stdev Pb total))] x n/n-1

Slope (a) = R value x Stdev Pb total / Stdev Pb soluble

Intercept (b) = ((Mean Pb total - slope (a)) x Mean Pb soluble

Notes:

Dataset includes all soil sampl■pairs that were subject■d to labatory anal≤ is of soluble lead AND which were also analyzed for total lead

Duplicate sample■ere excluded from analysis if the origina l saple was a■e alyzed for total □N□D soluble lead

□lpate sample■ere excluded from analysis if the origina l saple was a■e al ed for total □N□D soluble lead

□ s that did not contain detected concentrations of solu ble ad were excluded from regression analysis

Wet-Pb - Soluble lead as determined by STLC/WET (citric acid extraction method)

Table C-5

Confidence Intervals for Hot Areas

Group 1: B-17N, 18N, 19N, 21N, 22N

0 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1935.80	1546.00
STLC -WET	170.68	138.01

0 + 1 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1288.85	1053.82
STLC -WET	138.16	111.79

1 + 2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1038.96	283.11
STLC -WET	157.12	70.10

2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	52.77	31.64
STLC -WET	7.9 (a)	NA

0 + 1 + 2 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1288.85	1053.82
STLC -WET	126.54	102.25

3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	<5.0	<5.0
STLC -WET	<0.5	<0.5

Group 2: B-25N, 26N, 27N, 31N, 32N

0 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1253.78	1089.67
STLC -WET	119.83	108.64

0 + 1 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1354.71	832.23
STLC -WET	119.13	100.21

1 + 2 + 3 fbg	Upper, Limit 95%	Upper Limit 80%
Total Lead		
STLC -WET		

2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead		
STLC -WET		

0 + 1 + 2 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1673.64	1673.64
STLC -WET	119.13	100.21

3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	31.97	24.03
STLC -WET	4.17	2.84

Group 3: 41N, 44N, 45N, 66N, 63N

0 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1758.14	1340.15
STLC -WET	192.50	149.76

0 + 1 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1486.12	1172.11
STLC -WET	135.01	107.66

1 + 2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1071.75	397.53
STLC -WET	95.00	65.98

2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1209.44	1209.44
STLC -WET	130 (a)	NA

0 + 1 + 2 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1486.12	1172.11
STLC -WET	134.28	110.29

3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	<5.0	<5.0
STLC -WET	<0.5	<0.5

Table C-5 (continued)

Confidence Intervals for Hot Areas

Group 4: 29N, 36N, 140S, 47N

0 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1515.64	1033.98
STLC -WET	194.38	141.29

0 + 1 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	975.57	653.60
STLC -WET	112.70	89.52

1 + 2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	239.33	194.02
STLC -WET	47.65	32.27

	Upper	Upper
Total Lead	122.67	
STLC -WET	43.88	24.19

0 + 1 + 2 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	975.57	653.60
STLC -WET	108.29	75.02

3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	210 (a)	NA
STLC -WET	15 (a)	NA

0 + 1 + 2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	785.19	542.02
STLC -WET	89.18	63.92

Group 5: 124S, 128S, 132S

0 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1540.92	1164.87
STLC -WET	176.70	120.79

0 + 1 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	1617.50	889.58
STLC -WET	123.70	96.01

1 + 2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	69.33	51.68
STLC -WET	6.10	4.60

2 + 3 fbg	Upper Limit 95%	Upper Limit 80%
Total Lead	19.09	19.09
STLC -WET	3.40	2.44

Table C-6 Caltrans Soil Classification for Soil Depth 0.0 - 0.5 fbg

Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class
B-1N	0.0-0.5	Y-1	B-39N	0.0-0.5	Y-1	B-77N	0.0-0.5	Y-2	B-116S	0.0-0.5	Unrestricted	B-154S	0.0-0.5	Y-1
B-2N	0.0-0.5	Unrestricted	B-40N	0.0-0.5	Unrestricted	B-78N	0.0-0.5	Unrestricted	B-117S	0.0-0.5	Unrestricted	B-155S	0.0-0.5	Unrestricted
B-3N	0.0-0.5	Y-1	B-41N	0.0-0.5	Z-3	B-79N	0.0-0.5	Unrestricted	B-118S	0.0-0.5	Unrestricted	B-156S	0.0-0.5	Unrestricted
B-4N	0.0-0.5	Unrestricted	B-42N	0.0-0.5	Y-1	B-80N	0.0-0.5	Unrestricted	B-119S	0.0-0.5	Unrestricted	B-157S	0.0-0.5	Unrestricted
B-5N	0.0-0.5	Y-1	B-43N	0.0-0.5	Unrestricted	B-81S	0.0-0.5	Y-2	B-120S	0.0-0.5	Unrestricted	B-158S	0.0-0.5	Y-1
B-6N	0.0-0.5	Y-1	B-44N	0.0-0.5	Z-3	B-82S	0.0-0.5	Unrestricted	B-121S	0.0-0.5	Unrestricted	B-159S	0.0-0.5	Unrestricted
B-7N	0.0-0.5	Unrestricted	B-45N	0.0-0.5	Z-3	B-83S	0.0-0.5	Unrestricted	B-122S	0.0-0.5	Unrestricted	B-160S	0.0-0.5	Y-1
B-8N	0.0-0.5	Unrestricted	B-46N	0.0-0.5	Y-1	B-84S	0.0-0.5	Unrestricted	B-123S	0.0-0.5	Y-1	B-161S	0.0-0.5	Unrestricted
B-9N	0.0-0.5	Unrestricted	B-47N	0.0-0.5	Unrestricted	B-85S	0.0-0.5	Unrestricted	B-124S	0.0-0.5	Y-2	B-162N	0.0-0.5	Y-1
B-10N	0.0-0.5	Y-1	B-48N	0.0-0.5	Unrestricted	B-86S	0.0-0.5	Unrestricted	B-125S	0.0-0.5	Unrestricted	B-163N	0.0-0.5	Y-1
B-11N	0.0-0.5	Unrestricted	B-49N	0.0-0.5	Unrestricted	B-87S	0.0-0.5	Unrestricted	B-126S	0.0-0.5	Y-1			
B-12N	0.0-0.5	Unrestricted	B-50N	0.0-0.5	Unrestricted	B-88S	0.0-0.5	Unrestricted	B-127S	0.0-0.5	Unrestricted			
B-13N	0.0-0.5	Y-1	B-51N	0.0-0.5	Unrestricted	B-89S	0.0-0.5	Unrestricted	B-128S	0.0-0.5	Y-2			
B-14N	0.0-0.5	Unrestricted	B-52N	0.0-0.5	Unrestricted	B-90S	0.0-0.5	Unrestricted	B-129S	0.0-0.5	Unrestricted			
B-15N	0.0-0.5	Unrestricted	B-53N	0.0-0.5	Unrestricted	B-91S	0.0-0.5	Unrestricted	B-130S	0.0-0.5	Unrestricted			
B-16N	0.0-0.5	Y-2	B-54N	0.0-0.5	Y-1	B-92S	0.0-0.5	Unrestricted	B-131S	0.0-0.5	Unrestricted			
B-17N	0.0-0.5	Z-3	B-55N	0.0-0.5	Unrestricted	B-93S	0.0-0.5	Unrestricted	B-132S	0.0-0.5	Y-1			
B-18N	0.0-0.5	Y-2	B-56N	0.0-0.5	Unrestricted	B-94S	0.0-0.5	Y-1	B-133S	0.0-0.5	Unrestricted			
B-19N	0.0-0.5	Z-3	B-57N	0.0-0.5	Y-1	B-94S-2	0.0-0.5	Unrestricted	B-134S	0.0-0.5	Unrestricted			
B-20N	0.0-0.5	Y-1	B-58N	0.0-0.5	Y-1	B-95S	0.0-0.5	Unrestricted	B-135S	0.0-0.5	Unrestricted			
B-21N	0.0-0.5	Z-3	B-59N	0.0-0.5	Y-1	B-96S	0.0-0.5	Y-2	B-136S	0.0-0.5	Y-1			
B-22N	0.0-0.5	Y-2	B-60N	0.0-0.5	Y-1	B-97S	0.0-0.5	Unrestricted	B-137S	0.0-0.5	Unrestricted			
B-23N	0.0-0.5	Y-1	B-61N	0.0-0.5	Unrestricted	B-98S	0.0-0.5	Unrestricted	B-138S	0.0-0.5	Y-1			
B-24N	0.0-0.5	Y-1	B-62N	0.0-0.5	Unrestricted	B-99S	0.0-0.5	Unrestricted	B-139S	0.0-0.5	Unrestricted			
B-25N	0.0-0.5	Z-3	B-63N	0.0-0.5	Z-3	B-102S	0.0-0.5	Y-1	B-140S	0.0-0.5	Z-3			
B-26N	0.0-0.5	Y-1	B-64N	0.0-0.5	Unrestricted	B-103S	0.0-0.5	Unrestricted	B-141S	0.0-0.5	Unrestricted			
B-27N	0.0-0.5	Z-3	B-65N	0.0-0.5	Unrestricted	B-104S	0.0-0.5	Unrestricted	B-142S	0.0-0.5	Unrestricted			
B-28N	0.0-0.5	Y-1	B-66N	0.0-0.5	Z-3	B-105S	0.0-0.5	Unrestricted	B-143S	0.0-0.5	Unrestricted			
B-29N	0.0-0.5	Z-3	B-67N	0.0-0.5	Y-1	B-106S	0.0-0.5	Unrestricted	B-144S	0.0-0.5	Unrestricted			
B-30N	0.0-0.5	Y-1	B-68N	0.0-0.5	Unrestricted	B-107S	0.0-0.5	Unrestricted	B-145S	0.0-0.5	Y-1			
B-31N	0.0-0.5	Z-3	B-69N	0.0-0.5	Unrestricted	B-108S	0.0-0.5	Unrestricted	B-146S	0.0-0.5	Y-1			
B-32N	0.0-0.5	Z-3	B-70N	0.0-0.5	Unrestricted	B-109S	0.0-0.5	Unrestricted	B-147S	0.0-0.5	Unrestricted			
B-33N	0.0-0.5	Unrestricted	B-71N	0.0-0.5	Unrestricted	B-110S	0.0-0.5	Unrestricted	B-148S	0.0-0.5	Unrestricted			
B-34N	0.0-0.5	Y-1	B-72N	0.0-0.5	Y-1	B-111S	0.0-0.5	Unrestricted	B-149S	0.0-0.5	Unrestricted			
B-35N	0.0-0.5	Unrestricted	B-73N	0.0-0.5	Unrestricted	B-112S	0.0-0.5	Unrestricted	B-150N	0.0-0.5	Y-2			
B-36N	0.0-0.5	Z-3	B-74N	0.0-0.5	Unrestricted	B-113S	0.0-0.5	Y-1	B-151N	0.0-0.5	Y-1			
B-37N	0.0-0.5	Unrestricted	B-75N	0.0-0.5	Unrestricted	B-114S	0.0-0.5	Unrestricted	B-152N	0.0-0.5	Unrestricted			
B-38N	0.0-0.5	Unrestricted	B-76N	0.0-0.5	Unrestricted	B-115S	0.0-0.5	Unrestricted	B-153N	0.0-0.5	Y-1			

Table C-6 Caltrans Soil Classification for Soil Depth 0.0 - 0.5 fbg (Continued)															
Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil CIass	Sample	Depth	Soil CIass	Sample	Depth	Soil Class
B-164N	0.0-0.5	Unrestricted	B-209N	0.0-0.5	Y-1	B-244N	0.0-0.5	Unrestricted	B-279S	0.0-0.5	Unrestricted			
B-164NA	0.0-0.5	Unrestricted	B-210S	0.0-0.5	Y-1	B-245S	0.0-0.5	Unrestricted	B-280S	0.0-0.5	Unrestricted			
B-165N	0.0-0.5	Unrestricted	B-211S	0.0-0.5	Unrestricted	B-246N	0.0-0.5	Unrestricted	B-280S	0.0-0.5	Unrestricted			
B-166N	0.0-0.5	Unrestricted	B-212S	0.0-0.5	Y-1	B-247S	0.0-0.5	Y-1						
B-167N	0.0-0.5	Unrestricted	B-213S	0.0-0.5	Y-1	B-248S	0.0-0.5	Y-2						
B-168N	0.0-0.5	Unrestricted	B-214S	0.0-0.5	Unrestricted	B-249S	0.0-0.5	Unrestricted						
B-169N	0.0-0.5	Y-1	B-215S	0.0-0.5	Unrestricted	B-250N	0.0-0.5	Unrestricted						
B-170N	0.0-0.5	Unrestricted	B-216S	0.0-0.5	Unrestricted	B-251S	0.0-0.5	Y-2						
B-171N	0.0-0.5	Y-1	B-217S	0.0-0.5	Unrestricted	B-252S	0.0-0.5	Y-2						
B-171NA	0.0-0.5	Y-1	B-218S	0.0-0.5	Unrestricted	B-253S	0.0-0.5	Unrestricted						
B-172N	0.0-0.5	Y-1	B-218SA	0.0-0.5	Unrestricted	B-254S	0.0-0.5	Unrestricted						
B-173N	0.0-0.5	Unrestricted	B-219S	0.0-0.5	Unrestricted	B-255S	0.0-0.5	Unrestricted						
B-174N	0.0-0.5	Unrestricted	B-220S	0.0-0.5	Unrestricted	B-256S	0.0-0.5	Unrestricted						
B-180N	0.0-0.5	Unrestricted	B-221S	0.0-0.5	Unrestricted	B-256SA	0.0-0.5	Unrestricted						
B-181N	0.0-0.5	Y-1	B-222S	0.0-0.5	Unrestricted	B-257S	0.0-0.5	Unrestricted						
B-182N	0.0-0.5	Unrestricted	B-223S	0.0-0.5	Unrestricted	B-258S	0.0-0.5	Unrestricted						
B-183N	0.0-0.5	Unrestricted	B-224S	0.0-0.5	Unrestricted	B-259S	0.0-0.5	Unrestricted						
B-184N	0.0-0.5	Unrestricted	B-225S	0.0-0.5	Unrestricted	B-260S	0.0-0.5	Unrestricted						
B-185N	0.0-0.5	Unrestricted	B-226S	0.0-0.5	Unrestricted	B-261S	0.0-0.5	Unrestricted						
B-186N	0.0-0.5	Unrestricted	B-227S	0.0-0.5	Unrestricted	B-262S	0.0-0.5	Unrestricted						
B-187N	0.0-0.5	Unrestricted	B-228S	0.0-0.5	Unrestricted	B-263S	0.0-0.5	Unrestricted						
B-193N	0.0-0.5	Unrestricted	B-229S	0.0-0.5	Y-2	B-264S	0.0-0.5	Unrestricted						
B-194N	0.0-0.5	Unrestricted	B-230S	0.0-0.5	Unrestricted	B-264S	0.0-0.5	Unrestricted						
B-195N	0.0-0.5	Unrestricted	B-231S	0.0-0.5	Unrestricted	B-265S	0.0-0.5	Unrestricted						
B-196N	0.0-0.5	Unrestricted	B-232S	0.0-0.5	Unrestricted	B-266S	0.0-0.5	Unrestricted						
B-197N	0.0-0.5	Unrestricted	B-233S	0.0-0.5	Unrestricted	B-267S	0.0-0.5	Unrestricted						
B-198N	0.0-0.5	Unrestricted	B-234N	0.0-0.5	Unrestricted	B-268S	0.0-0.5	Unrestricted						
B-199N	0.0-0.5	Unrestricted	B-234NA	0.0-0.5	Unrestricted	B-269S	0.0-0.5	Unrestricted						
B-200N	0.0-0.5	Unrestricted	B-235N	0.0-0.5	Unrestricted	B-270S	0.0-0.5	Unrestricted						
B-201N	0.0-0.5	Y-1	B-236N	0.0-0.5	Unrestricted	B-271S	0.0-0.5	Unrestricted						
B-202N	0.0-0.5	Unrestricted	B-237S	0.0-0.5	Unrestricted	B-272S	0.0-0.5	Unrestricted						
B-202NA	0.0-0.5	Unrestricted	B-237SA	0.0-0.5	Unrestricted	B-272S	0.0-0.5	Unrestricted						
B-203N	0.0-0.5	Y-1	B-238S	0.0-0.5	Unrestricted	B-273S	0.0-0.5	Unrestricted						
B-204N	0.0-0.5	Y-2	B-239S	0.0-0.5	Unrestricted	B-274S	0.0-0.5	Unrestricted						
B-205N	0.0-0.5	Z-3	B-240S	0.0-0.5	Unrestricted	B-275S	0.0-0.5	Unrestricted						
B-206N	0.0-0.5	Y-1	B-241S	0.0-0.5	Unrestricted	B-276S	0.0-0.5	Unrestricted						
B-207N	0.0-0.5	Y-1	B-242N	0.0-0.5	Y-1	B-277S	0.0-0.5	Unrestricted						
B-208N	0.0-0.5	Unrestricted	B-243N	0.0-0.5	Y-1	B-278S	0.0-0.5	Unrestricted						

Table C-7 Caltrans Soil Classification for Soil Depth 1.0 - 1.5 fbg

Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class
B-1N	1.0-1.5	Unrestricted	B-38N	1.0-1.5	Unrestricted	B-76N	1.0-1.5	Unrestricted	B-114S	1.0-1.5	Unrestricted	B-151N	1.0-1.5	Y-1
B-2N	1.0-1.5	Unrestricted	B-39N	1.0-1.5	Y-2	B-77N	1.0-1.5	Unrestricted	B-115S	1.0-1.5	Unrestricted	B-152N	1.0-1.5	Unrestricted
B-3N	1.0-1.5	Y-1	B-40N	1.0-1.5	Unrestricted	B-78N	1.0-1.5	Unrestricted	B-116S	1.0-1.5	Y-1	B-153N	1.0-1.5	Y-1
B-4N	1.0-1.5	Y-1	B-41N	1.0-1.5	Unrestricted	B-79N	1.0-1.5	Unrestricted	B-117S	1.0-1.5	Unrestricted	B-154S	1.0-1.5	Unrestricted
B-5N	1.0-1.5	Unrestricted	B-42N	1.0-1.5	Y-1	B-80N	1.0-1.5	Unrestricted	B-118S	1.0-1.5	Unrestricted	B-155S	1.0-1.5	Unrestricted
B-6N	1.0-1.5	Unrestricted	B-43N	1.0-1.5	Y-1	B-81S	1.0-1.5	Unrestricted	B-119S	1.0-1.5	Unrestricted	B-156S	1.0-1.5	Unrestricted
B-7N	1.0-1.5	Unrestricted	B-44N	1.0-1.5	Y-1	B-82S	1.0-1.5	Unrestricted	B-120S	1.0-1.5	Unrestricted	B-157S	1.0-1.5	Unrestricted
B-8N	1.0-1.5	Unrestricted	B-45N	1.0-1.5	Y-2	B-83S	1.0-1.5	Unrestricted	B-121S	1.0-1.5	Unrestricted	B-158S	1.0-1.5	Unrestricted
B-9N	1.0-1.5	Unrestricted	B-46N	1.0-1.5	Unrestricted	B-84S	1.0-1.5	Unrestricted	B-122S	1.0-1.5	Unrestricted	B-159S	1.0-1.5	Unrestricted
B-10N	1.0-1.5	Y-1	B-47N	1.0-1.5	Z-3	B-85S	1.0-1.5	Unrestricted	B-123S	1.0-1.5	Unrestricted	B-160S	1.0-1.5	Unrestricted
B-11N	1.0-1.5	Unrestricted	B-48N	1.0-1.5	Unrestricted	B-86S	1.0-1.5	Unrestricted	B-124S	1.0-1.5	Unrestricted	B-161S	1.0-1.5	Unrestricted
B-12N	1.0-1.5	Unrestricted	B-49N	1.0-1.5	Unrestricted	B-87S	1.0-1.5	Unrestricted	B-125S	1.0-1.5	Unrestricted	B-162N	1.0-1.5	Unrestricted
B-13N	1.0-1.5	Y-2	B-50N	1.0-1.5	Unrestricted	B-88S	1.0-1.5	Unrestricted	B-126S	1.0-1.5	Unrestricted	B-163N	1.0-1.5	Y-1
B-14N	1.0-1.5	Unrestricted	B-52N	1.0-1.5	Unrestricted	B-89S	1.0-1.5	Unrestricted	B-127S	1.0-1.5	Unrestricted	B-60N	1.5-2.0	Unrestricted
B-15N	1.0-1.5	Unrestricted	B-53N	1.0-1.5	Unrestricted	B-90S	1.0-1.5	Unrestricted	B-128S	1.0-1.5	Y-1			
B-16N	1.0-1.5	Y-1	B-54N	1.0-1.5	Z-3	B-91S	1.0-1.5	Unrestricted	B-129S	1.0-1.5	Unrestricted			
B-17N	1.0-1.5	Unrestricted	B-55N	1.0-1.5	Unrestricted	B-92S	1.0-1.5	Unrestricted	B-130S	1.0-1.5	Unrestricted			
B-18N	1.0-1.5	Y-1	B-56N	1.0-1.5	Unrestricted	B-93S	1.0-1.5	Unrestricted	B-131S	1.0-1.5	Unrestricted			
B-19N	1.0-1.5	Unrestricted	B-57N	1.0-1.5	Unrestricted	B-94S	1.0-1.5	Unrestricted	B-132S	1.0-1.5	Unrestricted			
B-20N	1.0-1.5	Unrestricted	B-58N	1.0-1.5	Unrestricted	B-94S-3	1.0-1.5	Unrestricted	B-133S	1.0-1.5	Unrestricted			
B-21N	1.0-1.5	Y-1	B-59N	1.0-1.5	Unrestricted	B-95S	1.0-1.5	Unrestricted	B-134S	1.0-1.5	Unrestricted			
B-22N	1.0-1.5	Y-1	B-60N	1.0-1.5	Unrestricted	B-96S	1.0-1.5	Y-2	B-135S	1.0-1.5	Unrestricted			
B-23N	1.0-1.5	Unrestricted	B-61N	1.0-1.5	Y-2	B-97S	1.0-1.5	Y-1	B-136S	1.0-1.5	Y-1			
B-24N	1.0-1.5	Unrestricted	B-62N	1.0-1.5	Y-1	B-98S	1.0-1.5	Unrestricted	B-137S	1.0-1.5	Unrestricted			
B-25N	1.0-1.5	Unrestricted	B-63N	1.0-1.5	Unrestricted	B-99S	1.0-1.5	Unrestricted	B-138S	1.0-1.5	Y-1			
B-26N	1.0-1.5	Y-1	B-64N	1.0-1.5	Unrestricted	B-102S	1.0-1.5	Y-1	B-139S	1.0-1.5	Unrestricted			
B-27N	1.0-1.5	Unrestricted	B-65N	1.0-1.5	Unrestricted	B-103S	1.0-1.5	Unrestricted	B-140S	1.0-1.5	Y-2			
B-28N	1.0-1.5	Unrestricted	B-66N	1.0-1.5	Y-1	B-104S	1.0-1.5	Unrestricted	B-141S	1.0-1.5	Unrestricted			
B-29N	1.0-1.5	Unrestricted	B-67N	1.0-1.5	Unrestricted	B-105S	1.0-1.5	Unrestricted	B-142S	1.0-1.5	Unrestricted			
B-30N	1.0-1.5	Unrestricted	B-68N	1.0-1.5	Unrestricted	B-106S	1.0-1.5	Unrestricted	B-143S	1.0-1.5	Unrestricted			
B-31N	1.0-1.5	Unrestricted	B-69N	1.0-1.5	Unrestricted	B-107S	1.0-1.5	Unrestricted	B-144S	1.0-1.5	Unrestricted			
B-32N	1.0-1.5	Unrestricted	B-70N	1.0-1.5	Y-1	B-108S	1.0-1.5	Unrestricted	B-145S	1.0-1.5	Y-1			
B-33N	1.0-1.5	Unrestricted	B-71N	1.0-1.5	Unrestricted	B-109S	1.0-1.5	Unrestricted	B-146S	1.0-1.5	Unrestricted			
B-34N	1.0-1.5	Unrestricted	B-72N	1.0-1.5	Unrestricted	B-110S	1.0-1.5	Unrestricted	B-147S	1.0-1.5	Unrestricted			
B-35N	1.0-1.5	Unrestricted	B-73N	1.0-1.5	Unrestricted	B-111S	1.0-1.5	Unrestricted	B-148S	1.0-1.5	Unrestricted			
B-36N	1.0-1.5	Z-3	B-74N	1.0-1.5	Unrestricted	B-112S	1.0-1.5	Unrestricted	B-149S	1.0-1.5	Unrestricted			
B-37N	1.0-1.5	Unrestricted	B-75N	1.0-1.5	Unrestricted	B-113S	1.0-1.5	Unrestricted	B-150N	1.0-1.5	Unrestricted			

Table C-7 Caltrans Soil Classification for Soil Depth 1.0 - 1.5 fbg (Continued)												
Sample	**Depth**	**Soil Class**	**Sample**	**Depth**	**Soil Class**	**Sample**	**Depth**	**Soil Class**	**Sample**	**Depth**	**Soil Class**	**Sample**	**Depth**	**Soil Class**
B-172N	1.0-1.5	Y-1	B-225S	1.0-1.5	Unrestricted									
B-173N	1.0-1.5	Unrestricted	B-226S	1.0-1.5	Unrestricted									
B-174N	1.0-1.5	Unrestricted	B-227S	1.0-1.5	Unrestricted									
B-182N	1.0-1.5	Unrestricted	B-228S	1.0-1.5	Unrestricted									
B-184N	1.0-1.5	Unrestricted	B-229S	1.0-1.5	Y-1									
B-187N	1.0-1.5	Unrestricted	B-253S	1.0-1.5	Unrestricted									
B-195N	1.0-1.5	Unrestricted	B-254S	1.0-1.5	Unrestricted									
B-196N	1.0-1.5	Unrestricted	B-255S	1.0-1.5	Unrestricted									
B-197N	1.0-1.5	Unrestricted	B-257S	1.0-1.5	Unrestricted									
B-198N	1.0-1.5	Unrestricted	B-258S	1.0-1.5	Unrestricted									
B-199N	1.0-1.5	Unrestricted	B-259S	1.0-1.5	Unrestricted									
B-200N	1.0-1.5	Unrestricted	B-260S	1.0-1.5	Unrestricted									
B-201N	1.0-1.5	Y-1	B-261S	1.0-1.5	Unrestricted									
B-202N	1.0-1.5	Unrestricted	B-262S	1.0-1.5	Unrestricted									
B-202NA	1.0-1.5	Unrestricted	B-263S	1.0-1.5	Unrestricted									
B-203N	1.0-1.5	Unrestricted	B-264S	1.0-1.5	Unrestricted									
B-204N	1.0-1.5	Unrestricted	B-264S	1.0-1.5	Unrestricted									
B-205N	1.0-1.5	Y-1	B-265S	1.0-1.5	Unrestricted									
B-206N	1.0-1.5	Unrestricted	B-266S	1.0-1.5	Unrestricted									
B-207N	1.0-1.5	Unrestricted	B-267S	1.0-1.5	Unrestricted									
B-208N	1.0-1.5	Unrestricted	B-268S	1.0-1.5	Unrestricted									
B-209N	1.0-1.5	Unrestricted	B-269S	1.0-1.5	Unrestricted									
B-210S	1.0-1.5	Y-1	B-270S	1.0-1.5	Unrestricted									
B-211S	1.0-1.5	Unrestricted	B-271S	1.0-1.5	Unrestricted									
B-212S	1.0-1.5	Unrestricted	B-272S	1.0-1.5	Unrestricted									
B-213S	1.0-1.5	Unrestricted	B-272S	1.0-1.5	Unrestricted									
B-214S	1.0-1.5	Unrestricted	B-273S	1.0-1.5	Unrestricted									
B-215S	1.0-1.5	Unrestricted	B-274S	1.0-1.5	Unrestricted									
B-216S	1.0-1.5	Unrestricted	B-275S	1.0-1.5	Unrestricted									
B-217S	1.0-1.5	Unrestricted	B-276S	1.0-1.5	Unrestricted									
B-218S	1.0-1.5	Unrestricted	B-277S	1.0-1.5	Unrestricted									
B-218SA	1.0-1.5	Unrestricted	B-278S	1.0-1.5	Unrestricted									
B-219S	1.0-1.5	Unrestricted	B-279S	1.0-1.5	Unrestricted									
B-220S	1.0-1.5	Unrestricted	B-280S	1.0-1.5	Unrestricted									
B-221S	1.0-1.5	Unrestricted	B-280S	1.0-1.5	Y-1									
B-222S	1.0-1.5	Unrestricted												
B-223S	1.0-1.5	Unrestricted												
B-224S	1.0-1.5	Unrestricted												

Table C-8 Caltrans Soil Classification for Soil Depth 2.0 - 2.5 fbg

Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class
B-62N	2.0-2.4	Unrestricted	B-38N	2.0-2.5	Unrestricted	B-79N	2.0-2.5	Y-1	B-117S	2.0-2.5	Unrestricted	B-154S	2.0-2.5	Unrestricted
B-1N	2.0-2.5	Unrestricted	B-39N	2.0-2.5	Unrestricted	B-80N	2.0-2.5	Unrestricted	B-118S	2.0-2.5	Unrestricted	B-155S	2.0-2.5	Unrestricted
B-2N	2.0-2.5	Unrestricted	B-40N	2.0-2.5	Unrestricted	B-81S	2.0-2.5	Unrestricted	B-119S	2.0-2.5	Unrestricted	B-156S	2.0-2.5	Unrestricted
B-3N	2.0-2.5	Unrestricted	B-41N	2.0-2.5	Unrestricted	B-82S	2.0-2.5	Unrestricted	B-120S	2.0-2.5	Unrestricted	B-157S	2.0-2.5	Unrestricted
B-4N	2.0-2.5	Unrestricted	B-42N	2.0-2.5	Y-2	B-83S	2.0-2.5	Unrestricted	B-121S	2.0-2.5	Unrestricted	B-158S	2.0-2.5	Unrestricted
B-5N	2.0-2.5	Unrestricted	B-43N	2.0-2.5	Y-1	B-84S	2.0-2.5	Unrestricted	B-122S	2.0-2.5	Unrestricted	B-159S	2.0-2.5	Unrestricted
B-6N	2.0-2.5	Unrestricted	B-44N	2.0-2.5	Z-3	B-85S	2.0-2.5	Unrestricted	B-123S	2.0-2.5	Unrestricted	B-161S	2.0-2.5	Unrestricted
B-7N	2.0-2.5	Unrestricted	B-45N	2.0-2.5	Unrestricted	B-86S	2.0-2.5	Unrestricted	B-124S	2.0-2.5	Unrestricted	B-162N	2.0-2.5	Unrestricted
B-8N	2.0-2.5	Unrestricted	B-46N	2.0-2.5	Y-1	B-87S	2.0-2.5	Unrestricted	B-125S	2.0-2.5	Y-1	B-163N	2.0-2.5	Unrestricted
B-9N	2.0-2.5	Unrestricted	B-47N	2.0-2.5	Z-3	B-88S	2.0-2.5	Unrestricted	B-126S	2.0-2.5	Unrestricted			
B-ION	2.0-2.5	Y-1	B-48N	2.0-2.5	Unrestricted	B-89S	2.0-2.5	Unrestricted	B-127S	2.0-2.5	Unrestricted			
B-11N	2.0-2.5	Unrestricted	B-50N	2.0-2.5	Y-1	B-90S	2.0-2.5	Unrestricted	B-128S	2.0-2.5	Unrestricted			
B-12N	2.0-2.5	Unrestricted	B-52N	2.0-2.5	Unrestricted	B-91S	2.0-2.5	Unrestricted	B-129S	2.0-2.5	Unrestricted			
B-14N	2.0-2.5	Unrestricted	B-53N	2.0-2.5	Y-1	B-92S	2.0-2.5	Unrestricted	B-130S	2.0-2.5	Unrestricted			
B-15N	2.0-2.5	Unrestricted	B-54N	2.0-2.5	Y-2	B-93S	2.0-2.5	Unrestricted	B-131S	2.0-2.5	Unrestricted			
B-16N	2.0-2.5	Y-1	B-55N	2.0-2.5	Unrestricted	B-94S	2.0-2.5	Unrestricted	B-132S	2.0-2.5	Unrestricted			
B-17N	2.0-2.5	Unrestricted	B-56N	2.0-2.5	Unrestricted	B-94S-4	2.0-2.5	Unrestricted	B-133S	2.0-2.5	Unrestricted			
B-18N	2.0-2.5	Unrestricted	B-57N	2.0-2.5	Unrestricted	B-95S	2.0-2.5	Unrestricted	B-134S	2.0-2.5	Unrestricted			
B-19N	2.0-2.5	Unrestricted	B-58N	2.0-2.5	Unrestricted	B-96S	2.0-2.5	Unrestricted	B-135S	2.0-2.5	Unrestricted			
B-20N	2.0-2.5	Unrestricted	B-59N	2.0-2.5	Unrestricted	B-97S	2.0-2.5	Unrestricted	B-136S	2.0-2.5	Y-2			
B-21N	2.0-2.5	Y-1	B-61N	2.0-2.5	Unrestricted	B-98S	2.0-2.5	Unrestricted	B-137S	2.0-2.5	Unrestricted			
B-22N	2.0-2.5	Unrestricted	B-63N	2.0-2.5	Unrestricted	B-99S	2.0-2.5	Unrestricted	B-138S	2.0-2.5	Unrestricted			
B-23N	2.0-2.5	Unrestricted	B-64N	2.0-2.5	Unrestricted	B-102S	2.0-2.5	Unrestricted	B-139S	2.0-2.5	Unrestricted			
B-24N	2.0-2.5	Unrestricted	B-65N	2.0-2.5	Unrestricted	B-103S	2.0-2.5	Unrestricted	B-140S	2.0-2.5	Unrestricted			
B-25N	2.0-2.5	Unrestricted	B-66N	2.0-2.5	Unrestricted	B-104S	2.0-2.5	Unrestricted	B-141S	2.0-2.5	Unrestricted			
B-26N	2.0-2.5	Unrestricted	B-67N	2.0-2.5	Unrestricted	B-105S	2.0-2.5	Unrestricted	B-142S	2.0-2.5	Unrestricted			
B-27N	2.0-2.5	Unrestricted	B-68N	2.0-2.5	Unrestricted	B-106S	2.0-2.5	Unrestricted	B-143S	2.0-2.5	Unrestricted			
B-28N	2.0-2.5	Unrestricted	B-69N	2.0-2.5	Unrestricted	B-107S	2.0-2.5	Unrestricted	B-144S	2.0-2.5	Unrestricted			
B-29N	2.0-2.5	Unrestricted	B-70N	2.0-2.5	Unrestricted	B-108S	2.0-2.5	Unrestricted	B-145S	2.0-2.5	Unrestricted			
B-30N	2.0-2.5	Y-1	B-71N	2.0-2.5	Unrestricted	B-109S	2.0-2.5	Y-1	B-146S	2.0-2.5	Unrestricted			
B-31N	2.0-2.5	Unrestricted	B-72N	2.0-2.5	Unrestricted	B-110S	2.0-2.5	Unrestricted	B-147S	2.0-2.5	Unrestricted			
B-32N	2.0-2.5	Unrestricted	B-73N	2.0-2.5	Unrestricted	B-111S	2.0-2.5	Unrestricted	B-148S	2.0-2.5	Unrestricted			
B-33N	2.0-2.5	Unrestricted	B-74N	2.0-2.5	Unrestricted	B-112S	2.0-2.5	Unrestricted	B-149S	2.0-2.5	Unrestricted			
B-34N	2.0-2.5	Unrestricted	B-75N	2.0-2.5	Unrestricted	B-113S	2.0-2.5	Unrestricted	B-150N	2.0-2.5	Unrestricted			
B-35N	2.0-2.5	Unrestricted	B-76N	2.0-2.5	Unrestricted	B-114S	2.0-2.5	Unrestricted	B-151N	2.0-2.5	Unrestricted			
B-36N	2.0-2.5	Y-1	B-77N	2.0-2.5	Unrestricted	B-115S	2.0-2.5	Unrestricted	B-152N	2.0-2.5	Unrestricted			
B-37N	2.0-2.5	Unrestricted	B-78N	2.0-2.5	Unrestricted	B-116S	2.0-2.5	Y-1	B-153N	2.0-2.5	Unrestricted			

Table C-8 Caltrans Soil Classification for Soil Depth 2.0 - 2.5 fbg (Continued)														
Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class	Sample	Depth	Soil Class
B-172N	2.0-2.5	Unrestricted	B-225S	2.0-2.5	Unrestricted									
B-173N	2.0-2.5	Y-1	B-226S	2.0-2.5	Unrestricted									
B-174N	2.0-2.5	Unrestricted	B-227S	2.0-2.5	Unrestricted									
B-182N	2.0-2.5	Unrestricted	B-228S	2.0-2.5	Unrestricted									
B-184N	2.0-2.5	Unrestricted	B-229S	2.0-2.5	Z-3									
B-187N	2.0-2.5	Unrestricted	B-253S	2.0-2.5	Unrestricted									
B-195N	2.0-2.5	Unrestricted	B-254S	2.0-2.5	Unrestricted									
B-196N	2.0-2.5	Unrestricted	B-255S	2.0-2.5	Unrestricted									
B-197N	2.0-2.5	Unrestricted	B-257S	2.0-2.5	Unrestricted									
B-198N	2.0-2.5	Unrestricted	B-258S	2.0-2.5	Unrestricted									
B-199N	2.0-2.5	Unrestricted	B-259S	2.0-2.5	Unrestricted									
B-200N	2.0-2.5	Unrestricted	B-260S	2.0-2.5	Unrestricted									
B-201N	2.0-2.5	Y-1	B-261S	2.0-2.5	Unrestricted									
B-202N	2.0-2.5	Unrestricted	B-262S	2.0-2.5	Unrestricted									
B-202NA	2.0-2.5	Unrestricted	B-263S	2.0-2.5	Unrestricted									
B-203N	2.0-2.5	Unrestricted	B-264S	2.0-2.5	Unrestricted									
B-204N	2.0-2.5	Unrestricted	B-264S	2.0-2.5	Unrestricted									
B-205N	2.0-2.5	Y-1	B-265S	2.0-2.5	Unrestricted									
B-206N	2.0-2.5	Unrestricted	B-266S	2.0-2.5	Unrestricted									
B-207N	2.0-2.5	Unrestricted	B-267S	2.0-2.5	Unrestricted									
B-208N	2.0-2.5	Unrestricted	B-268S	2.0-2.5	Unrestricted									
B-209N	2.0-2.5	Unrestricted	B-269S	2.0-2.5	Unrestricted									
B-210S	2.0-2.5	Unrestricted	B-270S	2.0-2.5	Unrestricted									
B-211S	2.0-2.5	Unrestricted	B-271S	2.0-2.5	Unrestricted									
B-212S	2.0-2.5	Unrestricted	B-272S	2.0-2.5	Unrestricted									
B-213S	2.0-2.5	Unrestricted	B-272S	2.0-2.5	Unrestricted									
B-214S	2.0-2.5	Unrestricted	B-273S	2.0-2.5	Unrestricted									
B-215S	2.0-2.5	Unrestricted	B-274S	2.0-2.5	Unrestricted									
B-216S	2.0-2.5	Unrestricted	B-275S	2.0-2.5	Unrestricted									
B-217S	2.0-2.5	Unrestricted	B-276S	2.0-2.5	Unrestricted									
B-218S	2.0-2.5	Unrestricted	B-277S	2.0-2.5	Unrestricted									
B-218SA	2.0-2.5	Unrestricted	B-278S	2.0-2.5	Unrestricted									
B-219S	2.0-2.5	Unrestricted	B-279S	2.0-2.5	Unrestricted									
B-220S	2.0-2.5	Unrestricted	B-280S	2.0-2.5	Unrestricted									
B-221S	2.0-2.5	Unrestricted	B-280S	2.0-2.5	Unrestricted									
B-222S	2.0-2.5	Unrestricted												
B-223S	2.0-2.5	Unrestricted												
B-224S	2.0-2.5	Unrestricted												

Table C-9 Caltrans Soil Classification for Soil Depth 3.0 - 3.5 fbg												
Sample	**Depth**	**Soil Class**	**Sample**	**Depth**	**Soil Class**	**Sample**	**Depth**	**Soil Class**	**Sample**	**Depth**	**Soil Class**
B-39N	3.0-3.5	Unrestricted	B-80N	3.0-3.5	Unrestricted	B-118S	3.0-3.5	Unrestricted	B-156S	3.0-3.5	Unrestricted
B-40N	3.0-3.5	Unrestricted	B-81S	3.0-3.5	Unrestricted	B-119S	3.0-3.5	Unrestricted	B-157S	3.0-3.5	Unrestricted
B-17N	3.0-3.5	Unrestricted	B-82S	3.0-3.5	Unrestricted	B-120S	3.0-3.5	Unrestricted	B-158S	3.0-3.5	Unrestricted
B-18N	3.0-3.5	Unrestricted	B-83S	3.0-3.5	Unrestricted	B-121S	3.0-3.5	Unrestricted	B-159S	3.0-3.5	Unrestricted
B-19N	3.0-3.5	Unrestricted	B-84S	3.0-3.5	Unrestricted	B-122S	3.0-3.5	Unrestricted	B-161S	3.0-3.5	Unrestricted
B-20N	3.0-3.5	Y-1	B-85S	3.0-3.5	Unrestricted	B-123S	3.0-3.5	Unrestricted	B-162N	3.0-3.5	Unrestricted
B-24N	3.0-3.5	Unrestricted	B-86S	3.0-3.5	Unrestricted	B-124S	3.0-3.5	Unrestricted	B-163N	3.0-3.5	Unrestricted
B-25N	3.0-3.5	Unrestricted	B-87S	3.0-3.5	Unrestricted	B-125S	3.0-3.5	Unrestricted			
B-26N	3.0-3.5	Unrestricted	B-88S	3.0-3.5	Unrestricted	B-126S	3.0-3.5	Unrestricted			
B-27N	3.0-3.5	Unrestricted	B-89S	3.0-3.5	Unrestricted	B-127S	3.0-3.5	Unrestricted			
B-28N	3.0-3.5	Unrestricted	B-90S	3.0-3.5	Unrestricted	B-128S	3.0-3.5	Unrestricted			
B-29N	3.0-3.5	Y-1	B-91S	3.0-3.5	Unrestricted	B-129S	3.0-3.5	Unrestricted			
B-30N	3.0-3.5	Unrestricted	B-92S	3.0-3.5	Unrestricted	B-130S	3.0-3.5	Unrestricted			
B-31N	3.0-3.5	Unrestricted	B-93S	3.0-3.5	Unrestricted	B-131S	3.0-3.5	Unrestricted			
B-48N	3.0-3.5	Unrestricted	B-94S	3.0-3.5	Unrestricted	B-132S	3.0-3.5	Y-2			
B-50N	3.0-3.5	Unrestricted	B-94S-5	3.0-3.5	Unrestricted	B-133S	3.0-3.5	Unrestricted			
B-52N	3.0-3.5	Unrestricted	B-95S	3.0-3.5	Unrestricted	B-134S	3.0-3.5	Unrestricted			
B-53N	3.0-3.5	Unrestricted	B-96S	3.0-3.5	Unrestricted	B-135S	3.0-3.5	Unrestricted			
B-54N	3.0-3.5	Unrestricted	B-97S	3.0-3.5	Unrestricted	B-136S	3.0-3.5	Unrestricted			
B-55N	3.0-3.5	Unrestricted	B-98S	3.0-3.5	Unrestricted	B-137S	3.0-3.5	Unrestricted			
B-56N	3.0-3.5	Unrestricted	B-99S	3.0-3.5	Unrestricted	B-138S	3.0-3.5	Unrestricted			
B-57N	3.0-3.5	Unrestricted	B-102S	3.0-3.5	Unrestricted	B-139S	3.0-3.5	Unrestricted			
B-65N	3.0-3.5	Unrestricted	B-103S	3.0-3.5	Unrestricted	B-140S	3.0-3.5	Unrestricted			
B-66N	3.0-3.5	Unrestricted	B-104S	3.0-3.5	Unrestricted	B-141S	3.0-3.5	Unrestricted			
B-67N	3.0-3.5	Unrestricted	B-105S	3.0-3.5	Unrestricted	B-142S	3.0-3.5	Unrestricted			
B-68N	3.0-3.5	Unrestricted	B-106S	3.0-3.5	Unrestricted	B-143S	3.0-3.5	Unrestricted			
B-69N	3.0-3.5	Unrestricted	B-107S	3.0-3.5	Unrestricted	B-144S	3.0-3.5	Unrestricted			
B-70N	3.0-3.5	Unrestricted	B-108S	3.0-3.5	Unrestricted	B-145S	3.0-3.5	Unrestricted			
B-71N	3.0-3.5	Unrestricted	B-109S	3.0-3.5	Unrestricted	B-146S	3.0-3.5	Unrestricted			
B-72N	3.0-3.5	Unrestricted	B-110S	3.0-3.5	Unrestricted	B-147S	3.0-3.5	Unrestricted			
B-73N	3.0-3.5	Unrestricted	B-111S	3.0-3.5	Unrestricted	B-148S	3.0-3.5	Unrestricted			
B-74N	3.0-3.5	Unrestricted	B-112S	3.0-3.5	Unrestricted	B-149S	3.0-3.5	Unrestricted			
B-75N	3.0-3.5	Unrestricted	B-113S	3.0-3.5	Unrestricted	B-150N	3.0-3.5	Unrestricted			
B-76N	3.0-3.5	Unrestricted	B-114S	3.0-3.5	Unrestricted	B-151N	3.0-3.5	Unrestricted			
B-77N	3.0-3.5	Unrestricted	B-115S	3.0-3.5	Unrestricted	B-153N	3.0-3.5	Unrestricted			
B-78N	3.0-3.5	Unrestricted	B-116S	3.0-3.5	Unrestricted	B-154S	3.0-3.5	Unrestricted			
B-79N	3.0-3.5	Unrestricted	B-117S	3.0-3.5	Unrestricted	B-155S	3.0-3.5	Unrestricted			

APPENDIX D

OFFICIAL LABORATORY REPORTS AND CHAIN OF CUSTODY RECORDS
(on compact disc)

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAF' No.: 1838
NELAF' No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098417

RE: West County Connectors Project, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 098417
Project: West County Connectors Project, 151396
Lab ID: 098417-001

Client Sample ID: B-81S@0.0-0.5
Collection Date: 4/21/2008 9:21:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515E** QC Batch: **R94592**					PrepDate:		Analyst: **CL**
Lead	80	0.042	1.0		mg/L	20	5/15/2008 05:32 PM
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080516H** QC Batch: **45618**					PrepDate:	**5/13/2008**	Analyst: **AMT**
Lead	0.80	0.011	0.25		mg/L	5	5/16/2008 04:19 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080516C** QC Batch: **45675**					PrepDate:	**5/15/2008**	Analyst: **AMT**
Lead	3.8	0.053	1.2		mg/L	5	5/16/2008 11:55 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94592

Sample ID: **MB-45614**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **PBS**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457897**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45614**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **LCSS**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.974	0.050	1.000	0	97.4	85	115				

Sample ID: **098724-001ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457901**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.075	1.0						0.07818	0	20	

Sample ID: **098724-001AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457902**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.402	1.0	2.500	0.07818	92.9	71	118				

Sample ID: **098724-001AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457903**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.474	1.0	2.500	0.07818	95.8	71	118	2.402	2.95	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45618

Sample ID: **MB-45618**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/13/2008**	RunNo: **94650**
Client ID: **PBW**	Batch ID: **45618**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/16/2008**	SeqNo: **1459088**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.004	0.050									

Sample ID: **LCS-45618**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/13/2008**	RunNo: **94650**
Client ID: **LCSW**	Batch ID: **45618**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/16/2008**	SeqNo: **1459089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.060	0.050	1.000	0.004094	106	85	115				

Sample ID: **098417-001ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/13/2008**	RunNo: **94650**
Client ID: **B-81S@0.0-0.5**	Batch ID: **45618**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/16/2008**	SeqNo: **1459091**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.807	0.25						0.8039	0.418	20	

Sample ID: **098417-001AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/13/2008**	RunNo: **94650**
Client ID: **B-81S@0.0-0.5**	Batch ID: **45618**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/16/2008**	SeqNo: **1459092**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.148	0.25	2.500	0.8039	93.8	71	118				

Sample ID: **098417-001AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/13/2008**	RunNo: **94650**
Client ID: **B-81S@0.0-0.5**	Batch ID: **45618**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/16/2008**	SeqNo: **1459093**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.121	0.25	2.500	0.8039	92.7	71	118	3.148	0.855	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45675

Sample ID: **MB-45675**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/15/2008**	RunNo: **94621**
Client ID: **PBS**	Batch ID: **45675**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458586**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45637 TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/15/2008**	RunNo: **94621**
Client ID: **PBS**	Batch ID: **45675**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458587**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45675**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/15/2008**	RunNo: **94621**
Client ID: **LCSS**	Batch ID: **45675**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458588**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.956	0.050	1.000	0.004544	95.1	85	115				

Sample ID: **098417-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/15/2008**	RunNo: **94621**
Client ID: **B-81S@0.0-0.5**	Batch ID: **45675**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458591**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.254	1.2						3.812	11.0	20	

Sample ID: **098417-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/15/2008**	RunNo: **94621**
Client ID: **B-81S@0.0-0.5**	Batch ID: **45675**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458592**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.273	1.2	12.50	3.812	99.7	71	118				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45675

Sample ID: **098417-001AMSD** SampType: **MSD** TestCode: **6010_TC** Units: **mg/L** Prep Date: **5/15/2008** RunNo: **94621**
Client ID: **B-81S@0.0-0.5** Batch ID: **45675** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **5/16/2008** SeqNo: **1458593**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.168	1.2	12.50	3.812	90.8	71	118	16.27	7.03	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

April 29,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098417

RE: West County Connectors Project, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-81S@0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:21:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate: **4/24/2008**		Analyst: **CL**
Lead	740	0.25	5.0		mg/Kg	1	4/28/2008 03:40 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424D**	QC Batch: **R93845**				PrepDate:		Analyst: **CNP**
pH	7.1	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-81S@1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:25:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate: **4/24/2008**		Analyst: **CL**
Lead	18	0.25	5.0		mg/Kg	1	4/28/2008 03:43 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424D**	QC Batch: **R93845**				PrepDate:		Analyst: **CNP**
pH	7.7	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-81S@2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:28:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate: **4/24/2008**		Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 03:47 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424D**	QC Batch: **R93845**				PrepDate:		Analyst: **CNP**
pH	8.2	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-81S@3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:32:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate: **4/24/2008**		Analyst: **CL**
Lead	5.2	0.25	5.0		mg/Kg	1	4/28/2008 03:51 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424D**	QC Batch: **R93845**				PrepDate:		Analyst: **CNP**
pH	8.1	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-82S@0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 03:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-82S@1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 03:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-82S@2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:02 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-82S@3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 9:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-83S@0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:20:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-83S@1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:20:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B83S@2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:20:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B83S@3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:20:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B84S@0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:45:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B84S@1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:45:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B84S@2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:45:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 04:57 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B84S@3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 10:45:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 05:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B85S@0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:05:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 05:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B85S@1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:05:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 05:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B85S@2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:05:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 05:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B85S@3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:05:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428D**	QC Batch: **45183**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 05:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B86S 0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 05:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B86S 1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 05:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B86S 2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:01 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B86S 3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 11:50:00 AM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	5.8	0.25	5.0		mg/Kg	1	4/28/2008 06:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B87S 0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:17:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	16	0.25	5.0		mg/Kg	1	4/28/2008 06:07 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B87S 1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:20:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B87S 2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:25:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B87S 3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:22:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B87SA 0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:17:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	5.1	0.25	5.0		mg/Kg	1	4/28/2008 06:28 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B87SA 1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:20:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B87SA 2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:25:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:46 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B87SA 3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 12:28:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B88S 0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 1:40:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	7.4	0.25	5.0		mg/Kg	1	4/28/2008 06:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B88S 1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 1:40:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B88S 2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 1:40:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 06:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B88S 3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 1:40:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	5.0	0.25	5.0		mg/Kg	1	4/28/2008 07:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B89S 0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:05:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 07:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B89S 1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:05:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 07:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B89S 2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:05:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 07:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B89S 3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:05:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428A**	QC Batch: **45184**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 07:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-90S 0.0-0.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:30:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428E**	QC Batch: **45185**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 07:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-90S 1.0-1.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:35:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428E**	QC Batch: **45185**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 07:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-90S 2.0-2.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:38:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428E**	QC Batch: **45185**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	5.2	0.25	5.0		mg/Kg	1	4/28/2008 08:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	B-90S 3.0-3.5
Lab Order:	098417	**Collection Date:**	4/21/2008 2:42:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	SOIL
Lab ID:	098417-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080428E**	QC Batch: **45185**				PrepDate:	**4/24/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/28/2008 08:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

ANALYTICAL RESULTS

Advanced Technology Laboratories

Print Date: *29-Apr-08*

CLIENT:	TRC	**Client Sample ID:**	CREW 2-ER-1
Lab Order:	098417	**Collection Date:**	4/21/2008 2:50:00 PM
Project:	West County Connectors Project, 151396	**Matrix:**	WATER
Lab ID:	098417-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080428C**	QC Batch: **45240**				PrepDate:	**4/25/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	4/28/2008 12:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45183A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **PBS**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446840**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45183**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **LCSS**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	252.601	5.0	250.0	0	101	80	120				

Sample ID: **098417-010ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **B-83S@1.0-1.5**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446852**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.248	5.0						2.095	0	20	

Sample ID: **098417-010AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **B-83S@1.0-1.5**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446853**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	165.328	5.0	250.0	2.095	65.3	45	110				

Sample ID: **MB-45183B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **PBS**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446854**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098417-020ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **B85S@3.0-3.5**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446865**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.084	5.0						3.097	0	20	

Sample ID: **098417-020AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **B85S@3.0-3.5**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446866**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	161.365	5.0	250.0	3.097	63.3	45	110				

Sample ID: **098417-020AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93891**
Client ID: **B85S@3.0-3.5**	Batch ID: **45183**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446867**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	172.471	5.0	250.0	3.097	67.7	45	110	161.4	6.65	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45184A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **PBS**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446886**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45184**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **LCSS**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446887**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	246.619	5.0	250.0	0	98.6	80	120				

Sample ID: **098417-030ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **B87SA 1.0-1.5**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.146	5.0						2.350	0	20	

Sample ID: **098417-030AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **B87SA 1.0-1.5**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446899**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	158.292	5.0	250.0	2.350	62.4	45	110				

Sample ID: **MB-45184B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **PBS**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446900**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098417-040ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **B89S 3.0-3.5**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446911**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.641	5.0						4.503	0	20	

Sample ID: **098417-040AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **B89S 3.0-3.5**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446912**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	160.525	5.0	250.0	4.503	62.4	45	110				

Sample ID: **098417-040AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93932**
Client ID: **B89S 3.0-3.5**	Batch ID: **45184**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446913**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	136.462	5.0	250.0	4.503	52.8	45	110	160.5	16.2	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45185**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93933**
Client ID: **PBS**	Batch ID: **45185**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446914**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45185**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93933**
Client ID: **LCSS**	Batch ID: **45185**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446915**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	234.470	5.0	250.0	0	93.8	80	120				

Sample ID: **098417-044ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93933**
Client ID: **B-90S 3.0-3.5**	Batch ID: **45185**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446920**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.137	5.0						4.336	16.9	20	

Sample ID: **098417-044AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93933**
Client ID: **B-90S 3.0-3.5**	Batch ID: **45185**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446921**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	143.640	5.0	250.0	4.336	55.7	45	110				

Sample ID: **098417-044AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/24/2008**	RunNo: **93933**
Client ID: **B-90S 3.0-3.5**	Batch ID: **45185**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/28/2008**	SeqNo: **1446922**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	127.935	5.0	250.0	4.336	49.4	45	110	143.6	11.6	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45240**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **PBW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446770**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45240**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **LCSW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.996	0.25	1.000	0	99.6	85	115				

Sample ID: **098366-001BDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.2						0	0	20	

Sample ID: **098449-005AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.250	1.2	2.500	0	90.0	71	118				

Sample ID: **098449-005AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.366	1.2	2.500	0	94.6	71	118	2.250	5.02	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098417
Project: West County Connectors Project, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098417-004A-DUP**	SampType: **DUP**	TestCode: **9045_S**	Units: **pH Units**	Prep Date:				RunNo: **93845**			
Client ID: **B-81S@3.0-3.5**	Batch ID: **R93845**	TestNo: **EPA 9045C**		Analysis Date: **4/24/2008**				SeqNo: **1445198**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.050	0.10						8.110	0.743	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 5

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: 151396
Logged By: _____ Date: 4/23/08

Method of Transport
Client ☑
ATL ☐
CA OverN 'O ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1 CHILLED 9.8 Y ☐ N ☐ 4. SEALED Y ☐ N ☑
2. HEADSPACE (VOA) Y ☐ N/A ☑ 5. # OF SPLS MATCH COC Y ☑ N ☐
3. CONTAINER INTACT Y ☑ N ☐ 6. PRESERVED Y ☑ N ☐

Client: TRC	Address: 21 TECHNOLOGY		TEL: (949) 727-9336
Attn: DAVID LEHNON	City IRVINE	State CA. Zip Code	FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS PROJECT Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:10
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:45	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LEHNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLEHNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); CA BY EPA 9040

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode _____
OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0704417-011	B-815@0.0-0.5	4/22/08	0921	15	1	J	STANDARD
	2	B-815@1.0-1.5		0925		1		T.A.T.
	3	B-815@2.0-2.5		0928		1		
	4	B815@3.0-3.5		0932		1	↓	
	5	B825@0.0-0.5		0950		1	T	
	6	B825@1.0-1.5		0952		1		
	7	B825@2.0-2.5		0956		1		
	8	B825@3.0-3.5		0950		1	↓	
	9	B835@0.0-0.5		1020		1		
	10	B835@1.0-1.5	↓	1024	↓	1	↓	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 4/24/08

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS PROJECT Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 16:45	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 1654
Relinquished by: (Signature and Printed Name)	Date: /	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: _____ Print Name _____ Date _____ Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA. Zip

Bill To:
Attn: _____
CO: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) / LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO)	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0784117-11	B835@2.0-2.5	4/24/08	1020					X					X				15 DAY	1	T		
	12	B835@3.0-3.5		1020					X					X					1			
	13	B845@0.0-0.5		1045					X					X					1			
	14	B845@1.0-1.5		1045					X					X					1			
	15	B845@2.0-2.5		1045					X					X					1			
	16	B845@3.0-3.5		1045					X					X					1			
	17	B855@0.0-0.5		1105					X					X					1			
	18	B855@1.0-1.5		1105					X					X					1			
	19	B855@2.0-2.5		1105					X					X					1			
	20	B855@3.0-3.5		1105					X					X					1			

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr | B= Emergency Next workday | C= Critical 2 Workdays | D= Urgent 3 Workdays | E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.# _____
Logged By: _____ Date: _____

Method of Transpo: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1 CHILLED Y ○ N ○ | 4 SEALED Y ○ N ☐
2 HEADSPACE (VOA) Y ☐ N ☐ | 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ | 6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTOR PROJECT
Project #: 151396
Sampler: (Printed Name) DAVID YUNKER (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:10
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1645	Received by: (Signature and Printed Name) MARIO GIL	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address _____
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B LEAD	8015B (GRO) / 8020	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0984117-21	B86S 0.0-0.5	4/16/08	1150				X						X				15	1	T		
	22	B86S 1.0-1.5	"	1150				X						X				"	1	"		
	23	B86S 2.0-2.5	"	1150				X						X				"	1	"		
	24	B86S 3.0-3.5	"	1150				X						X				"	1	↓		
	25	B87S 0.0-0.5	"	1217				X						X				"	1	G		
	26	B87S 1.0-1.5	"	1222				X						X				"	1	"		
	27	B87S 2.0-2.5	"	1225				X						X				"	1	"		
	28	B87S 3.0-3.5	"	1228				X						X				"	1	"		
	29	B87SA 0.0-0.5	"	1217				X						X				"	1	"		
	30	B87SA 1.0-1.5	↓	1222				X						X				↓	1	↓		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr | B= Emergency Next workday | C= Critical 2 Workdays | D= Urgent 3 Workdays | E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Pg 4 of

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.# _____

Lagged By _____ Date _____

Method of Transport
Client ☑
ATL ☐
CA OverN ☐
FEDEX ☐
Other. _____

Sample Condition Upon Receipt
1 CHILLED Y ☑ N ☐ 4. SEALED Y ☑ N ☐
2 HEADSPACE (VOA) Y ☑ N ☐ 5 # OF SPLS MATCH COC Y ☑ N ☐
3 CONTAINER INTACT Y ☑ N ☐ 6 PRESERVED Y ☑ N ☐

Client: TRC	Address: 21 TECHNOLOGY DR.	TEL: (949) 727-9336
Attn: DAVID LENNON	City IRVINE State CA Zip Code	FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTORS PROJECT	Project #: 151396	Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 5:10
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:45	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize A T L to perform the work Indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode _____
OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0384171	B87SA 2.0-2.5	4/16/08	1225	15	1	G	STANDARD
	172	B87SA 3.0-3.5	"	1228	"	1	"	TAT
	33	B88S 0.0-0.5	"	1340	"	1	T	
	34	B88S 1.0-1.5	"	1340	"	1	"	
	35	B88S 2.0-2.5	"	1340	"	1	"	
	36	B88S 3.0-3.5	"	1340	"	1	"	
	37	B89S 0.0-0.5	"	1405	"	1	"	
	38	B89S 1.0-1.5	"	1405	"	1	"	
	39	B89S 2.0-2.5	"	1405	"	1	"	
	40	B89S 3.0-3.5	V	1405	↓	1	W	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Pg 5 of

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

PO # _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1 CHILLED Y ☐ NO 4 SEALED Y O N O
2. HEADSPACE (VOA) Y q N q 5. #OF SPLS MATCH COC Y q N q
3. CONTAINER INTACT Y ☐ N q 6. PRESERVED Y O N ☐

Client: TRC	Address: 21 TECHNOLOGY DR	TEL: (949) 7279336
Attn: DAVID LENNON	City IRVINE State CA. Zip Code	FAX: (949) 7530111

Project Name: WEST COUNTY CONNECTORS Project #: 151396 Sampler: (Printed Name) DAVID YOUK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
signature

Send Report To:
Attn: DAVID LENNON
c JRC
Address: 21 TECHNOLOGY DR
City IRVINE State Zip

Bill To:
Attn: B-1
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATIVE | QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. ▮ Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	096417-41	B-905 0.0-0.5	4/22/08	1430	15 DAY	1	G	STANDARD
	42	B-905 1.0-1.5	"	1435	"	1	"	TAT
	43	B-905 2.0-2.5	"	1438	"	1	"	EXCEPT
	44	B-905 3.0-3.5	"	1442	"	1	"	"
	45	DRUM WATER FROM WASH BUCKET	"	1446	24 HR	1	P	←
	46	CRSW 2-ER-1	"	1450	15 DAY	1	P	
		~~B-875 0.0-0.5~~	~~"~~	~~1217~~			~~G~~	
		~~B-875 1.0-1.5~~	~~"~~	~~1220~~			~~"~~	
		~~B-875 2.0-2.5~~	~~"~~	~~1225~~			~~"~~	
		~~B-875 3.0-3.5~~	~~"~~	~~1228~~			~~"~~	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder. Pink to submitter.

May 16,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098418

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-94S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET					**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	13	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-94S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
EPA3010A			**EPA 1311/ 6010B**				
RunID: **ICP6_080515E** QC Batch: **45630**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 08:28 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
WET			**WET/ EPA 7420**				
RunID: **AA2_080514A** QC Batch: **45528**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	1.7	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-94S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION	**EPA3010A**				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 08:31 PM
LEAD BY ATOMIC ABSORPTION	**WET**				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	0.29	0.19	0.25		mg/L	1	5/14/2008
LEAD BY ATOMIC ABSORPTION (STLC)	**WET**				**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	0.37	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B96S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:12:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	2.6	0.19	0.25		mg/L	1	5/14/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
WET			**WET/ EPA 7420**				
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	49	0.93	1.2		mg/L	5	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B96S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:14:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION	**EPA3010A**				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E** QC Batch: **45630**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	3.1	0.011	0.25		mg/L	5	5/15/2008 08:33 PM
LEAD BY ATOMIC ABSORPTION	**WET**				**WET DI/ EPA 7420**		
RunID: **AA2_080512C** QC Batch: **45525**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	1.6	0.19	0.25		mg/L	1	5/14/2008
LEAD BY ATOMIC ABSORPTION (STLC)	**WET**				**WET/ EPA 7420**		
RunID: **AA2_080514A** QC Batch: **45528**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	32	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098418
Project: West County Connectors, 151396
Lab ID: 098418-032

Client Sample ID: B96S 3.0-3.5
Collection Date: 4/22/2008 11:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION	**EPA3010A**				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 08:36 PM
LEAD BY ATOMIC ABSORPTION	**WET**				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008
LEAD BY ATOMIC ABSORPTION (STLC)	**WET**				**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098418
Project: West County Connectors, 151396
Lab ID: 098418-034

Client Sample ID: B97S 1.0-1.5
Collection Date: 4/22/2008 11:35:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET					**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.949	0.25						7.622	9.24	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.261	0.50	5.000	7.622	72.8	70	130				

Sample ID: **MB-45525A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45525**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **LCSS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.211	0.25	5.000	0	104	80	120				

Sample ID: **MB-45525B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098461-010A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.599	0.25						4.638	0.838	20	

Sample ID: **098461-010A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456743**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.434	0.25	5.000	4.638	95.9	70	130				

Sample ID: **098461-010A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456744**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.398	0.25	5.000	4.638	95.2	70	130	9.434	0.378	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45528

Sample ID: **MB-45528A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **PBS**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456471**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45528**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **LCSS**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456472**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.122	0.25	5.000	0	102	80	120				

Sample ID: **098420-006A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **ZZZZZZ**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456481**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.156	0.25						7.108	0.674	20	

Sample ID: **098420-006A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **ZZZZZZ**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456482**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.122	0.50	5.000	7.108	100	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458357**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.789	0.25						5.665	39.7	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.772	0.25	2.500	5.665	-75.7	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.575	0.25	2.500	5.665	-43.6	71	118	3.772	19.2	20	S

Sample ID: **MB-45630A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458392**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.023	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **LCS-45630**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **LCSS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458393**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.940	0.050	1.000	0.002733	93.7	85	115				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

May 28,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098418

RE: West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-94S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B96S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:12:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	1.2	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **098439-023A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.893	0.25						5.893	0.0145	20	

Sample ID: **098439-023A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.775	0.25	2.500	5.893	75.3	70	130				

Sample ID: **098439-023A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.813	0.25	2.500	5.893	76.8	70	130	7.775	0.485	20	

Sample ID: **MB-45890A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464846**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **098437-019A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464855**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.573	0.25						1.550	1.49	20	

Sample ID: **098437-019A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.007	0.25	2.500	1.550	98.3	70	130				

Sample ID: **MB-45890B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 01,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098418

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-94S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080429A**	QC Batch: **45250**				PrepDate: **4/28/2008**		Analyst: **CL**
Lead	84	0.25	5.0		mg/Kg	1	4/29/2008 05:38 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	8.6	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098418
Project: West County Connectors, 151396
Lab ID: 098418-002

Client Sample ID: B-94S 1.0-1.5
Collection Date: 4/22/2008 8:50:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080429A**	QC Batch: **45250**				PrepDate: **4/28/2008**		Analyst: **CL**
Lead	140	0.25	5.0		mg/Kg	1	4/29/2008 05:42 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-94S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080429A**	QC Batch: **45250**				PrepDate: **4/28/2008**		Analyst: **CL**
Lead	19	0.25	5.0		mg/Kg	1	4/29/2008 05:46 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	8.2	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098418
Project: West County Connectors, 151396
Lab ID: 098418-004

Client Sample ID: B-94S 3.0-3.5
Collection Date: 4/22/2008 8:50:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080429A**	QC Batch: **45250**				PrepDate: **4/28/2008**		Analyst: **CL**
Lead	7.8	0.25	5.0		mg/Kg	1	4/29/2008 05:50 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	7.9	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-92S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080429A**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/29/2008 05:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-92S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080429A**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/29/2008 05:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-92S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080429A**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/29/2008 06:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-92S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 12:59 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-91S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:39:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 01:03 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-91S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:41:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	5.7	0.25	5.0		mg/Kg	1	4/30/2008 01:06 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B91S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:43:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 01:20 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B91S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:46:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 01:23 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B91SA 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:39:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	5.3	0.25	5.0		mg/Kg	1	4/30/2008 01:27 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B91SA 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:41:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	5.1	0.25	5.0		mg/Kg	1	4/30/2008 01:30 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B91SA 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:43:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	5.8	0.25	5.0		mg/Kg	1	4/30/2008 01:41 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B91SA 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 9:46:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 01:44 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B93S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	7.0	0.25	5.0		mg/Kg	1	4/30/2008 01:47 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B93S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 01:51 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B93S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 01:54 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B93S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429H**	QC Batch: **45250**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 01:58 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B94S-2 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:25 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B94S-2 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:29 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B94S-2 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:32 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B94S-2 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:36 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B95S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:39 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098418
Project: West County Connectors, 151396
Lab ID: 098418-026

Client Sample ID: B95S 1.0-1.5
Collection Date: 4/22/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:43 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B95S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:46 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B95S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 02:50 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B96S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:12:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	560	0.25	5.0		mg/Kg	1	4/30/2008 02:53 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098418
Project: West County Connectors, 151396
Lab ID: 098418-030

Client Sample ID: B96S 1.0-1.5
Collection Date: 4/22/2008 11:14:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	330	0.25	5.0		mg/Kg	1	4/30/2008 03:03 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B96S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:16:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:21 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B96S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	140	0.25	5.0		mg/Kg	1	4/30/2008 03:24 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B97S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:28 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B97S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080430I**	QC Batch: **45342**				PrepDate:	**4/30/2008**	Analyst: **CL**
Lead	64	0.25	5.0		mg/Kg	1	4/30/2008 10:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B97S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:31 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B97S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 11:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B99S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:45 AM

CLIENT:	TRC	**Client Sample ID:**	B99S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:48 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B99S 2.0-2.5
Lab Order:	098418	**Collection Date:**	4/22/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:52 AM

CLIENT:	TRC	**Client Sample ID:**	B99S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429I**	QC Batch: **45251**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 03:55 AM

CLIENT:	TRC	**Client Sample ID:**	B98S 0.0-0.5
Lab Order:	098418	**Collection Date:**	4/22/2008 1:30:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429M**	QC Batch: **45252**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	6.8	0.25	5.0		mg/Kg	1	4/30/2008 04:16 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B98S 1.0-1.5
Lab Order:	098418	**Collection Date:**	4/22/2008 1:33:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429M**	QC Batch: **45252**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	5.2	0.25	5.0		mg/Kg	1	4/30/2008 04:27 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098418
Project: West County Connectors, 151396
Lab ID: 098418-043

Client Sample ID: B98S 2.0-2.5
Collection Date: 4/22/2008 1:40:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429M**	QC Batch: **45252**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	6.4	0.25	5.0		mg/Kg	1	4/30/2008 04:30 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B98S 3.0-3.5
Lab Order:	098418	**Collection Date:**	4/22/2008 1:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098418-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429M**	QC Batch: **45252**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	5.0	0.25	5.0		mg/Kg	1	4/30/2008 04:34 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	CREW 2-ER-2
Lab Order:	098418	**Collection Date:**	4/22/2008 2:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	WATER
Lab ID:	098418-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080428C**	QC Batch: **45240**				PrepDate:	**4/25/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	4/28/2008 01:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098418-010ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93979**
Client ID: **B-91S 1.0-1.5**	Batch ID: **45250**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.671	5.0						5.744	1.28	20	

Sample ID: **098418-010AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93979**
Client ID: **B-91S 1.0-1.5**	Batch ID: **45250**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	117.431	5.0	250.0	5.744	44.7	45	110				S

Sample ID: **MB-45250B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93979**
Client ID: **PBS**	Batch ID: **45250**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448314**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **098418-020ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93979**
Client ID: **B93S 3.0-3.5**	Batch ID: **45250**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.181	5.0						3.452	0	20	

Sample ID: **098418-020AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93979**
Client ID: **B93S 3.0-3.5**	Batch ID: **45250**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448326**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	133.842	5.0	250.0	3.452	52.2	45	110				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098418-020AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93979**
Client ID: **B93S 3.0-3.5**	Batch ID: **45250**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448327**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	117.484	5.0	250.0	3.452	45.6	45	110	133.8	13.0	20	

Sample ID: **LCS-45250**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94014**
Client ID: **LCSS**	Batch ID: **45250**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448494**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	248.971	5.0	250.0	0	99.6	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45251A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93980**
Client ID: **PBS**	Batch ID: **45251**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448373**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45251**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93980**
Client ID: **LCSS**	Batch ID: **45251**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448374**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	254.698	5.0	250.0	0	102	80	120				

Sample ID: **098418-030ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93980**
Client ID: **B96S 1.0-1.5**	Batch ID: **45251**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448385**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	279.530	5.0						326.8	15.6	20	

Sample ID: **098418-030AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93980**
Client ID: **B96S 1.0-1.5**	Batch ID: **45251**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448386**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	456.974	5.0	250.0	326.8	52.1	45	110				

Sample ID: **098418-040ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93980**
Client ID: **B99S 3.0-3.5**	Batch ID: **45251**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448397**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.482	5.0						2.298	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098418-040AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93980**
Client ID: **B99S 3.0-3.5**	Batch ID: **45251**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448398**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	126.867	5.0	250.0	2.298	49.8	45	110				

Sample ID: **098418-040AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93980**
Client ID: **B99S 3.0-3.5**	Batch ID: **45251**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448399**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	121.611	5.0	250.0	2.298	47.7	45	110	126.9	4.23	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45252A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93988**
Client ID: **PBS**	Batch ID: **45252**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448400**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45252**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93988**
Client ID: **LCSS**	Batch ID: **45252**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448401**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	252.332	5.0	250.0	0	101	80	120				

Sample ID: **098430-023ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93988**
Client ID: **ZZZZZZ**	Batch ID: **45252**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448412**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.267	5.0						2.317	0	20	

Sample ID: **098430-023AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93988**
Client ID: **ZZZZZZ**	Batch ID: **45252**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448413**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.709	5.0	250.0	2.317	57.8	45	110				

Sample ID: **098430-035AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94026**
Client ID: **ZZZZZZ**	Batch ID: **45252**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448765**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	152.096	5.0	250.0	3.157	59.6	45	110				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098430-035ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94026**
Client ID: **ZZZZZZ**	Batch ID: **45252**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.739	5.0						3.157	0	20	

Sample ID: **098430-035AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94026**
Client ID: **ZZZZZZ**	Batch ID: **45252**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448767**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	155.802	5.0	250.0	3.157	61.1	45	110	152.1	2.41	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45342**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94027**
Client ID: **PBS**	Batch ID: **45342**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448768**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45342**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94027**
Client ID: **LCSS**	Batch ID: **45342**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448769**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	281.818	5.0	250.0	0	113	80	120				

Sample ID: **098418-034ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94027**
Client ID: **B97S 1.0-1.5**	Batch ID: **45342**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	77.325	5.0						64.03	18.8	20	

Sample ID: **098418-034AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94027**
Client ID: **B97S 1.0-1.5**	Batch ID: **45342**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448772**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	200.799	5.0	250.0	64.03	54.7	45	110				

Sample ID: **098418-034AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94027**
Client ID: **B97S 1.0-1.5**	Batch ID: **45342**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	255.160	5.0	250.0	64.03	76.5	45	110	200.8	23.8	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45240**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **PBW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446770**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45240**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **LCSW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.996	0.25	1.000	0	99.6	85	115				

Sample ID: **098366-001BDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.2						0	0	20	

Sample ID: **098449-005AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.250	1.2	2.500	0	90.0	71	118				

Sample ID: **098449-005AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.366	1.2	2.500	0	94.6	71	118	2.250	5.02	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098418
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098420-004A-DUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **93846**
Client ID: **ZZZZZZ** Batch ID: **R93846** TestNo: **EPA 9045C** Analysis Date: **4/24/2008** SeqNo: **1445221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.560	0.10						8.750	2.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.# _____

Logged By: _____ Date: 4/23/08

Method of Transport / Client
ATL ☒
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1 CHILLED 4.4 Y☐ N☐ 4 SEALED Y☐ N☑
2 HEADSPACE (VOA) Y☐ N/A N☐ 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA. Zip Code
TEL: (949) 727-9336
FAX: 949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:10
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 16:45	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA. Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | PH BY EPA 9040

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	PH BY EPA 9040	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0984184-001	B-9S 0.0-0.5	4/22/08	0850				X					X		X					15	1	T		STANDARD
	2	B-9S 1.0-1.5		0850				X					X		X						1			TAT
	3	B-9S 2.0-2.5		0850				X					X		X						1			
	4	B-9S 3.0-3.5		0850				X					X		X						1			
	5	B-9S 0.0-0.5		0930				X					X		X						1			
	6	B-9S 1.0-1.5		0930				X					X		X						1			
	7	B-9S 2.0-2.5		0930				X					X		X						1			
	8	B-9S 3.0-3.5		0930				X					X		X						1			
	9	B-9S 0.0-0.5		0959				X					X		X						1	G		
	10	B-9S 1.0-1.5		0941				X					X		X						1			

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N U 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N U 5. # OF SPLS MATCH COC Y q N☐
3. CONTAINER INTACT Y q N U 6. PRESERVED Y O N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151796
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1645	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ oats
Signature

Send Report To:
Attn: DAVID LENNON
co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn: _____
co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) CAM 17	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0984187 11	B-91S 2.0-2.5	4/22/08	0943				X						X				15 DAY	1	G	
	12	B-91S 3.0-3.5		0946				X						X					1		
	13	B91SA 0.0-0.5		0939				X						X					1		
	14	B91SA 1.0-1.5		0941				X						X					1		
	15	B91SA 2.0-2.5		0943				X						X					1		
	16	B91SA 3.0-3.5		0946				X						X					1		
	17	B93S 0.0-0.5		1010				X						X					1	T	
	18	B93S 1.0-1.5		1010				X						X					1		
	19	B93S 2.0-2.5		1010				X						X					1		
	20	B93S 3.0-3.5		1010				X						X					1		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
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Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA. Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396 Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/22/08 Time: 1510 Received by: (Signature and Printed Name) Date: 4/23/08 Time: 5.10
Relinquished by: (Signature and Printed Name) Date: 4/23/08 Time: 16.45 Received by: (Signature and Printed Name) Date: 4/23/08 Time: 1545
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA. Zip

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8061A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metals) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	0804918-21	B94S-2 0.0-0.5	4/22/08	1035	15 DAY	1	T	STANDARD TAT
	22	B94S-2 1.0-1.5		1035		1		
	23	B94S-2 2.0-2.5		1035		1		
	24	B94S-2 3.0-3.5		1035		1		
	25	B95S 0.0-0.5		1055		1		
	26	B95S 1.0-1.5		1055		1		
	27	B95S 2.0-2.5		1055		1		
	28	B95S 3.0-3.5		1055		1	↓	
	29	B96S 0.0-0.5		1112		1	G	
	30	B96S 1.0-1.5		1114		1	↓	

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TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

P.O.#:

Logged By: Date:

FOR LABORATORY USE ONLY:

Method of Transport
Client q
ATL ☒
CA OverN ☐
FEDEX ☐
Other:

Sample Condition Upon Receipt
1. CHILLED Y☐ NO 4. SEALED Y O N☐
2. HEADSPACE (VOA) Y☐ Nq 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Yq Nq 6. PRESERVED Y O N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/23/08 Time: 1510 Received by: (Signature and Printed Name) Date: 4/23/08 Time: 5:10
Relinquished by: (Signature and Printed Name) Date: 4/23/08 Time: 15:45 Received by: (Signature and Printed Name) Date: 4/23/08 Time: 15:45
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Ann:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode
OTHER

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) LEAD	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0804218-31	B96S 2.0-2.5	4/22/08	1116				X						X				15 DAY	1	G		STANDARD TAT
	32	B96S 3.0-3.5		1120				X						X					1	G		
	33	B97S 0.0-0.5		1135				X						X					1	T		
	34	B97S 1.0-1.5		1135				X						X					1			
	35	B97S 2.0-2.5		1135				X						X					1			
	36	B97S 3.0-3.5		1135				X						X					1			
	37	B99S 0.0-0.5		1310				X						X					1			
	38	B99S 1.0-1.5		1310				X						X					1			
	39	B99S 2.0-2.5		1310				X						X					1			
	40	B99S 3.0-3.5		1310				X						X					1			

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Lagged By: _____ Date: _____

Method of Transport: ☐ Client ☒ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y ☐ N O 5. #OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N q 6. PRESERVED Y O N ☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA. Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:16
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA. Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0704418-41	B98S 0.0-0.5	4/22/08	1330	15 DAY	1	G	STANDARD TAT
	42	B98S 1.0-1.5		1333		1		
	43	B98S 2.0-2.5		1340		1		
	44	B98S 3.0-3.5		1345		1		
	45	CRUSHER-2		1400		1	P	
		~~B-87SA 0.0-0.5~~	~~4/22/08~~	~~1217~~		~~1~~	~~G~~	
		~~B-87SA 1.0-1.5~~		~~1220~~		~~1~~		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder, Pink to submitter.

May 16,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098420

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-102S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516E**	QC Batch: **R94643**				PrepDate:		Analyst: **AMT**
Lead	20	0.021	0.50		mg/L	10	5/16/2008 03:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:53:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION	**EPA3010A**				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	0.38	0.011	0.25		mg/L	5	5/15/2008 08:39 PM
LEAD BY ATOMIC ABSORPTION (STLC)	**WET**				**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	7.1	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-102SA 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET					**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate: **5/9/2008**	Analyst: **LKN**	
Lead	13	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102SA 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:53:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET					**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate: **5/9/2008**	Analyst: **LKN**	
Lead	2.6	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-105S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION	**EPA3010A**				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**	Analyst: **AMT**	
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 08:41 PM
LEAD BY ATOMIC ABSORPTION	**WET**				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**	Analyst: **LKN**	
Lead	0.61	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-109S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET				**WET/ EPA 7420**			
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate: **5/9/2008**	Analyst: **LKN**	
Lead	4.3	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-032

Client Sample ID: B-109S 3.0-3.5
Collection Date: 4/23/2008 10:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 08:44 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-113S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET					**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate: **5/9/2008**	Analyst: **LKN**	
Lead	7.0	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-116S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:50:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-054		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET					**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate: **5/9/2008**	Analyst: **LKN**	
Lead	11	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-055

Client Sample ID: B-116S 2.0-2.5
Collection Date: 4/23/2008 12:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION	**EPA3010A**				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 08:46 PM
LEAD BY ATOMIC ABSORPTION	**WET**				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	0.26	0.19	0.25		mg/L	1	5/14/2008
LEAD BY ATOMIC ABSORPTION (STLC)	**WET**				**WET/ EPA 7420**		
RunID: **AA2_080514A**	QC Batch: **45528**				PrepDate:	**5/9/2008**	Analyst: **LKN**
Lead	6.3	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94643

Sample ID: **MB-45636** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94643**
Client ID: **PBS** Batch ID: **R94643** TestNo: **WET/ EPA 60** Analysis Date: **5/16/2008** SeqNo: **1458889**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45636** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94643**
Client ID: **LCSS** Batch ID: **R94643** TestNo: **WET/ EPA 60** Analysis Date: **5/16/2008** SeqNo: **1458890**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.031	0.050	1.000	0	103	85	115				

Sample ID: **098496-001ADUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94643**
Client ID: **ZZZZZZ** Batch ID: **R94643** TestNo: **WET/ EPA 60** Analysis Date: **5/16/2008** SeqNo: **1458894**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.201	0.50						2.005	50.1	20	R

Sample ID: **098496-001AMS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94643**
Client ID: **ZZZZZZ** Batch ID: **R94643** TestNo: **WET/ EPA 60** Analysis Date: **5/16/2008** SeqNo: **1458895**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.962	0.50	2.500	2.005	78.3	71	118				

Sample ID: **098496-001AMSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94643**
Client ID: **ZZZZZZ** Batch ID: **R94643** TestNo: **WET/ EPA 60** Analysis Date: **5/16/2008** SeqNo: **1458896**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.049	0.50	2.500	2.005	81.7	71	118	3.962	2.17	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458357**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.789	0.25						5.665	39.7	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.772	0.25	2.500	5.665	-75.7	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.575	0.25	2.500	5.665	-43.6	71	118	3.772	19.2	20	S

Sample ID: **MB-45630A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458392**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.023	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **LCS-45630**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **LCSS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60 EPA3010A**		Analysis Date: **5/15/2008**	SeqNo: **1458393**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.940	0.050	1.000	0.002733	93.7	85	115				

Sample ID: **098438-020ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60 EPA3010A**		Analysis Date: **5/15/2008**	SeqNo: **1458403**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.528	0.25						14.21	20.8	20	R

Sample ID: **098438-020AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60 EPA3010A**		Analysis Date: **5/15/2008**	SeqNo: **1458404**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.357	0.25	2.500	14.21	5.94	71	118				S

Sample ID: **MB-45630B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60 EPA3010A**		Analysis Date: **5/15/2008**	SeqNo: **1458678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.096	0.050									

Sample ID: **MB-45565B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60 EPA3010A**		Analysis Date: **5/15/2008**	SeqNo: **1458679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458689**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.289	0.25						4.946	40.2	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458690**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.312	0.25	2.500	4.946	-65.4	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458691**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.990	0.25	2.500	4.946	-38.2	71	118	3.312	18.6	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45528

Sample ID: **MB-45528A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **PBS**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456471**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45528**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **LCSS**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456472**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.122	0.25	5.000	0	102	80	120				

Sample ID: **098420-006A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **B-102S 1.0-1.5**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456481**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.156	0.25						7.108	0.674	20	

Sample ID: **098420-006A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **B-102S 1.0-1.5**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456482**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.122	0.50	5.000	7.108	100	80	120				

Sample ID: **MB-45528B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94510**
Client ID: **PBS**	Batch ID: **45528**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456483**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.949	0.25						7.622	9.24	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.261	0.50	5.000	7.622	72.8	70	130				

Sample ID: **MB-45525A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45525**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **LCSS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.211	0.25	5.000	0	104	80	120				

Sample ID: **MB-45525B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098461-010A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.599	0.25						4.638	0.838	20	

Sample ID: **098461-010A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456743**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.434	0.25	5.000	4.638	95.9	70	130				

Sample ID: **098461-010A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456744**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.398	0.25	5.000	4.638	95.2	70	130	9.434	0.378	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098420

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. R
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-102S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.66	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102SA 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.75	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-113S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.33	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-116S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:50:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-054		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A				**EPA 1311/ 7420**			
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	0.63	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45905

Sample ID: **MB-45905A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465599**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45853A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465600**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45905**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **LCSS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465601**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.092	0.25	1.000	0	109	80	120				

Sample ID: **098438-013A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.840	0.25						0.8142	3.13	20	

Sample ID: **098438-013A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.133	0.25	2.500	0.8142	92.8	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45905

Sample ID: **MB-45905B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465613**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45853B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.222	0.25									

Sample ID: **098438-030A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.631	0.25						0.6352	0.630	20	

Sample ID: **098438-030A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465622**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.281	0.25	2.500	0.6352	106	70	130				

Sample ID: **098438-030A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465623**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.242	0.25	2.500	0.6352	104	70	130	3.281	1.20	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

May 01,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098420

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 23,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-001

Client Sample ID: B-103S 0.0-0.5
Collection Date: 4/23/2008 8:38:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**		Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:46 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-002

Client Sample ID: B-103S 1.0-1.5
Collection Date: 4/23/2008 8:38:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**		Analyst: **CL**
Lead	5.1	0.25	5.0		mg/Kg	1	5/1/2008 10:49 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	8.4	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-003

Client Sample ID: B-103S 2.0-2.5
Collection Date: 4/23/2008 8:38:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**		Analyst: **CL**
Lead	8.6	0.25	5.0		mg/Kg	1	5/1/2008 10:53 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	8.4	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-103S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:38:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**		Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:56 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080424E**	QC Batch: **R93846**				PrepDate:		Analyst: **CNP**
pH	8.8	0.10	0.10		pH Units	1	4/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	190	0.25	5.0		mg/Kg	1	5/1/2008 11:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:53:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	100	0.25	5.0		mg/Kg	1	5/1/2008 11:03 AM

CLIENT:	TRC	**Client Sample ID:**	B-102S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:56:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 11:07 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 11:10 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102SA 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	100	0.25	5.0		mg/Kg	1	5/1/2008 11:14 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102SA 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:53:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	64	0.25	5.0		mg/Kg	1	5/1/2008 11:24 AM

CLIENT:	TRC	**Client Sample ID:**	B-102SA 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 8:56:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 11:38 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-102SA 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 11:41 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-105S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 11:45 AM

CLIENT:	TRC	**Client Sample ID:**	B-105S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 11:48 AM

CLIENT:	TRC	**Client Sample ID:**	B-105S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 11:52 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-105S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	17	0.25	5.0		mg/Kg	1	5/1/2008 11:55 AM

CLIENT:	TRC	**Client Sample ID:**	B-106S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:32:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 12:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-106S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:32:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 12:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-106S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:32:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	7.1	0.25	5.0		mg/Kg	1	5/1/2008 12:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-106S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:32:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501B**	QC Batch: **45292**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 12:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-107S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:45:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	5.3	0.25	5.0		mg/Kg	1	5/1/2008 12:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-107S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:45:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 12:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-107S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 9:45:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 12:56 PM

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-024

Client Sample ID: B-107S 3.0-3.5
Collection Date: 4/23/2008 9:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	6.6	0.25	5.0		mg/Kg	1	5/1/2008 12:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-108S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 01:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-108S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 01:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-027

Client Sample ID: B-108S 2.0-2.5
Collection Date: 4/23/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	9.9	0.25	5.0		mg/Kg	1	5/1/2008 01:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-108S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 01:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-109S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	31	0.25	5.0		mg/Kg	1	5/1/2008 01:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-030

Client Sample ID: B-109S 1.0-1.5
Collection Date: 4/23/2008 10:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	29	0.25	5.0		mg/Kg	1	5/1/2008 01:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-109S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	50	0.25	5.0		mg/Kg	1	5/1/2008 01:41 PM

CLIENT:	TRC	**Client Sample ID:**	B-109S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	15	0.25	5.0		mg/Kg	1	5/1/2008 01:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-110S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	23	0.25	5.0		mg/Kg	1	5/1/2008 01:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-110S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:37:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 01:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-110S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	5.3	0.25	5.0		mg/Kg	1	5/1/2008 01:55 PM

CLIENT:	TRC	**Client Sample ID:**	B-110S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:43:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 01:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-037

Client Sample ID: B-111S 0.0-0.5
Collection Date: 4/23/2008 10:48:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	14	0.25	5.0		mg/Kg	1	5/1/2008 02:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-111S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	9.1	0.25	5.0		mg/Kg	1	5/1/2008 02:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-111S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:53:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	6.3	0.25	5.0		mg/Kg	1	5/1/2008 02:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-111S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501C**	QC Batch: **45293**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	5.1	0.25	5.0		mg/Kg	1	5/1/2008 02:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-113S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	120	0.25	5.0		mg/Kg	1	5/1/2008 02:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-113S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 02:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-113S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	7.2	0.25	5.0		mg/Kg	1	5/1/2008 02:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-113S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	5.8	0.25	5.0		mg/Kg	1	5/1/2008 03:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-045

Client Sample ID: B-114S 0.0-0.5
Collection Date: 4/23/2008 12:20:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 03:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-114S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:20:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 03:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-114S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:20:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	11	0.25	5.0		mg/Kg	1	5/1/2008 03:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-114S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:20:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	5.5	0.25	5.0		mg/Kg	1	5/1/2008 03:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-115S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-049		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	34	0.25	5.0		mg/Kg	1	5/1/2008 03:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-115S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-050		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	32	0.25	5.0		mg/Kg	1	5/1/2008 03:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-115S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-051		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	5.2	0.25	5.0		mg/Kg	1	5/1/2008 03:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-115S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-052		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	6.5	0.25	5.0		mg/Kg	1	5/1/2008 03:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-053

Client Sample ID: B-116S 0.0-0.5
Collection Date: 4/23/2008 12:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	43	0.25	5.0		mg/Kg	1	5/1/2008 03:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-054

Client Sample ID: B-116S 1.0-1.5
Collection Date: 4/23/2008 12:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	130	0.25	5.0		mg/Kg	1	5/1/2008 03:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-116S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:50:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-055		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	78	0.25	5.0		mg/Kg	1	5/1/2008 04:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-116S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 12:50:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-056		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 04:05 PM

CLIENT:	TRC	**Client Sample ID:**	B-117S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-057		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	41	0.25	5.0		mg/Kg	1	5/1/2008 04:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-117S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-058		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	14	0.25	5.0		mg/Kg	1	5/1/2008 04:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-117S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-059		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	6.9	0.25	5.0		mg/Kg	1	5/1/2008 04:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-117S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-060		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501D**	QC Batch: **45294**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	7.0	0.25	5.0		mg/Kg	1	5/1/2008 04:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-118S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-061		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	27	0.25	5.0		mg/Kg	1	5/1/2008 04:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-118S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-062		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 04:53 PM

CLIENT:	TRC	**Client Sample ID:**	B-118S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-063		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	6.0	0.25	5.0		mg/Kg	1	5/1/2008 05:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-064

Client Sample ID: B-118S 3.0-3.5
Collection Date: 4/23/2008 1:25:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 05:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-119S 0.0-0.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-065		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	17	0.25	5.0		mg/Kg	1	5/1/2008 05:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-119S 1.0-1.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-066		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 05:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-119S 2.0-2.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-067		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	9.6	0.25	5.0		mg/Kg	1	5/1/2008 05:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-119S 3.0-3.5
Lab Order:	098420	**Collection Date:**	4/23/2008 1:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098420-068		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	7.2	0.25	5.0		mg/Kg	1	5/1/2008 05:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098420
Project: West County Connectors, 151396
Lab ID: 098420-069

Client Sample ID: CREW 2-ER 3
Collection Date: 4/23/2008 2:10:00 PM
Matrix: WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080428C**	QC Batch: **45240**				PrepDate:	**4/25/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	4/28/2008 01:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45292A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94050**
Client ID: **PBS**	Batch ID: **45292**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449199**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45292**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94050**
Client ID: **LCSS**	Batch ID: **45292**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449200**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	274.036	5.0	250.0	0	110	80	120				

Sample ID: **098420-010ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94050**
Client ID: **B-102SA 1.0-1.5**	Batch ID: **45292**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449211**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	39.727	5.0						63.98	46.8	20	R

Sample ID: **098420-010AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94050**
Client ID: **B-102SA 1.0-1.5**	Batch ID: **45292**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449212**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	240.865	5.0	250.0	63.98	70.8	45	110				

Sample ID: **098420-020ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94050**
Client ID: **B-106S 3.0-3.5**	Batch ID: **45292**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449224**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.769	5.0						4.079	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098420-020AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94050**
Client ID: **B-106S 3.0-3.5**	Batch ID: **45292**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449225**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	169.391	5.0	250.0	4.079	66.1	45	110				

Sample ID: **098420-020AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94050**
Client ID: **B-106S 3.0-3.5**	Batch ID: **45292**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449226**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	152.463	5.0	250.0	4.079	59.4	45	110	169.4	10.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45293A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94055**
Client ID: **PBS**	Batch ID: **45293**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449320**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45293**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94055**
Client ID: **LCSS**	Batch ID: **45293**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449321**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	266.138	5.0	250.0	0	106	80	120				

Sample ID: **098420-030ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94055**
Client ID: **B-109S 1.0-1.5**	Batch ID: **45293**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449332**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	32.511	5.0						28.77	12.2	20	

Sample ID: **098420-030AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94055**
Client ID: **B-109S 1.0-1.5**	Batch ID: **45293**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449333**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	202.710	5.0	250.0	28.77	69.6	45	110				

Sample ID: **098420-040ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94055**
Client ID: **B-111S 3.0-3.5**	Batch ID: **45293**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449345**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.736	5.0						5.141	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098420-040AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94055**
Client ID: **B-111S 3.0-3.5**	Batch ID: **45293**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449346**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.912	5.0	250.0	5.141	56.7	45	110				

Sample ID: **098420-040AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94055**
Client ID: **B-111S 3.0-3.5**	Batch ID: **45293**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449347**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	172.975	5.0	250.0	5.141	67.1	45	110	146.9	16.3	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45294A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94063**
Client ID: **PBS**	Batch ID: **45294**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449436**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45294**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94063**
Client ID: **LCSS**	Batch ID: **45294**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449437**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	285.663	5.0	250.0	0	114	80	120				

Sample ID: **098420-050ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94063**
Client ID: **B-115S 1.0-1.5**	Batch ID: **45294**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449448**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	26.926	5.0						31.91	17.0	20	

Sample ID: **098420-050AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94063**
Client ID: **B-115S 1.0-1.5**	Batch ID: **45294**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449449**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	192.073	5.0	250.0	31.91	64.1	45	110				

Sample ID: **098420-060ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94063**
Client ID: **B-117S 3.0-3.5**	Batch ID: **45294**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449461**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.209	5.0						6.959	16.5	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098420-060AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94063**
Client ID: **B-117S 3.0-3.5**	Batch ID: **45294**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449462**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	179.323	5.0	250.0	6.959	68.9	45	110				

Sample ID: **098420-060AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94063**
Client ID: **B-117S 3.0-3.5**	Batch ID: **45294**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449463**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	184.781	5.0	250.0	6.959	71.1	45	110	179.3	3.00	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45295A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **PBS**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449530**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45295**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **LCSS**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449531**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	235.533	5.0	250.0	0	94.2	80	120				

Sample ID: **098438-002ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **ZZZZZZ**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449542**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.496	5.0						6.342	2.41	20	

Sample ID: **098438-002AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **ZZZZZZ**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449543**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	160.859	5.0	250.0	6.342	61.8	45	110				

Sample ID: **098438-012ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **ZZZZZZ**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449572**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.495	5.0						13.78	27.0	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098438-012AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **ZZZZZZ**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449573**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	157.827	5.0	250.0	13.78	57.6	45	110				

Sample ID: **098438-012AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **ZZZZZZ**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449574**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	149.926	5.0	250.0	13.78	54.5	45	110	157.8	5.13	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45240**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **PBW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446770**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45240**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **LCSW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.996	0.25	1.000	0	99.6	85	115				

Sample ID: **098366-001BDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.2						0	0	20	

Sample ID: **098449-005AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.250	1.2	2.500	0	90.0	71	118				

Sample ID: **098449-005AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.366	1.2	2.500	0	94.6	71	118	2.250	5.02	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098420
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098420-004A-DUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **93846**
Client ID: **B-103S 3.0-3.5** Batch ID: **R93846** TestNo: **EPA 9045C** Analysis Date: **4/24/2008** SeqNo: **1445221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.560	0.10						8.750	2.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 2

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 4/23/08

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 5.0 Y☐ N☐ 4. SEALED Y☐ N☒
2. HEADSPACE (VOA) Y☐ N/A☐ 5. # OF SPLS MATCH COC Y☒ N☐
3. CONTAINER INTACT Y☒ N☐ 6. PRESERVED Y☒ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:10
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:45	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) LEAD, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000), PH BY EPA 9040

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
1	084420-01	B-103S 0.0-0.5	4/23/08	0838	E	1	T	STANDARD
2	02	B-103S 1.0-1.5				1		TAT
3	03	B-103S 2.0-2.5				1		
4	04	B-103S 3.0-3.5		↓		1	↓	
5	05	B-102S 0.0-0.5		0850		1	G	
6	06	B-102S 1.0-1.5		0853		1		
7	07	B-102S 2.0-2.5		0856		1		
8	08	B-102S 3.0-3.5		0900		1		
9	09	B-102SA 0.0-0.5		0850		1		
10	10	B-102SA 1.0-1.5	↓	0853	↓	1	↓	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill. CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client q; ATL ☒; CA OverN 'O; FEDEX ☐; Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y O N O 4. SEALED Y O N O
2. HEADSPACE (VOA) Y ☐ N q 5. # OF SPLS MATCH COC Y q N q
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y O N O

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: 949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 15.10
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1605	Received by: (Signature and Printed Name) MTGL	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work Indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐; CT ☐; SWRCB ☐; Logcode ____; OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0804470 - 11	B-102SA 2.0-2.5	4/23/08	0856				X						X				E	1	G		STANDARD
	12	B-102SA 3.0-3.5		0900				X						X					1	↓		TAT
	13	B-105S 0.0-0.5		0915				X						X					1	T		
	14	B-105S 1.0-1.5		↓				X						X					1			
	15	B-105S 2.0-2.5						X						X					1			
	16	B-105S 3.0-3.5		↓				X						X					1			
	17	B-106S 0.0-0.5		0932				X						X					1			
	18	B-106S 1.0-1.5						X						X					1			
	19	B-106S 2.0-2.5						X						X					1			
	20	B-106S 3.0-3.5	↓	↓				X						X				↓	1	↓		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:

Logged By: Date:

Method of Transport: Client ☐ ATL ☒ CA Overnight ☐ FEDEX ☐ Other: ☐

Sample Condition Upon Receipt
1. CHILLED Y☒ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Address: 21 TECHNOLOGY DR
TEL: (949) 727-9336
Attn: DAVID LENNON
City IRVINE State CA Zip Code
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metals) CAM17, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0708470-21	B-107S 0.0-0.5	4/23/08	0945				X	X					X				E	1	T		STANDARD
	22	B-107S 1.0-1.5		0945				X	X					X					1			TAT
	23	B-107S 2.0-2.5		0945				X	X					X					1			
	24	B-107S 3.0-3.5		0945				X	X					X					1			
	25	B-108S 0.0-0.5		1005				X	X					X					1			
	26	B-108S 1.0-1.5		1005				X	X					X					1			
	27	B-108S 2.0-2.5		1005				X	X					X					1			
	28	B-108S 3.0-3.5		1005				X	X					X					1			
	29	B-109S 0.0-0.5		1020				X	X					X					1			
	30	B-109S 1.0-1.5		1020				X	X					X					1			

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 **Walnut Avenue**
Signal Hill, CA 90755
(562) 989-4045 • **Fax (562)** 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED YO N☐ 4. SEALED Y O N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SRS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ NO 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LEONNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 1513396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/23/08 Time: 1510 Received by: (Signature and Printed Name) Date: 4/23/08 Time: 15:10
Relinquished by: (Signature and Printed Name) Date: 4/23/08 Time: 1545 Received by: (Signature and Printed Name) Date: 4/23/08 Time: 1545
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LEONNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Ann:
Co:
Address
City State Zip

Special Instructions/Comments:
DLEONNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	08540-31	B-109S 2.0-2.5	4/23/08	1020				X						X				E	1	T		STANDARD
	32	B-109S 3.0-3.5		1020				X						X					1	↓		TAT
	33	B-110S 0.0-0.5		1035				X						X					1	G		
	34	B-110S 1.0-1.5		1037				X						X					1			
	35	B-110S 2.0-2.5		1040				X						X					1			
	36	B-110S 3.0-3.5		1043				X						X					1			
	37	B-111S 0.0-0.5		1048				X						X					1			
	38	B-111S 1.0-1.5		1050				X						X					1			
	39	B-111S 2.0-2.5		1053				X						X					1			
	40	B-111S 3.0-3.5	↓	1055				X						X				↓	1	↓		↓

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 **Walnut Avenue**
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y O N O
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y O N O

Client: TRC
Address: 21 TECHNOLOGY DR.
TEL: (949) 727-9336
Attn: DAVID LENNON
City IRVINE State CA. Zip Code
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	594641	B-113S 0.0-0.5	4/23/08	1100	E	1	T	STANDARD
	42	B-113S 1.0-1.5		1200		1		TAT
	43	B-113S 2.0-2.5		1200		1		
	44	B-113S 3.0-3.5		1200		1		
	45	B-114S 0.0-0.5		1220		1		
	46	B-114S 1.0-1.5		1220		1		
	47	B-114S 2.0-2.5		1220		1		
	48	B-114S 3.0-3.5		1220		1		
	49	B-115S 0.0-0.5		1235		1		
	50	B-115S 1.0-1.5		1235		1		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

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P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1 CHILLED Y 0 N O | 4. SEALED Y 0 N O | 2 HEADSPACE (VOA) Y ☐ N ☐ | 5. # OF SPLS MATCH COC Y ☐ N ☐ | 3 CONTAINER IMACT Y q N q | 6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 5:16
Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 15:45	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1545
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize A n lo perform the work indicated below:
Project Mgr /Submitter:
Pint Name Oats
Signature

Send Report To:
Attn: DAVID LENNON
Co:
Address 21 TECHNOLOGY DR
City IRVINE State ____ Zip ____

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State ____ Zip ____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

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SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8270C (BNA)	6010B (Total Metal) LEAD	SOIL	TAT	Container(s) #	Container(s) Type	REMARKS
	098470-51	B-115S 2.0-2.5	4/23/08	1235	X	X	X	E	1	T	STANDARD TAT
	52	B-115S 3.0-3.5		1235	X	X	X		1		
	53	B-116S 0.0-0.5		1250	X	X	X		1		
	54	B-116S 1.0-1.5		1250	X	X	X		1		
	55	B-116S 2.0-2.5		1250	X	X	X		1		
	56	B-116S 3.0-3.5		1250	X	X	X		1		
	57	B-117S 0.0-0.5		1310	X	X	X		1		
	58	B-117S 1.0-1.5		1310	X	X	X		1		
	59	B-117S 2.0-2.5		1310	X	X	X		1		
	60	B-117S 3.0-3.5	V	1310	X	X	X	V	1	V	

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Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

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P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt

1. CHILLED	Y☐ N☐	4. SEALED	Y☐ N☐
2. HEADSPACE (VOA)	Y☐ N☐	5. # OF SPLS MATCH COC	Y☐ N☐
3. CONTAINER INTACT	Y☐ N☐	6. PRESERVED	Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City: IRVINE State: CA Zip Code:
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FAX: (949) 753-0111

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Relinquished by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510	Received by: (Signature and Printed Name)	Date: 4/23/08	Time: 1510
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I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

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SPECIFY APPROPRIATE MATRIX: SOIL / WATER / GROUND WATER / WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	098420-61	B-1185 0.0-0.5	4/17/08	1325	G	1	T	STANDARD
	62	B-1185 1.0-1.5		1325		1		TAT
	63	B-1185 2.0-2.5		1325		1		
	64	B-1185 3.0-3.5		1325		1		
	65	B-1195 0.0-0.5		1345		1		
	66	B-1195 1.0-1.5		1345		1		
	67	B-1195 2.0-2.5		1345		1		
	68	B-1195 3.0-3.5		1345		1		
	69	CREW 2-ER 3		1410		1	P	

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 13,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098437

RE: Caltrans-West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-7N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 9:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-002		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
		WET/ EPA 7420				
RunID: AA2_080513C	QC Batch: R94457			PrepDate:		Analyst: **LKN**
Lead	2.6	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-010		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
		WET/ EPA 7420				
RunID: AA2_080513C	QC Batch: R94457			PrepDate:		Analyst: **LKN**
Lead	7.1	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-011		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
		WET/ EPA 7420				
RunID: AA2_080513C	QC Batch: R94457			PrepDate:		Analyst: **LKN**
Lead	8.9	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-012		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
		WET/ EPA 7420				
RunID: AA2_080513B	QC Batch: R94456			PrepDate:		Analyst: **LKN**
Lead	16	0.50		mg/L	2	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-13N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 1:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-019		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
			WET/ EPA 7420			
RunID: AA2_080513B	QC Batch: R94456			PrepDate:		Analyst: **LKN**
Lead	24	1.0		mg/L	4	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098437
Project: Caltrans-West County Connectors, 151396
Lab ID: 098437-020

Client Sample ID: B-13N-1.0-1.5
Collection Date: 4/21/2008 1:30:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
WET				**WET DI/ EPA 7420**		
RunID: AA2_080509D	QC Batch: 45465			PrepDate: 5/7/2008		Analyst: **LKN**
Lead	0.81	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)						
				WET/ EPA 7420		
RunID: AA2_080513B	QC Batch: R94456			PrepDate:		Analyst: **LKN**
Lead	41	1.2		mg/L	5	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94456

Sample ID: **MB-45529A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **PBS**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455503**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45529**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **LCSS**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455504**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.916	0.25	5.000	0	98.3	80	120				

Sample ID: **098438-016A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **ZZZZZZ**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455515**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	45.078	1.2						33.63	29.1	20	R

Sample ID: **098438-016A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **ZZZZZZ**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455516**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	40.011	2.5	5.000	33.63	128	80	120				S

Sample ID: **MB-45529B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **PBS**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455517**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94456

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **ZZZZZZ**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455526**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	55.437	2.5						63.23	13.1	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **ZZZZZZ**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455527**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	71.479	2.5	5.000	63.23	165	80	120				S

Sample ID: **098438-046A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **ZZZZZZ**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	70.007	2.5	5.000	63.23	136	80	120	71.48	2.08	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94457

Sample ID: **MB-45528A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94457**
Client ID: **PBS**	Batch ID: **R94457**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455558**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45528**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94457**
Client ID: **LCSS**	Batch ID: **R94457**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455559**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.106	0.25	5.000	0	102	80	120				

Sample ID: **098437-011A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94457**
Client ID: **B-10N-1.0-1.5**	Batch ID: **R94457**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455563**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.578	0.25						8.864	3.27	20	

Sample ID: **098437-011A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94457**
Client ID: **B-10N-1.0-1.5**	Batch ID: **R94457**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455564**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	13.860	0.50	5.000	8.864	99.9	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45465

Sample ID: **098439-012A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454057**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098439-012A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.526	0.25	5.000	0	111	70	130				

Sample ID: **MB-45465B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **PBS**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45465A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **PBS**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454065**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098439-052A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454066**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45465

Sample ID: **098439-052A-MS** SampType: **MS** TestCode: **7420_DI** Units: **mg/L** Prep Date: **5/7/2008** RunNo: **94365**
Client ID: **ZZZZZZ** Batch ID: **45465** TestNo: **WET DI/ EPA WET** Analysis Date: **5/9/2008** SeqNo: **1454067**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.320	0.25	5.000	0	106	70	130				

Sample ID: **098439-052A-MSD** SampType: **MSD** TestCode: **7420_DI** Units: **mg/L** Prep Date: **5/7/2008** RunNo: **94365**
Client ID: **ZZZZZZ** Batch ID: **45465** TestNo: **WET DI/ EPA WET** Analysis Date: **5/9/2008** SeqNo: **1454068**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.391	0.25	5.000	0	108	70	130	5.320	1.32	20	

Sample ID: **LCS-45465** SampType: **LCS** TestCode: **7420_DI** Units: **mg/L** Prep Date: **5/7/2008** RunNo: **94365**
Client ID: **LCSS** Batch ID: **45465** TestNo: **WET DI/ EPA WET** Analysis Date: **5/9/2008** SeqNo: **1454069**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.967	0.25	5.000	0	99.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098437

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-10N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.40	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate: **5/23/2008**	Analyst: **LKN**	
Lead	ND	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-13N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 1:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	1.5	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-13N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 1:30:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	1.8	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **098439-023A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.893	0.25						5.893	0.0145	20	

Sample ID: **098439-023A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.775	0.25	2.500	5.893	75.3	70	130				

Sample ID: **098439-023A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.813	0.25	2.500	5.893	76.8	70	130	7.775	0.485	20	

Sample ID: **MB-45890A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464846**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **098437-019A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **B-13N-0.0-0.5**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464855**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.573	0.25						1.550	1.49	20	

Sample ID: **098437-019A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **B-13N-0.0-0.5**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.007	0.25	2.500	1.550	98.3	70	130				

Sample ID: **MB-45890B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **098439-023A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.893	0.25						5.893	0.0145	20	

Sample ID: **098439-023A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.775	0.25	2.500	5.893	75.3	70	130				

Sample ID: **098439-023A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.813	0.25	2.500	5.893	76.8	70	130	7.775	0.485	20	

Sample ID: **MB-45890A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464846**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **098437-019A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **B-13N-0.0-0.5**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464855**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.573	0.25						1.550	1.49	20	

Sample ID: **098437-019A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **B-13N-0.0-0.5**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.007	0.25	2.500	1.550	98.3	70	130				

Sample ID: **MB-45890B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 01,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098437

RE: Caltrans-West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-7N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 9:45:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080429L**	QC Batch: **45254**				PrepDate: **4/28/2008**		Analyst: **CL**
Lead	24	0.25	5.0		mg/Kg	1	4/29/2008 09:57 PM
PH							
EPA 9045C							
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	9.1	0.10	0.10		pH Units	1	4/25/2008

CLIENT:	TRC	**Client Sample ID:**	B-7N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 9:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080429L**	QC Batch: **45254**				PrepDate: **4/28/2008**		Analyst: **CL**
Lead	54	0.25	5.0		mg/Kg	1	4/29/2008 10:00 PM
PH							
			EPA 9045C				
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.8	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-7N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 9:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080429L**	QC Batch: **45254**				PrepDate: **4/28/2008**		Analyst: **CL**
Lead	9.3	0.25	5.0		mg/Kg	1	4/29/2008 10:03 PM
PH							
			EPA 9045C				
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.7	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-8N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 10:20:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080429L**	QC Batch: **45254**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	19	0.25	5.0		mg/Kg	1	4/29/2008 10:14 PM

CLIENT:	TRC	**Client Sample ID:**	B-8N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 10:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429L**	QC Batch: **45254**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	14	0.25	5.0		mg/Kg	1	4/29/2008 10:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-8N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 10:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429L**	QC Batch: **45254**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	10	0.25	5.0		mg/Kg	1	4/29/2008 10:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-9N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:05:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429L**	QC Batch: **45254**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	21	0.25	5.0		mg/Kg	1	4/29/2008 10:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-9N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:07:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	38	0.25	5.0		mg/Kg	1	4/29/2008 10:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-9N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	44	0.25	5.0		mg/Kg	1	4/29/2008 10:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	57	0.25	5.0		mg/Kg	1	4/29/2008 10:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	71	0.25	5.0		mg/Kg	1	4/29/2008 11:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-10N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 11:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	81	0.25	5.0		mg/Kg	1	4/29/2008 11:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-11N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 12:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	24	0.25	5.0		mg/Kg	1	4/29/2008 11:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-11N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 12:02:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	24	0.25	5.0		mg/Kg	1	4/29/2008 11:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-11N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 12:05:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	6.3	0.25	5.0		mg/Kg	1	4/29/2008 11:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-12N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 12:10:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	43	0.25	5.0		mg/Kg	1	4/29/2008 11:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-12N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 12:12:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	13	0.25	5.0		mg/Kg	1	4/29/2008 11:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-12N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 12:15:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	7.0	0.25	5.0		mg/Kg	1	4/29/2008 11:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-13N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 1:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	210	0.25	5.0		mg/Kg	1	4/29/2008 11:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-13N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 1:30:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	380	0.25	5.0		mg/Kg	1	4/29/2008 11:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-14N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:05:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/29/2008 11:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-14N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:07:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/29/2008 11:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-14N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:10:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	5.6	0.25	5.0		mg/Kg	1	4/30/2008 12:01 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-15N-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:30:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	12	0.25	5.0		mg/Kg	1	4/30/2008 12:04 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-15N-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:32:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	4/30/2008 12:07 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-15N-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:35:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	6.6	0.25	5.0		mg/Kg	1	4/30/2008 12:18 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-15Na-0.0-0.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080429J**	QC Batch: **45255**				PrepDate: **4/28/2008**	Analyst: **CL**	
Lead	13	0.25	5.0		mg/Kg	1	4/30/2008 12:21 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-15Na-1.0-1.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:42:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501A**	QC Batch: **45256**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:12 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-15Na-2.0-2.5
Lab Order:	098437	**Collection Date:**	4/21/2008 2:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098437-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501A**	QC Batch: **45256**				PrepDate:	**4/28/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:15 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-CREW 1-DAY 1
Lab Order:	098437	**Collection Date:**	4/21/2008 2:55:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	098437-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080428C**	QC Batch: **45240**				PrepDate:	**4/25/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	4/28/2008 01:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45254A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93987**
Client ID: **PBS**	Batch ID: **45254**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448232**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45254**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93987**
Client ID: **LCSS**	Batch ID: **45254**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	248.682	5.0	250.0	0	99.5	80	120				

Sample ID: **098435-013ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93987**
Client ID: **ZZZZZZ**	Batch ID: **45254**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448244**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	37.574	5.0						36.63	2.55	20	

Sample ID: **098435-013AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93987**
Client ID: **ZZZZZZ**	Batch ID: **45254**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448245**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	207.550	5.0	250.0	36.63	68.4	45	110				

Sample ID: **098437-007ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93987**
Client ID: **B-9N-0.0-0.5**	Batch ID: **45254**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448257**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.748	5.0						20.96	28.4	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098437-007AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93987**
Client ID: **B-9N-0.0-0.5**	Batch ID: **45254**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448258**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	158.474	5.0	250.0	20.96	55.0	45	110				

Sample ID: **098437-007AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93987**
Client ID: **B-9N-0.0-0.5**	Batch ID: **45254**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448259**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	170.112	5.0	250.0	20.96	59.7	45	110	158.5	7.08	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45255A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93982**
Client ID: **PBS**	Batch ID: **45255**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448566**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45255**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93982**
Client ID: **LCSS**	Batch ID: **45255**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448567**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	240.453	5.0	250.0	0	96.2	80	120				

Sample ID: **098437-017ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93982**
Client ID: **B-12N-1.0-1.5**	Batch ID: **45255**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448578**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	13.503	5.0						12.53	7.50	20	

Sample ID: **098437-017AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93982**
Client ID: **B-12N-1.0-1.5**	Batch ID: **45255**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/29/2008**	SeqNo: **1448579**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	181.192	5.0	250.0	12.53	67.5	45	110				

Sample ID: **098437-027ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93982**
Client ID: **B-15Na-0.0-0.5**	Batch ID: **45255**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448591**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	104.881	5.0						12.89	156	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098437-027AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93982**
Client ID: **B-15Na-0.0-0.5**	Batch ID: **45255**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448592**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	161.736	5.0	250.0	12.89	59.5	45	110				

Sample ID: **098437-027AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **93982**
Client ID: **B-15Na-0.0-0.5**	Batch ID: **45255**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **4/30/2008**	SeqNo: **1448593**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	180.144	5.0	250.0	12.89	66.9	45	110	161.7	10.8	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45256**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94037**
Client ID: **PBS**	Batch ID: **45256**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1448972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45256**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94037**
Client ID: **LCSS**	Batch ID: **45256**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1448973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	273.156	5.0	250.0	0	109	80	120				

Sample ID: **098437-029ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94037**
Client ID: **B-15Na-2.0-2.5**	Batch ID: **45256**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1448976**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.577	5.0						3.772	0	20	

Sample ID: **098437-029AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94037**
Client ID: **B-15Na-2.0-2.5**	Batch ID: **45256**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1448977**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	144.367	5.0	250.0	3.772	56.2	45	110				

Sample ID: **098437-029AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94037**
Client ID: **B-15Na-2.0-2.5**	Batch ID: **45256**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1448978**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	152.176	5.0	250.0	3.772	59.4	45	110	144.4	5.27	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45240**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **PBW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446770**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45240**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **LCSW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.996	0.25	1.000	0	99.6	85	115				

Sample ID: **098366-001BDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.2						0	0	20	

Sample ID: **098449-005AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.250	1.2	2.500	0	90.0	71	118				

Sample ID: **098449-005AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.366	1.2	2.500	0	94.6	71	118	2.250	5.02	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098437
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098439-003ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **93847**
Client ID: **ZZZZZZ** Batch ID: **R93847** TestNo: **EPA 9045C** Analysis Date: **4/25/2008** SeqNo: **1445231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.790	0.10						7.780	0.128	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 4/24/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 4° Y☑ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N/A☐ 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans - West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature)

Relinquished by: (Signature and Printed Name)	Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)	Kel	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)		Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
CREW 1 - PAY 1

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | pH (9040) (9045)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0984377-001	B-7N-0.0-0.5	4/21/08	945	E	1	J	
	2	B-7N-1.0-1.5		950			J	
	3	B-7N-2.0-2.5		955			J	
	4	B-8N-0.0-0.5		1020			J	
	5	B-8N-1.0-1.5		1025			J	
	6	B-8N-2.0-2.5		1030			J	
	7	B-9N-0.0-0.5		1105			P	
	8	B-9N-1.0-1.5		1107			P	
	9	B-9N-2.0-2.5		1110			P	
	10	B-10N-0.0-0.5		1125			P	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr | B= Emergency Next workday | C= Critical 2 Workdays | D= Urgent 3 Workdays | E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.# _____

Logged By: _____ Date: _____

Method of Transport: Client; ATL; CA OverN ☐; FEDEX q; Other: _____

Sample Condition Upon Receipt:
1 CHILLED Y O N O 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y q N q 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N ☐ 6. PRESERVED Y O N ☐

Client: TRC	Address: 21 Technology Dr.		TEL: (949) 727-9336
Attn: David Lennon	City Irvine	State CA Zip Code 92618	FAX: ( )
Project Name: Caltrans - West County Connectors	Project #: 151396	Sampler: (Printed Name) Kelly S. Keller	(Signature) Kelly S. Keller
Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name) Ben Cashyap	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name) Kal	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work Indicated below:
Project Mgr /Submitter:
_____ Date
Print Name
Signature

Send Report To:
Attn: David Lennon
Co:
Address _____
City _____ State ____ Zip ____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State ____ Zip ____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) + Cd,Cr,Ni; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); Pb (6010)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	098647-11	B-10N - 1.0-1.5	4/21/08	1127	E	1	P	
	12	B-10N - 2.0-2.5		1135				
	13	B-11N - 0.0-0.5		1200				
	14	B-11N - 1.0-1.5		1202				
	15	B-11N - 2.0-2.5		1205				
	16	B-12N - 0.0-0.5		1210				
	17	B-12N - 1.0-1.5		1212				
	18	B-12N - 2.0-2.5		12:15				
	19	B-13N - 0.0-0.5		15:20				
	20	B-13N - 1.0-1.5		13:30				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y O N ☐
2 HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N O 6. PRESERVED Y O N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name)	Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:30	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)		Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	Rinsate	TAT	Container(s) #	Container(s) Type	REMARKS
	0708437-21	B-14N-0.0-0.5	4/21	1405				X						X					E	1	J	
	22	B-14N-1.0-1.5	4/21	1407																	J	
	23	B-14N-2.0-2.5	4/21	1410																	J	
	24	B-15N-0.0-0.5		1430																	P	
	25	B-15N-1.0-1.5		1432																		
	26	B-15N-2.0-2.5		1435																		
	27	B-15Na-0.0-0.5D		1445																		
	28	B-15Na-1.0-1.5		1442																		
	29	B-15Na-2.0-2.5		1445																		
	30	ER-CREW1-DAY1		1455													X					

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

May 16,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098438

RE: Caltrans West Coast Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in **part** or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT:	TRC	**Client Sample ID:**	B-1N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:40:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	13	0.37	0.50		mg/L	2	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-1N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:42:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	3.9	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-3N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	8.2	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-3N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:52:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	7.2	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-5N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:05:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	5.3	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-6N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:25:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	36	0.74	1.0		mg/L	4	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-30N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:00:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	34	0.74	1.0		mg/L	4	5/13/2008

CLIENT:	TRC	**Client Sample ID:**	B-30N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:05:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	6.6	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-31N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:20:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	14	0.011	0.25		mg/L	5	5/15/2008 08:49 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate: **5/7/2008**		Analyst: **LKN**
Lead	0.42	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	98	1.9	2.5		mg/L	10	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-31N-3.0-3.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:27:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515E**	QC Batch: **R94592**				PrepDate:		Analyst: **CL**
Lead	4.7	0.042	1.0		mg/L	20	5/15/2008 05:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-32N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:45:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515F**	QC Batch: **R94602**				PrepDate:		Analyst: **CL**
Lead	80	0.042	1.0		mg/L	20	5/15/2008 07:05 PM
LEAD BY ATOMIC ABSORPTION							
	WET		**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-34N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 11:50:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515F**	QC Batch: **R94602**				PrepDate:		Analyst: **CL**
Lead	9.0	0.042	1.0		mg/L	20	5/15/2008 06:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-35N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:07:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	4.9	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-43N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 1:57:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	9.1	0.19	0.25		mg/L	1	5/13/2008

CLIENT:	TRC	**Client Sample ID:**	B-43N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:00:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	6.0	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-45N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:35:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	30	0.011	0.25		mg/L	5	5/15/2008 09:08 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	38	0.93	1.2		mg/L	5	5/12/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	230	7.4	10		mg/L	40	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-45N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:37:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	1.2	0.011	0.25		mg/L	5	5/15/2008 09:10 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	7.6	0.19	0.25		mg/L	1	5/12/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080513B**	QC Batch: **R94456**				PrepDate:		Analyst: **LKN**
Lead	63	1.9	2.5		mg/L	10	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94456

Sample ID: **MB-45529A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **PBS**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455503**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45529**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **LCSS**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455504**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.916	0.25	5.000	0	98.3	80	120				

Sample ID: **098438-016A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **B-30N-0.0-0.5**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455515**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	45.078	1.2						33.63	29.1	20	R

Sample ID: **098438-016A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **B-30N-0.0-0.5**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455516**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	40.011	2.5	5.000	33.63	128	80	120				S

Sample ID: **MB-45529B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **PBS**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455517**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94456

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **B-45N-1.0-1.5**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455526**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	55.437	2.5						63.23	13.1	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **B-45N-1.0-1.5**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455527**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	71.479	2.5	5.000	63.23	165	80	120				S

Sample ID: **098438-046A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94456**
Client ID: **B-45N-1.0-1.5**	Batch ID: **R94456**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	70.007	2.5	5.000	63.23	136	80	120	71.48	2.08	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94592

Sample ID: **MB-45614**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **PBS**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457897**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45614**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **LCSS**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.974	0.050	1.000	0	97.4	85	115				

Sample ID: **098724-001ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457901**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.075	1.0						0.07818	0	20	

Sample ID: **098724-001AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457902**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.402	1.0	2.500	0.07818	92.9	71	118				

Sample ID: **098724-001AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457903**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.474	1.0	2.500	0.07818	95.8	71	118	2.402	2.95	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94602

Sample ID: **MB-45615**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **PBS**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458205**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45615**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **LCSS**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458206**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.034	0.050	1.000	0	103	85	115				

Sample ID: **098438-030ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **B-34N-0.0-0.5**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458209**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	1.0						0	0	20	
Arsenic	ND	1.0						0	0	20	
Barium	3.704	1.0						3.948	6.38	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.034	1.0						0.03757	0	20	
Chromium	0.148	1.0						0.1589	0	20	
Cobalt	0.099	1.0						0.09947	0	20	
Copper	2.216	1.0						2.157	2.68	20	
Lead	9.712	1.0						8.957	8.09	20	
Molybdenum	0.041	1.0						0	0	20	
Nickel	0.245	1.0						0.2958	0	20	
Selenium	ND	1.0						0	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	0.257	1.0						0.2839	0	20	
Zinc	7.878	1.0						8.499	7.58	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94602

Sample ID: **098438-030AMS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **B-34N-0.0-0.5** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458210**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	2.375	1.0	2.500	0	95.0	77	122				
Arsenic	2.365	1.0	2.500	0	94.6	76	120				
Barium	5.661	1.0	2.500	3.948	68.5	70	119				S
Beryllium	2.212	1.0	2.500	0	88.5	77	121				
Cadmium	2.317	1.0	2.500	0.03757	91.2	76	120				
Chromium	2.401	1.0	2.500	0.1589	89.7	75	120				
Cobalt	2.371	1.0	2.500	0.09947	90.9	75	118				
Copper	4.176	1.0	2.500	2.157	80.7	77	126				
Lead	10.419	1.0	2.500	8.957	58.5	71	118				S
Molybdenum	2.271	1.0	2.500	0	90.8	76	121				
Nickel	2.549	1.0	2.500	0.2958	90.1	73	120				
Selenium	2.392	1.0	2.500	0	95.7	73	127				
Silver	2.128	1.0	2.500	0	85.1	64	130				
Thallium	2.135	1.0	2.500	0	85.4	67	119				
Vanadium	2.474	1.0	2.500	0.2839	87.6	79	119				
Zinc	9.973	1.0	2.500	8.499	59.0	67	122				S

Sample ID: **098438-030AMSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **B-34N-0.0-0.5** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458211**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	2.361	1.0	2.500	0	94.4	77	122	2.375	0.568	20	
Arsenic	2.371	1.0	2.500	0	94.8	76	120	2.365	0.258	20	
Barium	5.742	1.0	2.500	3.948	71.8	70	119	5.661	1.43	20	
Beryllium	2.245	1.0	2.500	0	89.8	77	121	2.212	1.45	20	
Cadmium	2.350	1.0	2.500	0.03757	92.5	76	120	2.317	1.40	20	
Chromium	2.435	1.0	2.500	0.1589	91.1	75	120	2.401	1.40	20	
Cobalt	2.403	1.0	2.500	0.09947	92.2	75	118	2.371	1.35	20	
Copper	4.239	1.0	2.500	2.157	83.3	77	126	4.176	1.50	20	
Lead	10.543	1.0	2.500	8.957	63.5	71	118	10.42	1.19	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94602

Sample ID: **098438-030AMSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **B-34N-0.0-0.5** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458211**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	2.306	1.0	2.500	0	92.2	76	121	2.271	1.52	20	
Nickel	2.589	1.0	2.500	0.2958	91.7	73	120	2.549	1.56	20	
Selenium	2.466	1.0	2.500	0	98.6	73	127	2.392	3.05	20	
Silver	2.158	1.0	2.500	0	86.3	64	130	2.128	1.40	20	
Thallium	2.155	1.0	2.500	0	86.2	67	119	2.135	0.913	20	
Vanadium	2.507	1.0	2.500	0.2839	88.9	79	119	2.474	1.33	20	
Zinc	10.073	1.0	2.500	8.499	63.0	67	122	9.973	0.997	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45465

Sample ID: **098439-012A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454057**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098439-012A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.526	0.25	5.000	0	111	70	130				

Sample ID: **MB-45465B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **PBS**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45465A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **PBS**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454065**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098439-052A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454066**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45465

Sample ID: **098439-052A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454067**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.320	0.25	5.000	0	106	70	130				

Sample ID: **098439-052A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **ZZZZZZ**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454068**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.391	0.25	5.000	0	108	70	130	5.320	1.32	20	

Sample ID: **LCS-45465**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **LCSS**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454069**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.967	0.25	5.000	0	99.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458357**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.789	0.25						5.665	39.7	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.772	0.25	2.500	5.665	-75.7	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.575	0.25	2.500	5.665	-43.6	71	118	3.772	19.2	20	S

Sample ID: **MB-45630A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458392**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.023	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **LCS-45630**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **LCSS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458393**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.940	0.050	1.000	0.002733	93.7	85	115				

Sample ID: **098438-020ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **B-31N-0.0-0.5**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458403**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.528	0.25						14.21	20.8	20	R

Sample ID: **098438-020AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **B-31N-0.0-0.5**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458404**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.357	0.25	2.500	14.21	5.94	71	118				S

Sample ID: **MB-45630B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.096	0.050									

Sample ID: **MB-45565B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458689**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.289	0.25						4.946	40.2	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458690**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.312	0.25	2.500	4.946	-65.4	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458691**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.990	0.25	2.500	4.946	-38.2	71	118	3.312	18.6	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **B-45N-1.0-1.5**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.949	0.25						7.622	9.24	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **B-45N-1.0-1.5**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.261	0.50	5.000	7.622	72.8	70	130				

Sample ID: **MB-45525A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45525**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **LCSS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.211	0.25	5.000	0	104	80	120				

Sample ID: **MB-45525B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098461-010A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.599	0.25						4.638	0.838	20	

Sample ID: **098461-010A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456743**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.434	0.25	5.000	4.638	95.9	70	130				

Sample ID: **098461-010A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456744**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.398	0.25	5.000	4.638	95.2	70	130	9.434	0.378	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

May 28,2008

David Lennon
TRC
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TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098438

RE: Caltrans West Coast Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Edc lie F. Rodr driguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-1N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:40:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	1.1	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-3N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.53	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-3N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:52:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.50	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-5N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:05:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.57	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-6N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:25:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.81	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-30N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:00:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	2.2	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-30N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:05:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.35	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-32N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:45:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	9.0	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-34N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 11:50:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.64	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-43N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 1:57:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.81	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-43N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:00:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.65	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45905

Sample ID: **MB-45905A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465599**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45853A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465600**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45905**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **LCSS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465601**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.092	0.25	1.000	0	109	80	120				

Sample ID: **098438-013A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **B-6N-0.0-0.5**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.840	0.25						0.8142	3.13	20	

Sample ID: **098438-013A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **B-6N-0.0-0.5**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.133	0.25	2.500	0.8142	92.8	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45905

Sample ID: **MB-45905B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465613**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45853B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.222	0.25									

Sample ID: **098438-030A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **B-34N-0.0-0.5**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.631	0.25						0.6352	0.630	20	

Sample ID: **098438-030A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **B-34N-0.0-0.5**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465622**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.281	0.25	2.500	0.6352	106	70	130				

Sample ID: **098438-030A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **B-34N-0.0-0.5**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465623**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.242	0.25	2.500	0.6352	104	70	130	3.281	1.20	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45906

Sample ID: **MB-45906A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **PBS**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465624**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.224	0.25									

Sample ID: **MB-45854A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **PBS**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465625**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.226	0.25									

Sample ID: **LCS-45906**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **LCSS**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.063	0.25	1.000	0.2236	84.0	80	120				

Sample ID: **098439-052A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **ZZZZZZ**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465636**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.892	0.25						0.9275	3.90	20	

Sample ID: **098439-052A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **ZZZZZZ**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465637**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.975	0.25	2.500	0.9275	122	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45906

Sample ID: **098439-052A-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **5/24/2008** RunNo: **95045**
Client ID: **ZZZZZZ** Batch ID: **45906** TestNo: **EPA 1311/ 74** **EPA3010A** Analysis Date: **5/27/2008** SeqNo: **1465638**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.803	0.25	2.500	0.9275	115	70	130	3.975	4.40	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 02,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098438

RE: Caltrans West Coast Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 098438
Project: Caltrans West Coast Connectors, 151396
Lab ID: 098438-001

Client Sample ID: B-2N-0.0-0.5
Collection Date: 4/23/2008 8:30:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**		Analyst: **CL**
Lead	9.2	0.25	5.0		mg/Kg	1	5/1/2008 05:25 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.2	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-2N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:32:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**		Analyst: **CL**
Lead	6.3	0.25	5.0		mg/Kg	1	5/1/2008 05:28 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-2N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:35:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**		Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 05:49 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-1N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:40:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	120	0.25	5.0		mg/Kg	1	5/1/2008 05:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-1N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:42:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	50	0.25	5.0		mg/Kg	1	5/1/2008 05:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-1N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:45:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 06:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-3N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:50:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	120	0.25	5.0		mg/Kg	1	5/1/2008 06:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-3N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:52:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	83	0.25	5.0		mg/Kg	1	5/1/2008 06:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-3N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 8:55:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	8.4	0.25	5.0		mg/Kg	1	5/1/2008 06:10 PM

CLIENT:	TRC	**Client Sample ID:**	B-5N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:05:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	72	0.25	5.0		mg/Kg	1	5/1/2008 06:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-5N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:07:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	5.1	0.25	5.0		mg/Kg	1	5/1/2008 06:17 PM

CLIENT:	TRC	**Client Sample ID:**	B-5N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:10:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501E**	QC Batch: **45295**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	14	0.25	5.0		mg/Kg	1	5/1/2008 06:27 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-6N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:25:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	300	0.25	5.0		mg/Kg	1	5/1/2008 06:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-6N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:27:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	8.6	0.25	5.0		mg/Kg	1	5/1/2008 06:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-6N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 9:30:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 06:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-30N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:00:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	230	0.25	5.0		mg/Kg	1	5/1/2008 07:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-30N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:02:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	45	0.25	5.0		mg/Kg	1	5/1/2008 07:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-30N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:05:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	61	0.25	5.0		mg/Kg	1	5/1/2008 07:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-30N-3.0-3.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:07:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 07:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-31N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:20:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	730	0.25	5.0		mg/Kg	1	5/1/2008 07:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-31N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:22:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	21	0.25	5.0		mg/Kg	1	5/1/2008 07:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-31N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:25:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	41	0.25	5.0		mg/Kg	1	5/1/2008 07:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-31N-3.0-3.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:27:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	22	0.25	5.0		mg/Kg	1	5/1/2008 07:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-32N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:45:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	570	0.25	5.0		mg/Kg	1	5/1/2008 07:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-32N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:47:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	18	0.25	5.0		mg/Kg	1	5/1/2008 07:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-32N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 10:50:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	8.5	0.25	5.0		mg/Kg	1	5/1/2008 08:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098438
Project: Caltrans West Coast Connectors, 151396
Lab ID: 098438-027

Client Sample ID: B-33N-0.0-0.5
Collection Date: 4/23/2008 11:30:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	28	0.25	5.0		mg/Kg	1	5/1/2008 08:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098438
Project: Caltrans West Coast Connectors, 151396
Lab ID: 098438-028

Client Sample ID: B-33N-1.0-1.5
Collection Date: 4/23/2008 11:35:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	20	0.25	5.0		mg/Kg	1	5/1/2008 08:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098438
Project: Caltrans West Coast Connectors, 151396
Lab ID: 098438-029

Client Sample ID: B-33N-2.0-2.5
Collection Date: 4/23/2008 11:37:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	21	0.25	5.0		mg/Kg	1	5/1/2008 08:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-34N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 11:50:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	110	0.25	5.0		mg/Kg	1	5/1/2008 08:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-34N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 11:52:00 AM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	35	0.25	5.0		mg/Kg	1	5/1/2008 08:20 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098438
Project: Caltrans West Coast Connectors, 151396
Lab ID: 098438-032

Client Sample ID: B-34N-2.0-2.5
Collection Date: 4/23/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501F**	QC Batch: **45296**				PrepDate: **4/29/2008**	Analyst: **CL**	
Lead	45	0.25	5.0		mg/Kg	1	5/1/2008 08:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-35N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:05:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate:	**4/29/2008**	Analyst: **LKN**
Lead	48	0.25	5.0		mg/Kg	1	5/1/2008 04:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098438
Project: Caltrans West Coast Connectors, 151396
Lab ID: 098438-034

Client Sample ID: B-35N-1.0-1.5
Collection Date: 4/23/2008 12:07:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	62	0.25	5.0		mg/Kg	1	5/1/2008 04:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-35N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:10:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate:	**4/29/2008**	Analyst: **LKN**
Lead	5.5	0.25	5.0		mg/Kg	1	5/1/2008 04:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098438
Project: Caltrans West Coast Connectors, 151396
Lab ID: 098438-036

Client Sample ID: B-37N-0.0-0.5
Collection Date: 4/23/2008 12:20:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	8.4	0.25	5.0		mg/Kg	1	5/1/2008 04:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-37N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:22:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate:	**4/29/2008**	Analyst: **LKN**
Lead	8.3	0.25	5.0		mg/Kg	1	5/1/2008 04:21 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-37N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:25:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	13	0.25	5.0		mg/Kg	1	5/1/2008 04:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-38N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:30:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	10	0.25	5.0		mg/Kg	1	5/1/2008 04:28 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-38N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:32:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	11	0.25	5.0		mg/Kg	1	5/1/2008 04:39 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-38N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 12:35:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate:	**4/29/2008**	Analyst: **LKN**
Lead	7.2	0.25	5.0		mg/Kg	1	5/1/2008 04:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-43N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 1:55:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	12	0.25	5.0		mg/Kg	1	5/1/2008 04:46 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-43N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 1:57:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	63	0.25	5.0		mg/Kg	1	5/1/2008 05:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-43N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:00:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate:	**4/29/2008**	Analyst: **LKN**
Lead	62	0.25	5.0		mg/Kg	1	5/1/2008 05:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-45N-0.0-0.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:35:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate:	**4/29/2008**	Analyst: **LKN**
Lead	1800	0.25	5.0		mg/Kg	1	5/1/2008 05:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-45N-1.0-1.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:37:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate:	**4/29/2008**	Analyst: **LKN**
Lead	790	0.25	5.0		mg/Kg	1	5/1/2008 05:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-45N-2.0-2.5
Lab Order:	098438	**Collection Date:**	4/23/2008 2:40:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098438-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501E**	QC Batch: **45297**				PrepDate: **4/29/2008**	Analyst: **LKN**	
Lead	12	0.25	5.0		mg/Kg	1	5/1/2008 05:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-CREW 1-DAY 3
Lab Order:	098438	**Collection Date:**	4/23/2008 2:50:00 PM
Project:	Caltrans West Coast Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	098438-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080428C**	QC Batch: **45240**				PrepDate:	**4/25/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	4/28/2008 01:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45295A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **PBS**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449530**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45295**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **LCSS**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449531**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	235.533	5.0	250.0	0	94.2	80	120				

Sample ID: **098438-002ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **B-2N-1.0-1.5**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449542**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.496	5.0						6.342	2.41	20	

Sample ID: **098438-002AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **B-2N-1.0-1.5**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449543**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	160.859	5.0	250.0	6.342	61.8	45	110				

Sample ID: **098438-012ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **B-5N-2.0-2.5**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449572**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.495	5.0						13.78	27.0	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098438-012AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **B-5N-2.0-2.5**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449573**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	157.827	5.0	250.0	13.78	57.6	45	110				

Sample ID: **098438-012AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94069**
Client ID: **B-5N-2.0-2.5**	Batch ID: **45295**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449574**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	149.926	5.0	250.0	13.78	54.5	45	110	157.8	5.13	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45296A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94075**
Client ID: **PBS**	Batch ID: **45296**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449575**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45296**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94075**
Client ID: **LCSS**	Batch ID: **45296**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449576**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	231.160	5.0	250.0	0	92.5	80	120				

Sample ID: **098438-022ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94075**
Client ID: **B-31N-2.0-2.5**	Batch ID: **45296**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449587**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	46.373	5.0						41.18	11.9	20	

Sample ID: **098438-022AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94075**
Client ID: **B-31N-2.0-2.5**	Batch ID: **45296**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449588**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	164.316	5.0	250.0	41.18	49.3	45	110				

Sample ID: **098438-032ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94075**
Client ID: **B-34N-2.0-2.5**	Batch ID: **45296**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449600**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	41.946	5.0						44.96	6.93	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098438-032AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94075**
Client ID: **B-34N-2.0-2.5**	Batch ID: **45296**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449601**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	167.677	5.0	250.0	44.96	49.1	45	110				

Sample ID: **098438-032AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94075**
Client ID: **B-34N-2.0-2.5**	Batch ID: **45296**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449602**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	161.077	5.0	250.0	44.96	46.4	45	110	167.7	4.02	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45297A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94068**
Client ID: **PBS**	Batch ID: **45297**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449507**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45297**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94068**
Client ID: **LCSS**	Batch ID: **45297**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449508**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	229.293	5.0	250.0	0	91.7	80	120				

Sample ID: **098438-042A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94068**
Client ID: **B-43N-0.0-0.5**	Batch ID: **45297**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449519**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.726	5.0						12.23	18.5	20	

Sample ID: **098438-042A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94068**
Client ID: **B-43N-0.0-0.5**	Batch ID: **45297**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449520**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	160.316	5.0	250.0	12.23	59.2	45	110				

Sample ID: **098438-047A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94068**
Client ID: **B-45N-2.0-2.5**	Batch ID: **45297**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449527**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.413	5.0						12.12	48.2	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098438-047A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94068**
Client ID: **B-45N-2.0-2.5**	Batch ID: **45297**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	120.453	5.0	250.0	12.12	43.3	45	110				S

Sample ID: **098438-047A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/29/2008**	RunNo: **94068**
Client ID: **B-45N-2.0-2.5**	Batch ID: **45297**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449529**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	130.097	5.0	250.0	12.12	47.2	45	110	120.5	7.70	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45240**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **PBW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446770**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45240**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **LCSW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.996	0.25	1.000	0	99.6	85	115				

Sample ID: **098366-001BDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.2						0	0	20	

Sample ID: **098449-005AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.250	1.2	2.500	0	90.0	71	118				

Sample ID: **098449-005AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.366	1.2	2.500	0	94.6	71	118	2.250	5.02	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098438
Project: Caltrans West Coast Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098439-003ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **93847**
Client ID: **ZZZZZZ** Batch ID: **R93847** TestNo: **EPA 9045C** Analysis Date: **4/25/2008** SeqNo: **1445231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.790	0.10						7.780	0.128	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 4/24/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 7.5 Y☐ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N/A☐ 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West Coast Connectors Project #: 151396
Sampler: (Printed Name) Kelly Keller (Signature) Kelly Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 9:25	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 0 50	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 0 50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
CREW 1 - DAY 3

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	TPH (8015)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0904478-001	B-2N-0.0-0.5	4/23	830				X						X					E	1	J	
	2	B-2N-1.0-1.5		832																		
	3	B-2N-2.0-2.5		835																		
	4	B-1N-0.0-0.5		840																		
	5	B-1N-1.0-1.5		842																		
	6	B-1N-2.0-2.5		845																		
	7	B-3N-0.0-0.5		850																		
	8	B-3N-1.0-1.5		852																		
	9	B-3N-2.0-2.5		855																		
	10	B-5N-0.0-0.5		905																		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O
2. HEADSPACE (VOA) Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐
4. SEALED Y O N O
5. # OF SPLS MATCH COC Y ☐ N ☐
6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Ann: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0984434-11	B-5N-1.0-1.5	4/23	907					X					X				E	1	T		
	12	B-5N-2.0-2.5		910																		
	13	B-6N-0.0-0.5		925																		
	14	B-6N-1.0-1.5		927																		
	15	B-6N-2.0-2.5		930																		
	16	B-30N-0.0-0.5		1000																P		
	17	B-30N-1.0-1.5		1002																		
	18	B-30N-2.0-2.5		1005																		
	19	B-30N-3.0-3.5		1007																		
	20	B-31N-0.0-0.5		1020																		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 **Walnut Avenue**
Signal Hill, CA 90755
(562) 989-4045 • **Fax (562)** 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y q N O 4. SEALED Y O N O
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West Coast Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work Indicated below:
Proiect Mar /Submitter:
Print Name _____ Date _____
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) Cr; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL X; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0704434-21	B-31N-1.0-1.5	4/23	1022	E	1	P	
	22	B-31N-2.0-2.5		1025			P	
	23	B-31N-3.0-3.5		1027			P	
	24	B-32N-0.0-0.5		1045			P	
	25	B-32N-1.0-1.5		1047			P	
	26	B-32N-2.0-2.5		1050			P	
	27	B-33N-0.0-0.5		1130			J	
	28	B-33N-1.0-1.5		1135			J	
	29	B-33N-2.0-2.5		1137			J	
	30	B-34N-0.0-0.5		1150			J	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Dele: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N ☐ 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y O N q 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N q 6. PRESERVED Y O N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West Coast Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)	Kal	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐ Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0904438- 31	B-34N- 1.0-1.5	4/23	11:52				X						X				E		J	
	32	B-34N- 2.0-2.5		11:55																	
	33	B-35N- 0.0-0.5		1205																	
	34	B-35N- 1.0-1.5		1207																	
	35	B-35N- 2.0-2.5		1210																	
	36	B-36N- 0.0-0.5		1220																	
	37	B-37N- 1.0-1.5		1222																	
	38	B-37N- 2.0-2.5		1225																	
	39	B-38N- 0.0-0.5		1230																	
	40	B-38N- 1.0-1.5		1232																	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with **report**, Yellow to folder, Pink to **submitter**.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client; ATL; CA OverN q; FEDEX q; Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y O N O 4. SEALED Y O N □
2. HEADSPACE (VOA) Y q N □ 5. #OF SPLS MATCH COC Y q N □
3. CONTAINER INTACT Y □ N q 6. PRESERVED Y O N □

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-~~7358~~ 9336
FAX: ( )

Project Name: Caltrans West Coast connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To: Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To: Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

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- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

Q A / Q C
RTNE □
CT □
SWRCB □
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	Effluent	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0984738-41	B-38N-2.0-2.5	4/23	1235				X						X					E		J		
	42	B-43N-0.0-0.5		1355																			
	43	B-43N-1.0-1.5		1357																			
	44	B-43N-2.0-2.5		1400																			
	45	B-45N-0.0-0.5		1435																			
	46	B-45N-1.0-1.5		1432																			
	47	B-45N-2.0-2.5		1440																			
	48	ER-CREW 1-DAY 3		1450										X			X		P				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 16,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098439

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an amended report. Please disregard all previous documentation that corresponds to the page(s) enclosed.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot he reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-4N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 8:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	14	0.25	5.0		mg/Kg	1	5/1/2008 09:33 AM
PH							
			EPA 9045C				
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.8	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-4N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 8:57:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	56	0.25	5.0		mg/Kg	1	5/1/2008 09:36 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-4N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:00:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	11	0.25	5.0		mg/Kg	1	5/1/2008 09:40 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	7.8	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-16N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	800	0.25	5.0		mg/Kg	1	5/1/2008 09:43 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-16N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:20:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	630	0.25	5.0		mg/Kg	1	5/1/2008 09:47 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-16N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:22:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	380	0.25	5.0		mg/Kg	1	5/1/2008 09:50 AM

CLIENT:	TRC	**Client Sample ID:**	B-17N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080515B**	QC Batch: **45646**				PrepDate: **5/14/2008**	Analyst: **CL**	
Lead	900	0.25	5.0		mg/Kg	1	5/15/2008 10:10 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:32:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 10:04 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	9.4	0.25	5.0		mg/Kg	1	5/1/2008 10:08 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:37:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:11 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	440	0.25	5.0		mg/Kg	1	5/1/2008 10:25 AM

CLIENT:	TRC	**Client Sample ID:**	B-18N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	1600	0.25	5.0		mg/Kg	1	5/1/2008 10:28 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	7.9	0.25	5.0		mg/Kg	1	5/1/2008 10:32 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:57:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080515B**	QC Batch: **45646**				PrepDate: **5/14/2008**	Analyst: **CL**	
Lead	1800	0.25	5.0		mg/Kg	1	5/15/2008 10:16 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	300	0.25	5.0		mg/Kg	1	5/1/2008 10:49 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	16	0.25	5.0		mg/Kg	1	5/1/2008 10:53 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:17:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:56 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	170	0.25	5.0		mg/Kg	1	5/1/2008 11:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:32:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	9.5	0.25	5.0		mg/Kg	1	5/1/2008 11:03 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	160	0.25	5.0		mg/Kg	1	5/1/2008 11:31 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:37:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	620	0.25	5.0		mg/Kg	1	5/1/2008 11:34 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080515B**	QC Batch: **45646**				PrepDate: **5/14/2008**	Analyst: **CL**	
Lead	850	0.25	5.0		mg/Kg	1	5/15/2008 10:21 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	93	0.25	5.0		mg/Kg	1	5/1/2008 11:42 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	100	0.25	5.0		mg/Kg	1	5/1/2008 11:46 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-22N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	2200	0.25	5.0		mg/Kg	1	5/1/2008 11:50 AM

CLIENT:	TRC	**Client Sample ID:**	B-22N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	150	0.25	5.0		mg/Kg	1	5/1/2008 11:54 AM

CLIENT:	TRC	**Client Sample ID:**	B-22N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	5.7	0.25	5.0		mg/Kg	1	5/1/2008 11:57 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-23N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	360	0.25	5.0		mg/Kg	1	5/1/2008 12:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-23N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	64	0.25	5.0		mg/Kg	1	5/1/2008 12:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-23N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	28	0.25	5.0		mg/Kg	1	5/1/2008 12:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	100	0.25	5.0		mg/Kg	1	5/1/2008 12:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	48	0.25	5.0		mg/Kg	1	5/1/2008 12:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:50:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	5.9	0.25	5.0		mg/Kg	1	5/1/2008 12:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:52:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 12:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:15:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080515B**	QC Batch: **45646**				PrepDate: **5/14/2008**	Analyst: **CL**	
Lead	1300	0.25	5.0		mg/Kg	1	5/15/2008 10:26 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:17:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	21	0.25	5.0		mg/Kg	1	5/1/2008 12:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:20:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	38	0.25	5.0		mg/Kg	1	5/1/2008 12:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:22:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 01:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	74	0.25	5.0		mg/Kg	1	5/1/2008 01:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:02:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	31	0.25	5.0		mg/Kg	1	5/1/2008 01:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:05:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	26	0.25	5.0		mg/Kg	1	5/1/2008 01:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:07:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 01:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080515B**	QC Batch: **45646**				PrepDate: **5/14/2008**	Analyst: **CL**	
Lead	1200	0.25	5.0		mg/Kg	1	5/15/2008 10:31 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:42:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	60	0.25	5.0		mg/Kg	1	5/1/2008 01:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	29	0.25	5.0		mg/Kg	1	5/1/2008 01:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	30	0.25	5.0		mg/Kg	1	5/1/2008 01:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080515B**	QC Batch: **45646**				PrepDate: **5/14/2008**	Analyst: **CL**	
Lead	1000	0.25	5.0		mg/Kg	1	5/15/2008 10:36 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:02:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-049		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	22	0.25	5.0		mg/Kg	1	5/1/2008 02:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:05:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-050		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	18	0.25	5.0		mg/Kg	1	5/1/2008 02:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:07:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-051		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 02:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:20:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-052		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	600	0.25	5.0		mg/Kg	1	5/1/2008 02:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:22:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-053		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	34	0.25	5.0		mg/Kg	1	5/1/2008 02:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:23:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-054		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	32	0.25	5.0		mg/Kg	1	5/1/2008 02:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:27:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-055		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	9.0	0.25	5.0		mg/Kg	1	5/1/2008 02:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-056		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	89	0.25	5.0		mg/Kg	1	5/1/2008 02:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-057		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	37	0.25	5.0		mg/Kg	1	5/1/2008 02:57 PM

CLIENT:	TRC	**Client Sample ID:**	B-29N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:50:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-058		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	17	0.25	5.0		mg/Kg	1	5/1/2008 03:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:52:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-059		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	210	0.25	5.0		mg/Kg	1	5/1/2008 03:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-CREW 1-DAY 2
Lab Order:	098439	**Collection Date:**	4/22/2008 3:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	098439-060		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080428C**	QC Batch: **45240**				PrepDate:	**4/25/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	4/28/2008 01:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45265A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **PBS**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45265**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **LCSS**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	235.470	5.0	250.0	0	94.2	80	120				

Sample ID: **098439-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-17N-3.0-3.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449127**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.186	5.0						4.573	0	20	

Sample ID: **098439-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-17N-3.0-3.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	156.177	5.0	250.0	4.573	60.6	45	110				

Sample ID: **MB-45265B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **PBS**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098439-020A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-20N-1.0-1.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449140**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	25.827	5.0						9.521	92.3	20	R

Sample ID: **098439-020A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-20N-1.0-1.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449141**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	173.572	5.0	250.0	9.521	65.6	45	110				

Sample ID: **098439-020A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-20N-1.0-1.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	149.371	5.0	250.0	9.521	55.9	45	110	173.6	15.0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45266A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **PBS**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45266**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **LCSS**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449239**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	248.509	5.0	250.0	0	99.4	80	120				

Sample ID: **098439-030A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-23N-1.0-1.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	80.188	5.0						64.06	22.4	20	R

Sample ID: **098439-030A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-23N-1.0-1.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449251**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	181.821	5.0	250.0	64.06	47.1	45	110				

Sample ID: **MB-45266B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **PBS**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449252**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098439-040A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-24Na-0.0-0.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449263**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	69.389	5.0						73.69	6.01	20	

Sample ID: **098439-040A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-24Na-0.0-0.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449264**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	230.745	5.0	250.0	73.69	62.8	45	110				

Sample ID: **098439-040A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-24Na-0.0-0.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449265**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	246.419	5.0	250.0	73.69	69.1	45	110	230.7	6.57	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45267A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **PBS**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449365**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45267**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **LCSS**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449366**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	253.533	5.0	250.0	0	101	80	120				

Sample ID: **098439-050A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **B-27N-2.0-2.5**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449377**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	23.407	5.0						17.74	27.5	20	R

Sample ID: **098439-050A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **B-27N-2.0-2.5**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449378**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	156.284	5.0	250.0	17.74	55.4	45	110				

Sample ID: **MB-45267B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **PBS**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449379**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098439-059A-DUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/28/2008** RunNo: **94057**
Client ID: **B-29N-3.0-3.5** Batch ID: **45267** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449389**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	175.381	5.0						205.8	16.0	20	

Sample ID: **098439-059A-MS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/28/2008** RunNo: **94057**
Client ID: **B-29N-3.0-3.5** Batch ID: **45267** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449390**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	275.393	5.0	250.0	205.8	27.8	45	110				S

Sample ID: **098439-059A-MSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/28/2008** RunNo: **94057**
Client ID: **B-29N-3.0-3.5** Batch ID: **45267** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	314.590	5.0	250.0	205.8	43.5	45	110	275.4	13.3	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45646**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/14/2008**	RunNo: **94576**
Client ID: **PBS**	Batch ID: **45646**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/15/2008**	SeqNo: **1457678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45646**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/14/2008**	RunNo: **94576**
Client ID: **LCSS**	Batch ID: **45646**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/15/2008**	SeqNo: **1457679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	232.403	5.0	250.0	0	93.0	80	120				

Sample ID: **098439-048ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/14/2008**	RunNo: **94576**
Client ID: **B-27N-0.0-0.5**	Batch ID: **45646**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/15/2008**	SeqNo: **1457686**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	911.681	5.0						1014	10.6	20	

Sample ID: **098439-048AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/14/2008**	RunNo: **94576**
Client ID: **B-27N-0.0-0.5**	Batch ID: **45646**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/15/2008**	SeqNo: **1457687**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1079.498	5.0	250.0	1014	26.4	45	110				S

Sample ID: **098439-048AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/14/2008**	RunNo: **94576**
Client ID: **B-27N-0.0-0.5**	Batch ID: **45646**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/15/2008**	SeqNo: **1457688**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1093.604	5.0	250.0	1014	32.0	45	110	1079	1.30	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45240** SampType: **MBLK** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **4/25/2008** RunNo: **93889**
Client ID: **PBW** Batch ID: **45240** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **4/28/2008** SeqNo: **1446770**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45240** SampType: **LCS** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **4/25/2008** RunNo: **93889**
Client ID: **LCSW** Batch ID: **45240** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **4/28/2008** SeqNo: **1446771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.996	0.25	1.000	0	99.6	85	115				

Sample ID: **098366-001BDUP** SampType: **DUP** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **4/25/2008** RunNo: **93889**
Client ID: **ZZZZZZ** Batch ID: **45240** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **4/28/2008** SeqNo: **1446773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.2						0	0	20	

Sample ID: **098449-005AMS** SampType: **MS** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **4/25/2008** RunNo: **93889**
Client ID: **ZZZZZZ** Batch ID: **45240** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **4/28/2008** SeqNo: **1446775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.250	1.2	2.500	0	90.0	71	118				

Sample ID: **098449-005AMSD** SampType: **MSD** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **4/25/2008** RunNo: **93889**
Client ID: **ZZZZZZ** Batch ID: **45240** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **4/28/2008** SeqNo: **1446776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.366	1.2	2.500	0	94.6	71	118	2.250	5.02	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098439-003ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **93847**
Client ID: **B-4N-2.0-2.5** Batch ID: **R93847** TestNo: **EPA 9045C** Analysis Date: **4/25/2008** SeqNo: **1445231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.790	0.10						7.780	0.128	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

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FOR LABORATORY USE ONLY:

P.O.#:

Logged By: [illegible] Date: 4/24/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other:

Sample Condition Upon Receipt
1. CHILLED 5.0 Y☐ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N/A☑ 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Cal Trans - West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 4/24/08 Time: 8:25
Received by: (Signature and Printed Name) [illegible] Date: 4/24/08 Time: 8:25

Relinquished by: (Signature and Printed Name) [illegible] Date: 4/24/08 Time: 8:50
Received by: (Signature and Printed Name) [illegible] Date: 4/24/08 Time: 8:50

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:
CREW 1 - DAY 2

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) pH (9045)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0904439-001	B-4N-0.0-0.5	4/22	855				X					X	X				E	1	P	
	2	B-4N-1.0-1.5		857									X							P	
	3	B-4N-2.0-2.5		900									X							P	
	4	B-16N-0.0-0.5		915									X							J	no plt
	5	B-16N-1.0-1.5		920									X							J	no plt
	6	B-16N-2.0-2.5		922									X							J	no plt
	7	B-17N-0.0-0.5		930									X							P	no plt
	8	B-17N-1.0-1.5		932									X								no plt
	9	B-17N-2.0-2.5		935									X								no plt
	10	B-17N-3.0-3.5		937									X								no plt

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

P.O.#:

Logged By: Date:

FOR LABORATORY USE ONLY:

Method of Transport
Client ☐
ATL ☑
CA OverN ☐
FEDEX ☐
Other:

Sample Condition Upon Receipt
1. CHILLED YO N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ NO 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED YO NO

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City: Irvine State: CA Zip Code: 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans-West County connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature)

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 4/24/08 Time: 5:25
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 7:25

Relinquished by: (Signature and Printed Name) Date: 4/24/08 Time:
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 5:50

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize A n lo perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Sa
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode
OTHER

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	098439-11	B-18N-0.0-0.5	4/22	9580				X						X				E	1	P	
	12	B-18N-1.0-1.5		952																	
	13	B-18N-2.0-2.5		955																	
	14	B-18N-3.0-3.5		957																	
	15	B-19N-0.0-0.5		1010																	
	16	B-19N-1.0-1.5		1012																	
	17	B-19N-2.0-2.5		1015																	
	18	B-19N-3.0-3.5		1017																	
	19	B-20N-0.0-0.5		1030																	
	20	B-20N-1.0-1.5		1032																	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y ○ N ○ 4. SEALED Y ○ N ☐
2. HEADSPACE (VOA) Y ☐ N ☑ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☑ 6. PRESERVED Y ○ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished By: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received By: (Signature and Printed Name)	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:30	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:30
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work Indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	298435-21	B-20N-2.0-2.5	4/22	1036			X		Lead					X				E	1	P	
	22	B-20N-3.0-3.5		1037																	
	23	B-21N-0.0-0.5		1050																	
	24	B-21N-1.0-1.5		1052																	
	25	B-21N-2.0-2.5		1055																	
	26	B-22N-0.0-0.5		1110																	
	27	B-22N-1.0-1.5		1112																	
	28	B-22N-2.0-2.5		1115																	
	29	B-23N-0.0-0.5		1125																	
	30	B-23N-1.0-1.5		1127																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. **Yellow** to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport
Client
ATL
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O
2. HEADSPACE (VOA) Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐
4. SEALED Y O N O
5. # OF SPLS MATCH COC Y ☐ N ☐
6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: David Lennan
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: West County Connectors
Project #: 15396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:24
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennan
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: David Lennan
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	349435-31	B-23N-2.0-2.5	4/22	1130				X						X				E	L	P	
	32	B-24N-0.0-0.5		1245																	
	33	B-24N-1.0-1.5		1247																	
	34	B-24N-2.0-2.5		1250																	
	35	B-24N-3.0-3.5		1252																	
	36	B-25N-0.0-0.5		1315																	
	37	B-25N-1.0-1.5		1317																	
	38	B-25N-2.0-2.5		1320																	
	39	B-25N-3.0-3.5		1322																	
	40	B-24NA-0.0-0.5		1300																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

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Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=Hcl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Dale: _____

Method of Transport
Client ☐
ATL ☑
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N U 6. PRESERVED Y O N ☐

Client: TPE
Attn: David Lennan
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans-West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Kelly S. Keller Date: 4/24/08 Time: 8:25
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 8:25

Relinquished by: (Signature and Printed Name) Date: 4/24/08 Time: 8:50
Received by: (Signature and Printed Name) Kal Date: 4/24/08 Time: 8:50

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name
Signature

Send Report To:
Attn: David Lennan
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
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- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0804337-41	B-24Na-1.0-1.5	4/22	1302				X						X				E	1	P	
	42	B-24Na-2.0-2.5		1305																	
	43	B-24Na-3.0-3.5		1307																	
	44	B-26N-0.0-0.5		1340																	
	45	B-26N-1.0-1.5		1342																	
	46	B-26N-2.0-2.5		1345																	
	47	B-26N-3.0-3.5		1347																	
	48	B-27N-0.0-0.5		1400																	
	49	B-27N-1.0-1.5		1402																	
	50	B-27N-2.0-2.5		1405																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=Hcl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )
Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name)	Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)		Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To: Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To: Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) Cd Cr Ni Pb Zn; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); ~~TPH Calif~~

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER; Rinsate

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0804437-51	B-27N-3.0-3.5	4/22	1407	6		P	
	52	B-28N-0.0-0.5		1420				
	53	B-28N-1.0-1.5		1422				
	54	B-28N-2.0-2.5		1423				
	55	B-28N-3.0-3.5		1427				
	56	B-29N-0.0-0.5		1445				
	57	B-29N-1.0-1.5		1447				
	58	B-29N-2.0-2.5		1450				
	59	B-29N-3.0-3.5		1452				
	60	ER-CREW 1-DAY 2		1500				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 16,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098439

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-4N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 8:57:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	5.1	0.19	0.25		mg/L	1	5/13/2008

CLIENT:	TRC	**Client Sample ID:**	B-16N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	0.55	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	93	1.9	2.5		mg/L	10	5/13/2008
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A			**EPA 1311/ 7420**				
RunID: **AA2_080513A**	QC Batch: **45578**				PrepDate:	**5/12/2008**	Analyst: **LKN**
Lead	1.7	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-16N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:20:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate: **5/7/2008**		Analyst: **LKN**
Lead	0.26	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
WET/ EPA 7420							
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	58	1.9	2.5		mg/L	10	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-16N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:22:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	4.3	0.011	0.25		mg/L	5	5/15/2008 09:13 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate: **5/7/2008**		Analyst: **LKN**
Lead	0.30	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	41	0.93	1.2		mg/L	5	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516D**	QC Batch: **R94636**				PrepDate:		Analyst: **AMT**
Lead	67	0.021	0.50		mg/L	10	5/16/2008 02:40 PM
LEAD BY ATOMIC ABSORPTION							
	WET		**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate: **5/7/2008**		Analyst: **LKN**
Lead	0.28	0.19	0.25		mg/L	1	5/9/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-18N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate: **5/7/2008**		Analyst: **LKN**
Lead	5.8	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	59	1.9	2.5		mg/L	10	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	210	4.6	6.2		mg/L	25	5/13/2008
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080513A**	QC Batch: **45578**				PrepDate:	**5/12/2008**	Analyst: **LKN**
Lead	1.7	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-19N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516D**	QC Batch: **R94636**				PrepDate:		Analyst: **AMT**
Lead	130	0.021	0.50		mg/L	10	5/16/2008 02:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
WET/ EPA 7420							
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	1.2	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	14	0.37	0.50		mg/L	2	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	0.32	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:37:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	68	1.9	2.5		mg/L	10	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516D**	QC Batch: **R94636**				PrepDate:		Analyst: **AMT**
Lead	95	0.021	0.50		mg/L	10	5/16/2008 02:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-21N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	3.5	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	7.9	0.19	0.25		mg/L	1	5/13/2008

CLIENT:	TRC	**Client Sample ID:**	B-22N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	210	4.6	6.2		mg/L	25	5/13/2008
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080513A**	QC Batch: **45578**				PrepDate:	**5/12/2008**	Analyst: **LKN**
Lead	3.8	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-22N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	13	0.37	0.50		mg/L	2	5/13/2008

CLIENT:	TRC	**Client Sample ID:**	B-23N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515E**	QC Batch: **R94592**				PrepDate:		Analyst: **CL**
Lead	120	0.042	1.0		mg/L	20	5/15/2008 05:37 PM
LEAD BY ATOMIC ABSORPTION							
	WET		**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-23N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	3.8	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513D**	QC Batch: **R94482**				PrepDate:		Analyst: **LKN**
Lead	8.0	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:15:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516D**	QC Batch: **R94636**				PrepDate:		Analyst: **AMT**
Lead	130	0.021	0.50		mg/L	10	5/16/2008 02:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:22:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515E**	QC Batch: **R94592**				PrepDate:		Analyst: **CL**
Lead	1.3	0.042	1.0		mg/L	20	5/15/2008 05:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080513E**	QC Batch: **R94484**				PrepDate:		Analyst: **LKN**
Lead	13	0.37	0.50		mg/L	2	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516D**	QC Batch: **R94636**				PrepDate:		Analyst: **AMT**
Lead	110	0.021	0.50		mg/L	10	5/16/2008 02:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:42:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080513E**	QC Batch: **R94484**				PrepDate:		Analyst: **LKN**
Lead	6.9	0.19	0.25		mg/L	1	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515E**	QC Batch: **R94592**				PrepDate:		Analyst: **CL**
Lead	1.3	0.042	1.0		mg/L	20	5/15/2008 05:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516D**	QC Batch: **R94636**				PrepDate:		Analyst: **AMT**
Lead	81	0.021	0.50		mg/L	10	5/16/2008 02:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:20:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-052		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
WET			**WET DI/ EPA 7420**				
RunID: **AA2_080509D**	QC Batch: **45465**				PrepDate:	**5/7/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/9/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
WET/ EPA 7420							
RunID: **AA2_080513E**	QC Batch: **R94484**				PrepDate:		Analyst: **LKN**
Lead	27	0.74	1.0		mg/L	4	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-056		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080513E**	QC Batch: **R94484**				PrepDate:		Analyst: **LKN**
Lead	81	1.9	2.5		mg/L	10	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:52:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-059		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	0.53	0.011	0.25		mg/L	5	5/15/2008 09:16 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/12/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080513E**	QC Batch: **R94484**				PrepDate:		Analyst: **LKN**
Lead	15	0.37	0.50		mg/L	2	5/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94482

Sample ID: **098439-019A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **B-20N-0.0-0.5**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455896**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.152	0.50						14.40	1.77	20	

Sample ID: **098439-019A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **B-20N-0.0-0.5**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455897**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.629	0.50	5.000	14.40	84.5	80	120				

Sample ID: **MB-45530B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **PBS**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098439-032A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **B-24N-0.0-0.5**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455908**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.209	0.25						8.035	13.6	20	

Sample ID: **098439-032A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **B-24N-0.0-0.5**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455909**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.340	0.25	5.000	8.035	-33.9	80	120				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94482

Sample ID: **098439-032A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **B-24N-0.0-0.5**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.220	0.25	5.000	8.035	-36.3	80	120	6.340	1.92	20	S

Sample ID: **MB-45530A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **PBS**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455911**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45530**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94482**
Client ID: **LCSS**	Batch ID: **R94482**	TestNo: **WET/ EPA 74**		Analysis Date: **5/13/2008**	SeqNo: **1455912**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.931	0.25	5.000	0	98.6	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94636

Sample ID: **MB-45623A**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94636**
Client ID: **PBS**	Batch ID: **R94636**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45623**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94636**
Client ID: **LCSS**	Batch ID: **R94636**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458777**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.020	0.050	1.000	0	102	85	115				

Sample ID: **098439-048ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94636**
Client ID: **B-27N-0.0-0.5**	Batch ID: **R94636**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458784**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	81.236	0.50						80.82	0.515	20	

Sample ID: **098439-048AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94636**
Client ID: **B-27N-0.0-0.5**	Batch ID: **R94636**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458785**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	80.381	0.50	2.500	80.82	-17.5	71	118				S

Sample ID: **098439-048AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94636**
Client ID: **B-27N-0.0-0.5**	Batch ID: **R94636**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458786**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	80.402	0.50	2.500	80.82	-16.7	71	118	80.38	0.0262	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94592

Sample ID: **MB-45614**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **PBS**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457897**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45614**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **LCSS**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457898**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.974	0.050	1.000	0	97.4	85	115				

Sample ID: **098724-001ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457901**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.075	1.0						0.07818	0	20	

Sample ID: **098724-001AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457902**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.402	1.0	2.500	0.07818	92.9	71	118				

Sample ID: **098724-001AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94592**
Client ID: **ZZZZZZ**	Batch ID: **R94592**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1457903**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.474	1.0	2.500	0.07818	95.8	71	118	2.402	2.95	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94484

Sample ID: **MB-45531A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **94484**
Client ID: **PBS** Batch ID: **R94484** TestNo: **WET/ EPA 74** Analysis Date: **5/13/2008** SeqNo: **1455941**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45531** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **94484**
Client ID: **LCSS** Batch ID: **R94484** TestNo: **WET/ EPA 74** Analysis Date: **5/13/2008** SeqNo: **1455942**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.104	0.25	5.000	0	102	80	120				

Sample ID: **098439-059A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **94484**
Client ID: **B-29N-3.0-3.5** Batch ID: **R94484** TestNo: **WET/ EPA 74** Analysis Date: **5/13/2008** SeqNo: **1455951**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.601	0.50						0.1987	195	20	R

Sample ID: **098439-059A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **94484**
Client ID: **B-29N-3.0-3.5** Batch ID: **R94484** TestNo: **WET/ EPA 74** Analysis Date: **5/13/2008** SeqNo: **1455952**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	20.627	0.75	5.000	0.1987	409	80	120				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45465

Sample ID: **098439-012A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **B-18N-1.0-1.5**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454057**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098439-012A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **B-18N-1.0-1.5**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.526	0.25	5.000	0	111	70	130				

Sample ID: **MB-45465B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **PBS**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45465A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **PBS**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454065**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098439-052A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/7/2008**	RunNo: **94365**
Client ID: **B-28N-0.0-0.5**	Batch ID: **45465**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/9/2008**	SeqNo: **1454066**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45465

Sample ID: **098439-052A-MS** SampType: **MS** TestCode: **7420_DI** Units: **mg/L** Prep Date: **5/7/2008** RunNo: **94365**
Client ID: **B-28N-0.0-0.5** Batch ID: **45465** TestNo: **WET DI/ EPA WET** Analysis Date: **5/9/2008** SeqNo: **1454067**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.320	0.25	5.000	0	106	70	130				

Sample ID: **098439-052A-MSD** SampType: **MSD** TestCode: **7420_DI** Units: **mg/L** Prep Date: **5/7/2008** RunNo: **94365**
Client ID: **B-28N-0.0-0.5** Batch ID: **45465** TestNo: **WET DI/ EPA WET** Analysis Date: **5/9/2008** SeqNo: **1454068**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.391	0.25	5.000	0	108	70	130	5.320	1.32	20	

Sample ID: **LCS-45465** SampType: **LCS** TestCode: **7420_DI** Units: **mg/L** Prep Date: **5/7/2008** RunNo: **94365**
Client ID: **LCSS** Batch ID: **45465** TestNo: **WET DI/ EPA WET** Analysis Date: **5/9/2008** SeqNo: **1454069**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.967	0.25	5.000	0	99.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45578

Sample ID: **MB-45578**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94437**
Client ID: **PBS**	Batch ID: **45578**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/13/2008**	SeqNo: **1455192**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45563 TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94437**
Client ID: **PBS**	Batch ID: **45578**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/13/2008**	SeqNo: **1455193**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45578**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94437**
Client ID: **LCSS**	Batch ID: **45578**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/13/2008**	SeqNo: **1455194**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.088	0.25	1.000	0	109	80	120				

Sample ID: **098439-026A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94437**
Client ID: **B-22N-0.0-0.5**	Batch ID: **45578**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/13/2008**	SeqNo: **1455198**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.485	0.25	2.500	3.807	147	70	130				S

Sample ID: **098439-026A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94437**
Client ID: **B-22N-0.0-0.5**	Batch ID: **45578**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/13/2008**	SeqNo: **1455199**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.005	0.25	2.500	3.807	168	70	130	7.485	6.72	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458357**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.789	0.25						5.665	39.7	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.772	0.25	2.500	5.665	-75.7	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.575	0.25	2.500	5.665	-43.6	71	118	3.772	19.2	20	S

Sample ID: **MB-45630A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458392**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.023	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **LCS-45630**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **LCSS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458393**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.940	0.050	1.000	0.002733	93.7	85	115				

Sample ID: **098438-020ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458403**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.528	0.25						14.21	20.8	20	R

Sample ID: **098438-020AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458404**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.357	0.25	2.500	14.21	5.94	71	118				S

Sample ID: **MB-45630B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.096	0.050									

Sample ID: **MB-45565B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.949	0.25						7.622	9.24	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.261	0.50	5.000	7.622	72.8	70	130				

Sample ID: **MB-45525A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45525**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **LCSS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.211	0.25	5.000	0	104	80	120				

Sample ID: **MB-45525B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098461-010A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.599	0.25						4.638	0.838	20	

Sample ID: **098461-010A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456743**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.434	0.25	5.000	4.638	95.9	70	130				

Sample ID: **098461-010A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456744**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.398	0.25	5.000	4.638	95.2	70	130	9.434	0.378	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 29,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098439

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax; 562 989-4040

CLIENT:	TRC	**Client Sample ID:**	B-4N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 8:57:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-16N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:20:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	1.7	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate: **5/28/2008**		Analyst: **LKN**
Lead	7.3	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	2.4	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	13	0.37	0.50		mg/L	2	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	0.42	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:37:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	0.27	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	5.9	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	0.36	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-22N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-23N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527A**	QC Batch: **45890**				PrepDate:	**5/23/2008**	Analyst: **LKN**
Lead	3.2	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.46	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:15:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate: **5/24/2008**		Analyst: **LKN**
Lead	15	0.37	0.50		mg/L	2	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.86	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	3.5	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:42:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.45	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	8.7	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:20:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-052		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527C**	QC Batch: **45906**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.93	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-056		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	7.2	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
			WET DI/ EPA 7420				
RunID: **AA2_080529A**	QC Batch: **R95139**				PrepDate:		Analyst: **AMT**
Lead	ND	0.19	0.25		mg/L	1	5/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
			WET DI/ EPA 7420				
RunID: **AA2_080529A**	QC Batch: **R95139**				PrepDate:		Analyst: **AMT**
Lead	ND	0.19	0.25		mg/L	1	5/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:15:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
			WET DI/ EPA 7420				
RunID: **AA2_080529A**	QC Batch: **R95139**				PrepDate:		Analyst: **AMT**
Lead	0.98	0.19	0.25		mg/L	1	5/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
			WET DI/ EPA 7420				
RunID: **AA2_080529A**	QC Batch: **R95139**				PrepDate:		Analyst: **AMT**
Lead	ND	0.19	0.25		mg/L	1	5/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION							
			WET DI/ EPA 7420				
RunID: **AA2_080529A**	QC Batch: **R95139**				PrepDate:		Analyst: **AMT**
Lead	ND	0.19	0.25		mg/L	1	5/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45906

Sample ID: **MB-45906A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **PBS**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465624**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.224	0.25									

Sample ID: **MB-45854A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **PBS**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465625**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.226	0.25									

Sample ID: **LCS-45906**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **LCSS**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.063	0.25	1.000	0.2236	84.0	80	120				

Sample ID: **098439-052A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **B-28N-0.0-0.5**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465636**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.892	0.25						0.9275	3.90	20	

Sample ID: **098439-052A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95045**
Client ID: **B-28N-0.0-0.5**	Batch ID: **45906**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465637**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.975	0.25	2.500	0.9275	122	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45906

Sample ID: **098439-052A-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **5/24/2008** RunNo: **95045**
Client ID: **B-28N-0.0-0.5** Batch ID: **45906** TestNo: **EPA 1311/ 74** **EPA3010A** Analysis Date: **5/27/2008** SeqNo: **1465638**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.803	0.25	2.500	0.9275	115	70	130	3.975	4.40	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098461-028A-DUP** SampType: **DUP** TestCode: **7420_TC** Units: **mg/L** Prep Date: **5/24/2008** RunNo: **95046**
Client ID: **ZZZZZZ** Batch ID: **45907** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **5/27/2008** SeqNo: **1465644**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.496	0.25						0.5307	6.82	20	

Sample ID: **098461-028A-MS** SampType: **MS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **5/24/2008** RunNo: **95046**
Client ID: **ZZZZZZ** Batch ID: **45907** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **5/27/2008** SeqNo: **1465645**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.031	0.25	2.500	0.5307	100	70	130				

Sample ID: **MB-45907B** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **5/24/2008** RunNo: **95046**
Client ID: **PBS** Batch ID: **45907** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **5/27/2008** SeqNo: **1465646**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855B TCLP** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **5/24/2008** RunNo: **95046**
Client ID: **PBS** Batch ID: **45907** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **5/27/2008** SeqNo: **1465647**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098527-030A-DUP** SampType: **DUP** TestCode: **7420_TC** Units: **mg/L** Prep Date: **5/24/2008** RunNo: **95046**
Client ID: **ZZZZZZ** Batch ID: **45907** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **5/27/2008** SeqNo: **1465652**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.333	0.25						0.3215	3.64	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098527-030A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465653**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.025	0.25	2.500	0.3215	108	70	130				

Sample ID: **098527-030A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465654**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.190	0.25	2.500	0.3215	115	70	130	3.025	5.31	20	

Sample ID: **MB-45907A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465655**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45907**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **LCSS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465657**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.913	0.25	1.000	0	91.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R95139

Sample ID: **MB-45897**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **95139**
Client ID: **PBS**	Batch ID: **R95139**	TestNo: **WET DI/ EPA**		Analysis Date: **5/29/2008**	SeqNo: **1467188**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45897**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **95139**
Client ID: **LCSS**	Batch ID: **R95139**	TestNo: **WET DI/ EPA**		Analysis Date: **5/29/2008**	SeqNo: **1467189**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.860	0.25	5.000	0	97.2	80	120				

Sample ID: **098439-048A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **95139**
Client ID: **B-27N-0.0-0.5**	Batch ID: **R95139**	TestNo: **WET DI/ EPA**		Analysis Date: **5/29/2008**	SeqNo: **1467195**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.228	0.25						0	0	20	

Sample ID: **098439-048A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **95139**
Client ID: **B-27N-0.0-0.5**	Batch ID: **R95139**	TestNo: **WET DI/ EPA**		Analysis Date: **5/29/2008**	SeqNo: **1467196**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.251	0.25	5.000	0	105	70	130				

Sample ID: **098439-048A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **95139**
Client ID: **B-27N-0.0-0.5**	Batch ID: **R95139**	TestNo: **WET DI/ EPA**		Analysis Date: **5/29/2008**	SeqNo: **1467197**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.305	0.25	5.000	0	106	70	130	5.251	1.02	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **098439-023A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **B-21N-0.0-0.5**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.893	0.25						5.893	0.0145	20	

Sample ID: **098439-023A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **B-21N-0.0-0.5**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.775	0.25	2.500	5.893	75.3	70	130				

Sample ID: **098439-023A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **B-21N-0.0-0.5**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.813	0.25	2.500	5.893	76.8	70	130	7.775	0.485	20	

Sample ID: **MB-45890A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464846**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45890

Sample ID: **LCS-45890**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **LCSS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464848**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.976	0.25	1.000	0	97.6	80	120				

Sample ID: **098437-019A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464855**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.573	0.25						1.550	1.49	20	

Sample ID: **098437-019A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **ZZZZZZ**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.007	0.25	2.500	1.550	98.3	70	130				

Sample ID: **MB-45890B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45889B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/23/2008**	RunNo: **95004**
Client ID: **PBS**	Batch ID: **45890**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1464858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

May 01,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098439

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 24,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT:	TRC	**Client Sample ID:**	B-4N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 8:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	14	0.25	5.0		mg/Kg	1	5/1/2008 09:33 AM
PH							
			EPA 9045C				
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.8	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-4N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 8:57:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	56	0.25	5.0		mg/Kg	1	5/1/2008 09:36 AM
PH							
			EPA 9045C				
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-4N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:00:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**		Analyst: **LKN**
Lead	11	0.25	5.0		mg/Kg	1	5/1/2008 09:40 AM
PH							
			EPA 9045C				
RunID: **WETCHEM_080425A**	QC Batch: **R93847**				PrepDate:		Analyst: **CNP**
pH	7.8	0.10	0.10		pH Units	1	4/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-16N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	800	0.25	5.0		mg/Kg	1	5/1/2008 09:43 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-16N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:20:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	630	0.25	5.0		mg/Kg	1	5/1/2008 09:47 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-16N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:22:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	380	0.25	5.0		mg/Kg	1	5/1/2008 09:50 AM

CLIENT:	TRC	**Client Sample ID:**	B-17N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	360	0.25	5.0		mg/Kg	1	5/1/2008 09:54 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:32:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 10:04 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	9.4	0.25	5.0		mg/Kg	1	5/1/2008 10:08 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-17N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:37:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:11 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	440	0.25	5.0		mg/Kg	1	5/1/2008 10:25 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	1600	0.25	5.0		mg/Kg	1	5/1/2008 10:28 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	7.9	0.25	5.0		mg/Kg	1	5/1/2008 10:32 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-18N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 9:57:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	120	0.25	5.0		mg/Kg	1	5/1/2008 10:46 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	300	0.25	5.0		mg/Kg	1	5/1/2008 10:49 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	16	0.25	5.0		mg/Kg	1	5/1/2008 10:53 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-19N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:17:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:56 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	170	0.25	5.0		mg/Kg	1	5/1/2008 11:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:32:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501A**	QC Batch: **45265**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	9.5	0.25	5.0		mg/Kg	1	5/1/2008 11:03 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	160	0.25	5.0		mg/Kg	1	5/1/2008 11:31 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-20N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:37:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	620	0.25	5.0		mg/Kg	1	5/1/2008 11:34 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	110	0.25	5.0		mg/Kg	1	5/1/2008 11:38 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	93	0.25	5.0		mg/Kg	1	5/1/2008 11:42 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-21N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 10:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	100	0.25	5.0		mg/Kg	1	5/1/2008 11:46 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-22N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	2200	0.25	5.0		mg/Kg	1	5/1/2008 11:50 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-22N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	150	0.25	5.0		mg/Kg	1	5/1/2008 11:54 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-22N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	5.7	0.25	5.0		mg/Kg	1	5/1/2008 11:57 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-23N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	360	0.25	5.0		mg/Kg	1	5/1/2008 12:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-23N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	64	0.25	5.0		mg/Kg	1	5/1/2008 12:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-23N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 11:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	28	0.25	5.0		mg/Kg	1	5/1/2008 12:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	100	0.25	5.0		mg/Kg	1	5/1/2008 12:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	48	0.25	5.0		mg/Kg	1	5/1/2008 12:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:50:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	5.9	0.25	5.0		mg/Kg	1	5/1/2008 12:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 12:52:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 12:40 PM

CLIENT:	TRC	**Client Sample ID:**	B-25N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:15:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	130	0.25	5.0		mg/Kg	1	5/1/2008 12:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:17:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	21	0.25	5.0		mg/Kg	1	5/1/2008 12:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:20:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	38	0.25	5.0		mg/Kg	1	5/1/2008 12:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-25N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:22:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 01:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501B**	QC Batch: **45266**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	74	0.25	5.0		mg/Kg	1	5/1/2008 01:05 PM

CLIENT:	TRC	**Client Sample ID:**	B-24Na-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:02:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	31	0.25	5.0		mg/Kg	1	5/1/2008 01:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:05:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	26	0.25	5.0		mg/Kg	1	5/1/2008 01:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-24Na-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:07:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 01:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	280	0.25	5.0		mg/Kg	1	5/1/2008 01:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:42:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	60	0.25	5.0		mg/Kg	1	5/1/2008 01:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	29	0.25	5.0		mg/Kg	1	5/1/2008 01:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-26N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 1:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	30	0.25	5.0		mg/Kg	1	5/1/2008 01:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	170	0.25	5.0		mg/Kg	1	5/1/2008 01:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:02:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-049		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	22	0.25	5.0		mg/Kg	1	5/1/2008 02:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:05:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-050		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	18	0.25	5.0		mg/Kg	1	5/1/2008 02:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-27N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:07:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-051		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 02:36 PM

CLIENT:	TRC	**Client Sample ID:**	B-28N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:20:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-052		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate:	**4/28/2008**	Analyst: **LKN**
Lead	600	0.25	5.0		mg/Kg	1	5/1/2008 02:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098439
Project: Caltrans-West County Connectors, 151396
Lab ID: 098439-053

Client Sample ID: B-28N-1.0-1.5
Collection Date: 4/22/2008 2:22:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	34	0.25	5.0		mg/Kg	1	5/1/2008 02:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:23:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-054		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	32	0.25	5.0		mg/Kg	1	5/1/2008 02:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-28N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:27:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-055		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	9.0	0.25	5.0		mg/Kg	1	5/1/2008 02:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-0.0-0.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-056		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	89	0.25	5.0		mg/Kg	1	5/1/2008 02:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-1.0-1.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-057		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	37	0.25	5.0		mg/Kg	1	5/1/2008 02:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-2.0-2.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:50:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-058		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	17	0.25	5.0		mg/Kg	1	5/1/2008 03:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-29N-3.0-3.5
Lab Order:	098439	**Collection Date:**	4/22/2008 2:52:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098439-059		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501C**	QC Batch: **45267**				PrepDate: **4/28/2008**	Analyst: **LKN**	
Lead	210	0.25	5.0		mg/Kg	1	5/1/2008 03:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-CREW 1-DAY 2
Lab Order:	098439	**Collection Date:**	4/22/2008 3:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	098439-060		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080428C**	QC Batch: **45240**				PrepDate:	**4/25/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	4/28/2008 01:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45265A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **PBS**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45265**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **LCSS**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	235.470	5.0	250.0	0	94.2	80	120				

Sample ID: **098439-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-17N-3.0-3.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449127**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.186	5.0						4.573	0	20	

Sample ID: **098439-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-17N-3.0-3.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	156.177	5.0	250.0	4.573	60.6	45	110				

Sample ID: **098439-020A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-20N-1.0-1.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449140**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	25.827	5.0						9.521	92.3	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098439-020A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-20N-1.0-1.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449141**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	173.572	5.0	250.0	9.521	65.6	45	110				

Sample ID: **098439-020A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94044**
Client ID: **B-20N-1.0-1.5**	Batch ID: **45265**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	149.371	5.0	250.0	9.521	55.9	45	110	173.6	15.0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45266A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **PBS**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45266**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **LCSS**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449239**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	248.509	5.0	250.0	0	99.4	80	120				

Sample ID: **098439-030A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-23N-1.0-1.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	80.188	5.0						64.06	22.4	20	R

Sample ID: **098439-030A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-23N-1.0-1.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449251**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	181.821	5.0	250.0	64.06	47.1	45	110				

Sample ID: **098439-040A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-24Na-0.0-0.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449263**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	69.389	5.0						73.69	6.01	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098439-040A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-24Na-0.0-0.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449264**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	230.745	5.0	250.0	73.69	62.8	45	110				

Sample ID: **098439-040A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94052**
Client ID: **B-24Na-0.0-0.5**	Batch ID: **45266**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449265**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	246.419	5.0	250.0	73.69	69.1	45	110	230.7	6.57	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45267A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **PBS**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449365**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45267**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **LCSS**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449366**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	253.533	5.0	250.0	0	101	80	120				

Sample ID: **098439-050A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **B-27N-2.0-2.5**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449377**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	23.407	5.0						17.74	27.5	20	R

Sample ID: **098439-050A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **B-27N-2.0-2.5**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449378**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	156.284	5.0	250.0	17.74	55.4	45	110				

Sample ID: **098439-059A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **B-29N-3.0-3.5**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449389**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	175.381	5.0						205.8	16.0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098439-059A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **B-29N-3.0-3.5**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449390**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	275.393	5.0	250.0	205.8	27.8	45	110				S

Sample ID: **098439-059A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/28/2008**	RunNo: **94057**
Client ID: **B-29N-3.0-3.5**	Batch ID: **45267**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	314.590	5.0	250.0	205.8	43.5	45	110	275.4	13.3	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45240**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **PBW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446770**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45240**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **LCSW**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.996	0.25	1.000	0	99.6	85	115				

Sample ID: **098366-001BDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.2						0	0	20	

Sample ID: **098449-005AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.250	1.2	2.500	0	90.0	71	118				

Sample ID: **098449-005AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **4/25/2008**	RunNo: **93889**
Client ID: **ZZZZZZ**	Batch ID: **45240**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **4/28/2008**	SeqNo: **1446776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.366	1.2	2.500	0	94.6	71	118	2.250	5.02	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098439
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098439-003ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **93847**
Client ID: **B-4N-2.0-2.5** Batch ID: **R93847** TestNo: **EPA 9045C** Analysis Date: **4/25/2008** SeqNo: **1445231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.790	0.10						7.780	0.128	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 4/24/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 5.0 Y☐ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N☑ N/A 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans - West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 4/24/08 Time: 8:25
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 8:25
Relinquished by: (Signature and Printed Name) Date: 4/24/08 Time: 8:50
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 8:50
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
CREW 1 - DAY 2

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); Pit (4045)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0804439-001	B-4N-0.0-0.5	4/22	855	E	1	P	
	2	B-4N-1.0-1.5		857			P	
	3	B-4N-2.0-2.5		900			P	
	4	B-16N-0.0-0.5		915			J	no plt
	5	B-16N-1.0-1.5		920			J	no plt
	6	B-16N-2.0-2.5		922			J	no plt
	7	B-17N-0.0-0.5		930			P	no plt
	8	B-17N-1.0-1.5		932				no plt
	9	B-17N-2.0-2.5		935				no plt
	10	B-17N-3.0-3.5		937				no plt

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ NO 5. # OF SPLS MATCH COC Y q N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City: Irvine State: CA Zip Code: 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans-West County connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 4/24/08 Time: 5:25
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 5:25

Relinquished by: (Signature and Printed Name) Date: 4/24/08 Time:
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 5:50

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) Lead, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	098439-11	B-18N-0.0-0.5	4/22	958	E	1	P	
	12	B-18N-1.0-1.5		952				
	13	B-18N-2.0-2.5		955				
	14	B-18N-3.0-3.5		957				
	15	B-19N-0.0-0.5		1010				
	16	B-19N-1.0-1.5		1012				
	17	B-19N-2.0-2.5		1015				
	18	B-19N-3.0-3.5		1017				
	19	B-20N-0.0-0.5		1030				
	20	B-20N-1.0-1.5		1032				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☑ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED YO NO 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y q NO 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N q 6. PRESERVED Y O N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co:
Address _____
City _____ State _____ Zip _____

Bill To:
Ann: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0708439-21	B-20N-2.0-2.5	4/22	1036			X	X	Lead					X				E	1	P	
	22	B-20N-3.0-3.5		1037																	
	23	B-21N-0.0-0.5		1050																	
	24	B-21N-1.0-1.5		1052																	
	25	B-21N-2.0-2.5		1055																	
	26	B-22N-0.0-0.5		1110																	
	27	B-22N-1.0-1.5		1112																	
	28	B-22N-2.0-2.5		1115																	
	29	B-23N-0.0-0.5		1125																	
	30	B-23N-1.0-1.5		1127																	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennan
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-1336
FAX: ( )

Project Name: West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 4/24/08 Time: 8:25
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 8:24
Relinquished by: (Signature and Printed Name) Date: 4/24/08 Time: 8:50
Received by: (Signature and Printed Name) Date: 4/24/08 Time: 8:50
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennan
Co:
Address
City State Zip

Bill To:
Attn: David Lennan
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metals) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0984731	B-23N-2.0-2.5	4/22	1130				X						X				E	1	P		
	32	B-24N-0.0-0.50		1245																		
	33	B-24N-1.0-1.5		1247																		
	34	B-24N-2.0-2.5		1250																		
	35	B-24N-3.0-3.5		1252																		
	36	B-25N-0.0-0.5		1315																		
	37	B-25N-1.0-1.5		1317																		
	38	B-25N-2.0-2.5		1320																		
	39	B-25N-3.0-3.5		1322																		
	40	B-24NQ-0.0-0.5		1300																		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client; ATL ☒; CA OverN ☐; FEDEX ☐; Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y O N O; 2. HEADSPACE (VOA) Y ☐ N ☐; CONTAINER INTACT Y ☐ N ☐; 4. SEALED Y O N ☐; 5. # OF SPLS MATCH COC Y ☐ N ☐; PRESERVED Y ☐ N ☐

Client: TRC	Address: 21 Technology Dr.		TEL: (949) 727-9336
Attn: David Lennon	City Irvine	State CA Zip Code 92618	FAX: ( )
Project Name: Caltrans-West County Connectors	Project #: 151396	Sampler: (Printed Name) Kelly S. Keller	(Signature) Kelly S. Keller
Relinquished by: (Signature and Printed Name) Kelly S. Keller Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name) [illegible]	Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name) [illegible]	Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name) Kal	Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To: Attn: David Lennon; Co: _____; Address _____; City _____ State _____ Zip _____

Bill To: Attn: Same; Co: _____; Address _____; City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0804397-41	B-24Na-1.0-1.5	4/22	1302				X						X				E	1	P	
	42	B-24Na-2.0-2.5		1305																	
	43	B-24Na-3.0-3.5		1307																	
	44	B-26N-0.0-0.5		1340																	
	45	B-26N-1.0-1.5		1342																	
	46	B-26N-2.0-2.5		1345																	
	47	B-26N-3.0-3.5		1347																	
	48	B-27N-0.0-0.5		1400																	
	49	B-27N-1.0-1.5		1402																	
	50	B-27N-2.0-2.5		1405																	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax *(562)* 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition upon Receipt
1. CHILLED Y ☑ N ☐ 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☑ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name)	Kelly S. Keller	Date: 4/24/08	Time: 8:25	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:25
Relinquished by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:50	Received by: (Signature and Printed Name)		Date: 4/24/08	Time: 8:50
Relinquished by: (Signature and Printed Name)		Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
_____ ____
Print Name
_____
Signature

Send Report To:
Attn: David Lennon
Co:
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

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Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

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- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER, Rinsate

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) Ni - Cr	SOIL	WATER	GROUND WATER	WASTEWATER	Rinsate	TAT	Container(s) #	Container(s) Type	REMARKS
	0984439-51	B-27N-3.0-3.5	4/22	1407				X						X						E		P	
	52	B-28N-0.0-0.5		1420																			
	53	B-28N-1.0-1.5		1422																			
	54	B-28N-2.0-2.5		1423																			
	55	B-28N-3.0-3.5		1427																			
	56	B-29N-0.0-0.5		1445																			
	57	B-29N-1.0-1.5		1447																			
	58	B-29N-2.0-2.5		1450																			
	59	B-29N-3.0-3.5		1452																			
	60	EB-CREW 1-DAY 2		1500														X					

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098460

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 098460
Project: Caltrans West County Connectors, 151396
Lab ID: 098460-002

Client Sample ID: B62N-1.0-1.5
Collection Date: 4/25/2008 8:30:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B** QC Batch: **R94619**					PrepDate:		Analyst: **AMT**
Lead	7.6	0.021	0.50		mg/L	10	5/16/2008 10:54 AM
ICP METALS BY TCLP EXTRACTION							
		EPA3010A			**EPA 1311/ 6010B**		
RunID: **ICP6_080515E** QC Batch: **45630**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 09:18 PM
LEAD BY ATOMIC ABSORPTION							
		WET			**WET DI/ EPA 7420**		
RunID: **AA2_080512C** QC Batch: **45525**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098460
Project: Caltrans West County Connectors, 151396
Lab ID: 098460-004

Client Sample ID: B63N-0.0-0.5
Collection Date: 4/25/2008 9:25:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B** QC Batch: **R94619**					PrepDate:		Analyst: **AMT**
Lead	120	0.021	0.50		mg/L	10	5/16/2008 10:56 AM
ICP METALS BY TCLP EXTRACTION							
		EPA3010A			**EPA 1311/ 6010B**		
RunID: **ICP6_080515E** QC Batch: **45630**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	18	0.011	0.25		mg/L	5	5/15/2008 09:21 PM
LEAD BY ATOMIC ABSORPTION							
		WET			**WET DI/ EPA 7420**		
RunID: **AA2_080512C** QC Batch: **45525**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	6.6	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B61N-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B**	QC Batch: **R94619**				PrepDate:		Analyst: **AMT**
Lead	2.5	0.021	0.50		mg/L	10	5/16/2008 10:59 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098460
Project: Caltrans West County Connectors, 151396
Lab ID: 098460-008

Client Sample ID: B61N-1.0-1.5
Collection Date: 4/25/2008 10:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B**	QC Batch: **R94619**				PrepDate:		Analyst: **AMT**
Lead	13	0.021	0.50		mg/L	10	5/16/2008 11:02 AM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515E**	QC Batch: **45630**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	0.88	0.011	0.25		mg/L	5	5/15/2008 09:24 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	0.80	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098460
Project: Caltrans West County Connectors, 151396
Lab ID: 098460-016

Client Sample ID: B70N-1.0-1.5
Collection Date: 4/25/2008 11:25:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B** QC Batch: **R94619**					PrepDate:		Analyst: **AMT**
Lead	9.0	0.021	0.50		mg/L	10	5/16/2008 11:04 AM
ICP METALS BY TCLP EXTRACTION							
		EPA3010A			**EPA 1311/ 6010B**		
RunID: **ICP6_080516A** QC Batch: **45630**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	2.8	0.011	0.25		mg/L	5	5/16/2008 09:16 AM
LEAD BY ATOMIC ABSORPTION							
		WET			**WET DI/ EPA 7420**		
RunID: **AA2_080512C** QC Batch: **45525**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	0.33	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B71NA-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 1:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B**	QC Batch: **R94619**				PrepDate:		Analyst: **AMT**
Lead	15	0.021	0.50		mg/L	10	5/16/2008 11:07 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94619

Sample ID: **MB-45531B**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **PBS**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458548**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **LCS-45531**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **LCSS**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458549**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.007	0.050	1.000	0.003180	100	85	115				

Sample ID: **098461-006ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **ZZZZZZ**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458560**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	24.353	0.50						47.75	64.9	20	R

Sample ID: **098461-006AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **ZZZZZZ**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458561**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	50.454	0.50	2.500	47.75	108	71	118				

Sample ID: **098461-006AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **ZZZZZZ**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458562**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	48.388	0.50	2.500	47.75	25.7	71	118	50.45	4.18	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458357**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.789	0.25						5.665	39.7	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.772	0.25	2.500	5.665	-75.7	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.575	0.25	2.500	5.665	-43.6	71	118	3.772	19.2	20	S

Sample ID: **MB-45630A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458392**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.023	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **LCS-45630**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **LCSS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458393**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.940	0.050	1.000	0.002733	93.7	85	115				

Sample ID: **098438-020ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458403**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.528	0.25						14.21	20.8	20	R

Sample ID: **098438-020AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458404**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.357	0.25	2.500	14.21	5.94	71	118				S

Sample ID: **MB-45630B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.096	0.050									

Sample ID: **MB-45565B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.949	0.25						7.622	9.24	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.261	0.50	5.000	7.622	72.8	70	130				

Sample ID: **MB-45525A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45525**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **LCSS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.211	0.25	5.000	0	104	80	120				

Sample ID: **MB-45525B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098461-010A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.599	0.25						4.638	0.838	20	

Sample ID: **098461-010A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456743**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.434	0.25	5.000	4.638	95.9	70	130				

Sample ID: **098461-010A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456744**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.398	0.25	5.000	4.638	95.2	70	130	9.434	0.378	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098460

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B71NA-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 1:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098461-028A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465644**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.496	0.25						0.5307	6.82	20	

Sample ID: **098461-028A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465645**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.031	0.25	2.500	0.5307	100	70	130				

Sample ID: **MB-45907B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465646**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465647**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098527-030A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465652**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.333	0.25						0.3215	3.64	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098527-030A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465653**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.025	0.25	2.500	0.3215	108	70	130				

Sample ID: **098527-030A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465654**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.190	0.25	2.500	0.3215	115	70	130	3.025	5.31	20	

Sample ID: **MB-45907A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465655**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45907**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **LCSS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465657**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.913	0.25	1.000	0	91.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 02,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098460

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B62N-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 8:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	14	0.25	5.0		mg/Kg	1	5/1/2008 07:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B62N-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 8:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	83	0.25	5.0		mg/Kg	1	5/1/2008 07:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B62N-2.0-2.5
Lab Order:	098460	**Collection Date:**	4/25/2008 8:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 07:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B63N-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 9:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	1200	0.25	5.0		mg/Kg	1	5/1/2008 07:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B63N-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 9:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	5.2	0.25	5.0		mg/Kg	1	5/1/2008 07:55 PM

CLIENT:	TRC	**Client Sample ID:**	B63N-2.0-2.5
Lab Order:	098460	**Collection Date:**	4/25/2008 9:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	9.4	0.25	5.0		mg/Kg	1	5/1/2008 07:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B61N-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	83	0.25	5.0		mg/Kg	1	5/1/2008 08:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B61N-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	110	0.25	5.0		mg/Kg	1	5/1/2008 08:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B61N-2.0-2.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 08:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	Crew 1-ER-4
Lab Order:	098460	**Collection Date:**	4/25/2008 9:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	WATER
Lab ID:	098460-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080502C**	QC Batch: **45359**				PrepDate:	**5/1/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	5/2/2008 10:03 AM

CLIENT:	TRC	**Client Sample ID:**	B69N-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	6.2	0.25	5.0		mg/Kg	1	5/1/2008 08:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B69N-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 08:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B69N-2.0-2.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	6.3	0.25	5.0		mg/Kg	1	5/1/2008 08:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B69N-3.0-3.5
Lab Order:	098460	**Collection Date:**	4/25/2008 10:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	5.2	0.25	5.0		mg/Kg	1	5/1/2008 08:41 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B70N-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 11:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 08:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B70N-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 11:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	66	0.25	5.0		mg/Kg	1	5/1/2008 08:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B70N-2.0-2.5
Lab Order:	098460	**Collection Date:**	4/25/2008 11:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 08:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B70N-3.0-3.5
Lab Order:	098460	**Collection Date:**	4/25/2008 11:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	6.3	0.25	5.0		mg/Kg	1	5/1/2008 09:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B71N-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 12:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	5.4	0.25	5.0		mg/Kg	1	5/1/2008 09:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B71N-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 12:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	18	0.25	5.0		mg/Kg	1	5/1/2008 09:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098460
Project: Caltrans West County Connectors, 151396
Lab ID: 098460-021

Client Sample ID: B71NA-0.0-0.5
Collection Date: 4/25/2008 1:15:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501G**	QC Batch: **45322**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:12 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	8.8	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B71NA-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 1:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	100	0.25	5.0		mg/Kg	1	5/1/2008 09:39 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	7.5	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B71NA-2.0-2.5
Lab Order:	098460	**Collection Date:**	4/25/2008 1:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:43 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	7.9	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B71NA-3.0-3.5
Lab Order:	098460	**Collection Date:**	4/25/2008 1:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:46 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B62NA-1.0-1.5
Lab Order:	098460	**Collection Date:**	4/25/2008 8:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	12	0.25	5.0		mg/Kg	1	5/1/2008 09:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B62NA-2.0-2.5
Lab Order:	098460	**Collection Date:**	4/25/2008 8:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B62NA-0.0-0.5
Lab Order:	098460	**Collection Date:**	4/25/2008 8:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098460-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	11	0.25	5.0		mg/Kg	1	5/1/2008 09:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	Crew 1-ER-5
Lab Order:	098460	**Collection Date:**	4/25/2008 1:35:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	WATER
Lab ID:	098460-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080502C**	QC Batch: **45359**				PrepDate:	**5/1/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	5/2/2008 10:23 AM

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45322A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **PBS**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449835**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45322**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **LCSS**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449836**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	232.574	5.0	250.0	0	93.0	80	120				

Sample ID: **098460-011A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **B69N-0.0-0.5**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.938	5.0						6.164	25.2	20	R

Sample ID: **098460-011A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **B69N-0.0-0.5**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449848**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	159.419	5.0	250.0	6.164	61.3	45	110				

Sample ID: **MB-45322B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **PBS**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449849**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098460-021A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **B71NA-0.0-0.5**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449860**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.754	5.0						4.857	0	20	

Sample ID: **098460-021A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **B71NA-0.0-0.5**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449861**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	135.675	5.0	250.0	4.857	52.3	45	110				

Sample ID: **098460-021A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94086**
Client ID: **B71NA-0.0-0.5**	Batch ID: **45322**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449862**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	164.303	5.0	250.0	4.857	63.8	45	110	135.7	19.1	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45323A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **PBS**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449878**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45323**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **LCSS**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449879**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	227.548	5.0	250.0	0	91.0	80	120				

Sample ID: **098461-004A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **ZZZZZZ**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449890**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	51.286	5.0						57.59	11.6	20	

Sample ID: **098461-004A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **ZZZZZZ**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449891**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	186.480	5.0	250.0	57.59	51.6	45	110				

Sample ID: **MB-45323B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **PBS**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449892**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098461-014A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **ZZZZZZ**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449903**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	23.649	5.0						26.28	10.5	20	

Sample ID: **098461-014A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **ZZZZZZ**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449904**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	162.748	5.0	250.0	26.28	54.6	45	110				

Sample ID: **098461-014A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **ZZZZZZ**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	177.986	5.0	250.0	26.28	60.7	45	110	162.7	8.94	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45359**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **PBW**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450092**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45359**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **LCSW**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450093**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.047	0.25	1.000	0	105	85	115				

Sample ID: **098460-010ADUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **Crew 1-ER-4**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450095**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098460-010AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **Crew 1-ER-4**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450096**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.471	0.25	2.500	0	98.8	71	118				

Sample ID: **098460-010AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **Crew 1-ER-4**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450097**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.431	0.25	2.500	0	97.2	71	118	2.471	1.63	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098460
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098460-024ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94001**
Client ID: **B71NA-3.0-3.5** Batch ID: **R94001** TestNo: **EPA 9045C** Analysis Date: **4/29/2008** SeqNo: **1448052**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.400	0.10						8.290	1.32	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 2

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:

Logged By: [signature] Date: 4/25/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other:

Sample Condition Upon Receipt
1. CHILLED 4.0 YO NO 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N/A☐ 5. # of SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC (Caltrans)	Address: 21 Technology Dr		TEL: (949) 727 9336
Attn: David Lennon	City IRVINE	State CA Zip Code 92618	FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396 Sampler: (Printed Name) (Signature)

Relinquished by: (Signature and Printed Name) [signature] Tibbetts	Date: 4/25/08	Time: 14:30	Received by: (Signature and Printed Name) [signature]	Date: 4/25/08	Time: 14:30
Relinquished by: (Signature and Printed Name) [signature]	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name) Margo Hill	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To: Attn: David Lennon Co: Address City State Zip

Bill To: Attn: Same Co: Address City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metals) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	078960-001	B62N - 0.0 - 0.5	4/25/08	8:30	E	P	T	
	2	B62N - 1.0 - 1.5	4/25/08	8:30	E	P	T	
	3	B62N - 2.0 - 2.5	4/25	8:30	E			
	4	B63N - 0.5 - 0.5	4/25	9:25	E			
	5	B63N - 1.5 - 1.5	4/25	9:25	E			
	6	B63N - 2.5 - 2.5	4/25	9:25	E			
	7	B61N - 0.0 - 0.5	4/25	10:20	E	P	T	
	8	B61N - 1.0 - 1.5	4/25	10:20	E	P	T	
	9	B61N - 2.0 - 2.5	4/25	10:20	E	P	T	
	10	Crew2-ER-4	4/25	9:10	E	P	P	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y O N O

Client: TRC (Caltrans) Address: 21 Technology Dr. TEL: (949) 727 9336
Attn: David Lennon City IRVINE State CA Zip Code 92618 FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396 Sampler: (Printed Name) (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 14:30 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 14:30
Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1455 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1455
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B Total Metals Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION | TAT | Container(s): # | Type

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8260B	6010B Lead	SOIL	TAT	#	Type	REMARKS
	098460- 11	B69N-0.0-0.5	4/25/08	10:55	✓		✓	E	1	T P	
	12	B69N-1.0-1.5		10:55	✓		✓				
	13	B69N-2.0-2.5		10:55	✓		✓				
	14	B69N-3.0-3.5		10:55	✓		✓				
	15	B70N-0.0-0.5		11:25	✓		✓				
	16	B70N-1.0-1.5		11:25	✓		✓				
	17	B70N-2.0-2.5		11:25	✓		✓				
	18	B70N-3.0-3.5		11:25	✓		✓				
	19	B71N-0.0-0.5		12:50	✓		✓				
	20	B71N-1.0-1.5	4/25/08	12:50	✓		✓				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, C A 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Dale: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y O N O

Client: TRC (Caltrans) Address: 21 Technology TEL: (949) 727 9336
Attn: David Lennon City IRvine State CA Zip Code 92618 FAX: ( )

Project Name: Caltrans: West County Connectors Project #: 151396 Sampler: (Printed Name) Thomas Greene (Signature) Thomas Greene

Relinquished by: (Signature and Printed Name) T Greene Thomas Greene	Date: 4/25/08	Time: 1430	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 14:30
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: David Lennon
Co:
Address
City State Zip

Special Instructions/Comments:
Same

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metals) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | PH by EPA 1045

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0904640-21	B7INA-0.0-0.5	4/25	13:15	E	1	P T	
	22	B7INA-1.0-1.5	4/25	13:15	E	1	P T	
	23	B7INA-2.0-2.5	4/25	13:15	E	1	P T	
	24	B7INA-3.0-3.5	4/25	13:15	E	1	P T	
	~~TM~~	~~B62NA 0.0-0.5~~	~~4/25~~	~~8:50~~				
	25	B62NA 0.0-0.5	4/25	8:50	E	1	P T	
	26	B62NA 2.0-2.5	4/25	8:50	E	1	P T	
	27	B62NA 0.0 0.5	4/25	8:50	E	1	P T	
	28	Crew2-ER-5			E	1	P P	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Pg 1 of 1

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 - Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____ Logged By: _____ Date: 4/25/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 4.0 Y☐ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC (Caltrans)
Attn: David Lennon
Address: 21 Technology Dr
City: IRVine State: CA Zip Code: 92618
TEL: (949) 727 9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 14:30	Received by: (Signature and Printed Name)	Date: 4/25/08 Time: 14:55
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08 Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City ____ State ____ Zip ____

Bill To:
Attn: Same
Co: _____
Address _____
City ____ State ____ Zip ____

Special Instructions/Comments:
Lab noted one sample B65N-0.0-0.5 dated 4/25 10:20 was received. This sample should be B61N-0.0-0.5, TJ 4/28
Please Run the sample as such.

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	PRESERVATION
	078960-001	B62N - 0.0 - 0.5	4/25/08	8:30	E		P T	
	-2	B62N - 1.0 - 1.5	4/25/08	8:30	E		P T	
	3	B62N - 2.0 - 2.5	4/25	8:30	E			
	4	B63N - 0.5 - 0.5 TJ 4/28	4/25	9:25	E			
	5	B63N - 1.5 - 1.5 TJ	4/25	9:25	E			
	6	B63N - 2.5 - 2.5 TJ	4/25	9:25	E			
	7	B61N - 0.0 - 0.5	4/25	10:20	E		P T	
	8	B61N - 1.0 - 1.5	4/25	10:28	E		P T	
	9	B61N - 2.0 - 2.5	4/25	10:40	E		P T	
	10	Crew Lunch - ER-4 TJ 4/28	4/25	9:10	E		P P	

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____ REMARKS

starts 8 a.m. following day if ples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO3 S=H2SO4 C=4°C Z=Zn(AC)2 O=NaOH T=Na2S2O3

DISTRIBUTION: White with report Yellow to folder, Pink to submitter.

APR. 28. 2008 1:14PM TRC ALTON 949 753 0111. NO. 1377 P. 1

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: ____ Logged By: ____ Date: ____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: ____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC (Caltrans) Address: 21 Technology Dr. TEL: (949) 727-9336
Attn: David Lennon City: Irvine State: CA Zip Code: 92618 FAX: ( )
Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/05	Time: 14:30	Received by: (Signature and Printed Name) Date: 4/25/05 Time: 14:30
Relinquished by: (Signature and Printed Name)	Date: 4/25/05	Time: 1455	Received by: (Signature and Printed Name) Date: 4/25/05 Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ____ Print Name ____ Date ____ Signature

Send Report To: Attn: ____ Co: ____ Address ____ City ____ State ____ Zip ____

Bill To: Attn: ____ Co: ____ Address ____ City ____ State ____ Zip ____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.
Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (VOA/MtBE) | 8270C (BNA) | 6010B (CAM17 Metals) Lead | 8015B (DRO) | 8015B (ORO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	PRESERVATION	REMARKS
1	098961-1	B69N-0.0-0.5	4/25/05	10:55	E	1	T	P	
2	-2	B69N-1.0-1.5		10:55					
3	-3	B69N-2.0-2.5		10:55					
4	-4	B69N-3.0-3.5		10:55					
5	-5	B70N-0.0-0.5		11:25					
6	-6	B70N-1.0-1.5		11:25					
7	-7	B70N-2.0-2.5		11:25					
8	-8	B70N-3.0-3.5		11:25					
9	-9	B71N-0.0-0.5		12:50					
10	-10	B71N-1.0-1.5	4/25/05	12:55					

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO3 S=H2SO4 C=4°C Z=Zn(AC)2 O=NaOH T=Na2S2O3

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

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CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____ Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA Over/N ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC (Caltrans) Address: 21 Technology TEL: (949) 727336
Attn: David Lennon City Irvine State CA Zip Code 92618 FAX: ( )
Project Name: Caltrans West County Connectors Project #: 151396 Sampler: (Printed Name) Thomas Greene (Signature) Thomas Greene
Relinquished by: (Signature and Printed Name) Thomas Greene Date: 4/25/08 Time: 1460 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 14:30
Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1455 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1455
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I thereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: _____ Print Name _____ Date _____ Signature

Send Report To: Attn: David Lennon Co: _____ Address _____ City _____ State _____ Zip _____

Bill To: Attn: David Lennon Co: _____ Address _____ City _____ State _____ Zip _____

Special Instructions/Comments: Same

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (VOA/8xx) | 8270C (BNA) | 6010B (Recoverable) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | PB by EPA 1045

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	PRESERVATION
	(07)9C4L-0- 21	B7INA-0.0-0.5	4/25	13:15	E	1	P	T
	22	B7INA-1.0-1.5	4/25	13:15	E	1	P	T
	23	B7INA-2.0-2.5	4/25	13:15	E	1	P	T
	24	B7INA-3.0-3.5	4/25	13:15	E	1	P	T
	TAT	~~B62NA 0.0-0.5~~	~~4/25~~	~~8:50~~				
	25	B62NA 1.0-1.5	4/25	8:50	E	1	P	T
	26	B62NA 2.0-2.5	4/25	8:50	E	1	P	T
	27	B62NA 0.0 0.5	4/25	8:50	E	1	P	T
	28	Crew Z-ER-5 TAT 4hr	4/25	1335	E	1	P	P

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____ REMARKS

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO3 S=H2SO4 C=4°C Z=Zn(AC)2 O=NaOH T=Na2S2O3

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

APR. 28. 2008 1:15PM TRC ALTON 949 753 0111 NO. 1377 P. 3

CLIENT CORRESPONDENCE LOG

DATE: 4/28/2008 5:53:15 PM

Client Name: TRC-IRVINE

ATL Workorder No.: 098460

DATE	CONTACT	CALL IN/OUT	ISSUE / PROBLEM	COMMENTS/CORRECTIVE ACTION	INITIAL
4/25/2008 6:38:39			Sample Crew2-ER-5 no date and time of collection,	date and time of collection taken from the sample bottle	Margo
4/28/2008 11:47:44			COC marked as B63N-0.5-0.5, 1.5-1.5, 2.5-2.5. Sample labelled as B63N-0.0-0.5, 1.0-1.5, 2.0-2.5.	id on sample is correct will send corrected coc.	Margo
4/28/2008 11:49:56			No sample received for B61N-0.0-0.5@ 10:20, Received extra sample for B65N-0.0-0.5 @ 10:20.	B65N 0.0-0.5 @ 10:20 is the sample for B61N-0.0-0.5@ 10:20.	Margo
4/28/2008 11:52:41			COC marked as Crew 2-ER-4, Sample labelled Crew 1-ER-4.	sample id on container is correct, will send corrected coc.	Margo

May 20,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098461

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot he reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B41N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 8:45:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B** QC Batch: **R94619**					PrepDate:		Analyst: **AMT**
Lead	36	0.021	0.50		mg/L	10	5/16/2008 11:09 AM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080516A** QC Batch: **45630**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	5.7	0.011	0.25		mg/L	5	5/16/2008 09:18 AM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C** QC Batch: **45525**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	1.1	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B42N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:00:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B**	QC Batch: **R94619**				PrepDate:		Analyst: **AMT**
Lead	5.6	0.021	0.50		mg/L	10	5/16/2008 11:18 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:02:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B**	QC Batch: **R94619**				PrepDate:		Analyst: **AMT**
Lead	14	0.021	0.50		mg/L	10	5/16/2008 11:22 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098461
Project: Caltrans West County Connectors, 151396
Lab ID: 098461-006

Client Sample ID: B42N-2.0-2.5
Collection Date: 4/24/2008 9:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080516B** QC Batch: **R94619**					PrepDate:		Analyst: **AMT**
Lead	48	0.021	0.50		mg/L	10	5/16/2008 11:25 AM
ICP METALS BY TCLP EXTRACTION							
			EPA3010A		**EPA 1311/ 6010B**		
RunID: **ICP6_080515C** QC Batch: **45631**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	2.3	0.011	0.25		mg/L	5	5/15/2008 05:00 PM
LEAD BY ATOMIC ABSORPTION							
			WET		**WET DI/ EPA 7420**		
RunID: **AA2_080512C** QC Batch: **45525**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	3.0	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B44N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080519A** QC Batch: **R94685**					PrepDate:		Analyst: **AMT**
Lead	150	0.021	0.50		mg/L	10	5/19/2008 12:12 PM
ICP METALS BY TCLP EXTRACTION							
		EPA3010A			**EPA 1311/ 6010B**		
RunID: **ICP6_080515C** QC Batch: **45631**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	19	0.011	0.25		mg/L	5	5/15/2008 05:02 PM
LEAD BY ATOMIC ABSORPTION							
		WET			**WET DI/ EPA 7420**		
RunID: **AA2_080512C** QC Batch: **45525**					PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	3.3	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B44N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:32:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080519A**	QC Batch: **R94685**				PrepDate:		Analyst: **AMT**
Lead	7.0	0.021	0.50		mg/L	10	5/19/2008 12:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B44N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	8.0	0.011	0.25		mg/L	5	5/15/2008 05:10 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	4.4	0.19	0.25		mg/L	1	5/14/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	130	3.7	5.0		mg/L	20	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	1.1	0.011	0.25		mg/L	5	5/15/2008 05:13 PM
LEAD BY ATOMIC ABSORPTION							
	WET				**WET DI/ EPA 7420**		
RunID: **AA2_080512C**	QC Batch: **45525**				PrepDate: **5/9/2008**		Analyst: **LKN**
Lead	4.6	0.19	0.25		mg/L	1	5/14/2008
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	44	0.93	1.2		mg/L	5	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:17:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	13	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:15:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	6.1	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B46N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 01:57 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	1.9	0.011	0.25		mg/L	5	5/15/2008 05:15 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	26	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B46N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:57:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	7.8	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B47N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 10:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080519A** QC Batch: **R94685**					PrepDate:		Analyst: **AMT**
Lead	70	0.021	0.50		mg/L	10	5/19/2008 12:17 PM
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A** QC Batch: **45526**					PrepDate:	**5/9/2008**	Analyst: **AMT**
Lead	2.2	0.011	0.25		mg/L	5	5/15/2008 02:00 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C** QC Batch: **45631**					PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	5.5	0.011	0.25		mg/L	5	5/15/2008 05:18 PM

CLIENT: TRC
Lab Order: 098461
Project: Caltrans West County Connectors, 151396
Lab ID: 098461-018

Client Sample ID: B47N-2.0-2.5
Collection Date: 4/24/2008 10:12:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080519A**	QC Batch: **R94685**				PrepDate:		Analyst: **AMT**
Lead	47	0.021	0.50		mg/L	10	5/19/2008 12:25 PM
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate:	**5/9/2008**	Analyst: **AMT**
Lead	0.70	0.011	0.25		mg/L	5	5/15/2008 02:02 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	5.9	0.011	0.25		mg/L	5	5/15/2008 05:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B54N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	26	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098461
Project: Caltrans West County Connectors, 151396
Lab ID: 098461-020

Client Sample ID: B54N-1.0-1.5
Collection Date: 4/24/2008 11:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	1.6	0.011	0.25		mg/L	5	5/15/2008 02:05 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	2.8	0.011	0.25		mg/L	5	5/15/2008 05:23 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	6.3	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B54N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.64	0.011	0.25		mg/L	5	5/15/2008 02:07 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 05:26 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	4.5	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B54N-3.0-3.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	3.9	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B57N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 12:00:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	2.7	0.011	0.25		mg/L	5	5/15/2008 05:29 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	25	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B58N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
				WET/ EPA 7420			
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	15	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B59N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	28	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B60N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 2:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP6_080519A**	QC Batch: **R94685**				PrepDate:		Analyst: **AMT**
Lead	80	0.021	0.50		mg/L	10	5/19/2008 12:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94619

Sample ID: **MB-45531B**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **PBS**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458548**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **LCS-45531**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **LCSS**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458549**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.007	0.050	1.000	0.003180	100	85	115				

Sample ID: **098461-006ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **B42N-2.0-2.5**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458560**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	24.353	0.50						47.75	64.9	20	R

Sample ID: **098461-006AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **B42N-2.0-2.5**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458561**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	50.454	0.50	2.500	47.75	108	71	118				

Sample ID: **098461-006AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94619**
Client ID: **B42N-2.0-2.5**	Batch ID: **R94619**	TestNo: **WET/ EPA 60**		Analysis Date: **5/16/2008**	SeqNo: **1458562**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	48.388	0.50	2.500	47.75	25.7	71	118	50.45	4.18	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **098461-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **B41N-0.0-0.5**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458357**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.789	0.25						5.665	39.7	20	R

Sample ID: **098461-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **B41N-0.0-0.5**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.772	0.25	2.500	5.665	-75.7	71	118				S

Sample ID: **098461-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94610**
Client ID: **B41N-0.0-0.5**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/16/2008**	SeqNo: **1458359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.575	0.25	2.500	5.665	-43.6	71	118	3.772	19.2	20	S

Sample ID: **MB-45630A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.003	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458392**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.023	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45630

Sample ID: **LCS-45630**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **LCSS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458393**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.940	0.050	1.000	0.002733	93.7	85	115				

Sample ID: **098438-020ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458403**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.528	0.25						14.21	20.8	20	R

Sample ID: **098438-020AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **ZZZZZZ**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458404**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.357	0.25	2.500	14.21	5.94	71	118				S

Sample ID: **MB-45630B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.096	0.050									

Sample ID: **MB-45565B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94611**
Client ID: **PBS**	Batch ID: **45630**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098438-046A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.949	0.25						7.622	9.24	20	

Sample ID: **098438-046A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **ZZZZZZ**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.261	0.50	5.000	7.622	72.8	70	130				

Sample ID: **MB-45525A**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45525**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **LCSS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/12/2008**	SeqNo: **1456027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.211	0.25	5.000	0	104	80	120				

Sample ID: **MB-45525B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **PBS**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45525

Sample ID: **098461-010A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **B42NA-2.0-2.5**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.599	0.25						4.638	0.838	20	

Sample ID: **098461-010A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **B42NA-2.0-2.5**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456743**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.434	0.25	5.000	4.638	95.9	70	130				

Sample ID: **098461-010A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94450**
Client ID: **B42NA-2.0-2.5**	Batch ID: **45525**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/14/2008**	SeqNo: **1456744**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.398	0.25	5.000	4.638	95.2	70	130	9.434	0.378	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45631

Sample ID: **MB-45631A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458086**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.007	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.024	0.25									

Sample ID: **LCS-45631**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **LCSS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458088**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.964	0.050	1.000	0.007446	95.6	85	115				

Sample ID: **098461-023ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **B57N-0.0-0.5**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458099**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.073	0.25						2.705	40.4	20	R

Sample ID: **098461-023AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **B57N-0.0-0.5**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458100**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.693	0.25	2.500	2.705	160	71	118				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45631

Sample ID: **MB-45631B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458101**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.006	0.050									

Sample ID: **098463-060ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458112**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.109	0.25						0.06586	0	20	

Sample ID: **098463-060AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458113**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.088	0.25	2.500	0.06586	80.9	71	118				

Sample ID: **098463-060AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.405	0.25	2.500	0.06586	93.6	71	118	2.088	14.1	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94685

Sample ID: **MB-45687**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94685**
Client ID: **PBS**	Batch ID: **R94685**	TestNo: **WET/ EPA 60**		Analysis Date: **5/19/2008**	SeqNo: **1459722**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.006	0.050									

Sample ID: **LCS-45687**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94685**
Client ID: **LCSS**	Batch ID: **R94685**	TestNo: **WET/ EPA 60**		Analysis Date: **5/19/2008**	SeqNo: **1459723**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.948	0.050	1.000	0.006338	94.1	85	115				

Sample ID: **098599-005ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94685**
Client ID: **ZZZZZZ**	Batch ID: **R94685**	TestNo: **WET/ EPA 60**		Analysis Date: **5/19/2008**	SeqNo: **1459725**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.864	0.50						1.362	44.7	20	R

Sample ID: **098599-005AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94685**
Client ID: **ZZZZZZ**	Batch ID: **R94685**	TestNo: **WET/ EPA 60**		Analysis Date: **5/19/2008**	SeqNo: **1459726**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.127	0.50	2.500	1.362	70.6	71	118				S

Sample ID: **098599-005AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94685**
Client ID: **ZZZZZZ**	Batch ID: **R94685**	TestNo: **WET/ EPA 60**		Analysis Date: **5/19/2008**	SeqNo: **1459727**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.187	0.50	2.500	1.362	73.0	71	118	3.127	1.89	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94535

Sample ID: **MB-45532A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **PBS**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457009**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45532**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **LCSS**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457010**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.788	0.25	5.000	0	95.8	80	120				

Sample ID: **098461-018A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **B47N-2.0-2.5**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457014**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	42.827	1.2	5.000	35.98	137	80	120				S

Sample ID: **MB-45532B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **PBS**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457015**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098462-017A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **ZZZZZZ**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.454	0.25						11.43	42.1	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94535

Sample ID: **098462-017A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **ZZZZZZ**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.378	0.50	5.000	11.43	78.9	80	120				S

Sample ID: **098462-017A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **ZZZZZZ**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.361	0.50	5.000	11.43	78.6	80	120	15.38	0.111	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **MB-45526A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458020**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **LCS-45526**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **LCSW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458021**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.894	0.050	1.000	0.005493	88.9	85	115				

Sample ID: **098463-012ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458032**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.049	0.25						0.3150	108	20	R

Sample ID: **098463-012AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458033**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.689	0.25	2.500	0.3150	95.0	71	118				

Sample ID: **MB-45526B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.004	0.050									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **098528-039ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.809	0.25						2.147	26.7	20	R

Sample ID: **098528-039AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.309	0.25	2.500	2.147	86.5	71	118				

Sample ID: **098528-039AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.381	0.25	2.500	2.147	89.4	71	118	4.309	1.65	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
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TEL: (949) 341-7458
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ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098461

RE: Caltrans West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B42N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:00:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.34	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:02:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.56	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B44N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:32:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	1.2	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:17:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.60	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:15:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate: **5/24/2008**		Analyst: **LKN**
Lead	0.53	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B46N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:57:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.47	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B54N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate: **5/24/2008**		Analyst: **LKN**
Lead	1.3	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B58N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.53	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B59N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.30	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B60N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 2:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	4.5	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098461-028A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **B58N-0.0-0.5**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465644**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.496	0.25						0.5307	6.82	20	

Sample ID: **098461-028A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **B58N-0.0-0.5**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465645**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.031	0.25	2.500	0.5307	100	70	130				

Sample ID: **MB-45907B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465646**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465647**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098527-030A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465652**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.333	0.25						0.3215	3.64	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098527-030A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465653**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.025	0.25	2.500	0.3215	108	70	130				

Sample ID: **098527-030A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465654**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.190	0.25	2.500	0.3215	115	70	130	3.025	5.31	20	

Sample ID: **MB-45907A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465655**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45907**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **LCSS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465657**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.913	0.25	1.000	0	91.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 02,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098461

RE: Caltrans West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B41N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 8:45:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	370	0.25	5.0		mg/Kg	1	5/1/2008 10:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B41N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 8:47:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	11	0.25	5.0		mg/Kg	1	5/1/2008 10:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B41N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 8:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	19	0.25	5.0		mg/Kg	1	5/1/2008 10:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:00:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	58	0.25	5.0		mg/Kg	1	5/1/2008 10:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:02:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	93	0.25	5.0		mg/Kg	1	5/1/2008 10:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:05:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	280	0.25	5.0		mg/Kg	1	5/1/2008 10:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B44N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	800	0.25	5.0		mg/Kg	1	5/1/2008 10:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B44N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:32:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	58	0.25	5.0		mg/Kg	1	5/1/2008 10:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B44N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	560	0.25	5.0		mg/Kg	1	5/1/2008 10:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	630	0.25	5.0		mg/Kg	1	5/1/2008 10:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:17:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	86	0.25	5.0		mg/Kg	1	5/1/2008 10:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B42NA-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:15:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	89	0.25	5.0		mg/Kg	1	5/1/2008 11:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B46N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	370	0.25	5.0		mg/Kg	1	5/1/2008 11:06 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	7.8	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B46N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:54:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501H**	QC Batch: **45323**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	26	0.25	5.0		mg/Kg	1	5/1/2008 11:09 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B46N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 9:57:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	81	0.25	5.0		mg/Kg	1	5/1/2008 11:37 PM
PH							
			EPA 9045C				
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B47N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 10:05:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	38	0.25	5.0		mg/Kg	1	5/1/2008 11:41 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B47N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 10:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	83	0.25	5.0		mg/Kg	1	5/1/2008 11:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B47N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 10:12:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	120	0.25	5.0		mg/Kg	1	5/1/2008 11:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B54N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	230	0.25	5.0		mg/Kg	1	5/1/2008 11:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B54N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	180	0.25	5.0		mg/Kg	1	5/1/2008 11:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B54N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	85	0.25	5.0		mg/Kg	1	5/1/2008 11:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B54N-3.0-3.5
Lab Order:	098461	**Collection Date:**	4/24/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	30	0.25	5.0		mg/Kg	1	5/2/2008 12:01 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B57N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 12:00:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	300	0.25	5.0		mg/Kg	1	5/2/2008 12:05 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B57N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 12:00:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	6.1	0.25	5.0		mg/Kg	1	5/2/2008 12:08 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B57N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 12:00:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 12:29 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B71N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/25/2008 12:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 12:32 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B71N-3.0-3.5
Lab Order:	098461	**Collection Date:**	4/25/2008 12:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	5.6	0.25	5.0		mg/Kg	1	5/2/2008 12:36 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B58N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	120	0.25	5.0		mg/Kg	1	5/2/2008 12:39 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B58N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	18	0.25	5.0		mg/Kg	1	5/2/2008 12:43 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B58N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 12:46 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B59N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	230	0.25	5.0		mg/Kg	1	5/2/2008 12:50 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B59N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 1:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	37	0.25	5.0		mg/Kg	1	5/2/2008 11:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B59N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 2:00:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	12	0.25	5.0		mg/Kg	1	5/2/2008 11:06 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B60N-0.0-0.5
Lab Order:	098461	**Collection Date:**	4/24/2008 2:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501I**	QC Batch: **45324**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	240	0.25	5.0		mg/Kg	1	5/2/2008 11:09 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B60N-1.0-1.5
Lab Order:	098461	**Collection Date:**	4/24/2008 2:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate:	**4/30/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 08:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B60N-2.0-2.5
Lab Order:	098461	**Collection Date:**	4/24/2008 2:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	6.2	0.25	5.0		mg/Kg	1	5/1/2008 08:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B57N-3.0-3.5
Lab Order:	098461	**Collection Date:**	4/24/2008 12:00:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098461-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45323A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **PBS**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449878**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45323**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **LCSS**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449879**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	227.548	5.0	250.0	0	91.0	80	120				

Sample ID: **098461-004A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **B42N-0.0-0.5**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449890**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	51.286	5.0						57.59	11.6	20	

Sample ID: **098461-004A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **B42N-0.0-0.5**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449891**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	186.480	5.0	250.0	57.59	51.6	45	110				

Sample ID: **MB-45323B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **PBS**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449892**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098461-014A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **B46N-1.0-1.5**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449903**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	23.649	5.0						26.28	10.5	20	

Sample ID: **098461-014A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **B46N-1.0-1.5**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449904**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	162.748	5.0	250.0	26.28	54.6	45	110				

Sample ID: **098461-014A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94088**
Client ID: **B46N-1.0-1.5**	Batch ID: **45323**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	177.986	5.0	250.0	26.28	60.7	45	110	162.7	8.94	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45324A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **PBS**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449906**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45324**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **LCSS**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449907**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	246.038	5.0	250.0	0	98.4	80	120				

Sample ID: **098461-024A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **B57N-1.0-1.5**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1449918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.696	5.0						6.086	23.4	20	R

Sample ID: **098461-024A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **B57N-1.0-1.5**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1449919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.052	5.0	250.0	6.086	56.0	45	110				

Sample ID: **MB-45324B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **PBS**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1449920**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098461-034A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **B60N-0.0-0.5**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1449999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	238.304	5.0						239.0	0.287	20	

Sample ID: **098461-034A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **B60N-0.0-0.5**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	607.345	5.0	250.0	239.0	147	45	110				S

Sample ID: **098461-034A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94089**
Client ID: **B60N-0.0-0.5**	Batch ID: **45324**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450001**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	409.939	5.0	250.0	239.0	68.4	45	110	607.3	38.8	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45325A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **PBS**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449603**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45325**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **LCSS**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449604**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	256.636	5.0	250.0	0	103	80	120				

Sample ID: **098462-007ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **ZZZZZZ**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.398	5.0						7.420	0.289	20	

Sample ID: **098462-007AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **ZZZZZZ**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449616**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	150.593	5.0	250.0	7.420	57.3	45	110				

Sample ID: **MB-45325A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **PBS**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449617**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098462-017ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **ZZZZZZ**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449628**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	162.917	5.0						171.1	4.91	20	

Sample ID: **098462-017AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **ZZZZZZ**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449629**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	286.475	5.0	250.0	171.1	46.1	45	110				

Sample ID: **098462-017AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **ZZZZZZ**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449630**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	310.544	5.0	250.0	171.1	55.8	45	110	286.5	8.06	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098461
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098462-040ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94003**
Client ID: **ZZZZZZ** Batch ID: **R94003** TestNo: **EPA 9045C** Analysis Date: **4/29/2008** SeqNo: **1448065**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.890	0.10						7.670	2.83	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 4/25/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 5.5 Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☐ N☐

Client: TRC (Caltrans)
Attn: David Lennon
Address: 21 Technology Dr
City Irvine State CA Zip Code 92618
TEL: (949) 727 9336
FAX: ( )
Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1430	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 14:30
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total+Hotsol) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8270C (BNA)	SOIL	TAT	Container(s): #	Type	REMARKS
	9546-001	B41N - 0.0-0.5	4/24/08	8:45	✓	X	E	1	P T	
	2	B41N - 1.0-1.5	4/24	8:47	✓					
	3	B41N - 2.0-2.5	4/24	8:50	✓					
	4	B42N - 0.0-0.5	4/24	9:00	✓					
	5	B42N - 1.0-1.5	4/24	9:02	✓					
	6	B42N - 2.0-2.5	4/24	9:05	✓					
	7	B44N - 0.0-0.5	4/24	9:30	✓					
	8	B44N - 1.0-1.5	4/24	9:32	✓					
	9	B44N - 2.0-2.5	4/24	9:35	✓	X	E	1	P T	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder. **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ NO 6. PRESERVED Y☐ N☐

Client: TRC (Caltrans) Address: 21 Technology Dr TEL: (949) 727 9336
Attn: David Lennon City Irvine State CA Zip Code 92618 FAX: (949) 753-0111

Project Name: Caltrans West County Connectors Project #: 151396 Sampler: (Printed Name) Tom Greene (Signature) Thomas O'Greene

Relinquished by: (Signature and Printed Name) Thomas O'Greene	Date: 4/25/08	Time: 14:30	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 14:30
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State ____ Zip ____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State ____ Zip ____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metals) Lead, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000), FH by EPA 90.45

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	FH by EPA 90.45	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	059461-10	B42NA-2.0-2.5	4/24	9:20					✓						X				E	1	P T	
	11	B42NA-1.0-1.5	4/24	9:17					✓													
	12	B42NA-0.0-0.5	4/24	9:15					✓													
	13	B46N-0.0-0.5		9:50					✓				✓									
	14	B46N-1.0-1.5		9:54					✓				✓									
	15	B46N-2.0-2.5		9:57					✓				✓									
	16	B47N-0.0-0.5		10:05					✓													
	17	B47N-1.0-1.5		10:10					✓													
	18	B47N-2.0-2.5	4/24	10:12					✓						X				E	1	P T	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client; ATL; CA OverN ☐; FEDEX ☐; Other: _____

Sample Condition Upon Receipt
1. CHILLED Y 0 N O 4. SEALED Y 0 NC
2. HEADSPACE (VOA) Y q N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC caltrans
Attn: David Lennon
Address: 21 Technology
City IRVine State CA Zip Code 92618
TEL: (949) 7279336
FAX: ( )

Project Name: Caltrans West Coast Connectors
Project #: 151396
Sampler: (Printed Name) Tom Greene (Signature) Thomas A Greene

Relinquished by: (Signature and Printed Name) T Greene Thomas A Greene Date: 4/25/08 Time: 14:30
Received by: (Signature and Printed Name) [illegible] Date: 17:30 Time: 4/25/08

Relinquished by: (Signature and Printed Name) [illegible] Date: 4/25/08 Time: 1455
Received by: (Signature and Printed Name) [illegible] Date: 4/25/08 Time: 1455

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
		~~B50N-0.5-1.0~~	~~4/24~~	~~10:30~~	E	1	P T	~~Hold~~
	0984641-19	~~B50~~ B54N-0.0-0.5	4/24	~~10:30~~ 11:10	E	1	P T	
	20	~~B50~~ B54N-1.0-1.5	4/24	~~10:30~~ 11:10		1	P T	
	21	B54N-2.0-2.5	4/24	11:10		1	P T	
	22	B54N-3.0-3.5	4/24	11:10		1	P T	
	23	B57N-0.0-0.5	4/24	12:00		1	P T	
	24	B57N-1.0-1.5	4/24	12:00		1	P T	
	25	B57N-2.0-2.5	4/24	12:00		1	P T	
	26	B71N-2.0-2.5	4/25	12:50		1	P T	
	27	B71N-3.0-3.5	4/25	12:50	E	1	P T	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: 949) 727 9336
FAX: ( )

Project Name: Caltrans West Coast connectors Project #: 151396
Sampler: (Printed Name) Tom Greene (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1430 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 14:30
Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1455 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1455
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

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- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (~~Total~~ Metals) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	0984L-1- 26	B58N-0.0-0.5	4/24	13:20	E	1	P T	
	29	B58N-1.0-1.5	4/24	13:20				
	30	B58N-2.0-2.5	4/24	13:20				
	31	B59N-0.0-0.5	4/24	13:50				
	32	B59N-1.0 1.5	4/24	1350				
	33	B59N-2.0-2.5	4/24	14:00				
	34	B60N-0.0-0.5	4/24	14:15				
	35	B60N 1.0-1.5	4/24	14:15				
	36	B60N 2.0-2.5	4/24	14:15	E	1	P T	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: ____
Logged By: ____ Date: ____

Method of Transport: Client / ATL / CA OverN ☐ / FEDEX ☐ / Other: ____

Sample Condition Upon Receipt:
1. CHILLED Y O N O
2. HEADSPACE (VOA) Y O N O
3. CONTAINER INTACT Y O N O
4. SEALED Y O N O
5. # OF SPLS MATCH COC Y ☐ N ☐
6. PRESERVED Y O N ☐

Client: TRC
Attn: David Lemmon
Address: 21 Technology
City: Irvine State: CA Zip Code: 92618
TEL: 949 727 9336
FAX: ( )

Project Name: Caltrans West Coast Connectors
Project #: 151396
Sampler: (Printed Name) Tom Greene (Signature) [signature]

Relinquished by: (Signature and Printed Name) Tom Greene [signature] Date: 4/25/08 Time: 14:30 Received by: (Signature and Printed Name) [signature] Date: 4/25/08 Time: 14:30
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name ____ Date ____
Signature ____

Send Report To:
Attn: David Lemmon
Co: ____
Address ____
City ____ State ____ Zip ____

Bill To:
Attn: Same
Co: ____
Address ____
City ____ State ____ Zip ____

Special Instructions/Comments:

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• Records : $1.00 / ATL workorder / mo (after 1 year)

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: Lab No.	Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (SNA)	6010B (Metals) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010/7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Type	PRESERVATION	REMARKS
		B58N-0.0-0.5	4/24	13:20					✓					✓				E	1	P T		
		B58N-1.0-1.5	4/24	13:20					↓					✓				↓	↓	↓		
		B58N-2.0-2.5	4/24	13:20					↓					✓				↓	↓	↓		
		B59N-0.0-0.5	4/24	13:50					↓					✓				↓	↓	↓		
		B59N-1.0-1.5	4/24	13:50					↓					✓				↓	↓	↓		
		B59N-2.0-2.5	4/24	14:15					↓					✓				↓	↓	↓		
		B60N-0.0-0.5	4/24	14:15					↓					✓				↓	↓	↓		
		B60N-1.0-1.5	4/24	14:15					↓					✓				↓	↓	↓		
		B60N-2.0-2.5	4/24	14:15					✓					✓				E	1	P T		
		B57N-3.0-3.5	4/24	12:00					✓					✓				E	1	P T		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CLIENT CORRESPONDENCE LOG

DATE: 51212008 2:32:24 PM

Client Name: TRC-IRVINE

ATL Workorder No.: 098461

DATE	CONTACT	CALL IN/OUT	ISSUE I PROBLEM	COMMENTS/CORRECTIVE ACTION	INITIAL
4/25/2008 6:53:55			Received extra sample id# B57N-3.0-3.5 @ 12:00. (Not on coc)	ok to run sample id# B57N-3.0-3.5@12.00 per tom will send e-mall confirm.	Margo

May 16,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098462

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Edd[illegible]lie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-137SA 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:49:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	4.0	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-146S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514E**	QC Batch: **R94535**				PrepDate:		Analyst: **AMT**
Lead	11	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-027

Client Sample ID: B-148S 2.0-2.5
Collection Date: 4/25/2008 10:00:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.37	0.011	0.25		mg/L	5	5/15/2008 02:10 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **admin**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 05:47 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	0.65	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-032

Client Sample ID: B-149S 3.0-3.5
Collection Date: 4/25/2008 10:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A** QC Batch: **45526**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 02:13 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C** QC Batch: **45631**					PrepDate: **5/14/2008**		Analyst: **admin**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 05:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-043

Client Sample ID: B-50N 2.0-2.5
Collection Date: 4/25/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.48	0.011	0.25		mg/L	5	5/15/2008 02:21 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **admin**
Lead	0.27	0.011	0.25		mg/L	5	5/15/2008 05:53 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	6.1	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-052

Client Sample ID: B-139S 3.0-3.5
Collection Date: 4/25/2008 12:55:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A** QC Batch: **45526**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 02:23 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C** QC Batch: **45631**					PrepDate: **5/14/2008**		Analyst: **admin**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 05:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94518

Sample ID: **MB-45533A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **PBS**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456607**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45533**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **LCSS**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456608**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.049	0.25	5.000	0	101	80	120				

Sample ID: **098483-007A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **ZZZZZZ**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.986	0.25						7.140	2.18	20	

Sample ID: **098483-007A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **ZZZZZZ**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.989	0.50	5.000	7.140	97.0	80	120				

Sample ID: **MB-45533B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **PBS**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94518

Sample ID: **098463-041A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **ZZZZZZ**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456632**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	125.660	3.8						127.0	1.07	20	

Sample ID: **098463-041A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **ZZZZZZ**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456633**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	133.858	3.8	5.000	127.0	137	80	120				S

Sample ID: **098463-041A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **ZZZZZZ**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456634**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	131.838	3.8	5.000	127.0	96.6	80	120	133.9	1.52	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94535

Sample ID: **MB-45532A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **PBS**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457009**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45532**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **LCSS**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457010**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.788	0.25	5.000	0	95.8	80	120				

Sample ID: **098461-018A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **ZZZZZZ**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457013**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	33.361	1.2						35.98	7.54	20	

Sample ID: **098461-018A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **ZZZZZZ**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457014**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	42.827	1.2	5.000	35.98	137	80	120				S

Sample ID: **MB-45532B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **PBS**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457015**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94535

Sample ID: **098462-017A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **B-146S 0.0-0.5**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.454	0.25						11.43	42.1	20	R

Sample ID: **098462-017A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **B-146S 0.0-0.5**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.378	0.50	5.000	11.43	78.9	80	120				S

Sample ID: **098462-017A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94535**
Client ID: **B-146S 0.0-0.5**	Batch ID: **R94535**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.361	0.50	5.000	11.43	78.6	80	120	15.38	0.111	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **MB-45526A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458020**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **LCS-45526**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **LCSW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458021**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.894	0.050	1.000	0.005493	88.9	85	115				

Sample ID: **098463-012ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458032**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.049	0.25						0.3150	108	20	R

Sample ID: **098463-012AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458033**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.689	0.25	2.500	0.3150	95.0	71	118				

Sample ID: **MB-45526B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.004	0.050									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **098528-039ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.809	0.25						2.147	26.7	20	R

Sample ID: **098528-039AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.309	0.25	2.500	2.147	86.5	71	118				

Sample ID: **098528-039AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.381	0.25	2.500	2.147	89.4	71	118	4.309	1.65	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45631

Sample ID: **MB-45631A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458086**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.007	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.024	0.25									

Sample ID: **LCS-45631**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **LCSS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458088**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.964	0.050	1.000	0.007446	95.6	85	115				

Sample ID: **098461-023ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458099**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.073	0.25						2.705	40.4	20	R

Sample ID: **098461-023AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458100**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.693	0.25	2.500	2.705	160	71	118				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45631

Sample ID: **MB-45631B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458101**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.006	0.050									

Sample ID: **098463-060ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458112**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.109	0.25						0.06586	0	20	

Sample ID: **098463-060AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458113**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.088	0.25	2.500	0.06586	80.9	71	118				

Sample ID: **098463-060AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.405	0.25	2.500	0.06586	93.6	71	118	2.088	14.1	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098462

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in **part** or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-146S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate: **5/28/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 02,2008

David Lennon
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ELAF' No.: 1838
NELAF' No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098462

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-135S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-135S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-135S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-135S 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-005

Client Sample ID: B-137S 0.0-0.5
Collection Date: 4/25/2008 8:49:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**		Analyst: **CL**
Lead	33	0.25	5.0		mg/Kg	1	5/1/2008 09:25 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	8.4	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-006

Client Sample ID: B-137S 1.0-1.5
Collection Date: 4/25/2008 8:51:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**		Analyst: **CL**
Lead	6.1	0.25	5.0		mg/Kg	1	5/1/2008 09:28 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	8.7	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-137S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:54:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**		Analyst: **CL**
Lead	7.4	0.25	5.0		mg/Kg	1	5/1/2008 09:32 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	8.7	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-008

Client Sample ID: B-137S 3.0-3.5
Collection Date: 4/25/2008 8:57:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**		Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:46 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	9.3	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-137SA 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:49:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	130	0.25	5.0		mg/Kg	1	5/1/2008 09:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-137SA 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:51:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 09:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-137SA 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:54:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	5.4	0.25	5.0		mg/Kg	1	5/1/2008 10:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-137SA 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 8:57:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	5.8	0.25	5.0		mg/Kg	1	5/1/2008 10:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-142S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-142S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-142S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-016

Client Sample ID: B-142S 3.0-3.5
Collection Date: 4/25/2008 9:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 10:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-017

Client Sample ID: B-146S 0.0-0.5
Collection Date: 4/25/2008 9:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501G**	QC Batch: **45325**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	170	0.25	5.0		mg/Kg	1	5/1/2008 10:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-018

Client Sample ID: B-146S 1.0-1.5
Collection Date: 4/25/2008 9:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501H**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	6.6	0.25	5.0		mg/Kg	1	5/1/2008 10:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-146S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501H**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	16	0.25	5.0		mg/Kg	1	5/1/2008 10:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-146S 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501H**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	6.5	0.25	5.0		mg/Kg	1	5/1/2008 11:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-147S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501H**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	24	0.25	5.0		mg/Kg	1	5/1/2008 11:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-147S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080501H**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **CL**	
Lead	26	0.25	5.0		mg/Kg	1	5/1/2008 11:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-147S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	24	0.25	5.0		mg/Kg	1	5/2/2008 11:27 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-147S 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	6.0	0.25	5.0		mg/Kg	1	5/2/2008 11:30 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-148S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	7.5	0.25	5.0		mg/Kg	1	5/2/2008 11:41 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-148S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 11:44 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-148S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	120	0.25	5.0		mg/Kg	1	5/2/2008 11:48 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-028

Client Sample ID: B-148S 3.0-3.5
Collection Date: 4/25/2008 10:00:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	5.9	0.25	5.0		mg/Kg	1	5/2/2008 12:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-149S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 12:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-149S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 12:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-149S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 12:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-149S 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	16	0.25	5.0		mg/Kg	1	5/2/2008 12:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-033

Client Sample ID: B-161S 0.0-0.5
Collection Date: 4/25/2008 10:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	36	0.25	5.0		mg/Kg	1	5/2/2008 12:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-161S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:47:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	7.2	0.25	5.0		mg/Kg	1	5/2/2008 12:30 PM

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-035

Client Sample ID: B-161S 2.0-2.5
Collection Date: 4/25/2008 10:49:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 12:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-161S 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 10:52:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	5.3	0.25	5.0		mg/Kg	1	5/2/2008 12:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-037

Client Sample ID: B-161SA 0.0-0.5
Collection Date: 4/25/2008 10:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502A**	QC Batch: **45326**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	9.8	0.25	5.0		mg/Kg	1	5/2/2008 12:40 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	7.4	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-038

Client Sample ID: B-161SA 1.0-1.5
Collection Date: 4/25/2008 10:47:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 05:43 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	6.1	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-039

Client Sample ID: B-161SA 2.0-2.5
Collection Date: 4/25/2008 10:49:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 05:46 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	6.4	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-040

Client Sample ID: B-161SA 3.0-3.5
Collection Date: 4/25/2008 10:52:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 05:50 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	7.7	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-50N 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 11:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	5.7	0.25	5.0		mg/Kg	1	5/1/2008 05:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-50N 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 11:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	11	0.25	5.0		mg/Kg	1	5/1/2008 06:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-50N 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 11:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	110	0.25	5.0		mg/Kg	1	5/1/2008 06:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-50N 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 11:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	6.9	0.25	5.0		mg/Kg	1	5/1/2008 06:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-104S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	7.8	0.25	5.0		mg/Kg	1	5/1/2008 06:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-104S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 06:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-104S 2.0-2.5
Lab Order:	098462	**Collection Date:**	4/25/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 06:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-104S 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 06:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-139S 0.0-0.5
Lab Order:	098462	**Collection Date:**	4/25/2008 12:55:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-049		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	40	0.25	5.0		mg/Kg	1	5/1/2008 06:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-139S 1.0-1.5
Lab Order:	098462	**Collection Date:**	4/25/2008 12:55:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-050		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	7.4	0.25	5.0		mg/Kg	1	5/1/2008 06:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098462
Project: West County Connectors, 151396
Lab ID: 098462-051

Client Sample ID: B-139S 2.0-2.5
Collection Date: 4/25/2008 12:55:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/1/2008 06:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-139S 3.0-3.5
Lab Order:	098462	**Collection Date:**	4/25/2008 12:55:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098462-052		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	18	0.25	5.0		mg/Kg	1	5/1/2008 06:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	CREW-2-ER-5
Lab Order:	098462	**Collection Date:**	4/25/2008 1:15:00 PM
Project:	West County Connectors, 151396	**Matrix:**	WATER
Lab ID:	098462-053		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080502C**	QC Batch: **45359**				PrepDate:	**5/1/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	5/2/2008 10:28 AM

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45325A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **PBS**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449603**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45325**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **LCSS**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449604**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	256.636	5.0	250.0	0	103	80	120				

Sample ID: **098462-007ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **B-137S 2.0-2.5**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.398	5.0						7.420	0.289	20	

Sample ID: **098462-007AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **B-137S 2.0-2.5**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449616**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	150.593	5.0	250.0	7.420	57.3	45	110				

Sample ID: **MB-45325A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94076**
Client ID: **PBS**	Batch ID: **45325**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449617**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098462-017ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94076**
Client ID: **B-146S 0.0-0.5** Batch ID: **45325** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449628**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	162.917	5.0						171.1	4.91	20	

Sample ID: **098462-017AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94076**
Client ID: **B-146S 0.0-0.5** Batch ID: **45325** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449629**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	286.475	5.0	250.0	171.1	46.1	45	110				

Sample ID: **098462-017AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94076**
Client ID: **B-146S 0.0-0.5** Batch ID: **45325** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449630**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	310.544	5.0	250.0	171.1	55.8	45	110	286.5	8.06	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45326A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94077**
Client ID: **PBS** Batch ID: **45326** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449631**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45326** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94077**
Client ID: **LCSS** Batch ID: **45326** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449632**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	236.502	5.0	250.0	0	94.6	80	120				

Sample ID: **098462-027A-DUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94107**
Client ID: **B-148S 2.0-2.5** Batch ID: **45326** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/2/2008** SeqNo: **1450164**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	80.072	5.0						119.1	39.2	20	R

Sample ID: **098462-027A-MS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94107**
Client ID: **B-148S 2.0-2.5** Batch ID: **45326** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/2/2008** SeqNo: **1450165**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	204.101	5.0	250.0	119.1	34.0	45	110				S

Sample ID: **MB-45326B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94107**
Client ID: **PBS** Batch ID: **45326** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/2/2008** SeqNo: **1450166**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098462-037A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94107**
Client ID: **B-161SA 0.0-0.5**	Batch ID: **45326**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450177**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.845	5.0						9.814	9.98	20	

Sample ID: **098462-037A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94107**
Client ID: **B-161SA 0.0-0.5**	Batch ID: **45326**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450178**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	220.468	5.0	250.0	9.814	84.3	45	110				

Sample ID: **098462-037A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94107**
Client ID: **B-161SA 0.0-0.5**	Batch ID: **45326**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	143.876	5.0	250.0	9.814	53.6	45	110	220.5	42.0	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45327A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94085**
Client ID: **PBS** Batch ID: **45327** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449807**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45327** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94085**
Client ID: **LCSS** Batch ID: **45327** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449808**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	229.695	5.0	250.0	0	91.9	80	120				

Sample ID: **098462-047A-DUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94085**
Client ID: **B-104S 2.0-2.5** Batch ID: **45327** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449819**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.067	5.0						1.673	0	20	

Sample ID: **098462-047A-MS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94085**
Client ID: **B-104S 2.0-2.5** Batch ID: **45327** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449820**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	175.899	5.0	250.0	1.673	69.7	45	110				

Sample ID: **MB-45327B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **4/30/2008** RunNo: **94085**
Client ID: **PBS** Batch ID: **45327** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **5/1/2008** SeqNo: **1449821**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098463-005A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **ZZZZZZ**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449832**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.346	5.0						9.476	40.9	20	R

Sample ID: **098463-005A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **ZZZZZZ**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449833**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	136.580	5.0	250.0	9.476	50.8	45	110				

Sample ID: **098463-005A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **ZZZZZZ**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449834**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.543	5.0	250.0	9.476	54.8	45	110	136.6	7.04	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45359** SampType: **MBLK** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/1/2008** RunNo: **94102**
Client ID: **PBW** Batch ID: **45359** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/2/2008** SeqNo: **1450092**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45359** SampType: **LCS** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/1/2008** RunNo: **94102**
Client ID: **LCSW** Batch ID: **45359** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/2/2008** SeqNo: **1450093**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.047	0.25	1.000	0	105	85	115				

Sample ID: **098460-010ADUP** SampType: **DUP** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/1/2008** RunNo: **94102**
Client ID: **ZZZZZZ** Batch ID: **45359** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/2/2008** SeqNo: **1450095**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098460-010AMS** SampType: **MS** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/1/2008** RunNo: **94102**
Client ID: **ZZZZZZ** Batch ID: **45359** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/2/2008** SeqNo: **1450096**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.471	0.25	2.500	0	98.8	71	118				

Sample ID: **098460-010AMSD** SampType: **MSD** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/1/2008** RunNo: **94102**
Client ID: **ZZZZZZ** Batch ID: **45359** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/2/2008** SeqNo: **1450097**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.431	0.25	2.500	0	97.2	71	118	2.471	1.63	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098460-024ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94001**
Client ID: **ZZZZZZ** Batch ID: **R94001** TestNo: **EPA 9045C** Analysis Date: **4/29/2008** SeqNo: **1448052**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.400	0.10						8.290	1.32	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098462
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098462-040ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94003**
Client ID: **B-161SA 3.0-3.5** Batch ID: **R94003** TestNo: **EPA 9045C** Analysis Date: **4/29/2008** SeqNo: **1448065**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.890	0.10						7.670	2.83	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 6

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 4/25/08

Method of Transport
Client ☐
ATL
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED 4.0 YO NO
2. HEADSPACE (VOA) Y ☐ N/A ☐
3. CONTAINER INTACT Y ☑ N ☐
4. SEALED Y O N, ☑
5. # OF SPLS MATCH COC Y ☑ N ☐
6. PRESERVED Y ☑ N ☐

Client: TRC	Address: 21 TECHNOLOGY DR		TEL: (949) 727-9336
Attn: DAVID LUNNON	City IRVINE	State CA Zip Code	FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTIONS	Project #: 151396	Sampler: (Printed Name) DAVID YORK	(Signature)
Relinquished by: (Signature and Printed Name)	Date: 4/25/08 Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08 Time: 14:00
Relinquished by: (Signature and Printed Name)	Date: 4/25/08 Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08 Time: 14:55
Relinquished by: (Signature and Printed Name)	Date: Time:	Received by: (Signature and Printed Name)	Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter.
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LUNNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State ____ Zip ____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State ____ Zip ____

Special Instructions/Comments:
DLUNNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) LEAD	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	PHG/EPA 9045	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	6984GV-01	B-135S 0.0-0.5	4/25/08	0805				X							X				E	1	T		STANDARD
	2	B-135S 1.0-1.5		0830				X							X					1			TAT
	3	B-135S 2.0-2.5		0830				X							X					1			
	4	B-135S 3.0-3.5		0835				X							X					1	↓		
	5	B-137S 0.0-0.5		0849				X					X		X					1	G		
	6	B-137S 1.0-1.5		0851				X					X		X					1			
	7	B-137S 2.0-2.5		0854				X					X		X					1			
	8	B-137S 3.0-3.5		0857				X					X		X					1			
	9	B-137SA 0.0-0.5		0849				X							X					1			
	10	B-137SA 1.0-1.5	↓	0851				X							X				↓	1	↓		↓

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED YO NO 4. SEALED Y☐ N☐ | 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ | 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize A n to perform the work Indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report *To:*
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill *To:*
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metals) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	098462-11	B-137SA 2.0-2.5	4/25/08	0854	E	1	G	STANDARD
	12	B-137SA 3.0-3.5		0857		1	↓	TAT
	13	B-142S 0.0-0.5		0905		1	T	
	14	B-142S 1.0-1.5		0905		1		
	15	B-142S 2.0-2.5		0905		1		
	16	B-142S 3.0-3.5		0905		1		
	17	B-146S 0.0-0.5		0920		1		
	18	B-146S 1.0-1.5		0920		1		
	19	B-146S 2.0-2.5		0920		1		
	20	B-146S 3.0-3.5	↓	0920		1	↓	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr | B= Emergency Next workday | C= Critical 2 Workdays | D= Urgent 3 Workdays | E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill. CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport
Client q
ATL ☒
CA OverN ☐
FEDEX q
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y O N O
2. HEADSPACE (VOA) Y q N q 5. # OF SPLS MATCH COC Y ☐ N q
3. CONTAINER INTACT Y O N ☐ 6. PRESERVED Y O N O

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0904962-21	B-147S 0.0-0.5	4/25/08	0935	E	1	T	STANDARD TAT
	22	B-147S 1.0-1.5		0935		1		
	23	B-147S 2.0-2.5		0935		1		
	24	B-147S 3.0-3.5		0935		1		
	25	B-148S 0.0-0.5		1000		1		
	26	B-148S 1.0-1.5		1000		1		
	27	B-148S 2.0-2.5		1000		1		
	28	B-148S 3.0-3.5		1000		1		
	29	B-149S 0.0-0.5		1015		1		
	30	B-149S 1.0-1.5	↓	1015	↓	1	↓	↓

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport
Client ☑
ATL ☑
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y ☑ NO 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☑ NO 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☑ N ☐ 6. PRESERVED Y ☑ N ☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1400 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 14:00
Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1455 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1455
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work Indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) LUFT; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); EPA 8015

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0803462-31	B-149S 2.0-2.5	4/25/08	1015	E	1	T	STANDARD
	32	B-149S 3.0-3.5		1015		1	↓	TAT
	33	B-161S 0.0-0.5		1045		1	G	
	34	B-161S 1.0-1.5		1047		1	↓	
	35	B-161S 2.0-2.5		1049		1		
	36	B-161S 3.0-3.5		1052		1		
	37	B-161SA 0.0-0.5		1045		1		
	38	B-161SA 1.0-1.5		1047		1		
	39	B-161SA 2.0-2.5		1049		1		
	40	B-161SA 3.0-3.5		1052		1		

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt

1. CHILLED	Y☐ N☐	4. SEALED	Y☐ N☐
2. HEADSPACE (VOA)	Y☐ N☐	5. # OF SPLS MATCH COC	Y☐ N☐
3. CONTAINER INTACT	Y☐ N☐	6. PRESERVED	Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: UNOCAL COUNTY CONNECTIONS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) CAM17 | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B CAM17	8015B GRO/8020	8015B DRO	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	098462-41	B-50N 0.0-0.5	4/25/08	1155				X						X				E	1	T	STANDARD TAT
	42	B-50N 1.0-1.5		1155				X						X					1		
	43	B-50N 2.0-2.5		1155				X						X					1		
	44	B-50N 3.0-3.5		1155				X						X					1		
	45	B-104S 0.0-0.5		1240				X						X					1		
	46	B-104S 1.0-1.5		1240				X						X					1		
	47	B-104S 2.0-2.5		1240				X						X					1		
	48	B-104S 3.0-3.5		1240				X						X					1		
	49	B-139S 0.0-0.5		1255				X						X					1		
	50	B-139S 1.0-1.5	V	1255				X						X				V	1	V	

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 **Walnut Avenue**
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax **(562)** 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition upon Receipt: 1. CHILLED Y O NO 4. SEALED Y O N O; 2. HEADSPACE (VOA) Y ☐ N q 5. # OF SPLS MATCH COC Y ☐ N q; 3. CONTAINER INTACT Y q N q 6. PRESERVED Y O N O

Client: TRC
Address: 21 TECHNOLOGY DR. TEL: (949) 727-9336
Attn: DAVID LENNON
City IRVINE State CA. Zip Code FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396 Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) LUFT	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0804527-51	B-139S 2.0-2.5	4/25/08	1255				X						X				E	1	T		STANDARD
	52	B-139S 3.0-3.5	↓	1255				X						X				↓	1	T		TAT
	53	CREW-2-ER-5	↓	1315				X							X			↓	1	P		

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098463

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot he reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-012

Client Sample ID: B-120S 3.0-3.5
Collection Date: 4/24/2008 8:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate:	**5/9/2008**	Analyst: **AMT**
Lead	0.32	0.011	0.25		mg/L	5	5/15/2008 02:26 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 05:59 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-121S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	4.9	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-123S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	37	0.93	1.2		mg/L	5	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-024

Client Sample ID: B-123S 3.0-3.5
Collection Date: 4/24/2008 9:35:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A** QC Batch: **45526**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 02:36 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C** QC Batch: **45631**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 06:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-025

Client Sample ID: B-124S 0.0-0.5
Collection Date: 4/24/2008 9:50:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.91	0.011	0.25		mg/L	5	5/15/2008 02:39 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	0.33	0.011	0.25		mg/L	5	5/15/2008 06:05 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	12	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-125S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	4.0	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-031

Client Sample ID: B-125S 2.0-2.5
Collection Date: 4/24/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.27	0.011	0.25		mg/L	5	5/15/2008 02:42 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 06:08 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	6.7	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-126S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	8.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-041

Client Sample ID: B-128S 0.0-0.5
Collection Date: 4/24/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.65	0.011	0.25		mg/L	5	5/15/2008 02:44 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	0.86	0.011	0.25		mg/L	5	5/15/2008 06:16 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	130	2.8	3.8		mg/L	15	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-128S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	11	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:58:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-057		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	12	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-060

Client Sample ID: B-132S 3.0-3.5
Collection Date: 4/24/2008 1:10:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 02:52 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515C**	QC Batch: **45631**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 06:19 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	6.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132SA 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:58:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-061		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	7.6	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132SA 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-062		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514B**	QC Batch: **R94518**				PrepDate:		Analyst: **LKN**
Lead	4.3	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132SA 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-064		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
WET			**WET DI/ EPA 6010B**				
RunID: **ICP6_080515A** QC Batch: **45526**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 02:55 PM
ICP METALS BY TCLP EXTRACTION							
EPA3010A			**EPA 1311/ 6010B**				
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 06:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **MB-45526A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458020**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **LCS-45526**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **LCSW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458021**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.894	0.050	1.000	0.005493	88.9	85	115				

Sample ID: **098463-012ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **B-120S 3.0-3.5**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458032**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.049	0.25						0.3150	108	20	R

Sample ID: **098463-012AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **B-120S 3.0-3.5**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458033**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.689	0.25	2.500	0.3150	95.0	71	118				

Sample ID: **MB-45526B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.004	0.050									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **098528-039ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.809	0.25						2.147	26.7	20	R

Sample ID: **098528-039AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.309	0.25	2.500	2.147	86.5	71	118				

Sample ID: **098528-039AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.381	0.25	2.500	2.147	89.4	71	118	4.309	1.65	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45631

Sample ID: **MB-45631A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458086**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.007	0.050									

Sample ID: **MB-45565A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.024	0.25									

Sample ID: **LCS-45631**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **LCSS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458088**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.964	0.050	1.000	0.007446	95.6	85	115				

Sample ID: **098461-023ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458099**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.073	0.25						2.705	40.4	20	R

Sample ID: **098461-023AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **ZZZZZZ**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458100**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.693	0.25	2.500	2.705	160	71	118				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45631

Sample ID: **MB-45631B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **PBS**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458101**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.006	0.050									

Sample ID: **098463-060ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **B-132S 3.0-3.5**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458112**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.109	0.25						0.06586	0	20	

Sample ID: **098463-060AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **B-132S 3.0-3.5**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458113**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.088	0.25	2.500	0.06586	80.9	71	118				

Sample ID: **098463-060AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94597**
Client ID: **B-132S 3.0-3.5**	Batch ID: **45631**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.405	0.25	2.500	0.06586	93.6	71	118	2.088	14.1	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.020	0.25									

Sample ID: **LCS-45632**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **LCSS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458117**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.955	0.050	1.000	0.005053	95.0	85	115				

Sample ID: **098530-032ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.028	0.25						0.08897	0	20	

Sample ID: **098530-032AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.950	0.25	2.500	0.08897	74.4	71	118				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458130**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.062	0.25						0.03780	0	20	

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.982	0.25	2.500	0.03780	77.8	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.269	0.25	2.500	0.03780	89.2	71	118	1.982	13.5	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94518

Sample ID: **MB-45533A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **PBS**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456607**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45533**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **LCSS**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456608**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.049	0.25	5.000	0	101	80	120				

Sample ID: **098483-007A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **ZZZZZZ**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.986	0.25						7.140	2.18	20	

Sample ID: **098483-007A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **ZZZZZZ**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.989	0.50	5.000	7.140	97.0	80	120				

Sample ID: **MB-45533B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **PBS**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94518

Sample ID: **098463-041A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **B-128S 0.0-0.5**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456632**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	125.660	3.8						127.0	1.07	20	

Sample ID: **098463-041A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **B-128S 0.0-0.5**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456633**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	133.858	3.8	5.000	127.0	137	80	120				S

Sample ID: **098463-041A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94518**
Client ID: **B-128S 0.0-0.5**	Batch ID: **R94518**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456634**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	131.838	3.8	5.000	127.0	96.6	80	120	133.9	1.52	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098463

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-123S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	1.0	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-126S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.66	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-128S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.79	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:58:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-057		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.88	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132SA 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:58:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-061		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate: **5/28/2008**		Analyst: **LKN**
Lead	0.89	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

May 05,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
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FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098463

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 25,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-112S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	12	0.25	5.0		mg/Kg	1	5/1/2008 06:59 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	8.2	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-002

Client Sample ID: B-112S 1.0-1.5
Collection Date: 4/24/2008 8:30:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	13	0.25	5.0		mg/Kg	1	5/1/2008 07:03 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	7.9	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-112S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:33:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	31	0.25	5.0		mg/Kg	1	5/1/2008 07:07 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	8.1	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-004

Client Sample ID: B-112S 3.0-3.5
Collection Date: 4/24/2008 8:35:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	6.5	0.25	5.0		mg/Kg	1	5/1/2008 07:10 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429E**	QC Batch: **R94003**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-112SA 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080501F**	QC Batch: **45327**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	9.5	0.25	5.0		mg/Kg	1	5/1/2008 07:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-112SA 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	15	0.25	5.0		mg/Kg	1	5/2/2008 05:05 PM

CLIENT:	TRC	**Client Sample ID:**	B-112SA 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:33:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	17	0.25	5.0		mg/Kg	1	5/2/2008 05:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-112SA 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	7.7	0.25	5.0		mg/Kg	1	5/2/2008 05:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-120S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:45:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	14	0.25	5.0		mg/Kg	1	5/2/2008 05:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-120S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:45:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 05:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-120S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:45:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 05:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-120S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 8:45:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	41	0.25	5.0		mg/Kg	1	5/2/2008 05:27 PM

CLIENT:	TRC	**Client Sample ID:**	B-121S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	140	0.25	5.0		mg/Kg	1	5/2/2008 05:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-014

Client Sample ID: B-121S 1.0-1.5
Collection Date: 4/24/2008 9:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	31	0.25	5.0		mg/Kg	1	5/2/2008 05:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-121S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	5.4	0.25	5.0		mg/Kg	1	5/2/2008 05:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-121S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 05:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-122S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	27	0.25	5.0		mg/Kg	1	5/2/2008 05:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-122S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	39	0.25	5.0		mg/Kg	1	5/2/2008 05:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-122S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	29	0.25	5.0		mg/Kg	1	5/2/2008 06:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-122S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 06:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-123S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	190	0.25	5.0		mg/Kg	1	5/2/2008 06:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-123S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	24	0.25	5.0		mg/Kg	1	5/2/2008 06:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-123S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	37	0.25	5.0		mg/Kg	1	5/2/2008 06:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-123S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:35:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	8.8	0.25	5.0		mg/Kg	1	5/2/2008 06:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-124S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502E**	QC Batch: **45328**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	1100	0.25	5.0		mg/Kg	1	5/2/2008 06:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-124S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	25	0.25	5.0		mg/Kg	1	5/2/2008 06:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-124S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	20	0.25	5.0		mg/Kg	1	5/2/2008 06:41 PM

CLIENT:	TRC	**Client Sample ID:**	B-124S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 9:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 06:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-125S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	120	0.25	5.0		mg/Kg	1	5/2/2008 06:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-125S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	39	0.25	5.0		mg/Kg	1	5/2/2008 06:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-125S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	85	0.25	5.0		mg/Kg	1	5/2/2008 06:52 PM

CLIENT:	TRC	**Client Sample ID:**	B-125S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	5.5	0.25	5.0		mg/Kg	1	5/2/2008 06:55 PM

CLIENT:	TRC	**Client Sample ID:**	B-126S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	140	0.25	5.0		mg/Kg	1	5/2/2008 07:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-126S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	11	0.25	5.0		mg/Kg	1	5/2/2008 07:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-126S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 07:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-126S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	6.6	0.25	5.0		mg/Kg	1	5/2/2008 07:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-127S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	15	0.25	5.0		mg/Kg	1	5/2/2008 07:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-127S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 07:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-127S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 07:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-127S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 07:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-128S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	1100	0.25	5.0		mg/Kg	1	5/2/2008 07:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-128S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	93	0.25	5.0		mg/Kg	1	5/2/2008 07:41 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-128S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 07:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-128S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 07:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-129S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502F**	QC Batch: **45329**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 07:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-129S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-129S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-129S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-130S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-049		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-130S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-050		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-130S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-051		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	24	0.25	5.0		mg/Kg	1	5/2/2008 08:24 PM

CLIENT:	TRC	**Client Sample ID:**	B-130S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-052		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-131S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-053		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-131S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-054		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-131S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-055		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	21	0.25	5.0		mg/Kg	1	5/2/2008 08:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-131S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-056		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 08:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 12:58:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-057		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	89	0.25	5.0		mg/Kg	1	5/2/2008 08:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-058		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	42	0.25	5.0		mg/Kg	1	5/2/2008 08:57 PM

CLIENT:	TRC	**Client Sample ID:**	B-132S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:05:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-059		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	8.8	0.25	5.0		mg/Kg	1	5/2/2008 09:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-132S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-060		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	1400	0.25	5.0		mg/Kg	1	5/2/2008 09:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-061

Client Sample ID: B-132SA 0.0-0.5
Collection Date: 4/24/2008 12:58:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	68	0.25	5.0		mg/Kg	1	5/2/2008 09:05 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429F**	QC Batch: **R94004**				PrepDate:		Analyst: **CNP**
pH	7.9	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-062

Client Sample ID: B-132SA 1.0-1.5
Collection Date: 4/24/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	68	0.25	5.0		mg/Kg	1	5/2/2008 09:14 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429F**	QC Batch: **R94004**				PrepDate:		Analyst: **CNP**
pH	7.8	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-063

Client Sample ID: B-132SA 2.0-2.5
Collection Date: 4/24/2008 1:05:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	11	0.25	5.0		mg/Kg	1	5/2/2008 09:17 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429F**	QC Batch: **R94004**				PrepDate:		Analyst: **CNP**
pH	8.4	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-064

Client Sample ID: B-132SA 3.0-3.5
Collection Date: 4/24/2008 1:10:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**		Analyst: **LKN**
Lead	49	0.25	5.0		mg/Kg	1	5/2/2008 09:20 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080429D**	QC Batch: **R94001**				PrepDate:		Analyst: **CNP**
pH	7.9	0.10	0.10		pH Units	1	4/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-065

Client Sample ID: B-133S 0.0-0.5
Collection Date: 4/24/2008 1:20:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502G**	QC Batch: **45330**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 09:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-133S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:20:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-066		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502H**	QC Batch: **45331**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 09:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-133S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:20:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-067		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502H**	QC Batch: **45331**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	5.8	0.25	5.0		mg/Kg	1	5/2/2008 09:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *05-May-08*

CLIENT: TRC
Lab Order: 098463
Project: West County Connectors, 151396
Lab ID: 098463-068

Client Sample ID: B-133S 3.0-3.5
Collection Date: 4/24/2008 1:20:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502H**	QC Batch: **45331**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 09:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-134S 0.0-0.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-069		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502H**	QC Batch: **45331**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 09:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-134S 1.0-1.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-070		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502H**	QC Batch: **45331**				PrepDate:	**4/30/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 09:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-134S 2.0-2.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-071		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502H**	QC Batch: **45331**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	9.0	0.25	5.0		mg/Kg	1	5/2/2008 09:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-134S 3.0-3.5
Lab Order:	098463	**Collection Date:**	4/24/2008 1:40:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098463-072		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080502H**	QC Batch: **45331**				PrepDate: **4/30/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/2/2008 10:00 PM

CLIENT:	TRC	**Client Sample ID:**	CREW-2-ER-4
Lab Order:	098463	**Collection Date:**	4/24/2008 2:00:00 PM
Project:	West County Connectors, 151396	**Matrix:**	WATER
Lab ID:	098463-073		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080502C**	QC Batch: **45359**				PrepDate:	**5/1/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	5/2/2008 10:33 AM

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45327A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **PBS**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449807**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45327**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **LCSS**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449808**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	229.695	5.0	250.0	0	91.9	80	120				

Sample ID: **098462-047A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **ZZZZZZ**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449819**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.067	5.0						1.673	0	20	

Sample ID: **098462-047A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **ZZZZZZ**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449820**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	175.899	5.0	250.0	1.673	69.7	45	110				

Sample ID: **MB-45327B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **PBS**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449821**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098463-005A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **B-112SA 0.0-0.5**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449832**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.346	5.0						9.476	40.9	20	R

Sample ID: **098463-005A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **B-112SA 0.0-0.5**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449833**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	136.580	5.0	250.0	9.476	50.8	45	110				

Sample ID: **098463-005A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94085**
Client ID: **B-112SA 0.0-0.5**	Batch ID: **45327**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/1/2008**	SeqNo: **1449834**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.543	5.0	250.0	9.476	54.8	45	110	136.6	7.04	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45328A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **PBS**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450477**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45328**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **LCSS**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450478**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	230.347	5.0	250.0	0	92.1	80	120				

Sample ID: **098463-015ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **B-121S 2.0-2.5**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450489**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.920	5.0						5.426	0	20	

Sample ID: **098463-015AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **B-121S 2.0-2.5**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450490**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.344	5.0	250.0	5.426	56.4	45	110				

Sample ID: **MB-45328B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **PBS**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098463-025ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **B-124S 0.0-0.5**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450502**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1051.838	5.0						1064	1.14	20	

Sample ID: **098463-025AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **B-124S 0.0-0.5**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450503**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1146.385	5.0	250.0	1064	33.0	45	110				S

Sample ID: **098463-025AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94131**
Client ID: **B-124S 0.0-0.5**	Batch ID: **45328**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450504**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	946.199	5.0	250.0	1064	-47.1	45	110	1146	19.1	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45329A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **PBS**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450505**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45329**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **LCSS**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450506**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	233.286	5.0	250.0	0	93.3	80	120				

Sample ID: **098463-035ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **B-126S 2.0-2.5**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450517**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.738	5.0						1.989	0	20	

Sample ID: **098463-035AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **B-126S 2.0-2.5**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450518**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	161.533	5.0	250.0	1.989	63.8	45	110				

Sample ID: **MB-45329B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **PBS**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450519**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.368	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098463-045ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **B-129S 0.0-0.5**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450530**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.747	5.0						3.289	0	20	

Sample ID: **098463-045AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **B-129S 0.0-0.5**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450531**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	161.014	5.0	250.0	3.289	63.1	45	110				

Sample ID: **098463-045AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94132**
Client ID: **B-129S 0.0-0.5**	Batch ID: **45329**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450532**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	156.333	5.0	250.0	3.289	61.2	45	110	161.0	2.95	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45330A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **PBS**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45330**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **LCSS**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450557**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	229.197	5.0	250.0	0	91.7	80	120				

Sample ID: **098463-055ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **B-131S 2.0-2.5**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450568**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	49.583	5.0						20.54	82.8	20	R

Sample ID: **098463-055AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **B-131S 2.0-2.5**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450569**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	170.633	5.0	250.0	20.54	60.0	45	110				

Sample ID: **MB-45330B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **PBS**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450570**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098463-065ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **B-133S 0.0-0.5**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450581**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.487	5.0						2.919	0	20	

Sample ID: **098463-065AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **B-133S 0.0-0.5**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450582**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	160.482	5.0	250.0	2.919	63.0	45	110				

Sample ID: **098463-065AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94135**
Client ID: **B-133S 0.0-0.5**	Batch ID: **45330**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450583**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	151.462	5.0	250.0	2.919	59.4	45	110	160.5	5.78	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45331A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94136**
Client ID: **PBS**	Batch ID: **45331**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45331**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94136**
Client ID: **LCSS**	Batch ID: **45331**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450585**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	212.498	5.0	250.0	0	85.0	80	120				

Sample ID: **098463-072ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94136**
Client ID: **B-134S 3.0-3.5**	Batch ID: **45331**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450593**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.164	5.0						3.601	0	20	

Sample ID: **098463-072AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94136**
Client ID: **B-134S 3.0-3.5**	Batch ID: **45331**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450594**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	166.437	5.0	250.0	3.601	65.1	45	110				

Sample ID: **098463-072AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **4/30/2008**	RunNo: **94136**
Client ID: **B-134S 3.0-3.5**	Batch ID: **45331**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/2/2008**	SeqNo: **1450595**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	152.666	5.0	250.0	3.601	59.6	45	110	166.4	8.63	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45359**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **PBW**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450092**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45359**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **LCSW**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450093**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.047	0.25	1.000	0	105	85	115				

Sample ID: **098460-010ADUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **ZZZZZZ**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450095**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098460-010AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **ZZZZZZ**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450096**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.471	0.25	2.500	0	98.8	71	118				

Sample ID: **098460-010AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **ZZZZZZ**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450097**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.431	0.25	2.500	0	97.2	71	118	2.471	1.63	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098460-024ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94001**
Client ID: **ZZZZZZ** Batch ID: **R94001** TestNo: **EPA 9045C** Analysis Date: **4/29/2008** SeqNo: **1448052**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.400	0.10						8.290	1.32	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098462-040ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94003**
Client ID: **ZZZZZZ** Batch ID: **R94003** TestNo: **EPA 9045C** Analysis Date: **4/29/2008** SeqNo: **1448065**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.890	0.10						7.670	2.83	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098463
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098463-062ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94004**
Client ID: **B-132SA 1.0-1.5** Batch ID: **R94004** TestNo: **EPA 9045C** Analysis Date: **4/29/2008** SeqNo: **1448072**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.800	0.10						7.830	0.384	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:
Logged By: Date: 4/25/08

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other:

Sample Condition Upon Receipt
1. CHILLED 7.1 Y☐ N☐ 4. SEALED Y☐ N☒
2. HEADSPACE (VOA) Y☐ N/A☐ 5. # OF SPLS MATCH COC Y☒ N☐
3. CONTAINER INTACT Y☒ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); PBT BY EPA 1645

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	7984463-001	B-112S 0.0-0.5	4/24/08	0825	E	1	G		STANDARD
	2	B-112S 1.0-1.5		0830		1			TAT
	3	B-112S 2.0-2.5		0833		1			
	4	B-112S 3.0-3.5		0835		1			
	5	B-112SA 0.0-0.5		0825		1			
	6	B-112SA 1.0-1.5		0830		1			
	7	B-112SA 2.0-2.5		0833		1			
	8	B-112SA 3.0-3.5		0835		1			
	9	B-120S 0.0-0.5		0845		1	T		
	10	B-120S 1.0-1.5		0845		1			

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport
Client ☐
ATL a
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED YO NO 4. SEALED Y o N U
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y q NO 6. PRESERVED Y o NO

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTIONS
Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 14:55	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
c: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State _____ Zip _____

special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metals) LEAD, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0984963 - 11	B-12OS 2.0-2.5	4/24/08	0845	E	1	T	STANDARD
	12	B-12OS 3.0-3.5		0845		1		TAT
	13	B-12IS 0.0-0.5		0905		1		
	14	B-12IS 1.0-1.5		0905		1		
	15	B-12IS 2.0-2.5		0905		1		
	16	B-12IS 3.0-3.5		0905		1		
	17	B-122S 0.0-0.5		0920		1		
	18	B-122S 1.0-1.5		0920		1		
	19	B-122S 2.0-2.5		0920		1		
	20	B-122S 3.0-3.5		0920		1		

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED YO NO 4. SEALED YO N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. 1 OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED YO N ☐

Client: TRC
Attn: DAVID KENNON
Address: 1 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS
Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) _____ Date: 4/25/08 Time: 1400
Received by: (Signature and Printed Name) _____ Date: 4/25/08 Time: 1400

Relinquished by: (Signature and Printed Name) _____ Date: 4/25/08 Time: 1455
Received by: (Signature and Printed Name) _____ Date: 4/25/08 Time: 1455

Relinquished by: (Signature and Printed Name) _____ Date: _____ Time: _____
Received by: (Signature and Printed Name) _____ Date: _____ Time: _____

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID KENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DKENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal); LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	099463-21	B-1235 0.0-0.5	4/24/08	0935	E	1	T	STANDARD TAT
	22	B-1235 1.0-1.5		0935		1		
	23	B-1235 2.0-2.5		0935		1		
	24	B-1235 3.0-3.5		0935		1		
	25	B-1245 0.0-0.5		0950		1		
	26	B-1245 1.0-1.5		0950		1		
	27	B-1245 2.0-2.5		0950		1		
	28	B-1245 3.0-3.5		0950		1		
	29	B-1255 0.0-0.5		1005		1		
	30	B-1255 1.0-1.5	↓	1005	↓	1	↓	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 **Walnut Avenue**
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client q; ATL ☒; CA OverN ☐; FEDEX ☐; Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y O N O
2. HEADSPACE (VOA) Y ☐ N q
3. CONTAINER INTACT Y q N ☐
4. SEALED Y O N ☐
5. # OF SPLS MATCH COC Y q N ☐
6. PRESERVED Y O N ☐

Client: TRC
Attn: DAVID LEGNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA. Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

	Date	Time	Received by: (Signature and Printed Name)	Date	Time
Relinquished by: (Signature and Printed Name)	4/25/08	1400		4/25/08	1405
Relinquished by: (Signature and Printed Name)	4/25/08	1455		4/25/08	1455
Relinquished by: (Signature and Printed Name)					

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LEGNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLEGNON@TRCSOLUTIONS.COM

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Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) CAM; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0903467- 31	B-125S 2.0-2.5	4/24/08	1005				X						X				E	1	T		STANDARD TAT
	32	B-125S 3.0-3.5		1005				X						X					1			
	33	B-126S 0.0-0.5		1025				X						X					1			
	34	B-126S 1.0-1.5		1025				X						X					1			
	35	B-126S 2.0-2.5		1025				X						X					1			
	36	B-126S 3.0-3.5		1025				X						X					1			
	37	B-127S 0.0-0.5		1040				X						X					1			
	38	B-127S 1.0-1.5		1040				X						X					1			
	39	B-127S 2.0-2.5		1040				X						X					1			
	40	B-127S 3.0-3.5		1040				X						X					1			

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill. CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LIGNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA. Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1400 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1400
Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1455 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1455
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize A n lo perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Ann: DAVID LIGNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA. Zip

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLIGNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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Storage Fees (applies when storage is requested):
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- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	PRESERVATION	REMARKS
	095463- 41	B-128S 0.0-0.5	4/24/08	1055	E	1	T		STANDARD
	42	B-128S 1.0-1.5		1055		1			TAT
	43	B-128S 2.0-2.5		1055		1			
	44	B-128S 3.0-3.5		1055		1			
	45	B-129S 0.0-0.5		1210		1			
	46	B-129S 1.0-1.5		1210		1			
	47	B-129S 2.0-2.5		1210		1			
	48	B-129S 3.0-3.5		1210		1			
	49	B-130S 0.0-0.5		1225		1			
	50	B-130S 1.0-1.5		1225		1			

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

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TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA. Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/24/08 Time: 1400 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1700
Relinquished by: (Signature and Printed Name) Date: 4/25/08 Time: 1455 Received by: (Signature and Printed Name) Date: 4/25/08 Time: 1455
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

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Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8270C (BNA)	SOIL	TAT	Container(s): #	Type	REMARKS
	098463-51	B-130S 2.0-2.5	4/24/08	1225	X	X	E	1	T	STANDARD
	52	B-130S 3.0-3.5		1225	X	X		1		TAT
	53	B-131S 0.0-0.5		1240	X	X		1		
	54	B-131S 1.0-1.5		1240	X	X		1		
	55	B-131S 2.0-2.5		1240	X	X		1		
	56	B-131S 3.0-3.5		1240	X	X		1		
	57	B-132S 0.0-0.5		1258	X	X		1	G	
	58	B-132S 1.0-1.5		1300	X	X		1		
	59	B-132S 2.0-2.5		1305	X	X		1		
	60	B-132S 3.0-3.5		1310	X	X		1		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

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Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill. CA 90755
(562) 989-4045 ▪ **Fax** (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ NC 4. SEALED YO N☐ 2. HEADSPACE (VOA) Y☐ hq 5. # OF SPLS MATCH COC Y☐ N☐ 3. COATAINER INTACT Yq h☐ 6. PRESERVED Y O N☐

Client: TRC
Ann: DAVID SHANON
Address: 1 TECHNOLOGY m.
City IRVINE State CA Zip Code
TEL (Y*) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 1 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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Circle or Add Analysis(es) Requested: 8081A (Pesticides) / 8082 (PCB) / 8260B (Volatiles) / 8270C (BNA) / 6010B (Total Metal) LEAD / 8015B (GRO) / 8020 (BTEX) / 8015B (DRO) / 8021 (BTEX) / TITLE 22 / CAM 17 (6010 / 7000) PB BY EPA 6045

SPECIFY APPROPRIATE MATRIX: SOIL / WATER / GROUND WATER / WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0904683- 61	B-132SA 0.0-0.5	4/24/08	1258	E	1	G	STANDARD
	62	B-132SA 1.0-1.5		1300				TAT
	63	B-132SA 2.0-2.5		1305				
	64	B-132SA 3.0-3.5		1310				
	65	B-133S 0.0-0.5		1320			T	
	66	B-133S 1.0-1.5		1320				
	67	B-133S 2.0-2.5		1320				
	68	B-133S 3.0-3.5		1320				
	69	B-134S 0.0-0.5		1340				
	70	B-134S 1.0-1.5		1340				

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DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax *(562)* 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport
Client ☐
ATL ☒
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y O N O
2. HEADSPACE (VOA) Y ☐ N q 5. #OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N q 6. PRESERVED Y O N O

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA. Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTORS Project #: 151396
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Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455	Received by: (Signature and Printed Name)	Date: 4/25/08	Time: 1455
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform ihs work indicated below:
Project Mgr /Submitter:
Print Name Dale
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

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SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B (LEAD)	8015B (GRO)/8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0984637-71	B-134S 2.0-2.5	4/24/08	1340				X						X				E	1	T		STANDARD
	72	B-134S 3.0-3.5	↓	1340				X						X				↓	1	T		TAT
	73	CREW-2-EB-4	↓	1400				X							X			↓	1	P		↓	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098527

RE: West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 098527
Project: West County Connectors, 151396
Lab ID: 098527-008

Client Sample ID: B-52N 3.0-3.5
Collection Date: 4/29/2008 8:40:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate:	**5/9/2008**	Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 02:57 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 06:49 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	3.9	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-145S 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:51:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	8.8	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145S 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	7.7	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145SA 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:51:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	10	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145SA 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	6.1	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-53N 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	11	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-53N 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	2.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **MB-45526A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458020**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **LCS-45526**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **LCSW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458021**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.894	0.050	1.000	0.005493	88.9	85	115				

Sample ID: **098463-012ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458032**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.049	0.25						0.3150	108	20	R

Sample ID: **098463-012AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458033**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.689	0.25	2.500	0.3150	95.0	71	118				

Sample ID: **MB-45526B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.004	0.050									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **098528-039ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.809	0.25						2.147	26.7	20	R

Sample ID: **098528-039AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.309	0.25	2.500	2.147	86.5	71	118				

Sample ID: **098528-039AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.381	0.25	2.500	2.147	89.4	71	118	4.309	1.65	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.020	0.25									

Sample ID: **LCS-45632**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **LCSS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458117**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.955	0.050	1.000	0.005053	95.0	85	115				

Sample ID: **098530-032ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.028	0.25						0.08897	0	20	

Sample ID: **098530-032AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.950	0.25	2.500	0.08897	74.4	71	118				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458130**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.062	0.25						0.03780	0	20	

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.982	0.25	2.500	0.03780	77.8	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.269	0.25	2.500	0.03780	89.2	71	118	1.982	13.5	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94520

Sample ID: **MB-45534A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **PBS**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456650**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45534**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **LCSS**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456651**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.915	0.25	5.000	0	98.3	80	120				

Sample ID: **098527-039A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **B-53N 2.0-2.5**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456662**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.325	0.50						10.53	1.98	20	

Sample ID: **098527-039A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **B-53N 2.0-2.5**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.688	0.50	5.000	10.53	-16.9	80	120				S

Sample ID: **MB-45534B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **PBS**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94520

Sample ID: **098528-036A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **ZZZZZZ**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.206	0.50						14.26	0.380	20	

Sample ID: **098528-036A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **ZZZZZZ**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456675**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.970	0.50	5.000	14.26	94.2	80	120				

Sample ID: **098528-036A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **ZZZZZZ**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456676**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.812	0.50	5.000	14.26	91.0	80	120	18.97	0.839	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lemon
TRC
21 Technology Dr
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098527

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-145S 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:51:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.53	0.19	0.25		mg/L	1	5/27/2008

CLIENT:	TRC	**Client Sample ID:**	B-145S 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527D**	QC Batch: **45907**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.32	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145SA 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:51:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.65	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145SA 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.54	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-53N 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.51	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098461-028A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465644**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.496	0.25						0.5307	6.82	20	

Sample ID: **098461-028A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **ZZZZZZ**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465645**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.031	0.25	2.500	0.5307	100	70	130				

Sample ID: **MB-45907B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465646**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465647**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098527-030A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **B-145S 1.0-1.5**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465652**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.333	0.25						0.3215	3.64	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45907

Sample ID: **098527-030A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **B-145S 1.0-1.5**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465653**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.025	0.25	2.500	0.3215	108	70	130				

Sample ID: **098527-030A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **B-145S 1.0-1.5**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465654**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.190	0.25	2.500	0.3215	115	70	130	3.025	5.31	20	

Sample ID: **MB-45907A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465655**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45855A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **PBS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45907**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95046**
Client ID: **LCSS**	Batch ID: **45907**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465657**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.913	0.25	1.000	0	91.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **MB-45908A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45908**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **LCSS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465665**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.011	0.25	1.000	0	101	80	120				

Sample ID: **098540-017-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465672**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.865	0.25									

Sample ID: **098540-017A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.033	0.25	2.500	1.848	127	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **098528-036A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.782	0.25						1.791	0.469	20	

Sample ID: **098528-036A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465680**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.849	0.25	2.500	1.791	82.3	70	130				

Sample ID: **098528-036A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465681**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.813	0.25	2.500	1.791	80.9	70	130	3.849	0.947	20	

Sample ID: **MB-45908B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465682**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465683**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 07,2008

David Lemon
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ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098527

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT:	TRC	**Client Sample ID:**	B-48N 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	5.4	0.25	5.0		mg/Kg	1	5/5/2008 09:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-48N 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	15	0.25	5.0		mg/Kg	1	5/5/2008 09:32 PM

CLIENT:	TRC	**Client Sample ID:**	B-48N 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	14	0.25	5.0		mg/Kg	1	5/5/2008 09:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-48N 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	13	0.25	5.0		mg/Kg	1	5/5/2008 09:40 PM

CLIENT:	TRC	**Client Sample ID:**	B-52N 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	7.7	0.25	5.0		mg/Kg	1	5/5/2008 09:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-52N 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	12	0.25	5.0		mg/Kg	1	5/5/2008 09:56 PM

CLIENT:	TRC	**Client Sample ID:**	B-52N 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	16	0.25	5.0		mg/Kg	1	5/5/2008 10:00 PM

CLIENT:	TRC	**Client Sample ID:**	B-52N 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 8:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	62	0.25	5.0		mg/Kg	1	5/5/2008 10:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-55N 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 9:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 10:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-55N 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 9:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	12	0.25	5.0		mg/Kg	1	5/5/2008 10:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-55N 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 9:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	17	0.25	5.0		mg/Kg	1	5/5/2008 10:28 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-55N 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 9:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	18	0.25	5.0		mg/Kg	1	5/5/2008 10:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-56N 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	10	0.25	5.0		mg/Kg	1	5/5/2008 10:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-56N 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	14	0.25	5.0		mg/Kg	1	5/5/2008 10:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098527
Project: West County Connectors, 151396
Lab ID: 098527-015

Client Sample ID: B-56N 2.0-2.5
Collection Date: 4/29/2008 9:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	8.4	0.25	5.0		mg/Kg	1	5/5/2008 10:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-56N 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 9:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	7.4	0.25	5.0		mg/Kg	1	5/5/2008 10:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-141S 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-141S 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-141S 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-141S 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505H**	QC Batch: **45397**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-143S 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	5.6	0.25	5.0		mg/Kg	1	5/5/2008 11:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-143S 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-143S 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:51 PM

CLIENT:	TRC	**Client Sample ID:**	B-143S 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:20:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-144S 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-144S 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 12:03 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-144S 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 12:15 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-144S 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:40:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 12:19 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145S 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:51:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	93	0.25	5.0		mg/Kg	1	5/6/2008 12:23 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145S 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	70	0.25	5.0		mg/Kg	1	5/6/2008 12:27 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145S 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 10:57:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	14	0.25	5.0		mg/Kg	1	5/6/2008 12:43 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145S 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 11:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	5.2	0.25	5.0		mg/Kg	1	5/6/2008 12:47 AM

CLIENT: TRC
Lab Order: 098527
Project: West County Connectors, 151396
Lab ID: 098527-033

Client Sample ID: B-145SA 0.0-0.5
Collection Date: 4/29/2008 10:51:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	110	0.25	5.0		mg/Kg	1	5/6/2008 12:51 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	7.6	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098527
Project: West County Connectors, 151396
Lab ID: 098527-034

Client Sample ID: B-145SA 1.0-1.5
Collection Date: 4/29/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	100	0.25	5.0		mg/Kg	1	5/6/2008 01:02 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	7.3	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098527
Project: West County Connectors, 151396
Lab ID: 098527-035

Client Sample ID: B-145SA 2.0-2.5
Collection Date: 4/29/2008 10:57:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	23	0.25	5.0		mg/Kg	1	5/6/2008 01:06 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-145SA 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 11:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	5.8	0.25	5.0		mg/Kg	1	5/6/2008 01:10 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.3	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-53N 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	9.1	0.25	5.0		mg/Kg	1	5/6/2008 01:14 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-53N 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	6.0	0.25	5.0		mg/Kg	1	5/6/2008 01:18 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-53N 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	68	0.25	5.0		mg/Kg	1	5/6/2008 01:22 AM

CLIENT:	TRC	**Client Sample ID:**	B-53N 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505I**	QC Batch: **45398**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	43	0.25	5.0		mg/Kg	1	5/6/2008 01:26 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-54N 0.0-0.5
Lab Order:	098527	**Collection Date:**	4/29/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	23	0.25	5.0		mg/Kg	1	5/6/2008 01:58 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-54N 1.0-1.5
Lab Order:	098527	**Collection Date:**	4/29/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 02:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-54N 2.0-2.5
Lab Order:	098527	**Collection Date:**	4/29/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	5.9	0.25	5.0		mg/Kg	1	5/6/2008 02:06 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-54N 3.0-3.5
Lab Order:	098527	**Collection Date:**	4/29/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098527-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 02:10 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	CREW-2-ER-7
Lab Order:	098527	**Collection Date:**	4/29/2008 1:20:00 PM
Project:	West County Connectors, 151396	**Matrix:**	WATER
Lab ID:	098527-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP6_080505D**	QC Batch: **45374**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.0021	0.25		mg/L	1	5/5/2008 01:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45397A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **PBS**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451521**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45397**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **LCSS**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451522**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	235.877	5.0	250.0	0	94.4	80	120				

Sample ID: **098527-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **B-55N 1.0-1.5**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451533**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.878	5.0						12.43	30.4	20	R

Sample ID: **098527-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **B-55N 1.0-1.5**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451534**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	167.729	5.0	250.0	12.43	62.1	45	110				

Sample ID: **MB-45397B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **PBS**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098527-020A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **B-141S 3.0-3.5**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451546**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.539	5.0						3.910	0	20	

Sample ID: **098527-020A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **B-141S 3.0-3.5**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451547**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	148.520	5.0	250.0	3.910	57.8	45	110				

Sample ID: **098527-020A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94186**
Client ID: **B-141S 3.0-3.5**	Batch ID: **45397**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451548**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	155.548	5.0	250.0	3.910	60.7	45	110	148.5	4.62	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45398A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **PBS**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451549**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45398**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **LCSS**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451550**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	232.826	5.0	250.0	0	93.1	80	120				

Sample ID: **098527-030A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **B-145S 1.0-1.5**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451561**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	82.327	5.0						70.24	15.8	20	

Sample ID: **098527-030A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **B-145S 1.0-1.5**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451562**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	243.185	5.0	250.0	70.24	69.2	45	110				

Sample ID: **MB-45398B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **PBS**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451563**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098527-040A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **B-53N 3.0-3.5**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451574**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	17.430	5.0						42.62	83.9	20	R

Sample ID: **098527-040A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **B-53N 3.0-3.5**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451575**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	147.120	5.0	250.0	42.62	41.8	45	110				S

Sample ID: **098527-040A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94187**
Client ID: **B-53N 3.0-3.5**	Batch ID: **45398**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451576**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	165.353	5.0	250.0	42.62	49.1	45	110	147.1	11.7	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45399A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **PBS**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451577**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45399**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **LCSS**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451578**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	232.680	5.0	250.0	0	93.1	80	120				

Sample ID: **098531-006A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **ZZZZZZ**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451589**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	29.714	5.0						35.08	16.6	20	

Sample ID: **098531-006A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **ZZZZZZ**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451590**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	176.183	5.0	250.0	35.08	56.4	45	110				

Sample ID: **MB-45399B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **PBS**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451591**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098531-016A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **ZZZZZZ**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451602**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.273	5.0						10.21	33.6	20	R

Sample ID: **098531-016A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **ZZZZZZ**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451603**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	113.399	5.0	250.0	10.21	41.3	45	110				S

Sample ID: **098531-016A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **ZZZZZZ**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451604**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	147.004	5.0	250.0	10.21	54.7	45	110	113.4	25.8	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45374** SampType: **MBLK** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/2/2008** RunNo: **94158**
Client ID: **PBW** Batch ID: **45374** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/5/2008** SeqNo: **1450910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45374** SampType: **LCS** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/2/2008** RunNo: **94158**
Client ID: **LCSW** Batch ID: **45374** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/5/2008** SeqNo: **1450911**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.044	0.25	1.000	0	104	85	115				

Sample ID: **098536-001DDUP** SampType: **DUP** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/2/2008** RunNo: **94158**
Client ID: **ZZZZZZ** Batch ID: **45374** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/5/2008** SeqNo: **1450917**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098536-001DMS** SampType: **MS** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/2/2008** RunNo: **94158**
Client ID: **ZZZZZZ** Batch ID: **45374** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/5/2008** SeqNo: **1450918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.335	0.25	2.500	0	93.4	71	118				

Sample ID: **098536-001DMSD** SampType: **MSD** TestCode: **6010_WPB** Units: **mg/L** Prep Date: **5/2/2008** RunNo: **94158**
Client ID: **ZZZZZZ** Batch ID: **45374** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **5/5/2008** SeqNo: **1450919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.498	0.25	2.500	0	99.9	71	118	2.335	6.76	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098531-004ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94214**
Client ID: **ZZZZZZ** Batch ID: **R94214** TestNo: **EPA 9045C** Analysis Date: **5/6/2008** SeqNo: **1451958**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.520	0.10						8.490	0.353	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098527
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098530-001ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94215**
Client ID: **ZZZZZZ** Batch ID: **R94215** TestNo: **EPA 9045C** Analysis Date: **5/6/2008** SeqNo: **1451962**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.050	0.10						8.030	0.249	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 4/30/08

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 5.6 4.4 4.4 Y ☐ N ☐ 4. SEALED Y ☐ N ☒
2. HEADSPACE (VOA) Y ☐ N ☐ N/A 5. # OF SPLS MATCH COC Y ☒ N ☐
3. CONTAINER INTACT Y ☒ N ☐ 6. PRESERVED Y ☒ N ☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: 949 753-0111
Project Name: WEST COUNTY CONNECTORS
Project #: 151396
Sampler: (Printed Name) DAVID YONG (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	0706527-001	B-48N 0.0-0.5	4/29/08	0815				X						X				E	1	T	STANDARD TAT
	2	B-48N 1.0-1.5		0815				X						X					1		
	3	B-48N 2.0-2.5		0815				X						X					1		
	4	B-48N 3.0-3.5		0815				X						X					1		
	5	B-52N 0.0-0.5		0840				X						X					1		
	6	B-52N 1.0-1.5		0840				X						X					1		
	7	B-52N 2.0-2.5		0840				X						X					1		
	8	B-52N 3.0-3.5		0840				X						X					1		
	9	B-55N 0.0-0.5		0900				X						X					1		
	10	B-55N 1.0-1.5		0900				X						X					1		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder. Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, C A 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ C A OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED YO NO 4. SEALED YO NO
2. HEADSPACE (VOA) Y q NO 5. # OFSPLSMATCHCOC Y O N q
3. CONTAINER INTACT Y q N q 6. PRESERVED YO NO

Client: TRC
Ann: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize A n to perform me work Indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) LEAD	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0708577-11	B-55N 2.0-2.5	4/29/08	0900				X						X				E	1	T		STANDARD TAT
	12	B-55N 3.0-3.5		0900				X						X					1			
	13	B-56N 0.0-0.5		0920				X						X					1			
	14	B-56N 1.0-1.5		0920				X						X					1			
	15	B-56N 2.0-2.5		0920				X						X					1			
	16	B-56N 3.0-3.5		0920				X						X					1			
	17	B-141S 0.0-0.5		1000				X						X					1			
	18	B-141S 1.0-1.5		1000				X						X					1			
	19	B-141S 2.0-2.5		1000				X						X					1			
	20	B-141S 3.0-3.5		1000				X						X					1			

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 **Walnut Avenue**
Signal Hill, CA 90755
(562) 989-4045 • **Fax** (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Dale: _____

Method of Transport
Client ☐
ATL ☒
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ NO 4. SEALED Y O N O
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ NO 6. PRESERVED Y O N O

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COAST CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) CAM17	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	QA/QC / REMARKS
	0708527-21	B-143S 0.0-0.5	4/29/08	1020				X						X				E	1	T		STANDARD
	22	B-143S 1.0-1.5		1020				X						X					1			TAT
	23	B-143S 2.0-2.5		1020				X						X					1			
	24	B-143S 3.0-3.5		1020				X						X					1			
	25	B-144S 0.0-0.5		1040				X						X					1			
	26	B-144S 1.0-1.5		1040				X						X					1			
	27	B-144S 2.0-2.5		1040				X						X					1			
	28	B-144S 3.0-3.5		1040				X						X					1			
	29	B-145S 0.0-0.5		1051				X						X					1	G		
	30	B-145S 1.0-1.5		1055				X						X					1			

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Dale: _____

Method of Transport
Client ☐
ATL
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O
2. HEADSPACE (VOA) Y q N q
3. CONTAINER INTACT Y ☐ N q
4. SEALED Y O N O
5. # OF SPLS MATCH COC Y q N q
6. PRESERVED Y 0 N O

Client: TRC
Attn: DAVID LUNNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0171

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/30/08 Time: 0900
Received by: (Signature and Printed Name) Date: 4/30/08 Time: 900
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LUNNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLUNNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) LEAD, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000), PH BY EPA 9045

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode
OTHER

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	0948527-31	B-145S 2.0-2.5	4/29/08	1057	E	1	G	STANDARD
	32	B-145S 3.0-3.5		1100		1		TAT
	33	B-145SA 0.0-0.5		1051		1		
	34	B-145SA 1.0-1.5		1055		1		
	35	B-145SA 2.0-2.5		1057		1		
	36	B-145SA 3.0-3.5		1100		1		
	37	B-53N 0.0-0.5		1235		1	T	
	38	B-53N 1.0-1.5		1235		1		
	39	B-53N 2.0-2.5		1235		1		
	40	B-53N 3.0-3.5		1235		1		

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 Technology Dr.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: West County Connections Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/30/08 Time: 900
Received by: (Signature and Printed Name) Date: 4/30/08 Time: 900

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 Technology Dr
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLennon@TRCSolutions.com

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) LUFT; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	0908977-41	B-54N 0.0-0.5	4/29/08	1310				X						X				E		T		STANDARD
	42	B-54N 1.0-1.5	↓	1310				X						X								TAT
	43	B-54N 2.0-2.5		1310				X						X								
	44	B-54N 3.0-3.5	↓	1310				X						X						↓		
	45	CREW-2-ER-7	↓	1320				X							X			↓		P		↓	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098528

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Edd[illegible]lie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-154S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515F**	QC Batch: **R94602**				PrepDate:		Analyst: **CL**
Lead	7.7	0.042	1.0		mg/L	20	5/15/2008 06:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-154SA 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	7.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-158S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	5.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-160S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 11:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	6.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-136S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	23	0.56	0.75		mg/L	3	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-136S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:27:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	4.7	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098528
Project: West County Connectors, 151396
Lab ID: 098528-033

Client Sample ID: B-136S 2.0-2.5
Collection Date: 4/28/2008 12:30:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A**	QC Batch: **45526**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.91	0.011	0.25		mg/L	5	5/15/2008 03:00 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	1.3	0.011	0.25		mg/L	5	5/15/2008 06:51 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	10	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098528
Project: West County Connectors, 151396
Lab ID: 098528-034

Client Sample ID: B-136S 3.0-3.5
Collection Date: 4/28/2008 12:32:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A** QC Batch: **45526**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 03:02 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 06:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-138S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	11	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-138S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:47:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514C**	QC Batch: **R94520**				PrepDate:		Analyst: **LKN**
Lead	14	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098528
Project: West County Connectors, 151396
Lab ID: 098528-039

Client Sample ID: B-140S 0.0-0.5
Collection Date: 4/28/2008 1:05:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515A** QC Batch: **45526**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	2.1	0.011	0.25		mg/L	5	5/15/2008 03:05 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	11	0.011	0.25		mg/L	5	5/15/2008 06:57 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	97	1.9	2.5		mg/L	10	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098528
Project: West County Connectors, 151396
Lab ID: 098528-040

Client Sample ID: B-140S 1.0-1.5
Collection Date: 4/28/2008 1:08:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	1.3	0.011	0.25		mg/L	5	5/15/2008 03:29 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	1.5	0.011	0.25		mg/L	5	5/15/2008 07:00 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	19	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098528
Project: West County Connectors, 151396
Lab ID: 098528-041

Client Sample ID: B-140S 2.0-2.5
Collection Date: 4/28/2008 1:10:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION	**WET**				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 03:32 PM
ICP METALS BY TCLP EXTRACTION	**EPA3010A**				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 07:03 PM
LEAD BY ATOMIC ABSORPTION (STLC)	**WET**				**WET/ EPA 7420**		
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	1.1	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94602

Sample ID: **MB-45615**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **PBS**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458205**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45615**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **LCSS**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458206**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.034	0.050	1.000	0	103	85	115				

Sample ID: **098438-030ADUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **ZZZZZZ**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458209**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.712	1.0						8.957	8.09	20	

Sample ID: **098438-030AMS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **ZZZZZZ**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458210**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.419	1.0	2.500	8.957	58.5	71	118				S

Sample ID: **098438-030AMSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date:	RunNo: **94602**
Client ID: **ZZZZZZ**	Batch ID: **R94602**	TestNo: **WET/ EPA 60**		Analysis Date: **5/15/2008**	SeqNo: **1458211**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.543	1.0	2.500	8.957	63.5	71	118	10.42	1.19	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94520

Sample ID: **MB-45534A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **PBS**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456650**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45534**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **LCSS**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456651**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.915	0.25	5.000	0	98.3	80	120				

Sample ID: **098527-039A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **ZZZZZZ**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456662**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.325	0.50						10.53	1.98	20	

Sample ID: **098527-039A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **ZZZZZZ**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.688	0.50	5.000	10.53	-16.9	80	120				S

Sample ID: **MB-45534B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **PBS**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94520

Sample ID: **098528-036A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **B-138S 1.0-1.5**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.206	0.50						14.26	0.380	20	

Sample ID: **098528-036A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **B-138S 1.0-1.5**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456675**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.970	0.50	5.000	14.26	94.2	80	120				

Sample ID: **098528-036A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94520**
Client ID: **B-138S 1.0-1.5**	Batch ID: **R94520**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1456676**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.812	0.50	5.000	14.26	91.0	80	120	18.97	0.839	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **MB-45526A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458020**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **LCS-45526**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **LCSW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458021**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.894	0.050	1.000	0.005493	88.9	85	115				

Sample ID: **098463-012ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458032**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.049	0.25						0.3150	108	20	R

Sample ID: **098463-012AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **ZZZZZZ**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458033**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.689	0.25	2.500	0.3150	95.0	71	118				

Sample ID: **MB-45526B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **PBW**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.004	0.050									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45526

Sample ID: **098528-039ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **B-140S 0.0-0.5**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458045**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.809	0.25						2.147	26.7	20	R

Sample ID: **098528-039AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **B-140S 0.0-0.5**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.309	0.25	2.500	2.147	86.5	71	118				

Sample ID: **098528-039AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94574**
Client ID: **B-140S 0.0-0.5**	Batch ID: **45526**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.381	0.25	2.500	2.147	89.4	71	118	4.309	1.65	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.020	0.25									

Sample ID: **LCS-45632**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **LCSS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458117**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.955	0.050	1.000	0.005053	95.0	85	115				

Sample ID: **098530-032ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.028	0.25						0.08897	0	20	

Sample ID: **098530-032AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.950	0.25	2.500	0.08897	74.4	71	118				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458130**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.062	0.25						0.03780	0	20	

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.982	0.25	2.500	0.03780	77.8	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.269	0.25	2.500	0.03780	89.2	71	118	1.982	13.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45535

Sample ID: **MB-45535A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **PBS**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456774**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45535**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **LCSS**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.006	0.25	5.000	0	100	80	120				

Sample ID: **098530-040A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456784**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098530-040A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456785**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.824	0.25	5.000	0	96.5	80	120				

Sample ID: **MB-45535B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **PBS**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456786**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45535

Sample ID: **098531-003A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456797**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.191	0.25						4.248	1.35	20	

Sample ID: **098531-003A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456798**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.531	0.25	5.000	4.248	85.7	80	120				

Sample ID: **098531-003A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456799**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.404	0.25	5.000	4.248	83.1	80	120	8.531	1.49	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **MB-44527A** SampType: **MBLK** TestCode: **6010_STDI** Units: **mg/L** Prep Date: **5/9/2008** RunNo: **94596**
Client ID: **PBW** Batch ID: **45527** TestNo: **WET DI/ EPA WET** Analysis Date: **5/15/2008** SeqNo: **1458062**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Sample ID: **LCS-45527** SampType: **LCS** TestCode: **6010_STDI** Units: **mg/L** Prep Date: **5/9/2008** RunNo: **94596**
Client ID: **LCSW** Batch ID: **45527** TestNo: **WET DI/ EPA WET** Analysis Date: **5/15/2008** SeqNo: **1458063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.900	0.050	1.000	0.009570	89.0	85	115				

Sample ID: **098530-046ADUP** SampType: **DUP** TestCode: **6010_STDI** Units: **mg/L** Prep Date: **5/9/2008** RunNo: **94596**
Client ID: **ZZZZZZ** Batch ID: **45527** TestNo: **WET DI/ EPA WET** Analysis Date: **5/15/2008** SeqNo: **1458074**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.257	0.25						1.829	20.9	20	R

Sample ID: **098530-046AMS** SampType: **MS** TestCode: **6010_STDI** Units: **mg/L** Prep Date: **5/9/2008** RunNo: **94596**
Client ID: **ZZZZZZ** Batch ID: **45527** TestNo: **WET DI/ EPA WET** Analysis Date: **5/15/2008** SeqNo: **1458075**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.260	0.25	2.500	1.829	97.2	71	118				

Sample ID: **MB-44527B** SampType: **MBLK** TestCode: **6010_STDI** Units: **mg/L** Prep Date: **5/9/2008** RunNo: **94596**
Client ID: **PBW** Batch ID: **45527** TestNo: **WET DI/ EPA WET** Analysis Date: **5/15/2008** SeqNo: **1458076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.056	0.25						10.06	22.1	20	R

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.052	0.25	2.500	10.06	79.7	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458085**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.020	0.25	2.500	10.06	78.4	71	118	12.05	0.267	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
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ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098528

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-154S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.54	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-154SA 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.76	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-158S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.37	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-160S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 11:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.50	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-136S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	1.5	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-138S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	1.4	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-138S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:47:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	1.8	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **MB-45908A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45908**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **LCSS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465665**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.011	0.25	1.000	0	101	80	120				

Sample ID: **098540-017-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465672**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.865	0.25									

Sample ID: **098540-017A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.033	0.25	2.500	1.848	127	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **098528-036A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **B-138S 1.0-1.5**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.782	0.25						1.791	0.469	20	

Sample ID: **098528-036A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **B-138S 1.0-1.5**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465680**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.849	0.25	2.500	1.791	82.3	70	130				

Sample ID: **098528-036A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **B-138S 1.0-1.5**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465681**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.813	0.25	2.500	1.791	80.9	70	130	3.849	0.947	20	

Sample ID: **MB-45908B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465682**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465683**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 07,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098528

RE: West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 098528
Project: West County Connectors, 151396
Lab ID: 098528-001

Client Sample ID: B-154S 0.0-0.5
Collection Date: 4/28/2008 8:50:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**		Analyst: **LKN**
Lead	60	0.25	5.0		mg/Kg	1	5/5/2008 04:32 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.2	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-154S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:52:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**		Analyst: **LKN**
Lead	22	0.25	5.0		mg/Kg	1	5/5/2008 04:36 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.2	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-154S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**		Analyst: **LKN**
Lead	5.1	0.25	5.0		mg/Kg	1	5/5/2008 04:40 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098528
Project: West County Connectors, 151396
Lab ID: 098528-004

Client Sample ID: B-154S 3.0-3.5
Collection Date: 4/28/2008 8:59:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 04:44 PM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.5	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-154SA 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:50:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	63	0.25	5.0		mg/Kg	1	5/5/2008 04:48 PM

CLIENT:	TRC	**Client Sample ID:**	B-154SA 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:52:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	49	0.25	5.0		mg/Kg	1	5/5/2008 04:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-154SA 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:55:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 04:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-154SA 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 8:59:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 05:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-155S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:10:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	6.8	0.25	5.0		mg/Kg	1	5/5/2008 05:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-155S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:12:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 05:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-155S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:14:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 05:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-155S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 05:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-156S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 05:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-156S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:26:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 05:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-156S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:28:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	5.2	0.25	5.0		mg/Kg	1	5/5/2008 05:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-156S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 9:30:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 05:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-157S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	29	0.25	5.0		mg/Kg	1	5/5/2008 06:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-157S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 06:07 PM

CLIENT:	TRC	**Client Sample ID:**	B-157S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 06:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-157S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505E**	QC Batch: **45387**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 06:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-158S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	78	0.25	5.0		mg/Kg	1	5/5/2008 06:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-158S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	7.6	0.25	5.0		mg/Kg	1	5/5/2008 06:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-158S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	5.1	0.25	5.0		mg/Kg	1	5/5/2008 06:54 PM

CLIENT:	TRC	**Client Sample ID:**	B-158S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:25:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 06:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-159S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 10:58:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	24	0.25	5.0		mg/Kg	1	5/5/2008 07:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-159S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 11:00:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	23	0.25	5.0		mg/Kg	1	5/5/2008 07:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-159S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 11:05:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 07:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-159S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 11:08:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 07:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-160S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 11:15:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	56	0.25	5.0		mg/Kg	1	5/5/2008 07:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-160S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 11:18:00 AM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	38	0.25	5.0		mg/Kg	1	5/5/2008 07:30 PM

CLIENT:	TRC	**Client Sample ID:**	B-136S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:25:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	270	0.25	5.0		mg/Kg	1	5/5/2008 07:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-136S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:27:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	77	0.25	5.0		mg/Kg	1	5/5/2008 07:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-136S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:30:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	170	0.25	5.0		mg/Kg	1	5/5/2008 07:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-136S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:32:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	16	0.25	5.0		mg/Kg	1	5/5/2008 07:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-138S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:45:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	100	0.25	5.0		mg/Kg	1	5/5/2008 08:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-138S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:47:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	110	0.25	5.0		mg/Kg	1	5/5/2008 08:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-138S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:49:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	14	0.25	5.0		mg/Kg	1	5/5/2008 08:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-138S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 12:52:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 08:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-140S 0.0-0.5
Lab Order:	098528	**Collection Date:**	4/28/2008 1:05:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	710	0.25	5.0		mg/Kg	1	5/5/2008 08:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-140S 1.0-1.5
Lab Order:	098528	**Collection Date:**	4/28/2008 1:08:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505F**	QC Batch: **45388**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	340	0.25	5.0		mg/Kg	1	5/5/2008 08:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-140S 2.0-2.5
Lab Order:	098528	**Collection Date:**	4/28/2008 1:10:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505G**	QC Batch: **45389**				PrepDate: **5/2/2008**	Analyst: **LKN**	
Lead	54	0.25	5.0		mg/Kg	1	5/5/2008 08:53 PM

CLIENT:	TRC	**Client Sample ID:**	B-140S 3.0-3.5
Lab Order:	098528	**Collection Date:**	4/28/2008 1:15:00 PM
Project:	West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098528-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505G**	QC Batch: **45389**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	5.3	0.25	5.0		mg/Kg	1	5/5/2008 09:05 PM

CLIENT:	TRC	**Client Sample ID:**	CREW-2-ER-6
Lab Order:	098528	**Collection Date:**	4/28/2008 1:20:00 PM
Project:	West County Connectors, 151396	**Matrix:**	WATER
Lab ID:	098528-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP6_080505D**	QC Batch: **45374**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.0021	0.25		mg/L	1	5/5/2008 01:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45387A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **PBS**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451445**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45387**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **LCSS**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451446**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	231.636	5.0	250.0	0	92.7	80	120				

Sample ID: **098528-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **B-155S 1.0-1.5**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451457**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.716	5.0						4.933	0	20	

Sample ID: **098528-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **B-155S 1.0-1.5**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451458**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	140.734	5.0	250.0	4.933	54.3	45	110				

Sample ID: **MB-45387B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **PBS**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451459**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098528-020A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **B-157S 3.0-3.5**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451470**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.377	5.0						3.139	0	20	

Sample ID: **098528-020A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **B-157S 3.0-3.5**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451471**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.460	5.0	250.0	3.139	57.3	45	110				

Sample ID: **098528-020A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94182**
Client ID: **B-157S 3.0-3.5**	Batch ID: **45387**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451472**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	123.245	5.0	250.0	3.139	48.0	45	110	146.5	17.2	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45388A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **PBS**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451473**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45388**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **LCSS**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451474**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	234.957	5.0	250.0	0	94.0	80	120				

Sample ID: **098528-030A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **B-160S 1.0-1.5**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451485**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	36.812	5.0						37.79	2.61	20	

Sample ID: **098528-030A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **B-160S 1.0-1.5**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	169.431	5.0	250.0	37.79	52.7	45	110				

Sample ID: **MB-45388B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **PBS**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098528-040A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **B-140S 1.0-1.5**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451498**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	240.992	5.0						344.3	35.3	20	R

Sample ID: **098528-040A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **B-140S 1.0-1.5**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451499**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	442.355	5.0	250.0	344.3	39.2	45	110				S

Sample ID: **098528-040A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94183**
Client ID: **B-140S 1.0-1.5**	Batch ID: **45388**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451500**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	401.360	5.0	250.0	344.3	22.8	45	110	442.4	9.72	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45389A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94185**
Client ID: **PBS**	Batch ID: **45389**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451514**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45389**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94185**
Client ID: **LCSS**	Batch ID: **45389**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451515**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	223.562	5.0	250.0	0	89.4	80	120				

Sample ID: **098528-042A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94185**
Client ID: **B-140S 3.0-3.5**	Batch ID: **45389**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451518**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.178	5.0						5.347	3.20	20	

Sample ID: **098528-042A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94185**
Client ID: **B-140S 3.0-3.5**	Batch ID: **45389**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451519**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	120.252	5.0	250.0	5.347	46.0	45	110				

Sample ID: **098528-042A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/2/2008**	RunNo: **94185**
Client ID: **B-140S 3.0-3.5**	Batch ID: **45389**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451520**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	130.777	5.0	250.0	5.347	50.2	45	110	120.3	8.39	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45374**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **PBW**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45374**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **LCSW**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450911**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.044	0.25	1.000	0	104	85	115				

Sample ID: **098536-001DDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450917**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098536-001DMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.335	0.25	2.500	0	93.4	71	118				

Sample ID: **098536-001DMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.498	0.25	2.500	0	99.9	71	118	2.335	6.76	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098528
Project: West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098531-004ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94214**
Client ID: **ZZZZZZ** Batch ID: **R94214** TestNo: **EPA 9045C** Analysis Date: **5/6/2008** SeqNo: **1451958**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.520	0.10						8.490	0.353	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 5

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 4/30/08

Method of Transport
Client ☑
CA OverN ☐
FEDEX ☑
Other: _____

Sample Condition Upon Receipt
1. CHILLED 5.8 4.6 Y ☑ N ☐ 4. SEALED Y O N O
2. HEADSPACE (VOA) Y O N ☑ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☑ N ☑ 6. PRESERVED Y O N O

Client: TRC	Address: 21 TECHNOLOGY DR	TEL: (949) 727-9336
Attn: DAVID LENNON	City IRVINE State CA Zip Code	FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTORS	Project #: 151396	Sampler: (Printed Name) DAVID YORK (Signature)
Relinquished by: (Signature and Printed Name)	Date: 4/30/08 Time: 0920	Received by: (Signature and Printed Name) Date: 4/30/08 Time: 900
Relinquished by: (Signature and Printed Name)	Date: Time:	Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name)	Date: Time:	Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work Indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
C TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) LEAD	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	PB by EPA 9045	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	098528-01	B-154S 0.0-0.5	4/29/08	0850				X					X		X				E	1	G	STANDARD
	-02	B-154S 1.0-1.5		0852				X					X		X					1		TAT
	-03	B-154S 2.0-2.5		0855				X					X		X					1		
	-04	B-154S 3.0-3.5		0859				X					X		X					1		
	-05	B-154SA 0.0-0.5		0850				X							X					1		
	-06	B-154SA 1.0-1.5		0852				X							X					1		
	-07	B-154SA 2.0-2.5		0855				X							X					1		
	-08	B-154SA 3.0-3.5		0859				X							X					1		
	-09	B-155S 0.0-0.5		0910				X							X					1		
	-10	B-155S 1.0-1.5		0912				X							X					1		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report. Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 4/30/08

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/30/08 Time: 0900 Received by: (Signature and Printed Name) Date: 4/30/08 Time: 960
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by. (Signature and Printed Name) Dale: Time: Received by: (Signature and Printed Name) Dale: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Dale
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY
City IRVINE State CA Zip

Bill To:
Ann: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION: TAT; Container(s) # Type

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	SOIL	TAT	#	Type	REMARKS
	098528-11	B-155S 2.0-2.5	4/29/08	0914	X	E	1	G	STANDARD
	-12	B-155S 3.0-3.5		0915	X		1		TAT
	-13	B-156S 0.0-0.5		0925	X		1		
	-14	B-156S 1.0-1.5		0926	X		1		
	-15	B-156S 2.0-2.5		0928	X		1		
	-16	B-156S 3.0-3.5		0930	X		1		
	-17	B-157S 0.0-0.5		1000	X		1	T	
	-18	B-157S 1.0-1.5		1000	X		1		
	-19	B-157S 2.0-2.5		1000	X		1		
	-20	B-157S 3.0-3.5		1000	X		1		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder, Pink to submitter

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:

Logged By: [signature] Date: 4/30/09

Method of Transport
Client ☐
ATL ☒
CA OverN ☐
FEDEX ☐
Other:

Sample Condition Upon Receipt
1. CHILLED Y q NO 4. SEALED Y O N O
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N q 6. PRESERVED Y ☐ N O

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YURIL (Signature) [signature]

Relinquished by: (Signature and Printed Name) [signature]	Date: 4/30/09	Time: 900	Received by: (Signature and Printed Name) [signature]	Date: 4/30/09	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metals) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION: TAT | Container(s) # | Type

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B (Lead)	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GW	WW	TAT	#	Type	REMARKS
	098528-21	B-158S 0.0-0.5	4/22/09	1025				X						X				E	1	T	STANDARD
	-22	B-158S 1.0-1.5		1025				X						X					1		TAT
	-23	B-158S 2.0-2.5		1025				X						X					1		
	-24	B-158S 3.0-3.5		1025				X						X					1	↓	
	-25	B-159S 0.0-0.5		1058				X						X					1	G	
	-26	B-159S 1.0-1.5		1100				X						X					1		
	-27	B-159S 2.0-2.5		1105				X						X					1		
	-28	B-159S 3.0-3.5		1108				X						X					1		
	-29	B-160S 0.0-0.5		1115				X						X					1		
	-30	B-160S 1.0-1.5	↓	1118				X						X				↓	1	↓	↓

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

P.O.#: _____

Logged By: _____ Date: _____

FOR LABORATORY USE ONLY:

Method of Transport: Client ☐ ATL ☑ CA OverN q FEDEX ☐ Other: _____

Sample Condition Upon Receipt

1. CHILLED	YO NO	4. SEALED	Y O N O
2. HEADSPACE (VOA)	YO NO	5. # OF SPLS MATCH COC	Y q N q
3. CONTAINER INTACT	Y q N q	6. PRESERVED	Y O N O

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WESTCOUNT CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name) Date: 4/30/08 Time: 0900
Received by: (Signature and Printed Name) Date: 4/30/08 Time: 900
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip

Bill To:
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Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

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Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) LUFT; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO) / 8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GW	WW	TAT	Container(s) #	Type	REMARKS
	098528-31	B-136S 0.0-0.5	4/28/08	1225				X						X				E	1	G	STANDARD
	-32	B-136S 1.0-1.5		1227				X						X					1		TAT
	-33	B-136S 2.0-2.5		1230				X						X					1		
	-34	B-136S 3.0-3.5		1232				X						X					1		
	-35	B-138S 0.0-0.5		1245				X						X					1		
	-36	B-138S 1.0-1.5		1247				X						X					1		
	-37	B-138S 2.0-2.5		1249				X						X					1		
	-38	B-138S 3.0-3.5		1252				X						X					1		
	-39	B-140S 0.0-0.5		1305				X						X					1		
	-40	B-140S 1.0-1.5		1308				X						X					1		

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

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CHAIN OF CUSTODY RECORD

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Signal Hill, CA 90755
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FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 4/30/08

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3 CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

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ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Cr+6	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	078528-41	B-1405 2.0-2.5	4/29/08	1310				X	X					X					E	1	G		STANDARD TAT
	-42	B-1405 3.0-3.5		1315				X	X					X						1			
	-43	GRAB-2-ER-6		1320				X	X						X					1	P		

Circle or Add Analysis(es) Requested
SPECIFY APPROPRIATE MATRIX
Container(s)
PRESERVATION
QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAF' No.: 1838
NELAF' No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098530

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30, 2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT:	TRC	**Client Sample ID:**	B-66N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
WET			**WET DI/ EPA 6010B**				
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	0.57	0.011	0.25		mg/L	5	5/15/2008 03:34 PM
ICP METALS BY TCLP EXTRACTION							
EPA3010A			**EPA 1311/ 6010B**				
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	7.9	0.011	0.25		mg/L	5	5/15/2008 07:05 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
WET			**WET/ EPA 7420**				
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	44	0.93	1.2		mg/L	5	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-66N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 03:37 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	0.90	0.011	0.25		mg/L	5	5/15/2008 07:08 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	15	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-67N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515F**	QC Batch: **R94602**				PrepDate:		Analyst: **CL**
Lead	5.5	0.042	1.0		mg/L	20	5/15/2008 06:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-68N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 9:05:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
			WET/ EPA 6010B				
RunID: **ICP8_080515F**	QC Batch: **R94602**				PrepDate:		Analyst: **CL**
Lead	3.7	0.042	1.0		mg/L	20	5/15/2008 07:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-76N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 03:40 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 07:10 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098530
Project: Caltrans-West County Connectors, 151396
Lab ID: 098530-033

Client Sample ID: B-77N-0.0-0.5
Collection Date: 4/29/2008 11:25:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
WET			**WET DI/ EPA 6010B**				
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	1.9	0.011	0.25		mg/L	5	5/15/2008 03:43 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
WET			**WET/ EPA 7420**				
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	23	0.56	0.75		mg/L	3	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-78N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:07:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 03:46 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 07:29 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-79N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 03:48 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	0.36	0.011	0.25		mg/L	5	5/15/2008 07:32 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	ND	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098530
Project: Caltrans-West County Connectors, 151396
Lab ID: 098530-045

Client Sample ID: B-36N-0.0-0.5
Collection Date: 4/29/2008 1:35:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	8.3	0.011	0.25		mg/L	5	5/15/2008 03:56 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	24	0.011	0.25		mg/L	5	5/15/2008 07:34 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	210	4.6	6.2		mg/L	25	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-36N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 1:37:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
WET			**WET DI/ EPA 6010B**				
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	1.8	0.011	0.25		mg/L	5	5/15/2008 03:59 PM
ICP METALS BY TCLP EXTRACTION							
EPA3010A			**EPA 1311/ 6010B**				
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	5.0	0.011	0.25		mg/L	5	5/15/2008 07:37 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
WET			**WET/ EPA 7420**				
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	44	0.93	1.2		mg/L	5	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098530
Project: Caltrans-West County Connectors, 151396
Lab ID: 098530-047

Client Sample ID: B-36N-2.0-2.5
Collection Date: 4/29/2008 1:40:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 04:09 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 07:40 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	5.3	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098530
Project: Caltrans-West County Connectors, 151396
Lab ID: 098530-048

Client Sample ID: B-36Na-0.0-0.5
Collection Date: 4/29/2008 1:42:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate:	**5/9/2008**	Analyst: **AMT**
Lead	4.3	0.011	0.25		mg/L	5	5/15/2008 04:12 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	13	0.011	0.25		mg/L	5	5/15/2008 07:43 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate:	**5/12/2008**	Analyst: **LKN**
Lead	120	2.8	3.8		mg/L	15	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098530
Project: Caltrans-West County Connectors, 151396
Lab ID: 098530-049

Client Sample ID: B-36Na-1.0-1.5
Collection Date: 4/29/2008 1:45:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B** QC Batch: **45527**					PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	1.9	0.011	0.25		mg/L	5	5/15/2008 04:14 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D** QC Batch: **45632**					PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	1.7	0.011	0.25		mg/L	5	5/15/2008 07:45 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D** QC Batch: **45535**					PrepDate: **5/12/2008**		Analyst: **LKN**
Lead	32	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098530
Project: Caltrans-West County Connectors, 151396
Lab ID: 098530-050

Client Sample ID: B-36Na-2.0-2.5
Collection Date: 4/29/2008 1:47:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate:	**5/9/2008**	Analyst: **AMT**
Lead	1.3	0.011	0.25		mg/L	5	5/15/2008 04:17 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	4.6	0.011	0.25		mg/L	5	5/15/2008 07:53 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate:	**5/12/2008**	Analyst: **LKN**
Lead	25	0.56	0.75		mg/L	3	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **MB-44527A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **PBW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458062**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Sample ID: **LCS-45527**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **LCSW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.900	0.050	1.000	0.009570	89.0	85	115				

Sample ID: **098530-046ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **B-36N-1.0-1.5**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458074**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.257	0.25						1.829	20.9	20	R

Sample ID: **098530-046AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **B-36N-1.0-1.5**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458075**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.260	0.25	2.500	1.829	97.2	71	118				

Sample ID: **MB-44527B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **PBW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.056	0.25						10.06	22.1	20	R

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.052	0.25	2.500	10.06	79.7	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458085**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.020	0.25	2.500	10.06	78.4	71	118	12.05	0.267	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.020	0.25									

Sample ID: **LCS-45632**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **LCSS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458117**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.955	0.050	1.000	0.005053	95.0	85	115				

Sample ID: **098530-032ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **B-76N-3.0-3.5**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.028	0.25						0.08897	0	20	

Sample ID: **098530-032AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **B-76N-3.0-3.5**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.950	0.25	2.500	0.08897	74.4	71	118				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458130**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.062	0.25						0.03780	0	20	

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.982	0.25	2.500	0.03780	77.8	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.269	0.25	2.500	0.03780	89.2	71	118	1.982	13.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45535

Sample ID: **MB-45535A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **PBS**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456774**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45535**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **LCSS**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.006	0.25	5.000	0	100	80	120				

Sample ID: **098530-040A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **B-78N-3.0-3.5**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456784**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098530-040A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **B-78N-3.0-3.5**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456785**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.824	0.25	5.000	0	96.5	80	120				

Sample ID: **MB-45535B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **PBS**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456786**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45535

Sample ID: **098531-003A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456797**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.191	0.25						4.248	1.35	20	

Sample ID: **098531-003A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456798**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.531	0.25	5.000	4.248	85.7	80	120				

Sample ID: **098531-003A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456799**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.404	0.25	5.000	4.248	83.1	80	120	8.531	1.49	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94602

Sample ID: **MB-45615** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **PBS** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458205**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-45615** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **LCSS** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458206**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.034	0.050	1.000	0	103	85	115				

Sample ID: **098438-030ADUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **ZZZZZZ** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458209**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.712	1.0						8.957	8.09	20	

Sample ID: **098438-030AMS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **ZZZZZZ** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458210**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.419	1.0	2.500	8.957	58.5	71	118				S

Sample ID: **098438-030AMSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **94602**
Client ID: **ZZZZZZ** Batch ID: **R94602** TestNo: **WET/ EPA 60** Analysis Date: **5/15/2008** SeqNo: **1458211**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.543	1.0	2.500	8.957	63.5	71	118	10.42	1.19	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX. (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098530

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-67N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.34	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-77N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	1.8	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **MB-45908A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45908**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **LCSS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465665**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.011	0.25	1.000	0	101	80	120				

Sample ID: **098540-017-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465672**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.865	0.25									

Sample ID: **098540-017A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.033	0.25	2.500	1.848	127	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **098528-036A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.782	0.25						1.791	0.469	20	

Sample ID: **098528-036A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465680**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.849	0.25	2.500	1.791	82.3	70	130				

Sample ID: **098528-036A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465681**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.813	0.25	2.500	1.791	80.9	70	130	3.849	0.947	20	

Sample ID: **MB-45908B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465682**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465683**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **B-67N-0.0-0.5**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **B-67N-0.0-0.5**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

May 07,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098530

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-65N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate: **5/5/2008**		Analyst: **CL**
Lead	38	0.25	5.0		mg/Kg	1	5/5/2008 05:46 PM
PH							
			EPA 9045C				
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-65N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:17:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate: **5/5/2008**		Analyst: **CL**
Lead	6.0	0.25	5.0		mg/Kg	1	5/5/2008 05:50 PM
PH							
EPA 9045C							
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-65N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:20:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate: **5/5/2008**		Analyst: **CL**
Lead	5.9	0.25	5.0		mg/Kg	1	5/5/2008 05:53 PM
PH							
			EPA 9045C				
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-65N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:22:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate: **5/5/2008**		Analyst: **CL**
Lead	6.3	0.25	5.0		mg/Kg	1	5/5/2008 05:56 PM
PH							
			EPA 9045C				
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.1	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-66N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	450	0.25	5.0		mg/Kg	1	5/5/2008 06:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-66N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	180	0.25	5.0		mg/Kg	1	5/5/2008 06:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-66N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate: **5/5/2008**	Analyst: **CL**	
Lead	17	0.25	5.0		mg/Kg	1	5/5/2008 06:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-66N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:32:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 06:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-67N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:35:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	67	0.25	5.0		mg/Kg	1	5/5/2008 06:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-67N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:37:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	5.1	0.25	5.0		mg/Kg	1	5/5/2008 06:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-67N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:40:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 06:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-67N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 8:42:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 06:41 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-68N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 9:05:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	56	0.25	5.0		mg/Kg	1	5/5/2008 06:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-68N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 9:07:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	7.4	0.25	5.0		mg/Kg	1	5/5/2008 06:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-68N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 9:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	6.8	0.25	5.0		mg/Kg	1	5/5/2008 06:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-68N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 9:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	6.1	0.25	5.0		mg/Kg	1	5/5/2008 07:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-73N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 9:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	44	0.25	5.0		mg/Kg	1	5/5/2008 07:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-73N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 9:57:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 07:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-73N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:00:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 07:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-73N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:02:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505F**	QC Batch: **45404**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	5.7	0.25	5.0		mg/Kg	1	5/5/2008 07:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-74N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:05:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	43	0.25	5.0		mg/Kg	1	5/5/2008 07:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-74N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:07:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 07:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-74N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 07:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-74N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate: **5/5/2008**	Analyst: **CL**	
Lead	5.4	0.25	5.0		mg/Kg	1	5/5/2008 07:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-75N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	34	0.25	5.0		mg/Kg	1	5/5/2008 08:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-75N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:17:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	18	0.25	5.0		mg/Kg	1	5/5/2008 08:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-75N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:20:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 08:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-75N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:22:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 08:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-76N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:45:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 08:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-76N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:47:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate: **5/5/2008**	Analyst: **CL**	
Lead	5.1	0.25	5.0		mg/Kg	1	5/5/2008 08:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-76N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	9.9	0.25	5.0		mg/Kg	1	5/5/2008 08:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-76N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 10:52:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate: **5/5/2008**	Analyst: **CL**	
Lead	19	0.25	5.0		mg/Kg	1	5/5/2008 08:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-77N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 11:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	260	0.25	5.0		mg/Kg	1	5/5/2008 08:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-77N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 11:27:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	17	0.25	5.0		mg/Kg	1	5/5/2008 08:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-77N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 11:30:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-035		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	5.3	0.25	5.0		mg/Kg	1	5/5/2008 08:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-77N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 11:32:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-036		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 09:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-78N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-037		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 09:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-78N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:02:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-038		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	6.3	0.25	5.0		mg/Kg	1	5/5/2008 09:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-78N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:05:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-039		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 09:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-78N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:07:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-040		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505G**	QC Batch: **45405**				PrepDate: **5/5/2008**	Analyst: **CL**	
Lead	47	0.25	5.0		mg/Kg	1	5/5/2008 09:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-79N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:35:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-041		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	10	0.25	5.0		mg/Kg	1	5/5/2008 10:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-79N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:37:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-042		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate: **5/5/2008**	Analyst: **CL**	
Lead	35	0.25	5.0		mg/Kg	1	5/5/2008 10:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-79N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-043		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	250	0.25	5.0		mg/Kg	1	5/5/2008 10:56 PM

CLIENT:	TRC	**Client Sample ID:**	B-79N-3.0-3.5
Lab Order:	098530	**Collection Date:**	4/29/2008 12:42:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 11:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-36N-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 1:35:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	2200	0.25	5.0		mg/Kg	1	5/5/2008 11:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-36N-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 1:37:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-046		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	350	0.25	5.0		mg/Kg	1	5/5/2008 11:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-36N-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 1:40:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	100	0.25	5.0		mg/Kg	1	5/5/2008 11:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-36Na-0.0-0.5
Lab Order:	098530	**Collection Date:**	4/29/2008 1:42:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	800	0.25	5.0		mg/Kg	1	5/5/2008 11:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-36Na-1.0-1.5
Lab Order:	098530	**Collection Date:**	4/29/2008 1:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-049		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	420	0.25	5.0		mg/Kg	1	5/5/2008 11:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-36Na-2.0-2.5
Lab Order:	098530	**Collection Date:**	4/29/2008 1:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098530-050		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505E**	QC Batch: **45406**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	290	0.25	5.0		mg/Kg	1	5/5/2008 11:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-CREW1-DAY 7
Lab Order:	098530	**Collection Date:**	4/29/2008 2:00:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	098530-051		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP6_080505D**	QC Batch: **45374**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.0021	0.25		mg/L	1	5/5/2008 01:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45404A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **PBS**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451235**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45404**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **LCSS**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451236**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	264.177	5.0	250.0	0	106	80	120				

Sample ID: **098530-010ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **B-67N-1.0-1.5**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451247**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.310	5.0						5.126	3.53	20	

Sample ID: **098530-010AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **B-67N-1.0-1.5**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451248**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	143.896	5.0	250.0	5.126	55.5	45	110				

Sample ID: **MB-45404B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **PBS**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451249**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098530-020ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **B-73N-3.0-3.5**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451260**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.810	5.0						5.661	2.61	20	

Sample ID: **098530-020AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **B-73N-3.0-3.5**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451261**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	135.738	5.0	250.0	5.661	52.0	45	110				

Sample ID: **098530-020AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94175**
Client ID: **B-73N-3.0-3.5**	Batch ID: **45404**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451262**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	149.044	5.0	250.0	5.661	57.4	45	110	135.7	9.34	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45405A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **PBS**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451263**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45405**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **LCSS**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451264**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	228.932	5.0	250.0	0	91.6	80	120				

Sample ID: **098530-030ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **B-76N-1.0-1.5**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451275**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.788	5.0						5.110	0	20	

Sample ID: **098530-030AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **B-76N-1.0-1.5**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451276**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	150.039	5.0	250.0	5.110	58.0	45	110				

Sample ID: **MB-45405B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **PBS**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451277**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098530-040ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **B-78N-3.0-3.5**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451288**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	13.539	5.0						47.11	111	20	R

Sample ID: **098530-040AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **B-78N-3.0-3.5**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451289**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	163.691	5.0	250.0	47.11	46.6	45	110				

Sample ID: **098530-040AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94176**
Client ID: **B-78N-3.0-3.5**	Batch ID: **45405**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451290**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	174.181	5.0	250.0	47.11	50.8	45	110	163.7	6.21	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45406**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94174**
Client ID: **PBS**	Batch ID: **45406**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451220**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45406**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94174**
Client ID: **LCSS**	Batch ID: **45406**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	265.648	5.0	250.0	0	106	80	120				

Sample ID: **098530-050ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94174**
Client ID: **B-36Na-2.0-2.5**	Batch ID: **45406**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451232**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	291.417	5.0						294.6	1.10	20	

Sample ID: **098530-050AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94174**
Client ID: **B-36Na-2.0-2.5**	Batch ID: **45406**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	593.251	5.0	250.0	294.6	119	45	110				S

Sample ID: **098530-050AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94174**
Client ID: **B-36Na-2.0-2.5**	Batch ID: **45406**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451234**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	611.258	5.0	250.0	294.6	127	45	110	593.3	2.99	20	S

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45374**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **PBW**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45374**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **LCSW**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450911**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.044	0.25	1.000	0	104	85	115				

Sample ID: **098536-001DDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450917**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098536-001DMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.335	0.25	2.500	0	93.4	71	118				

Sample ID: **098536-001DMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.498	0.25	2.500	0	99.9	71	118	2.335	6.76	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098530
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098530-001ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94215**
Client ID: **B-65N-0.0-0.5** Batch ID: **R94215** TestNo: **EPA 9045C** Analysis Date: **5/6/2008** SeqNo: **1451962**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.050	0.10						8.030	0.249	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 6

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 4/30/08

Method of Transport: Client ☑ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 5.9 7.4
1. CHILLED 3.8 4.8 Y ☐ N U 4. SEALED Y ☐ N ☑
2. HEADSPACE (VOA) Y ☐ N/A ☑ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☑ N ☐ 6. PRESERVED Y ☑ N ☐

Client: TRC	Address: 21 Technology Dr.		TEL: (949) 247-9336
Attn: David Lennon	City Irvine	State CA Zip Code 92618	FAX: ( )
Project Name: Caltrans- West County Connectors	Project #: 151396	Sampler: (Printed Name) Kelly J. Keller	(Signature) Kelly J. Keller
Relinquished by: (Signature and Printed Name) Kelly J. Keller	Date 4/29/08	Time: 1420	Received by: (Signature and Printed Name)	Date: 4/29/08	Time: 1420
Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 9:00
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
CREW 1 - DAY 7

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) Lead, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000), pH (9045)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	098530-1	B-65N-0.0-0.5	4/29/08	815	E	1	J	
	2	B-65N-1.0-1.5		817				
	3	B-65N-2.0-2.5		820				
	4	B-65N-3.0-3.5		822				
	5	B-66N-0.0-0.5		825				
	6	B-66N-1.0-1.5		827				
	7	B-66N-2.0-2.5		830				
	8	B-66N-3.0-3.5		832				
	9	B-67N-0.0-0.5		835				
	10	B-67N-1.0-1.5		837				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt

1. CHILLED	Y ☐ N ☐	4. SEALED	Y ☐ N ☐
2. HEADSPACE (VOA)	Y ☐ N ☐	5. # OF SPLS MATCH COC	Y ☐ N ☐
3. CONTAINER INTACT	Y ☐ N ☐	6. PRESERVED	Y ☐ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans-West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/29/08	Time: 1420	Received by: (Signature and Printed Name)	Date: 4/29/08	Time: 1420
Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metals) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	098530-11	B-67N-2.0-2.5	4/29/08	840				X						X				E	1	J	
	12	B-67N-3.0-3.5		842																	
	13	B-68N-0.0-0.5		905																	
	14	B-68N-1.0-1.5		907																	
	15	B-68N-2.0-2.5		910																	
	16	B-68N-3.0-3.5		912																	
	17	B-73N-0.0-0.5		955																	
	18	B-73N-1.0-1.5		957																	
	19	B-73N-2.0-2.5		1000																	
	20	B-73N-3.0-3.5		1002																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 **Walnut** Avenue
Signal Hill, CA 90755
(562) 989-4045 • **Fax** (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y ☐ N U 4. SEALED Y ☐ N O
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y O N O

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans-West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 4/29/08 Time: 1420 Received by: (Signature and Printed Name) _____ Date: 4/29/08 Time: 1420
Relinquished by: (Signature and Printed Name) _____ Date: 4/30/08 Time: 0900 Received by: (Signature and Printed Name) _____ Date: 4/30/08 Time: 900
Relinquished by: (Signature and Printed Name) _____ Date: Time: Received by: (Signature and Printed Name) _____ Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
_____ Date
Print Name
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Ann: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (SNA) | 6010B (Total Metal) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	098530-21	B-74N-0.0-0.5	4/29/08	1005	E	1	J	
	22	B-74N-1.0-1.5		1007				
	23	B-74N-2.0-2.5		1010				
	24	B-74N-3.0-3.5		1012				
	25	B-75N-0.0-0.5		1015				
	26	B-75N-1.0-1.5		1017				
	27	B-75N-2.0-2.5		1020				
	28	B-75N-3.0-3.5		1022				
	29	B-76N-0.0-0.5		10:45			P	
	30	B-76N-1.0-1.5		1047			P	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ | 4. SEALED Y O N O | 2 HEADSPACE (VOA) Y☐ N☐ | 5. # OF SPLS MATCH COC Y☐ N☐ | 3. CONTAINER INTACT Y O N☐ | 6. PRESERVED Y O N O

Client: TRC | Address: 21 Technology Dr. | TEL: (949) 727-9336
Attn: David Lennon | City Irvine State CA Zip Code 92618 | FAX: ( )
Project Name: Caltrans - West County Connectors | Project #: 151396 | Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/29/08	Time: 1420	Received by: (Signature and Printed Name)		Date: 4/29/08	Time: 1426
Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name) Mary Cliff		Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To: Attn: David Lennon | Co: _____ | Address _____ | City _____ State _____ Zip _____

Bill To: Attn: Same | Co: _____ | Address _____ | City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metals) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	098530-31	B-76N-2.0-2.5	4/29/08	1050	E	1	P	
	32	B-76N-3.0-3.5		1052			P	
	33	B-77N-0.0-0.5		1125			J	
	34	B-77N-1.0-1.5		1127			J	
	35	B-77N-2.0-2.5		1130			J	
	36	B-77N-3.0-3.5		1132			J	
	37	B-78N-0.0-0.5		1200			P	
	38	B-78N-1.0-1.5		1202			P	
	39	B-78N-2.0-2.5		1205			P	
	40	B-78N-3.0-3.5		1207			P	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr | B= Emergency Next workday | C= Critical 2 Workdays | D= Urgent 3 Workdays | E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition upon Receipt
1. CHILLED Y O N O
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y O N O

Client: TRC	Address: 21 Technology Dr.	TEL: (949) 727-9336
Attn: David Lennon	City Irvine State CA Zip Code 92618	FAX: ( )

Project Name: CalTrans - West County Connectors Project #: 151396

Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/29/08	Time: 1420	Received by: (Signature and Printed Name)	Date: 4/29/08	Time: 1420
Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) LEAD; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	098536-41	B-79N-0.0-0.5	4/24	1235	E	1	P	
	42	B-79N-1.0-1.5		1237			P	
	43	B-79N-2.0-2.5		1240			P	
	44	B-79N-3.0-3.5		1242			P	
	45	B-36N-0.0-0.5		1335			J	
	46	B-36N-1.0-1.5		1337				
	47	B-36N-2.0-2.5		1340				
	48	B-36Na-0.0-0.5		1342				
	49	B-36Na-1.0-1.5		1345				
	50	B-36Na-2.0-2.5	↓	1347				

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans - West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/29/08 Time: 1420	Received by: (Signature and Printed Name)	Date: 4/29/08 Time: 1429
Relinquished by: (Signature and Printed Name)	Date: 4/30/08 Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08 Time: 900
Relinquished by: (Signature and Printed Name)	Date: Time:	Received by: (Signature and Printed Name)	Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐ Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	Rinsate	TAT	Container(s) #	Container(s) Type	REMARKS
	098530-51	ER-CREEK1-DAY 7	4/29	1400				X									X		E	1	P	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

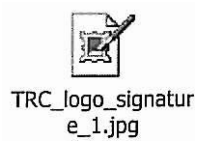
Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

Carmen Aguila

From: Bing Roura
Sent: Wednesday, April 30, 2008 4:56 PM
To: Carmen Aguila
Subject: Fw: Caltrans 1-405



Regards,
Bing Roura
Advanced Technology Laboratories
(562) 397-5276

-----Original Message-----
From: "Surrency, Ross \(Irvine,CA-US\)" <RSurrency@trcsolutions.com>

Date: Wed, 30 Apr 2008 19:36:28
To:"Bing Roura" <bing@atlglobal.com>
Subject: Caltrans I-405

Bing,

I received a call today from your lab to resolve a difference between a sample container ID and the sample ID shown on the COC. For sample B-78N-3.0-3.5, the sample ID on the COC is the correct ID. Please use this ID for the report. The ID on the sample container was B-78N-3.0-3.3.

Thanks,

Ross Surrency, PG

21 Technology Drive
Irvine, CA 92618

949-727-7324 phone
949-753-0111 fax
949-283-9257 cell
rsurrency@trcsolutions.com <mailto:rsurrency@trcsolutions.corn>

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098531

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-39N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:00:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET					**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate: **5/12/2008**	Analyst: **LKN**	
Lead	6.1	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098531
Project: Caltrans-West County Connectors, 151396
Lab ID: 098531-002

Client Sample ID: B-39N-1.0-1.5
Collection Date: 4/28/2008 9:02:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate:	**5/9/2008**	Analyst: **AMT**
Lead	0.53	0.011	0.25		mg/L	5	5/15/2008 04:20 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate:	**5/14/2008**	Analyst: **AMT**
Lead	1.2	0.011	0.25		mg/L	5	5/15/2008 07:56 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
	WET				**WET/ EPA 7420**		
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate:	**5/12/2008**	Analyst: **LKN**
Lead	30	0.56	0.75		mg/L	3	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-39N-2.0-2.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:05:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
WET				**WET/ EPA 7420**			
RunID: **AA2_080514D**	QC Batch: **45535**				PrepDate: **5/12/2008**	Analyst: **LKN**	
Lead	4.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-40N-3.0-3.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:17:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	2.0	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-72N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 1:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	5.2	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45535

Sample ID: **MB-45535A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **PBS**	Batch ID: **45535**	TestNo: **WET/ EPA 74**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456774**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45535**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **LCSS**	Batch ID: **45535**	TestNo: **WET/ EPA 74**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.006	0.25	5.000	0	100	80	120				

Sample ID: **098530-040A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456784**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098530-040A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **ZZZZZZ**	Batch ID: **45535**	TestNo: **WET/ EPA 74**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456785**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.824	0.25	5.000	0	96.5	80	120				

Sample ID: **MB-45535B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **PBS**	Batch ID: **45535**	TestNo: **WET/ EPA 74**	**WET**	Analysis Date: **5/14/2008**	SeqNo: **1456786**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45535

Sample ID: **098531-003A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **B-39N-2.0-2.5**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456797**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.191	0.25						4.248	1.35	20	

Sample ID: **098531-003A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **B-39N-2.0-2.5**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456798**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.531	0.25	5.000	4.248	85.7	80	120				

Sample ID: **098531-003A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date: **5/12/2008**	RunNo: **94522**
Client ID: **B-39N-2.0-2.5**	Batch ID: **45535**	TestNo: **WET/ EPA 74 WET**		Analysis Date: **5/14/2008**	SeqNo: **1456799**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.404	0.25	5.000	4.248	83.1	80	120	8.531	1.49	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **MB-44527A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **PBW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458062**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Sample ID: **LCS-45527**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **LCSW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.900	0.050	1.000	0.009570	89.0	85	115				

Sample ID: **098530-046ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458074**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.257	0.25						1.829	20.9	20	R

Sample ID: **098530-046AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458075**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.260	0.25	2.500	1.829	97.2	71	118				

Sample ID: **MB-44527B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **PBW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.056	0.25						10.06	22.1	20	R

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.052	0.25	2.500	10.06	79.7	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458085**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.020	0.25	2.500	10.06	78.4	71	118	12.05	0.267	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.020	0.25									

Sample ID: **LCS-45632**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **LCSS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458117**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.955	0.050	1.000	0.005053	95.0	85	115				

Sample ID: **098530-032ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.028	0.25						0.08897	0	20	

Sample ID: **098530-032AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.950	0.25	2.500	0.08897	74.4	71	118				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458130**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.062	0.25						0.03780	0	20	

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.982	0.25	2.500	0.03780	77.8	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.269	0.25	2.500	0.03780	89.2	71	118	1.982	13.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94540

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **ZZZZZZ**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.473	0.25						8.923	5.18	20	

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **ZZZZZZ**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457035**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.018	0.50	5.000	8.923	102	80	120				

Sample ID: **MB-45536B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **PBS**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457036**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.210	0.25									

Sample ID: **098540-025A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **ZZZZZZ**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457039**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.272	0.50						11.62	3.03	20	

Sample ID: **098540-025A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **ZZZZZZ**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457040**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.118	0.50	5.000	11.62	90.0	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94540

Sample ID: **098540-025A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **ZZZZZZ**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457041**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.763	0.50	5.000	11.62	82.9	80	120	16.12	2.22	20	

Sample ID: **MB-45536A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **PBS**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457042**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45536**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **LCSS**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457043**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.108	0.25	5.000	0.2099	98.0	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098531

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-39N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:00:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.42	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-72N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 1:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate:	**5/28/2008**	Analyst: **LKN**
Lead	0.43	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 07,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098531

RE: Caltrans-West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on April 30,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-39N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:00:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	70	0.25	5.0		mg/Kg	1	5/6/2008 02:14 AM
PH							
			EPA 9045C				
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.7	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-39N-1.0-1.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:02:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	280	0.25	5.0		mg/Kg	1	5/6/2008 02:18 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.4	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-39N-2.0-2.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:05:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
EPA 3050M			**EPA 6010B**				
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	84	0.25	5.0		mg/Kg	1	5/6/2008 02:22 AM
PH							
			EPA 9045C				
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.4	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-39N-3.0-3.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:07:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 02:26 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506B**	QC Batch: **R94214**				PrepDate:		Analyst: **CNP**
pH	8.5	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-40N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:10:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	11	0.25	5.0		mg/Kg	1	5/6/2008 02:38 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-40N-1.0-1.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:12:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	35	0.25	5.0		mg/Kg	1	5/6/2008 02:42 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-40N-2.0-2.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:15:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	36	0.25	5.0		mg/Kg	1	5/6/2008 02:58 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-40N-3.0-3.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:17:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	30	0.25	5.0		mg/Kg	1	5/6/2008 03:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-49N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:50:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 03:06 AM

CLIENT:	TRC	**Client Sample ID:**	B-49N-1.0-1.5
Lab Order:	098531	**Collection Date:**	4/28/2008 9:55:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	10	0.25	5.0		mg/Kg	1	5/6/2008 03:10 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-51N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 10:25:00 AM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	8.0	0.25	5.0		mg/Kg	1	5/6/2008 03:26 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-64N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 12:10:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	5.8	0.25	5.0		mg/Kg	1	5/6/2008 03:30 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-64N-1.0-1.5
Lab Order:	098531	**Collection Date:**	4/28/2008 12:12:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 03:34 AM

CLIENT:	TRC	**Client Sample ID:**	B-64N-2.0-2.5
Lab Order:	098531	**Collection Date:**	4/28/2008 12:15:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate:	**5/5/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/6/2008 03:38 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-64Na-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 12:20:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080505J**	QC Batch: **45399**				PrepDate: **5/5/2008**	Analyst: **LKN**	
Lead	10	0.25	5.0		mg/Kg	1	5/6/2008 03:42 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-64Na-1.0-1.5
Lab Order:	098531	**Collection Date:**	4/28/2008 12:22:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	7.7	0.25	5.0		mg/Kg	1	5/5/2008 09:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-64Na-2.0-2.5
Lab Order:	098531	**Collection Date:**	4/28/2008 12:25:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	9.0	0.25	5.0		mg/Kg	1	5/5/2008 09:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-72N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 1:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	93	0.25	5.0		mg/Kg	1	5/5/2008 09:54 PM

CLIENT:	TRC	**Client Sample ID:**	B-72N-1.0-1.5
Lab Order:	098531	**Collection Date:**	4/28/2008 1:47:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 09:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-72N-2.0-2.5
Lab Order:	098531	**Collection Date:**	4/28/2008 1:50:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 10:01 PM

CLIENT:	TRC	**Client Sample ID:**	B-72N-3.0-3.5
Lab Order:	098531	**Collection Date:**	4/28/2008 1:52:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 10:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-80N-0.0-0.5
Lab Order:	098531	**Collection Date:**	4/28/2008 2:30:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 10:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-80N-1.0-1.5
Lab Order:	098531	**Collection Date:**	4/28/2008 2:32:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 10:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-80N-2.0-2.5
Lab Order:	098531	**Collection Date:**	4/28/2008 2:35:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 10:15 PM

CLIENT:	TRC	**Client Sample ID:**	B-80N-3.0-3.5
Lab Order:	098531	**Collection Date:**	4/28/2008 2:37:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	098531-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP8_080505D**	QC Batch: **45400**				PrepDate:	**5/5/2008**	Analyst: **CL**
Lead	ND	0.25	5.0		mg/Kg	1	5/5/2008 10:25 PM

CLIENT:	TRC	**Client Sample ID:**	ER-CREW 1-DAY 6
Lab Order:	098531	**Collection Date:**	4/28/2008 2:45:00 PM
Project:	Caltrans-West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	098531-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP6_080505D**	QC Batch: **45374**				PrepDate:	**5/2/2008**	Analyst: **LKN**
Lead	ND	0.0021	0.25		mg/L	1	5/5/2008 02:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45399A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **PBS**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451577**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45399**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **LCSS**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451578**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	232.680	5.0	250.0	0	93.1	80	120				

Sample ID: **098531-006A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **B-40N-1.0-1.5**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451589**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	29.714	5.0						35.08	16.6	20	

Sample ID: **098531-006A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **B-40N-1.0-1.5**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451590**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	176.183	5.0	250.0	35.08	56.4	45	110				

Sample ID: **MB-45399B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **PBS**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451591**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098531-016A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **B-64Na-0.0-0.5**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451602**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.273	5.0						10.21	33.6	20	R

Sample ID: **098531-016A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **B-64Na-0.0-0.5**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451603**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	113.399	5.0	250.0	10.21	41.3	45	110				S

Sample ID: **098531-016A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94188**
Client ID: **B-64Na-0.0-0.5**	Batch ID: **45399**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/6/2008**	SeqNo: **1451604**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	147.004	5.0	250.0	10.21	54.7	45	110	113.4	25.8	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45400**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94173**
Client ID: **PBS**	Batch ID: **45400**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451205**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45400**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94173**
Client ID: **LCSS**	Batch ID: **45400**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451206**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	271.274	5.0	250.0	0	109	80	120				

Sample ID: **098531-026ADUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94173**
Client ID: **B-80N-3.0-3.5**	Batch ID: **45400**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451217**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.912	5.0						0.8771	0	20	

Sample ID: **098531-026AMS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94173**
Client ID: **B-80N-3.0-3.5**	Batch ID: **45400**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451218**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	140.455	5.0	250.0	0.8771	55.8	45	110				

Sample ID: **098531-026AMSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/5/2008**	RunNo: **94173**
Client ID: **B-80N-3.0-3.5**	Batch ID: **45400**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/5/2008**	SeqNo: **1451219**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	178.508	5.0	250.0	0.8771	71.1	45	110	140.5	23.9	20	R

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45374**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **PBW**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45374**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **LCSW**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450911**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.044	0.25	1.000	0	104	85	115				

Sample ID: **098536-001DDUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450917**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098536-001DMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.335	0.25	2.500	0	93.4	71	118				

Sample ID: **098536-001DMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/2/2008**	RunNo: **94158**
Client ID: **ZZZZZZ**	Batch ID: **45374**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/5/2008**	SeqNo: **1450919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.498	0.25	2.500	0	99.9	71	118	2.335	6.76	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098531
Project: Caltrans-West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098531-004ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94214**
Client ID: **B-39N-3.0-3.5** Batch ID: **R94214** TestNo: **EPA 9045C** Analysis Date: **5/6/2008** SeqNo: **1451958**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.520	0.10						8.490	0.353	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 4/30/08

Method of Transport: Client ☑ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 4.4 4.8 Y ☐ N ☐ 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☑ N ☐ 5. WOFSPLS MATCHCOC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☑ 6. PRESERVED Y ☑ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans - West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly Keller	Date: 4/29/08	Time: 1400	Received by: (Signature and Printed Name)	Date: 4/29/08	Time: 1420
Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:
CREW 1 - DAY 6

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) PH (9045)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	098531 - 1	B-39N-0.0-0.5	4/28/08	9:00				X					X	X				E	1	J	
	2	B-39N-1.0-1.5		9:02									X								
	3	B-39N-2.0-2.5		9:05									X								
	4	B-39N-3.0-3.5		9:07									X								
	5	B-40N-0.0-0.5		9:10																	
	6	B-40N-1.0-1.5		9:12																	
	7	B-40N-2.0-2.5		9:15																	
	8	B-40N-3.0-3.5		9:17																	
	9	B-49N-0.0-0.5		950															P		
	10	B-49N-1.0-1.5		955															P		

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder. Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, C A 90755
(562) 989-4045 • Fax (562) 989-4040

P.O.# _____

Logged By: _____ Date: _____

FOR LABORATORY USE ONLY:

Method of Transport: Client ☑ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1 CHILLED Y☐ NU 4. SEALED Y O N O; 2. HEADSPACE (VOA) Y☐ N☐ 5. #OF SPLS MATCH COC Y ☑ N ☐; 3. CONTAINER INTACT Y ☑ N ☑ 6. PRESERVED Y O N O

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans- West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/29/08	Time: 14:20	Received by: (Signature and Printed Name)	Date: 4/29/08	Time: 1426
Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records: $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. ▮ Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	098531-11	B-49N-2.0-2.5	4/28/08	958				X						X				E	1	P	
	12	B-51N-0.0-0.5		10:35				↓						↓				↓	↓	J	
	13	B-64N-0.0-0.5		1210																P	
	14	B-64N-1.0-1.5		1212																	
	15	B-64N-2.0-2.5		1215																	
	16	B-64Na-0.0-0.5		1220																	
	17	B-64Na-1.0-1.5		1222																	
	18	B-64Na-2.0-2.5		1225																↓	
	19	B-72N-0.0-0.5		1345																J	
	20	B-72N-1.0-1.5	↓	1347				↓						↓				↓	↓	J	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder, Pink to submitter

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 4/29/08	Time: 1420	Received by: (Signature and Printed Name)	Date: 4/29/08	Time: 1420
Relinquished by: (Signature and Printed Name)	Date: 4/30/08	Time: 0900	Received by: (Signature and Printed Name)	Date: 4/30/08	Time: 900
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	Rinsate	TAT	Container(s) #	Container(s) Type	REMARKS
	098531-21	B-72N-2.0-2.5	4/28/08	1350				X						X					E	1	J	13:50
	22	B-72N-3.0-3.5		1352																	J	13:52
	23	B-80N-0.0-0.5		1430																	P	
	24	B-80N-1.0-1.5		1432																	P	
	25	B-80N-2.0-2.5		1435																	P	
	26	B-80N-3.0-3.5		1437																	P	
	27	ER-CREEK1-DAY 6		1445													X				P	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

May 19,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098540

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on May 01,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot he reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 098540
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 098540-001

Client Sample ID: B-150N 0.0-0.5
Collection Date: 5/1/2008 8:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY WET DI EXTRACTION							
	WET				**WET DI/ EPA 6010B**		
RunID: **ICP6_080515B**	QC Batch: **45527**				PrepDate: **5/9/2008**		Analyst: **AMT**
Lead	10	0.011	0.25		mg/L	5	5/15/2008 04:27 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080515D**	QC Batch: **45632**				PrepDate: **5/14/2008**		Analyst: **AMT**
Lead	ND	0.011	0.25		mg/L	5	5/15/2008 08:00 PM
LEAD BY ATOMIC ABSORPTION (STLC)							
					WET/ EPA 7420		
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	170	3.7	5.0		mg/L	20	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-151N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:25:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	10	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:27:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	8.5	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151NA 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:25:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	11	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-152N 2.0-2.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:50:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	1.4	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-153N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:10:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	32	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-153N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:12:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	25	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-162N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:30:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	8.9	0.19	0.25		mg/L	1	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-163N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:55:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)							
			WET/ EPA 7420				
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	25	0.74	1.0		mg/L	4	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-163N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 10:00:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)					**WET/ EPA 7420**		
RunID: **AA2_080514F**	QC Batch: **R94540**				PrepDate:		Analyst: **AMT**
Lead	12	0.37	0.50		mg/L	2	5/14/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **MB-44527A**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **PBW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458062**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Sample ID: **LCS-45527**	SampType: **LCS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **LCSW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.900	0.050	1.000	0.009570	89.0	85	115				

Sample ID: **098530-046ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458074**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.257	0.25						1.829	20.9	20	R

Sample ID: **098530-046AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **ZZZZZZ**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458075**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.260	0.25	2.500	1.829	97.2	71	118				

Sample ID: **MB-44527B**	SampType: **MBLK**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **PBW**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.010	0.050									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45527

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **B-150N 0.0-0.5**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.056	0.25						10.06	22.1	20	R

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **B-150N 0.0-0.5**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.052	0.25	2.500	10.06	79.7	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_STDI**	Units: **mg/L**	Prep Date: **5/9/2008**	RunNo: **94596**
Client ID: **B-150N 0.0-0.5**	Batch ID: **45527**	TestNo: **WET DI/ EPA WET**		Analysis Date: **5/15/2008**	SeqNo: **1458085**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.020	0.25	2.500	10.06	78.4	71	118	12.05	0.267	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566A TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.020	0.25									

Sample ID: **LCS-45632**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **LCSS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458117**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.955	0.050	1.000	0.005053	95.0	85	115				

Sample ID: **098530-032ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.028	0.25						0.08897	0	20	

Sample ID: **098530-032AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **ZZZZZZ**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.950	0.25	2.500	0.08897	74.4	71	118				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45632

Sample ID: **MB-45632B**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458130**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **MB-45566B TC**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **PBS**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **098540-001ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **B-150N 0.0-0.5**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.062	0.25						0.03780	0	20	

Sample ID: **098540-001AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **B-150N 0.0-0.5**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.982	0.25	2.500	0.03780	77.8	71	118				

Sample ID: **098540-001AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **5/14/2008**	RunNo: **94598**
Client ID: **B-150N 0.0-0.5**	Batch ID: **45632**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **5/15/2008**	SeqNo: **1458144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.269	0.25	2.500	0.03780	89.2	71	118	1.982	13.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94540

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **B-162N 0.0-0.5**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.473	0.25						8.923	5.18	20	

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **B-162N 0.0-0.5**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457035**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	14.018	0.50	5.000	8.923	102	80	120				

Sample ID: **MB-45536B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **PBS**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457036**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.210	0.25									

Sample ID: **098540-025A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **B-163N 1.0-1.5**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457039**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.272	0.50						11.62	3.03	20	

Sample ID: **098540-025A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **B-163N 1.0-1.5**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457040**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.118	0.50	5.000	11.62	90.0	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R94540

Sample ID: **098540-025A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **B-163N 1.0-1.5**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457041**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.763	0.50	5.000	11.62	82.9	80	120	16.12	2.22	20	

Sample ID: **MB-45536A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **PBS**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457042**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45536**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **94540**
Client ID: **LCSS**	Batch ID: **R94540**	TestNo: **WET/ EPA 74**		Analysis Date: **5/14/2008**	SeqNo: **1457043**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.108	0.25	5.000	0.2099	98.0	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 28,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098540

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on May 01,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-151N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:25:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	0.55	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:27:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	0.65	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151NA 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:25:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate:	**5/24/2008**	Analyst: **LKN**
Lead	0.75	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-153N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:10:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	0.71	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-153N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:12:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527E**	QC Batch: **45908**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	1.8	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-162N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:30:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080528B**	QC Batch: **45929**				PrepDate: **5/28/2008**		Analyst: **LKN**
Lead	0.61	0.19	0.25		mg/L	1	5/28/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-163N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:55:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	2.6	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-163N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 10:00:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_080527B**	QC Batch: **45905**				PrepDate: **5/24/2008**	Analyst: **LKN**	
Lead	1.3	0.19	0.25		mg/L	1	5/27/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45905

Sample ID: **MB-45905A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465599**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45853A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465600**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45905**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **LCSS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465601**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.092	0.25	1.000	0	109	80	120				

Sample ID: **098438-013A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.840	0.25						0.8142	3.13	20	

Sample ID: **098438-013A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.133	0.25	2.500	0.8142	92.8	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45905

Sample ID: **MB-45905B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465613**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45853B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **PBS**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.222	0.25									

Sample ID: **098438-030A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.631	0.25						0.6352	0.630	20	

Sample ID: **098438-030A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465622**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.281	0.25	2.500	0.6352	106	70	130				

Sample ID: **098438-030A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95044**
Client ID: **ZZZZZZ**	Batch ID: **45905**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465623**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.242	0.25	2.500	0.6352	104	70	130	3.281	1.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **MB-45908A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45908**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **LCSS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465665**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.011	0.25	1.000	0	101	80	120				

Sample ID: **098540-017-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465672**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.865	0.25									

Sample ID: **098540-017A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **B-153N 1.0-1.5**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.033	0.25	2.500	1.848	127	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45908

Sample ID: **098528-036A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.782	0.25						1.791	0.469	20	

Sample ID: **098528-036A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465680**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.849	0.25	2.500	1.791	82.3	70	130				

Sample ID: **098528-036A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **ZZZZZZ**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465681**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.813	0.25	2.500	1.791	80.9	70	130	3.849	0.947	20	

Sample ID: **MB-45908B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465682**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45856B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/24/2008**	RunNo: **95047**
Client ID: **PBS**	Batch ID: **45908**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/27/2008**	SeqNo: **1465683**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-45928A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.213	0.25									

Sample ID: **LCS-45929**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **LCSS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.100	0.25	1.000	0	110	80	120				

Sample ID: **098530-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466295**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.308	0.25						0.3373	9.21	20	

Sample ID: **098530-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **ZZZZZZ**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.893	0.25	2.500	0.3373	102	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 45929

Sample ID: **MB-45929B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.232	0.25									

Sample ID: **MB-45928B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **PBS**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.307	0.25									

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **B-162N 0.0-0.5**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.469	0.25						0.6082	25.9	20	R

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **B-162N 0.0-0.5**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.080	0.25	2.500	0.6082	98.9	70	130				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **5/28/2008**	RunNo: **95079**
Client ID: **B-162N 0.0-0.5**	Batch ID: **45929**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **5/28/2008**	SeqNo: **1466304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.983	0.25	2.500	0.6082	95.0	70	130	3.080	3.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

May 07,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949)753-0101
FAX: (949)753-0111

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 098540

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on May 01,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-150N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:15:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate:	**5/6/2008**	Analyst: **LKN**
Lead	1300	0.25	5.0		mg/Kg	1	5/7/2008 10:28 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-150N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:15:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	8.7	0.25	5.0		mg/Kg	1	5/7/2008 10:32 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-150N 2.0-2.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:15:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/7/2008 10:36 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-150N 3.0-3.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:15:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/7/2008 10:40 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:25:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	100	0.25	5.0		mg/Kg	1	5/7/2008 10:44 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:27:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	72	0.25	5.0		mg/Kg	1	5/7/2008 10:47 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151N 2.0-2.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:30:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	7.0	0.25	5.0		mg/Kg	1	5/7/2008 10:51 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.0	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-151N 3.0-3.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:33:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	5.8	0.25	5.0		mg/Kg	1	5/7/2008 11:03 AM
PH							
					EPA 9045C		
RunID: **WETCHEM_080506C**	QC Batch: **R94215**				PrepDate:		Analyst: **CNP**
pH	8.5	0.10	0.10		pH Units	1	5/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151NA 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:25:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	92	0.25	5.0		mg/Kg	1	5/7/2008 11:07 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-151NA 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:27:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	32	0.25	5.0		mg/Kg	1	5/7/2008 11:11 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-151NA 2.0-2.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:30:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	5.6	0.25	5.0		mg/Kg	1	5/7/2008 11:27 AM

CLIENT:	TRC	**Client Sample ID:**	B-151NA 3.0-3.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:33:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	6.3	0.25	5.0		mg/Kg	1	5/7/2008 11:31 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-152N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:45:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	30	0.25	5.0		mg/Kg	1	5/7/2008 11:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-152N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 8:47:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	36	0.25	5.0		mg/Kg	1	5/7/2008 11:39 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098540
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 098540-015

Client Sample ID: B-152N 2.0-2.5
Collection Date: 5/1/2008 8:50:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	54	0.25	5.0		mg/Kg	1	5/7/2008 11:51 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-153N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:10:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	340	0.25	5.0		mg/Kg	1	5/7/2008 11:55 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-153N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:12:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate:	**5/6/2008**	Analyst: **LKN**
Lead	180	0.25	5.0		mg/Kg	1	5/7/2008 11:59 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-153N 2.0-2.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:15:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**	Analyst: **LKN**	
Lead	12	0.25	5.0		mg/Kg	1	5/7/2008 12:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-153N 3.0-3.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:18:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/7/2008 12:07 PM

CLIENT:	TRC	**Client Sample ID:**	B-162N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:30:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507A**	QC Batch: **45433**				PrepDate:	**5/6/2008**	Analyst: **LKN**
Lead	110	0.25	5.0		mg/Kg	1	5/7/2008 12:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-162N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:33:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507B**	QC Batch: **45435**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/7/2008 12:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-162N 2.0-2.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:35:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507B**	QC Batch: **45435**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/7/2008 12:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098540
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 098540-023

Client Sample ID: B-162N 3.0-3.5
Collection Date: 5/1/2008 9:40:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507B**	QC Batch: **45435**				PrepDate:	**5/6/2008**	Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/7/2008 12:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-163N 0.0-0.5
Lab Order:	098540	**Collection Date:**	5/1/2008 9:55:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507B**	QC Batch: **45435**				PrepDate:	**5/6/2008**	Analyst: **LKN**
Lead	200	0.25	5.0		mg/Kg	1	5/7/2008 12:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-163N 1.0-1.5
Lab Order:	098540	**Collection Date:**	5/1/2008 10:00:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507B**	QC Batch: **45435**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	97	0.25	5.0		mg/Kg	1	5/7/2008 12:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-163N 2.0-2.5
Lab Order:	098540	**Collection Date:**	5/1/2008 10:02:00 AM
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOIL
Lab ID:	098540-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507B**	QC Batch: **45435**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	14	0.25	5.0		mg/Kg	1	5/7/2008 01:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 098540
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 098540-027

Client Sample ID: B-163N 3.0-3.5
Collection Date: 5/1/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080507B**	QC Batch: **45435**				PrepDate: **5/6/2008**		Analyst: **LKN**
Lead	ND	0.25	5.0		mg/Kg	1	5/7/2008 01:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 098540
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 098540-028

Client Sample ID: CREW-2-ER-8
Collection Date: 5/1/2008 10:25:00 AM
Matrix: WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080502C**	QC Batch: **45359**				PrepDate:	**5/1/2008**	Analyst: **CL**
Lead	ND	0.0021	0.25		mg/L	1	5/2/2008 11:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45433A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **PBS**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452523**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45433**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **LCSS**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452524**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	221.523	5.0	250.0	0	88.6	80	120				

Sample ID: **098540-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **B-151NA 1.0-1.5**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	35.496	5.0						31.81	11.0	20	

Sample ID: **098540-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **B-151NA 1.0-1.5**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452536**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	161.811	5.0	250.0	31.81	52.0	45	110				

Sample ID: **MB-45433B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **PBS**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452537**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098540-020A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **B-162N 0.0-0.5**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452548**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	116.296	5.0						112.4	3.39	20	

Sample ID: **098540-020A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **B-162N 0.0-0.5**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452549**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	275.911	5.0	250.0	112.4	65.4	45	110				

Sample ID: **098540-020A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94253**
Client ID: **B-162N 0.0-0.5**	Batch ID: **45433**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452550**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	250.959	5.0	250.0	112.4	55.4	45	110	275.9	9.47	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-45435A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **PBS**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452552**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-45435**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **LCSS**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452553**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	225.128	5.0	250.0	0	90.1	80	120				

Sample ID: **098589-014A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **ZZZZZZ**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452564**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.444	5.0						4.564	0	20	

Sample ID: **098589-014A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **ZZZZZZ**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452565**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	146.773	5.0	250.0	4.564	56.9	45	110				

Sample ID: **MB-45435B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **PBS**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452566**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **098589-021A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **ZZZZZZ**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452574**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.139	5.0						16.46	9.72	20	

Sample ID: **098589-021A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **ZZZZZZ**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452575**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	142.753	5.0	250.0	16.46	50.5	45	110				

Sample ID: **098589-021A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **5/6/2008**	RunNo: **94254**
Client ID: **ZZZZZZ**	Batch ID: **45435**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **5/7/2008**	SeqNo: **1452576**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	144.198	5.0	250.0	16.46	51.1	45	110	142.8	1.01	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-45359**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **PBW**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450092**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-45359**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **LCSW**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450093**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.047	0.25	1.000	0	105	85	115				

Sample ID: **098460-010ADUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **ZZZZZZ**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450095**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **098460-010AMS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **ZZZZZZ**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450096**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.471	0.25	2.500	0	98.8	71	118				

Sample ID: **098460-010AMSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **5/1/2008**	RunNo: **94102**
Client ID: **ZZZZZZ**	Batch ID: **45359**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **5/2/2008**	SeqNo: **1450097**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.431	0.25	2.500	0	97.2	71	118	2.471	1.63	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 098540
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **098530-001ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **94215**
Client ID: **ZZZZZZ** Batch ID: **R94215** TestNo: **EPA 9045C** Analysis Date: **5/6/2008** SeqNo: **1451962**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.050	0.10						8.030	0.249	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg ____ of ____

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 5/1/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 4-2° Y☑ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N☐ NA☑ 5. # OF SPLS MATCH COC Y☑ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR.
City IRVINE State CA Zip Code
TEL: 949) 727-9336
FAX: 949) 753-0111
Project Name: WEST COUNTY CONNECTORS Project #: 151596
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 5/1/08	Time: 1100	Received by: (Signature and Printed Name)	Date: 5/1/08	Time: 11:00
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip

Bill To:
Attn:
Co:
Address
City State Zip

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) LEAD | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | PHG-LBRA 8045

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8270C (BNA)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	TAT	Container(s): #	Type	REMARKS
	098540-1	B-1SN 0.0-0.5	5/1/08	0815	X		X	E	1	T	STANDARD
	2	B-1SN 1.0-1.5		0815	X		X		1		TAT
	3	B-1SN 2.0-2.5		0815	X		X		1		
	4	B-1SN 3.0-3.5		0815	X		X		1		
	5	B-1S/N 0.0-0.5		0825	X	X	X		1	↓	
	6	B-1S/N 1.0-1.5		0827	X	X	X		1	G	
	7	B-1S/N 2.0-2.5		0830	X	X	X		1		
	8	B-1S/N 3.0-3.5		0833	X	X	X		1		
	9	B-1S/NA 0.0-0.5		0825	X		X		1		
	10	B-1S/NA 1.0-1.5	↓	0827	X		X	↓	1	↓	↓

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Pg _____ of _____

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: DAVID LEHNOW
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: (949) 727-9336
FAX: (949) 753-0111
Project Name: WEST COUNTY CONNECTORS
Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 5/1/08	Time: 1100	Received by: (Signature and Printed Name)	Date: 5/1/08	Time: 1100
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LEHNOW
Co: TRC
Address 21 TECHNOLOGY DR
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLEHNOW@TRCSOLUTIONS.COM

Sample/Records - Archival & Disposal
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Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode _____
OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metals) LEAD	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	098540-11	B-15/NA 2.0-2.5	5/1/08	0830				X	X					X				E	1	G	STANDARD TAT
	12	B-15/NA 3.0-3.5		0833				X	X					X					1		
	13	B-15Z N 0.0-0.5		0845				X	X					X					1		
	14	B-15Z N 1.0-1.5		0847				X	X					X					1		
	15	B-15Z N 2.0-2.5		0850				X	X					X					1		
	16	B-153 N 0.0-0.5		0910				X	X					X					1		
	17	B-153 N 1.0-1.5		0912				X	X					X					1		
	18	B-153N 2.0-2.5		0915				X	X					X					1		
	19	B-153N 3.0-3.5	↓	0918				X	X					X				↓	1	↓	↓

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Preservatives:
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Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

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CHAIN OF CUSTODY RECORD

Pg _____ of _____

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax(562) 989-4040

P.O.#: _____
Logged By: _____ Date: _____

FOR LABORATORY USE ONLY:

Method of Transport
Client ☐
ATL ☒
CA Overn ☐
FEDEX q
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y q NO 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y q N ☐ 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N q 6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: DAVID LENNON
Address: 21 TECHNOLOGY DR
City IRVINE State CA Zip Code
TEL: 949) 727-9336
FAX: (949) 753-0111

Project Name: WEST COUNTY CONNECTORS Project #: 151396
Sampler: (Printed Name) DAVID YORK (Signature)

Relinquished by: (Signature and Printed Name)	Date: 5/1/08	Time: 1100	Received by: (Signature and Printed Name)		Date: 5/2/08	Time: 1100
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: DAVID LENNON
Co: TRC
Address 21 TECHNOLOGY DR.
City IRVINE State CA Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
DLENNON@TRCSOLUTIONS.COM

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Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) LEAD; 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode _____
OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	098540-20	B-162N 0.0-0.5	5/1/08	0930	E	1	G	STANDARD
	21	B-162N 1.0-1.5		0933		1		TAT
	22	B-162N 2.0-2.5		0935		1		
	23	B-162N 3.0-3.5		0940		1		
	24	B-163N 0.0-0.5		0955		1		
	25	B-163N 1.0-1.5		1000		1		
	26	B-163N 2.0-2.5		1002		1		
	27	B-163N 3.0-3.5		1005		1		
	28	CREW-2-ER-8		1025		1	P	

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TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

September 08,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100642

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 26,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Project: Caltrans West County Connectors, 151396
Lab Order: 100642

CASE NARRATIVE

Samples for Herbicides (EPA 8151) were subcontracted to Sierra Laboratories with ELAP Cert.#2320.

The samples for EPA 8141 analysis were subcontracted to D-tek Analytical Laboratories, Inc. with ELAP Cert. 2344.

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-001

Client Sample ID: B-176N-0-0.5
Collection Date: 8/25/2008 9:35:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 01:45 PM
Arsenic	2.8	0.14	1.0		mg/Kg	1	9/2/2008 01:45 PM
Barium	33	0.070	1.0		mg/Kg	1	9/2/2008 01:45 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 01:45 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 01:45 PM
Chromium	7.9	0.075	1.0		mg/Kg	1	9/2/2008 01:45 PM
Cobalt	3.1	0.070	1.0		mg/Kg	1	9/2/2008 01:45 PM
Copper	5.8	0.10	2.0		mg/Kg	1	9/2/2008 01:45 PM
Lead	11	0.25	1.0		mg/Kg	1	9/2/2008 01:45 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 01:45 PM
Nickel	5.3	0.18	1.0		mg/Kg	1	9/2/2008 01:45 PM
Selenium	ND	0.52	1.0		mg/Kg	1	9/2/2008 01:45 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 01:45 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 01:45 PM
Vanadium	18	0.073	1.0		mg/Kg	1	9/2/2008 01:45 PM
Zinc	22	0.57	1.0		mg/Kg	1	9/2/2008 01:45 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 05:55 PM
Surr: Bromofluorobenzene (FID)	105	0	42-142		%REC	1	8/27/2008 05:55 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 05:55 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 05:55 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 05:55 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 05:55 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 05:55 PM
Surr: Bromofluorobenzene (PID)	100	0	71-139		%REC	1	8/27/2008 05:55 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080829E**	QC Batch: **48444**				PrepDate:	**8/29/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-001

Client Sample ID: B-176N-0-0.5
Collection Date: 8/25/2008 9:35:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080829E**	QC Batch: **48444**				PrepDate: **8/29/2008**		Analyst: **AMT**
Mercury	ND	0.0047	0.10		mg/Kg	1	8/29/2008 03:14 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 01:01 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:01 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:01 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 01:01 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 01:01 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 01:01 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:01 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:01 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:01 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:01 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 01:01 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 01:01 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:01 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 01:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-001

Client Sample ID: B-176N-0-0.5
Collection Date: 8/25/2008 9:35:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:01 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:01 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:01 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:01 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 01:01 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:01 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 01:01 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 01:01 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 01:01 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 01:01 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:01 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 01:01 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 01:01 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:01 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 01:01 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 01:01 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:01 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 01:01 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 01:01 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:01 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:01 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:01 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 01:01 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 01:01 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 01:01 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 01:01 PM
Surr: 1,2-Dichloroethane-d4	97.2	0	70-130		%REC	1	8/27/2008 01:01 PM
Surr: 4-Bromofluorobenzene	85.7	0	70-130		%REC	1	8/27/2008 01:01 PM
Surr: Dibromofluoromethane	95.8	0	70-130		%REC	1	8/27/2008 01:01 PM
Surr: Toluene-d8	92.1	0	70-130		%REC	1	8/27/2008 01:01 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B		**EPA 8270C**				
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 06:08 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 06:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-001

Client Sample ID: B-176N-0-0.5
Collection Date: 8/25/2008 9:35:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 06:08 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 06:08 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 06:08 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 06:08 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 06:08 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 06:08 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 06:08 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 06:08 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 06:08 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 06:08 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 06:08 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 06:08 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 06:08 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 06:08 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 06:08 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 06:08 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 06:08 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 06:08 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 06:08 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 06:08 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 06:08 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 06:08 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 06:08 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 06:08 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 06:08 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 06:08 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 06:08 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 06:08 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 06:08 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 06:08 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 06:08 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 06:08 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 06:08 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 06:08 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 06:08 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 06:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-001

Client Sample ID: B-176N-0-0.5
Collection Date: 8/25/2008 9:35:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 06:08 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 06:08 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 06:08 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 06:08 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 06:08 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 06:08 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 06:08 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 06:08 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 06:08 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 06:08 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 06:08 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 06:08 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 06:08 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 06:08 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 06:08 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 06:08 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 06:08 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 06:08 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 06:08 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 06:08 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 06:08 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 06:08 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 06:08 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 06:08 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 06:08 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 06:08 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 06:08 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 06:08 PM
Surr: 1,2-Dichlorobenzene-d4	70.7	0	40-97		%REC	1	9/3/2008 06:08 PM
Surr: 2,4,6-Tribromophenol	81.8	0	31-148		%REC	1	9/3/2008 06:08 PM
Surr: 2-Chlorophenol-d4	77.8	0	49-103		%REC	1	9/3/2008 06:08 PM
Surr: 2-Fluorobiphenyl	82.5	0	55-102		%REC	1	9/3/2008 06:08 PM
Surr: 2-Fluorophenol	76.5	0	45-105		%REC	1	9/3/2008 06:08 PM
Surr: 4-Terphenyl-d14	96.8	0	52-124		%REC	1	9/3/2008 06:08 PM
Surr: Nitrobenzene-d5	79.2	0	48-109		%REC	1	9/3/2008 06:08 PM
Surr: Phenol-d5	80.2	0	47-108		%REC	1	9/3/2008 06:08 PM

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-002

Client Sample ID: B-176N-2-2.5
Collection Date: 8/25/2008 9:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 01:49 PM
Arsenic	3.3	0.14	1.0		mg/Kg	1	9/2/2008 01:49 PM
Barium	58	0.070	1.0		mg/Kg	1	9/2/2008 01:49 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 01:49 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 01:49 PM
Chromium	13	0.075	1.0		mg/Kg	1	9/2/2008 01:49 PM
Cobalt	4.4	0.070	1.0		mg/Kg	1	9/2/2008 01:49 PM
Copper	15	0.10	2.0		mg/Kg	1	9/2/2008 01:49 PM
Lead	56	0.25	1.0		mg/Kg	1	9/2/2008 01:49 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 01:49 PM
Nickel	9.7	0.18	1.0		mg/Kg	1	9/2/2008 01:49 PM
Selenium	ND	0.52	1.0		mg/Kg	1	9/2/2008 01:49 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 01:49 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 01:49 PM
Vanadium	27	0.073	1.0		mg/Kg	1	9/2/2008 01:49 PM
Zinc	42	0.57	1.0		mg/Kg	1	9/2/2008 01:49 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 06:53 PM
Surr: Bromofluorobenzene (FID)	105	0	42-142		%REC	1	8/27/2008 06:53 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 06:53 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 06:53 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 06:53 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 06:53 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 06:53 PM
Surr: Bromofluorobenzene (PID)	101	0	71-139		%REC	1	8/27/2008 06:53 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080829E**	QC Batch: **48444**				PrepDate:	**8/29/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-002

Client Sample ID: B-176N-2-2.5
Collection Date: 8/25/2008 9:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080829E**	QC Batch: **48444**				PrepDate: **8/29/2008**		Analyst: **AMT**
Mercury	ND	0.0047	0.10		mg/Kg	1	8/29/2008 03:17 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 01:34 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:34 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:34 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 01:34 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 01:34 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 01:34 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:34 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:34 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:34 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:34 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 01:34 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 01:34 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:34 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 01:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-002

Client Sample ID: B-176N-2-2.5
Collection Date: 8/25/2008 9:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:34 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:34 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:34 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:34 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 01:34 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:34 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 01:34 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 01:34 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 01:34 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 01:34 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:34 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 01:34 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 01:34 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:34 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 01:34 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 01:34 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:34 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 01:34 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 01:34 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:34 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:34 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:34 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 01:34 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 01:34 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 01:34 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 01:34 PM
Surr: 1,2-Dichloroethane-d4	105	0	70-130		%REC	1	8/27/2008 01:34 PM
Surr: 4-Bromofluorobenzene	85.8	0	70-130		%REC	1	8/27/2008 01:34 PM
Surr: Dibromofluoromethane	104	0	70-130		%REC	1	8/27/2008 01:34 PM
Surr: Toluene-d8	94.1	0	70-130		%REC	1	8/27/2008 01:34 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 07:37 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 07:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-002

Client Sample ID: B-176N-2-2.5
Collection Date: 8/25/2008 9:45:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 07:37 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 07:37 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 07:37 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 07:37 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 07:37 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 07:37 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 07:37 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 07:37 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 07:37 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 07:37 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 07:37 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 07:37 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 07:37 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 07:37 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 07:37 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 07:37 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 07:37 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 07:37 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 07:37 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 07:37 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 07:37 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 07:37 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 07:37 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 07:37 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 07:37 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 07:37 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 07:37 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 07:37 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 07:37 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 07:37 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 07:37 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 07:37 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 07:37 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 07:37 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 07:37 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 07:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-002

Client Sample ID: B-176N-2-2.5
Collection Date: 8/25/2008 9:45:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 07:37 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 07:37 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 07:37 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 07:37 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 07:37 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 07:37 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 07:37 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 07:37 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 07:37 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 07:37 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 07:37 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 07:37 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 07:37 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 07:37 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 07:37 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 07:37 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 07:37 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 07:37 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 07:37 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 07:37 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 07:37 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 07:37 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 07:37 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 07:37 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 07:37 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 07:37 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 07:37 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 07:37 PM
Surr: 1,2-Dichlorobenzene-d4	75.3	0	40-97		%REC	1	9/3/2008 07:37 PM
Surr: 2,4,6-Tribromophenol	88.2	0	31-148		%REC	1	9/3/2008 07:37 PM
Surr: 2-Chlorophenol-d4	82.7	0	49-103		%REC	1	9/3/2008 07:37 PM
Surr: 2-Fluorobiphenyl	88.0	0	55-102		%REC	1	9/3/2008 07:37 PM
Surr: 2-Fluorophenol	81.3	0	45-105		%REC	1	9/3/2008 07:37 PM
Surr: 4-Terphenyl-d14	103	0	52-124		%REC	1	9/3/2008 07:37 PM
Surr: Nitrobenzene-d5	85.2	0	48-109		%REC	1	9/3/2008 07:37 PM
Surr: Phenol-d5	85.6	0	47-108		%REC	1	9/3/2008 07:37 PM

Qualifiers:

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H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-003

Client Sample ID: B-176N-4.5-5
Collection Date: 8/25/2008 9:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 01:54 PM
Arsenic	3.7	0.14	1.0		mg/Kg	1	9/2/2008 01:54 PM
Barium	98	0.070	1.0		mg/Kg	1	9/2/2008 01:54 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 01:54 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 01:54 PM
Chromium	22	0.075	1.0		mg/Kg	1	9/2/2008 01:54 PM
Cobalt	8.9	0.070	1.0		mg/Kg	1	9/2/2008 01:54 PM
Copper	22	0.10	2.0		mg/Kg	1	9/2/2008 01:54 PM
Lead	14	0.25	1.0		mg/Kg	1	9/2/2008 01:54 PM
Molybdenum	1.3	0.072	1.0		mg/Kg	1	9/2/2008 01:54 PM
Nickel	16	0.18	1.0		mg/Kg	1	9/2/2008 01:54 PM
Selenium	1.7	0.52	1.0		mg/Kg	1	9/2/2008 01:54 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 01:54 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 01:54 PM
Vanadium	49	0.073	1.0		mg/Kg	1	9/2/2008 01:54 PM
Zinc	65	0.57	1.0		mg/Kg	1	9/2/2008 01:54 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 07:23 PM
Surr: Bromofluorobenzene (FID)	108	0	42-142		%REC	1	8/27/2008 07:23 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 07:23 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:23 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 07:23 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 07:23 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 07:23 PM
Surr: Bromofluorobenzene (PID)	105	0	71-139		%REC	1	8/27/2008 07:23 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080829E**	QC Batch: **48444**				PrepDate:	**8/29/2008**	Analyst: **AMT**

Qualifiers:

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S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-003

Client Sample ID: B-176N-4.5-5
Collection Date: 8/25/2008 9:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080829E**	QC Batch: **48444**				PrepDate: **8/29/2008**		Analyst: **AMT**
Mercury	ND	0.0047	0.10		mg/Kg	1	8/29/2008 03:19 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 01:51 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:51 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:51 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 01:51 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 01:51 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 01:51 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:51 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:51 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:51 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:51 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 01:51 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 01:51 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:51 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 01:51 PM

Qualifiers:

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S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-003

Client Sample ID: B-176N-4.5-5
Collection Date: 8/25/2008 9:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 01:51 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:51 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:51 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:51 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 01:51 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:51 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 01:51 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 01:51 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 01:51 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 01:51 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 01:51 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 01:51 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 01:51 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 01:51 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 01:51 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 01:51 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 01:51 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 01:51 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 01:51 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 01:51 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 01:51 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 01:51 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 01:51 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 01:51 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 01:51 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 01:51 PM
Surr: 1,2-Dichloroethane-d4	104	0	70-130		%REC	1	8/27/2008 01:51 PM
Surr: 4-Bromofluorobenzene	87.1	0	70-130		%REC	1	8/27/2008 01:51 PM
Surr: Dibromofluoromethane	101	0	70-130		%REC	1	8/27/2008 01:51 PM
Surr: Toluene-d8	93.3	0	70-130		%REC	1	8/27/2008 01:51 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 01:42 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 01:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-003

Client Sample ID: B-176N-4.5-5
Collection Date: 8/25/2008 9:55:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 01:42 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 01:42 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 01:42 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 01:42 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 01:42 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 01:42 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 01:42 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 01:42 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 01:42 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 01:42 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 01:42 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 01:42 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 01:42 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 01:42 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 01:42 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 01:42 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 01:42 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 01:42 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 01:42 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 01:42 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 01:42 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 01:42 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 01:42 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 01:42 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 01:42 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 01:42 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 01:42 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 01:42 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 01:42 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 01:42 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 01:42 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 01:42 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 01:42 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 01:42 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 01:42 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 01:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-003

Client Sample ID: B-176N-4.5-5
Collection Date: 8/25/2008 9:55:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 01:42 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 01:42 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 01:42 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 01:42 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 01:42 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 01:42 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 01:42 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 01:42 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 01:42 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 01:42 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 01:42 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 01:42 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 01:42 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 01:42 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 01:42 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 01:42 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 01:42 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 01:42 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 01:42 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 01:42 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 01:42 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 01:42 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 01:42 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 01:42 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 01:42 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 01:42 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 01:42 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 01:42 PM
Surr: 1,2-Dichlorobenzene-d4	76.2	0	40-97		%REC	1	9/3/2008 01:42 PM
Surr: 2,4,6-Tribromophenol	79.0	0	31-148		%REC	1	9/3/2008 01:42 PM
Surr: 2-Chlorophenol-d4	81.5	0	49-103		%REC	1	9/3/2008 01:42 PM
Surr: 2-Fluorobiphenyl	85.3	0	55-102		%REC	1	9/3/2008 01:42 PM
Surr: 2-Fluorophenol	81.3	0	45-105		%REC	1	9/3/2008 01:42 PM
Surr: 4-Terphenyl-d14	102	0	52-124		%REC	1	9/3/2008 01:42 PM
Surr: Nitrobenzene-d5	85.0	0	48-109		%REC	1	9/3/2008 01:42 PM
Surr: Phenol-d5	84.1	0	47-108		%REC	1	9/3/2008 01:42 PM

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-004

Client Sample ID: B-177N-0-0.5
Collection Date: 8/25/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 01:58 PM
Arsenic	3.7	0.14	1.0		mg/Kg	1	9/2/2008 01:58 PM
Barium	59	0.070	1.0		mg/Kg	1	9/2/2008 01:58 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 01:58 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 01:58 PM
Chromium	11	0.075	1.0		mg/Kg	1	9/2/2008 01:58 PM
Cobalt	4.5	0.070	1.0		mg/Kg	1	9/2/2008 01:58 PM
Copper	11	0.10	2.0		mg/Kg	1	9/2/2008 01:58 PM
Lead	30	0.25	1.0		mg/Kg	1	9/2/2008 01:58 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 01:58 PM
Nickel	9.2	0.18	1.0		mg/Kg	1	9/2/2008 01:58 PM
Selenium	ND	0.52	1.0		mg/Kg	1	9/2/2008 01:58 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 01:58 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 01:58 PM
Vanadium	27	0.073	1.0		mg/Kg	1	9/2/2008 01:58 PM
Zinc	39	0.57	1.0		mg/Kg	1	9/2/2008 01:58 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 07:52 PM
Surr: Bromofluorobenzene (FID)	107	0	42-142		%REC	1	8/27/2008 07:52 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 07:52 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:52 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 07:52 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 07:52 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 07:52 PM
Surr: Bromofluorobenzene (PID)	99.9	0	71-139		%REC	1	8/27/2008 07:52 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-004

Client Sample ID: B-177N-0-0.5
Collection Date: 8/25/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 12:42 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 02:31 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:31 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 02:31 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 02:31 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 02:31 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 02:31 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 02:31 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:31 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:31 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:31 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 02:31 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 02:31 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:31 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 02:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-004

Client Sample ID: B-177N-0-0.5
Collection Date: 8/25/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 02:31 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:31 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:31 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:31 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 02:31 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:31 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 02:31 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 02:31 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 02:31 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 02:31 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 02:31 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 02:31 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 02:31 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 02:31 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 02:31 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 02:31 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:31 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 02:31 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 02:31 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:31 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:31 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:31 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 02:31 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 02:31 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 02:31 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 02:31 PM
Surr: 1,2-Dichloroethane-d4	97.1	0	70-130		%REC	1	8/27/2008 02:31 PM
Surr: 4-Bromofluorobenzene	83.7	0	70-130		%REC	1	8/27/2008 02:31 PM
Surr: Dibromofluoromethane	98.2	0	70-130		%REC	1	8/27/2008 02:31 PM
Surr: Toluene-d8	92.8	0	70-130		%REC	1	8/27/2008 02:31 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 08:07 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 08:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-004

Client Sample ID: B-177N-0-0.5
Collection Date: 8/25/2008 10:05:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 08:07 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 08:07 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 08:07 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 08:07 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 08:07 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 08:07 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 08:07 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 08:07 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 08:07 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 08:07 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 08:07 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 08:07 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 08:07 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 08:07 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 08:07 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 08:07 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 08:07 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 08:07 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 08:07 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 08:07 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 08:07 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 08:07 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 08:07 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 08:07 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 08:07 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 08:07 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 08:07 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 08:07 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 08:07 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 08:07 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 08:07 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 08:07 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 08:07 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 08:07 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 08:07 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 08:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-004

Client Sample ID: B-177N-0-0.5
Collection Date: 8/25/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
EPA 3550B			**EPA 8270C**				
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 08:07 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 08:07 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 08:07 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 08:07 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 08:07 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 08:07 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 08:07 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 08:07 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 08:07 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 08:07 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 08:07 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 08:07 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 08:07 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 08:07 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 08:07 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 08:07 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 08:07 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 08:07 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 08:07 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 08:07 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 08:07 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 08:07 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 08:07 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 08:07 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 08:07 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 08:07 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 08:07 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 08:07 PM
Surr: 1,2-Dichlorobenzene-d4	76.6	0	40-97		%REC	1	9/3/2008 08:07 PM
Surr: 2,4,6-Tribromophenol	89.9	0	31-148		%REC	1	9/3/2008 08:07 PM
Surr: 2-Chlorophenol-d4	84.9	0	49-103		%REC	1	9/3/2008 08:07 PM
Surr: 2-Fluorobiphenyl	89.4	0	55-102		%REC	1	9/3/2008 08:07 PM
Surr: 2-Fluorophenol	83.8	0	45-105		%REC	1	9/3/2008 08:07 PM
Surr: 4-Terphenyl-d14	105	0	52-124		%REC	1	9/3/2008 08:07 PM
Surr: Nitrobenzene-d5	88.0	0	48-109		%REC	1	9/3/2008 08:07 PM
Surr: Phenol-d5	87.9	0	47-108		%REC	1	9/3/2008 08:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-005

Client Sample ID: B-177N-2-2.5
Collection Date: 8/25/2008 10:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 02:03 PM
Arsenic	3.8	0.14	1.0		mg/Kg	1	9/2/2008 02:03 PM
Barium	110	0.070	1.0		mg/Kg	1	9/2/2008 02:03 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 02:03 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 02:03 PM
Chromium	15	0.075	1.0		mg/Kg	1	9/2/2008 02:03 PM
Cobalt	4.5	0.070	1.0		mg/Kg	1	9/2/2008 02:03 PM
Copper	14	0.10	2.0		mg/Kg	1	9/2/2008 02:03 PM
Lead	350	0.25	1.0		mg/Kg	1	9/2/2008 02:03 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 02:03 PM
Nickel	12	0.18	1.0		mg/Kg	1	9/2/2008 02:03 PM
Selenium	1.0	0.52	1.0		mg/Kg	1	9/2/2008 02:03 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 02:03 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 02:03 PM
Vanadium	29	0.073	1.0		mg/Kg	1	9/2/2008 02:03 PM
Zinc	65	0.57	1.0		mg/Kg	1	9/2/2008 02:03 PM
GASOLINE RANGE ORGANICS BY GC/FID							
			EPA 8015B(M)				
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 08:22 PM
Surr: Bromofluorobenzene (FID)	107	0	42-142		%REC	1	8/27/2008 08:22 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
			EPA 8021B				
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 08:22 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 08:22 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 08:22 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 08:22 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 08:22 PM
Surr: Bromofluorobenzene (PID)	106	0	71-139		%REC	1	8/27/2008 08:22 PM
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-005

Client Sample ID: B-177N-2-2.5
Collection Date: 8/25/2008 10:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 12:45 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 02:50 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:50 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 02:50 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 02:50 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 02:50 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 02:50 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 02:50 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:50 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:50 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:50 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 02:50 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 02:50 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:50 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 02:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-005

Client Sample ID: B-177N-2-2.5
Collection Date: 8/25/2008 10:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 02:50 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:50 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:50 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:50 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 02:50 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:50 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 02:50 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 02:50 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 02:50 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 02:50 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 02:50 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 02:50 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 02:50 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 02:50 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 02:50 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 02:50 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 02:50 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 02:50 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 02:50 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 02:50 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 02:50 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 02:50 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 02:50 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 02:50 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 02:50 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 02:50 PM
Surr: 1,2-Dichloroethane-d4	103	0	70-130		%REC	1	8/27/2008 02:50 PM
Surr: 4-Bromofluorobenzene	81.0	0	70-130		%REC	1	8/27/2008 02:50 PM
Surr: Dibromofluoromethane	104	0	70-130		%REC	1	8/27/2008 02:50 PM
Surr: Toluene-d8	94.6	0	70-130		%REC	1	8/27/2008 02:50 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 08:36 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 08:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-005

Client Sample ID: B-177N-2-2.5
Collection Date: 8/25/2008 10:10:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 08:36 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 08:36 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 08:36 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 08:36 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 08:36 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 08:36 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 08:36 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 08:36 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 08:36 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 08:36 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 08:36 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 08:36 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 08:36 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 08:36 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 08:36 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 08:36 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 08:36 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 08:36 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 08:36 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 08:36 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 08:36 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 08:36 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 08:36 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 08:36 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 08:36 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 08:36 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 08:36 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 08:36 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 08:36 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 08:36 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 08:36 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 08:36 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 08:36 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 08:36 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 08:36 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 08:36 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-005

Client Sample ID: B-177N-2-2.5
Collection Date: 8/25/2008 10:10:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 08:36 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 08:36 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 08:36 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 08:36 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 08:36 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 08:36 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 08:36 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 08:36 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 08:36 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 08:36 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 08:36 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 08:36 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 08:36 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 08:36 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 08:36 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 08:36 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 08:36 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 08:36 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 08:36 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 08:36 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 08:36 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 08:36 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 08:36 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 08:36 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 08:36 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 08:36 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 08:36 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 08:36 PM
Surr: 1,2-Dichlorobenzene-d4	74.9	0	40-97		%REC	1	9/3/2008 08:36 PM
Surr: 2,4,6-Tribromophenol	89.4	0	31-148		%REC	1	9/3/2008 08:36 PM
Surr: 2-Chlorophenol-d4	85.3	0	49-103		%REC	1	9/3/2008 08:36 PM
Surr: 2-Fluorobiphenyl	89.9	0	55-102		%REC	1	9/3/2008 08:36 PM
Surr: 2-Fluorophenol	82.7	0	45-105		%REC	1	9/3/2008 08:36 PM
Surr: 4-Terphenyl-d14	102	0	52-124		%REC	1	9/3/2008 08:36 PM
Surr: Nitrobenzene-d5	87.2	0	48-109		%REC	1	9/3/2008 08:36 PM
Surr: Phenol-d5	87.4	0	47-108		%REC	1	9/3/2008 08:36 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-006

Client Sample ID: B-177N-4.5-5
Collection Date: 8/25/2008 10:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 02:07 PM
Arsenic	4.5	0.14	1.0		mg/Kg	1	9/2/2008 02:07 PM
Barium	92	0.070	1.0		mg/Kg	1	9/2/2008 02:07 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 02:07 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 02:07 PM
Chromium	17	0.075	1.0		mg/Kg	1	9/2/2008 02:07 PM
Cobalt	6.9	0.070	1.0		mg/Kg	1	9/2/2008 02:07 PM
Copper	16	0.10	2.0		mg/Kg	1	9/2/2008 02:07 PM
Lead	31	0.25	1.0		mg/Kg	1	9/2/2008 02:07 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 02:07 PM
Nickel	15	0.18	1.0		mg/Kg	1	9/2/2008 02:07 PM
Selenium	1.4	0.52	1.0		mg/Kg	1	9/2/2008 02:07 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 02:07 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 02:07 PM
Vanadium	39	0.073	1.0		mg/Kg	1	9/2/2008 02:07 PM
Zinc	57	0.57	1.0		mg/Kg	1	9/2/2008 02:07 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 08:51 PM
Surr: Bromofluorobenzene (FID)	111	0	42-142		%REC	1	8/27/2008 08:51 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 08:51 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 08:51 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 08:51 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 08:51 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 08:51 PM
Surr: Bromofluorobenzene (PID)	109	0	71-139		%REC	1	8/27/2008 08:51 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-006

Client Sample ID: B-177N-4.5-5
Collection Date: 8/25/2008 10:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 12:47 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 03:04 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:04 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:04 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 03:04 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:04 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 03:04 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:04 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:04 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:04 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:04 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:04 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 03:04 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:04 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 03:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-006

Client Sample ID: B-177N-4.5-5
Collection Date: 8/25/2008 10:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:04 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:04 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:04 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:04 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 03:04 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:04 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:04 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:04 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:04 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:04 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:04 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 03:04 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 03:04 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:04 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:04 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 03:04 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:04 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 03:04 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:04 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:04 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:04 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:04 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 03:04 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 03:04 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 03:04 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:04 PM
Surr: 1,2-Dichloroethane-d4	99.5	0	70-130		%REC	1	8/27/2008 03:04 PM
Surr: 4-Bromofluorobenzene	81.3	0	70-130		%REC	1	8/27/2008 03:04 PM
Surr: Dibromofluoromethane	99.3	0	70-130		%REC	1	8/27/2008 03:04 PM
Surr: Toluene-d8	94.4	0	70-130		%REC	1	8/27/2008 03:04 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 07:08 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 07:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-006

Client Sample ID: B-177N-4.5-5
Collection Date: 8/25/2008 10:15:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 07:08 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 07:08 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 07:08 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 07:08 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 07:08 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 07:08 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 07:08 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 07:08 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 07:08 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 07:08 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 07:08 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 07:08 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 07:08 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 07:08 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 07:08 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 07:08 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 07:08 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 07:08 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 07:08 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 07:08 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 07:08 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 07:08 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 07:08 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 07:08 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 07:08 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 07:08 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 07:08 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 07:08 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 07:08 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 07:08 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 07:08 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 07:08 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 07:08 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 07:08 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 07:08 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 07:08 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-006

Client Sample ID: B-177N-4.5-5
Collection Date: 8/25/2008 10:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
EPA 3550B					**EPA 8270C**		
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 07:08 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 07:08 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 07:08 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 07:08 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 07:08 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 07:08 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 07:08 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 07:08 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 07:08 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 07:08 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 07:08 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 07:08 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 07:08 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 07:08 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 07:08 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 07:08 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 07:08 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 07:08 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 07:08 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 07:08 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 07:08 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 07:08 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 07:08 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 07:08 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 07:08 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 07:08 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 07:08 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 07:08 PM
Surr: 1,2-Dichlorobenzene-d4	76.5	0	40-97		%REC	1	9/3/2008 07:08 PM
Surr: 2,4,6-Tribromophenol	86.0	0	31-148		%REC	1	9/3/2008 07:08 PM
Surr: 2-Chlorophenol-d4	84.3	0	49-103		%REC	1	9/3/2008 07:08 PM
Surr: 2-Fluorobiphenyl	88.2	0	55-102		%REC	1	9/3/2008 07:08 PM
Surr: 2-Fluorophenol	83.7	0	45-105		%REC	1	9/3/2008 07:08 PM
Surr: 4-Terphenyl-d14	101	0	52-124		%REC	1	9/3/2008 07:08 PM
Surr: Nitrobenzene-d5	86.6	0	48-109		%REC	1	9/3/2008 07:08 PM
Surr: Phenol-d5	87.5	0	47-108		%REC	1	9/3/2008 07:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-007

Client Sample ID: B-178N-0-0.5
Collection Date: 8/25/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 02:15 PM
Arsenic	4.1	0.14	1.0		mg/Kg	1	9/2/2008 02:15 PM
Barium	97	0.070	1.0		mg/Kg	1	9/2/2008 02:15 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 02:15 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 02:15 PM
Chromium	23	0.075	1.0		mg/Kg	1	9/2/2008 02:15 PM
Cobalt	8.1	0.070	1.0		mg/Kg	1	9/2/2008 02:15 PM
Copper	22	0.10	2.0		mg/Kg	1	9/2/2008 02:15 PM
Lead	18	0.25	1.0		mg/Kg	1	9/2/2008 02:15 PM
Molybdenum	1.0	0.072	1.0		mg/Kg	1	9/2/2008 02:15 PM
Nickel	17	0.18	1.0		mg/Kg	1	9/2/2008 02:15 PM
Selenium	1.4	0.52	1.0		mg/Kg	1	9/2/2008 02:15 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 02:15 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 02:15 PM
Vanadium	45	0.073	1.0		mg/Kg	1	9/2/2008 02:15 PM
Zinc	62	0.57	1.0		mg/Kg	1	9/2/2008 02:15 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 09:20 PM
Surr: Bromofluorobenzene (FID)	114	0	42-142		%REC	1	8/27/2008 09:20 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 09:20 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 09:20 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 09:20 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 09:20 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 09:20 PM
Surr: Bromofluorobenzene (PID)	110	0	71-139		%REC	1	8/27/2008 09:20 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-007

Client Sample ID: B-178N-0-0.5
Collection Date: 8/25/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 12:50 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 03:20 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:20 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:20 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 03:20 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:20 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 03:20 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:20 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:20 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:20 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:20 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:20 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 03:20 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:20 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 03:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-007

Client Sample ID: B-178N-0-0.5
Collection Date: 8/25/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:20 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:20 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:20 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:20 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 03:20 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:20 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:20 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:20 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:20 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:20 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:20 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 03:20 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 03:20 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:20 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:20 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 03:20 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:20 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 03:20 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:20 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:20 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:20 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:20 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 03:20 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 03:20 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 03:20 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:20 PM
Surr: 1,2-Dichloroethane-d4	102	0	70-130		%REC	1	8/27/2008 03:20 PM
Surr: 4-Bromofluorobenzene	83.8	0	70-130		%REC	1	8/27/2008 03:20 PM
Surr: Dibromofluoromethane	103	0	70-130		%REC	1	8/27/2008 03:20 PM
Surr: Toluene-d8	94.5	0	70-130		%REC	1	8/27/2008 03:20 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 06:38 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 06:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-007

Client Sample ID: B-178N-0-0.5
Collection Date: 8/25/2008 10:55:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 06:38 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 06:38 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 06:38 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 06:38 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 06:38 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 06:38 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 06:38 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 06:38 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 06:38 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 06:38 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 06:38 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 06:38 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 06:38 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 06:38 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 06:38 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 06:38 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 06:38 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 06:38 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 06:38 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 06:38 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 06:38 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 06:38 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 06:38 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 06:38 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 06:38 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 06:38 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 06:38 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 06:38 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 06:38 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 06:38 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 06:38 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 06:38 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 06:38 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 06:38 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 06:38 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 06:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-007

Client Sample ID: B-178N-0-0.5
Collection Date: 8/25/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
EPA 3550B					**EPA 8270C**		
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 06:38 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 06:38 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 06:38 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 06:38 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 06:38 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 06:38 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 06:38 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 06:38 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 06:38 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 06:38 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 06:38 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 06:38 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 06:38 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 06:38 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 06:38 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 06:38 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 06:38 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 06:38 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 06:38 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 06:38 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 06:38 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 06:38 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 06:38 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 06:38 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 06:38 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 06:38 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 06:38 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 06:38 PM
Surr: 1,2-Dichlorobenzene-d4	79.4	0	40-97		%REC	1	9/3/2008 06:38 PM
Surr: 2,4,6-Tribromophenol	86.9	0	31-148		%REC	1	9/3/2008 06:38 PM
Surr: 2-Chlorophenol-d4	84.8	0	49-103		%REC	1	9/3/2008 06:38 PM
Surr: 2-Fluorobiphenyl	88.2	0	55-102		%REC	1	9/3/2008 06:38 PM
Surr: 2-Fluorophenol	83.9	0	45-105		%REC	1	9/3/2008 06:38 PM
Surr: 4-Terphenyl-d14	101	0	52-124		%REC	1	9/3/2008 06:38 PM
Surr: Nitrobenzene-d5	89.1	0	48-109		%REC	1	9/3/2008 06:38 PM
Surr: Phenol-d5	87.6	0	47-108		%REC	1	9/3/2008 06:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-008

Client Sample ID: B-178N-2-2.5
Collection Date: 8/25/2008 11:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 02:19 PM
Arsenic	2.7	0.14	1.0		mg/Kg	1	9/2/2008 02:19 PM
Barium	60	0.070	1.0		mg/Kg	1	9/2/2008 02:19 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 02:19 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 02:19 PM
Chromium	12	0.075	1.0		mg/Kg	1	9/2/2008 02:19 PM
Cobalt	4.5	0.070	1.0		mg/Kg	1	9/2/2008 02:19 PM
Copper	10	0.10	2.0		mg/Kg	1	9/2/2008 02:19 PM
Lead	27	0.25	1.0		mg/Kg	1	9/2/2008 02:19 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 02:19 PM
Nickel	9.2	0.18	1.0		mg/Kg	1	9/2/2008 02:19 PM
Selenium	ND	0.52	1.0		mg/Kg	1	9/2/2008 02:19 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 02:19 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 02:19 PM
Vanadium	27	0.073	1.0		mg/Kg	1	9/2/2008 02:19 PM
Zinc	41	0.57	1.0		mg/Kg	1	9/2/2008 02:19 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 09:49 PM
Surr: Bromofluorobenzene (FID)	106	0	42-142		%REC	1	8/27/2008 09:49 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 09:49 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 09:49 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 09:49 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 09:49 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 09:49 PM
Surr: Bromofluorobenzene (PID)	102	0	71-139		%REC	1	8/27/2008 09:49 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-008

Client Sample ID: B-178N-2-2.5
Collection Date: 8/25/2008 11:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 12:58 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 03:36 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:36 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:36 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 03:36 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:36 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 03:36 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:36 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:36 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:36 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:36 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:36 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 03:36 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:36 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 03:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-008

Client Sample ID: B-178N-2-2.5
Collection Date: 8/25/2008 11:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:36 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:36 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:36 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:36 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 03:36 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:36 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:36 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:36 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:36 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:36 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:36 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 03:36 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 03:36 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:36 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:36 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 03:36 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:36 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 03:36 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:36 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:36 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:36 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:36 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 03:36 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 03:36 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 03:36 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:36 PM
Surr: 1,2-Dichloroethane-d4	103	0	70-130		%REC	1	8/27/2008 03:36 PM
Surr: 4-Bromofluorobenzene	84.6	0	70-130		%REC	1	8/27/2008 03:36 PM
Surr: Dibromofluoromethane	104	0	70-130		%REC	1	8/27/2008 03:36 PM
Surr: Toluene-d8	95.0	0	70-130		%REC	1	8/27/2008 03:36 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	340	1600		µg/Kg	5	9/3/2008 09:05 PM
1,2-Dichlorobenzene	ND	210	1600		µg/Kg	5	9/3/2008 09:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-008

Client Sample ID: B-178N-2-2.5
Collection Date: 8/25/2008 11:05:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	270	1600		µg/Kg	5	9/3/2008 09:05 PM
1,4-Dichlorobenzene	ND	230	1600		µg/Kg	5	9/3/2008 09:05 PM
2,4,5-Trichlorophenol	ND	390	1600		µg/Kg	5	9/3/2008 09:05 PM
2,4,6-Trichlorophenol	ND	350	1600		µg/Kg	5	9/3/2008 09:05 PM
2,4-Dichlorophenol	ND	380	8200		µg/Kg	5	9/3/2008 09:05 PM
2,4-Dimethylphenol	ND	260	1600		µg/Kg	5	9/3/2008 09:05 PM
2,4-Dinitrophenol	ND	960	8200		µg/Kg	5	9/3/2008 09:05 PM
2,4-Dinitrotoluene	ND	380	1600		µg/Kg	5	9/3/2008 09:05 PM
2,6-Dinitrotoluene	ND	500	1600		µg/Kg	5	9/3/2008 09:05 PM
2-Chloronaphthalene	ND	290	1600		µg/Kg	5	9/3/2008 09:05 PM
2-Chlorophenol	ND	240	1600		µg/Kg	5	9/3/2008 09:05 PM
2-Methylnaphthalene	ND	310	1600		µg/Kg	5	9/3/2008 09:05 PM
2-Methylphenol	ND	300	1600		µg/Kg	5	9/3/2008 09:05 PM
2-Nitroaniline	ND	450	8200		µg/Kg	5	9/3/2008 09:05 PM
2-Nitrophenol	ND	440	1600		µg/Kg	5	9/3/2008 09:05 PM
3,3´-Dichlorobenzidine	ND	1300	3300		µg/Kg	5	9/3/2008 09:05 PM
3-Nitroaniline	ND	340	8200		µg/Kg	5	9/3/2008 09:05 PM
4,6-Dinitro-2-methylphenol	ND	1000	8200		µg/Kg	5	9/3/2008 09:05 PM
4-Bromophenyl-phenylether	ND	450	1600		µg/Kg	5	9/3/2008 09:05 PM
4-Chloro-3-methylphenol	ND	300	3300		µg/Kg	5	9/3/2008 09:05 PM
4-Chloroaniline	ND	870	3300		µg/Kg	5	9/3/2008 09:05 PM
4-Chlorophenyl-phenylether	ND	320	1600		µg/Kg	5	9/3/2008 09:05 PM
4-Methylphenol	ND	300	1600		µg/Kg	5	9/3/2008 09:05 PM
4-Nitroaniline	ND	580	8200		µg/Kg	5	9/3/2008 09:05 PM
4-Nitrophenol	ND	800	8200		µg/Kg	5	9/3/2008 09:05 PM
Acenaphthene	ND	350	1600		µg/Kg	5	9/3/2008 09:05 PM
Acenaphthylene	ND	360	1600		µg/Kg	5	9/3/2008 09:05 PM
Anthracene	ND	270	1600		µg/Kg	5	9/3/2008 09:05 PM
Benzidine (M)	ND	550	8200		µg/Kg	5	9/3/2008 09:05 PM
Benzo(a)anthracene	ND	430	1600		µg/Kg	5	9/3/2008 09:05 PM
Benzo(a)pyrene	ND	440	1600		µg/Kg	5	9/3/2008 09:05 PM
Benzo(b)fluoranthene	ND	480	1600		µg/Kg	5	9/3/2008 09:05 PM
Benzo(g,h,i)perylene	ND	380	1600		µg/Kg	5	9/3/2008 09:05 PM
Benzo(k)fluoranthene	ND	520	1600		µg/Kg	5	9/3/2008 09:05 PM
Benzoic acid	ND	780	8200		µg/Kg	5	9/3/2008 09:05 PM
Benzyl alcohol	ND	290	3300		µg/Kg	5	9/3/2008 09:05 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-008

Client Sample ID: B-178N-2-2.5
Collection Date: 8/25/2008 11:05:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	360	1600		µg/Kg	5	9/3/2008 09:05 PM
Bis(2-chloroethyl)ether	ND	230	1600		µg/Kg	5	9/3/2008 09:05 PM
Bis(2-chloroisopropyl)ether	ND	320	1600		µg/Kg	5	9/3/2008 09:05 PM
Bis(2-ethylhexyl)phthalate	ND	1300	1600		µg/Kg	5	9/3/2008 09:05 PM
Butylbenzylphthalate	ND	1600	1600		µg/Kg	5	9/3/2008 09:05 PM
Chrysene	ND	390	1600		µg/Kg	5	9/3/2008 09:05 PM
Di-n-butylphthalate	ND	320	1600		µg/Kg	5	9/3/2008 09:05 PM
Di-n-octylphthalate	ND	1600	1600		µg/Kg	5	9/3/2008 09:05 PM
Dibenz(a,h)anthracene	ND	380	1600		µg/Kg	5	9/3/2008 09:05 PM
Dibenzofuran	ND	300	1600		µg/Kg	5	9/3/2008 09:05 PM
Diethylphthalate	ND	510	1600		µg/Kg	5	9/3/2008 09:05 PM
Dimethylphthalate	ND	370	1600		µg/Kg	5	9/3/2008 09:05 PM
Fluoranthene	ND	410	1600		µg/Kg	5	9/3/2008 09:05 PM
Fluorene	ND	280	1600		µg/Kg	5	9/3/2008 09:05 PM
Hexachlorobenzene	ND	380	1600		µg/Kg	5	9/3/2008 09:05 PM
Hexachlorobutadiene	ND	270	3300		µg/Kg	5	9/3/2008 09:05 PM
Hexachlorocyclopentadiene	ND	780	3300		µg/Kg	5	9/3/2008 09:05 PM
Hexachloroethane	ND	310	1600		µg/Kg	5	9/3/2008 09:05 PM
Indeno(1,2,3-cd)pyrene	ND	370	1600		µg/Kg	5	9/3/2008 09:05 PM
Isophorone	ND	310	1600		µg/Kg	5	9/3/2008 09:05 PM
N-Nitrosodi-n-propylamine	ND	430	1600		µg/Kg	5	9/3/2008 09:05 PM
N-Nitrosodiphenylamine	ND	380	1600		µg/Kg	5	9/3/2008 09:05 PM
Naphthalene	ND	270	1600		µg/Kg	5	9/3/2008 09:05 PM
Nitrobenzene	ND	350	1600		µg/Kg	5	9/3/2008 09:05 PM
Pentachlorophenol	ND	630	8200		µg/Kg	5	9/3/2008 09:05 PM
Phenanthrene	ND	330	1600		µg/Kg	5	9/3/2008 09:05 PM
Phenol	ND	290	1600		µg/Kg	5	9/3/2008 09:05 PM
Pyrene	ND	410	1600		µg/Kg	5	9/3/2008 09:05 PM
Surr: 1,2-Dichlorobenzene-d4	73.4	0	40-97		%REC	5	9/3/2008 09:05 PM
Surr: 2,4,6-Tribromophenol	78.3	0	31-148		%REC	5	9/3/2008 09:05 PM
Surr: 2-Chlorophenol-d4	79.1	0	49-103		%REC	5	9/3/2008 09:05 PM
Surr: 2-Fluorobiphenyl	84.9	0	55-102		%REC	5	9/3/2008 09:05 PM
Surr: 2-Fluorophenol	76.9	0	45-105		%REC	5	9/3/2008 09:05 PM
Surr: 4-Terphenyl-d14	98.2	0	52-124		%REC	5	9/3/2008 09:05 PM
Surr: Nitrobenzene-d5	82.9	0	48-109		%REC	5	9/3/2008 09:05 PM
Surr: Phenol-d5	80.2	0	47-108		%REC	5	9/3/2008 09:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-009

Client Sample ID: B-178N-4.5-5
Collection Date: 8/25/2008 11:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate: **8/29/2008**		Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 02:24 PM
Arsenic	4.7	0.14	1.0		mg/Kg	1	9/2/2008 02:24 PM
Barium	92	0.070	1.0		mg/Kg	1	9/2/2008 02:24 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 02:24 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 02:24 PM
Chromium	22	0.075	1.0		mg/Kg	1	9/2/2008 02:24 PM
Cobalt	8.3	0.070	1.0		mg/Kg	1	9/2/2008 02:24 PM
Copper	21	0.10	2.0		mg/Kg	1	9/2/2008 02:24 PM
Lead	7.7	0.25	1.0		mg/Kg	1	9/2/2008 02:24 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 02:24 PM
Nickel	16	0.18	1.0		mg/Kg	1	9/2/2008 02:24 PM
Selenium	1.6	0.52	1.0		mg/Kg	1	9/2/2008 02:24 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 02:24 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 02:24 PM
Vanadium	48	0.073	1.0		mg/Kg	1	9/2/2008 02:24 PM
Zinc	58	0.57	1.0		mg/Kg	1	9/2/2008 02:24 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 10:19 PM
Surr: Bromofluorobenzene (FID)	108	0	42-142		%REC	1	8/27/2008 10:19 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 10:19 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 10:19 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 10:19 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 10:19 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 10:19 PM
Surr: Bromofluorobenzene (PID)	104	0	71-139		%REC	1	8/27/2008 10:19 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-009

Client Sample ID: B-178N-4.5-5
Collection Date: 8/25/2008 11:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 01:00 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 03:53 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:53 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:53 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 03:53 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:53 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 03:53 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:53 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:53 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:53 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:53 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 03:53 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 03:53 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:53 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 03:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-009

Client Sample ID: B-178N-4.5-5
Collection Date: 8/25/2008 11:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 03:53 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:53 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:53 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:53 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 03:53 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:53 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:53 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:53 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:53 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 03:53 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 03:53 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 03:53 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 03:53 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 03:53 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 03:53 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 03:53 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 03:53 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 03:53 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 03:53 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 03:53 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 03:53 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 03:53 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 03:53 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 03:53 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 03:53 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 03:53 PM
Surr: 1,2-Dichloroethane-d4	112	0	70-130		%REC	1	8/27/2008 03:53 PM
Surr: 4-Bromofluorobenzene	90.7	0	70-130		%REC	1	8/27/2008 03:53 PM
Surr: Dibromofluoromethane	109	0	70-130		%REC	1	8/27/2008 03:53 PM
Surr: Toluene-d8	96.9	0	70-130		%REC	1	8/27/2008 03:53 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 01:13 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 01:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-009

Client Sample ID: B-178N-4.5-5
Collection Date: 8/25/2008 11:45:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 01:13 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 01:13 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 01:13 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 01:13 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 01:13 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 01:13 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 01:13 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 01:13 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 01:13 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 01:13 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 01:13 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 01:13 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 01:13 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 01:13 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 01:13 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 01:13 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 01:13 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 01:13 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 01:13 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 01:13 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 01:13 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 01:13 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 01:13 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 01:13 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 01:13 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 01:13 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 01:13 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 01:13 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 01:13 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 01:13 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 01:13 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 01:13 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 01:13 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 01:13 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 01:13 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 01:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-009

Client Sample ID: B-178N-4.5-5
Collection Date: 8/25/2008 11:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
EPA 3550B			**EPA 8270C**				
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 01:13 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 01:13 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 01:13 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 01:13 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 01:13 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 01:13 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 01:13 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 01:13 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 01:13 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 01:13 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 01:13 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 01:13 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 01:13 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 01:13 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 01:13 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 01:13 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 01:13 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 01:13 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 01:13 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 01:13 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 01:13 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 01:13 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 01:13 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 01:13 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 01:13 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 01:13 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 01:13 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 01:13 PM
Surr: 1,2-Dichlorobenzene-d4	79.7	0	40-97		%REC	1	9/3/2008 01:13 PM
Surr: 2,4,6-Tribromophenol	81.2	0	31-148		%REC	1	9/3/2008 01:13 PM
Surr: 2-Chlorophenol-d4	83.8	0	49-103		%REC	1	9/3/2008 01:13 PM
Surr: 2-Fluorobiphenyl	86.5	0	55-102		%REC	1	9/3/2008 01:13 PM
Surr: 2-Fluorophenol	84.0	0	45-105		%REC	1	9/3/2008 01:13 PM
Surr: 4-Terphenyl-d14	104	0	52-124		%REC	1	9/3/2008 01:13 PM
Surr: Nitrobenzene-d5	89.6	0	48-109		%REC	1	9/3/2008 01:13 PM
Surr: Phenol-d5	86.5	0	47-108		%REC	1	9/3/2008 01:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-010

Client Sample ID: B-179N-0-0.5
Collection Date: 8/25/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902C**	QC Batch: **48448**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 02:29 PM
Arsenic	5.3	0.14	1.0		mg/Kg	1	9/2/2008 02:29 PM
Barium	110	0.070	1.0		mg/Kg	1	9/2/2008 02:29 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 02:29 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 02:29 PM
Chromium	21	0.075	1.0		mg/Kg	1	9/2/2008 02:29 PM
Cobalt	8.2	0.070	1.0		mg/Kg	1	9/2/2008 02:29 PM
Copper	20	0.10	2.0		mg/Kg	1	9/2/2008 02:29 PM
Lead	17	0.25	1.0		mg/Kg	1	9/2/2008 02:29 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 02:29 PM
Nickel	16	0.18	1.0		mg/Kg	1	9/2/2008 02:29 PM
Selenium	1.9	0.52	1.0		mg/Kg	1	9/2/2008 02:29 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 02:29 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 02:29 PM
Vanadium	45	0.073	1.0		mg/Kg	1	9/2/2008 02:29 PM
Zinc	62	0.57	1.0		mg/Kg	1	9/2/2008 02:29 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/27/2008 10:48 PM
Surr: Bromofluorobenzene (FID)	109	0	42-142		%REC	1	8/27/2008 10:48 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827A**	QC Batch: **D08VS138**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/27/2008 10:48 PM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/27/2008 10:48 PM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/27/2008 10:48 PM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/27/2008 10:48 PM
Toluene	ND	0.96	5.0		µg/Kg	1	8/27/2008 10:48 PM
Surr: Bromofluorobenzene (PID)	104	0	71-139		%REC	1	8/27/2008 10:48 PM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-010

Client Sample ID: B-179N-0-0.5
Collection Date: 8/25/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 01:03 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 04:10 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 04:10 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 04:10 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 04:10 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 04:10 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 04:10 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 04:10 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 04:10 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 04:10 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 04:10 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 04:10 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 04:10 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 04:10 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 04:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-010

Client Sample ID: B-179N-0-0.5
Collection Date: 8/25/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827A**	QC Batch: **K08VS401**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 04:10 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 04:10 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 04:10 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 04:10 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 04:10 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 04:10 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 04:10 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 04:10 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 04:10 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 04:10 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 04:10 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 04:10 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 04:10 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 04:10 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 04:10 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 04:10 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 04:10 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 04:10 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 04:10 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 04:10 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 04:10 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 04:10 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 04:10 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 04:10 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 04:10 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 04:10 PM
Surr: 1,2-Dichloroethane-d4	104	0	70-130		%REC	1	8/27/2008 04:10 PM
Surr: 4-Bromofluorobenzene	87.5	0	70-130		%REC	1	8/27/2008 04:10 PM
Surr: Dibromofluoromethane	104	0	70-130		%REC	1	8/27/2008 04:10 PM
Surr: Toluene-d8	96.4	0	70-130		%REC	1	8/27/2008 04:10 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B		**EPA 8270C**				
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/3/2008 05:38 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/3/2008 05:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-010

Client Sample ID: B-179N-0-0.5
Collection Date: 8/25/2008 11:55:00 AM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080902B** QC Batch: **48505** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/3/2008 05:38 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/3/2008 05:38 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/3/2008 05:38 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/3/2008 05:38 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/3/2008 05:38 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/3/2008 05:38 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/3/2008 05:38 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/3/2008 05:38 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/3/2008 05:38 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/3/2008 05:38 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/3/2008 05:38 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/3/2008 05:38 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 05:38 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/3/2008 05:38 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/3/2008 05:38 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/3/2008 05:38 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/3/2008 05:38 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/3/2008 05:38 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/3/2008 05:38 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/3/2008 05:38 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/3/2008 05:38 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/3/2008 05:38 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/3/2008 05:38 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/3/2008 05:38 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/3/2008 05:38 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/3/2008 05:38 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/3/2008 05:38 PM
Anthracene	ND	55	330		µg/Kg	1	9/3/2008 05:38 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/3/2008 05:38 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/3/2008 05:38 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/3/2008 05:38 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/3/2008 05:38 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/3/2008 05:38 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/3/2008 05:38 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/3/2008 05:38 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/3/2008 05:38 PM

Qualifiers:

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H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-010

Client Sample ID: B-179N-0-0.5
Collection Date: 8/25/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
EPA 3550B			**EPA 8270C**				
RunID: **MS6_080902B**	QC Batch: **48505**				PrepDate:	**9/2/2008**	Analyst: **SMH**
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/3/2008 05:38 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/3/2008 05:38 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/3/2008 05:38 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/3/2008 05:38 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/3/2008 05:38 PM
Chrysene	ND	78	330		µg/Kg	1	9/3/2008 05:38 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/3/2008 05:38 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/3/2008 05:38 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/3/2008 05:38 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/3/2008 05:38 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/3/2008 05:38 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/3/2008 05:38 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/3/2008 05:38 PM
Fluorene	ND	57	330		µg/Kg	1	9/3/2008 05:38 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/3/2008 05:38 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/3/2008 05:38 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/3/2008 05:38 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/3/2008 05:38 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/3/2008 05:38 PM
Isophorone	ND	62	330		µg/Kg	1	9/3/2008 05:38 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/3/2008 05:38 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/3/2008 05:38 PM
Naphthalene	ND	53	330		µg/Kg	1	9/3/2008 05:38 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/3/2008 05:38 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/3/2008 05:38 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/3/2008 05:38 PM
Phenol	ND	58	330		µg/Kg	1	9/3/2008 05:38 PM
Pyrene	ND	82	330		µg/Kg	1	9/3/2008 05:38 PM
Surr: 1,2-Dichlorobenzene-d4	83.9	0	40-97		%REC	1	9/3/2008 05:38 PM
Surr: 2,4,6-Tribromophenol	88.5	0	31-148		%REC	1	9/3/2008 05:38 PM
Surr: 2-Chlorophenol-d4	89.0	0	49-103		%REC	1	9/3/2008 05:38 PM
Surr: 2-Fluorobiphenyl	92.2	0	55-102		%REC	1	9/3/2008 05:38 PM
Surr: 2-Fluorophenol	88.3	0	45-105		%REC	1	9/3/2008 05:38 PM
Surr: 4-Terphenyl-d14	107	0	52-124		%REC	1	9/3/2008 05:38 PM
Surr: Nitrobenzene-d5	93.2	0	48-109		%REC	1	9/3/2008 05:38 PM
Surr: Phenol-d5	91.0	0	47-108		%REC	1	9/3/2008 05:38 PM

Qualifiers:

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S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-011

Client Sample ID: B-179N-2.0-2.5
Collection Date: 8/25/2008 12:05:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902D**	QC Batch: **48450**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 03:24 PM
Arsenic	3.7	0.14	1.0		mg/Kg	1	9/2/2008 03:24 PM
Barium	67	0.070	1.0		mg/Kg	1	9/2/2008 03:24 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 03:24 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 03:24 PM
Chromium	8.6	0.075	1.0		mg/Kg	1	9/2/2008 03:24 PM
Cobalt	4.0	0.070	1.0		mg/Kg	1	9/2/2008 03:24 PM
Copper	16	0.10	2.0		mg/Kg	1	9/2/2008 03:24 PM
Lead	430	0.25	1.0		mg/Kg	1	9/2/2008 03:24 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 03:24 PM
Nickel	8.3	0.18	1.0		mg/Kg	1	9/2/2008 03:24 PM
Selenium	1.0	0.52	1.0		mg/Kg	1	9/2/2008 03:24 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 03:24 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 03:24 PM
Vanadium	17	0.073	1.0		mg/Kg	1	9/2/2008 03:24 PM
Zinc	73	0.57	1.0		mg/Kg	1	9/2/2008 03:24 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/28/2008 03:42 AM
Surr: Bromofluorobenzene (FID)	101	0	42-142		%REC	1	8/28/2008 03:42 AM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/28/2008 03:42 AM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/28/2008 03:42 AM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/28/2008 03:42 AM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/28/2008 03:42 AM
Toluene	ND	0.96	5.0		µg/Kg	1	8/28/2008 03:42 AM
Surr: Bromofluorobenzene (PID)	97.8	0	71-139		%REC	1	8/28/2008 03:42 AM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

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S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-011

Client Sample ID: B-179N-2.0-2.5
Collection Date: 8/25/2008 12:05:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 01:05 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 06:29 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 06:29 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 06:29 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 06:29 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 06:29 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 06:29 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 06:29 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 06:29 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 06:29 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 06:29 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 06:29 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 06:29 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 06:29 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 06:29 PM

Qualifiers:

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DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-011

Client Sample ID: B-179N-2.0-2.5
Collection Date: 8/25/2008 12:05:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 06:29 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 06:29 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 06:29 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 06:29 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 06:29 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 06:29 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 06:29 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 06:29 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 06:29 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 06:29 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 06:29 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 06:29 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 06:29 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 06:29 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 06:29 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 06:29 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 06:29 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 06:29 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 06:29 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 06:29 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 06:29 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 06:29 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 06:29 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 06:29 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 06:29 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 06:29 PM
Surr: 1,2-Dichloroethane-d4	101	0	70-130		%REC	1	8/27/2008 06:29 PM
Surr: 4-Bromofluorobenzene	83.8	0	70-130		%REC	1	8/27/2008 06:29 PM
Surr: Dibromofluoromethane	104	0	70-130		%REC	1	8/27/2008 06:29 PM
Surr: Toluene-d8	92.8	0	70-130		%REC	1	8/27/2008 06:29 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080903B**	QC Batch: **48506**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	340	1600		µg/Kg	5	9/4/2008 03:19 PM
1,2-Dichlorobenzene	ND	210	1600		µg/Kg	5	9/4/2008 03:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-011

Client Sample ID: B-179N-2.0-2.5
Collection Date: 8/25/2008 12:05:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	270	1600		µg/Kg	5	9/4/2008 03:19 PM
1,4-Dichlorobenzene	ND	230	1600		µg/Kg	5	9/4/2008 03:19 PM
2,4,5-Trichlorophenol	ND	390	1600		µg/Kg	5	9/4/2008 03:19 PM
2,4,6-Trichlorophenol	ND	350	1600		µg/Kg	5	9/4/2008 03:19 PM
2,4-Dichlorophenol	ND	380	8200		µg/Kg	5	9/4/2008 03:19 PM
2,4-Dimethylphenol	ND	260	1600		µg/Kg	5	9/4/2008 03:19 PM
2,4-Dinitrophenol	ND	960	8200		µg/Kg	5	9/4/2008 03:19 PM
2,4-Dinitrotoluene	ND	380	1600		µg/Kg	5	9/4/2008 03:19 PM
2,6-Dinitrotoluene	ND	500	1600		µg/Kg	5	9/4/2008 03:19 PM
2-Chloronaphthalene	ND	290	1600		µg/Kg	5	9/4/2008 03:19 PM
2-Chlorophenol	ND	240	1600		µg/Kg	5	9/4/2008 03:19 PM
2-Methylnaphthalene	ND	310	1600		µg/Kg	5	9/4/2008 03:19 PM
2-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 03:19 PM
2-Nitroaniline	ND	450	8200		µg/Kg	5	9/4/2008 03:19 PM
2-Nitrophenol	ND	440	1600		µg/Kg	5	9/4/2008 03:19 PM
3,3´-Dichlorobenzidine	ND	1300	3300		µg/Kg	5	9/4/2008 03:19 PM
3-Nitroaniline	ND	340	8200		µg/Kg	5	9/4/2008 03:19 PM
4,6-Dinitro-2-methylphenol	ND	1000	8200		µg/Kg	5	9/4/2008 03:19 PM
4-Bromophenyl-phenylether	ND	450	1600		µg/Kg	5	9/4/2008 03:19 PM
4-Chloro-3-methylphenol	ND	300	3300		µg/Kg	5	9/4/2008 03:19 PM
4-Chloroaniline	ND	870	3300		µg/Kg	5	9/4/2008 03:19 PM
4-Chlorophenyl-phenylether	ND	320	1600		µg/Kg	5	9/4/2008 03:19 PM
4-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 03:19 PM
4-Nitroaniline	ND	580	8200		µg/Kg	5	9/4/2008 03:19 PM
4-Nitrophenol	ND	800	8200		µg/Kg	5	9/4/2008 03:19 PM
Acenaphthene	ND	350	1600		µg/Kg	5	9/4/2008 03:19 PM
Acenaphthylene	ND	360	1600		µg/Kg	5	9/4/2008 03:19 PM
Anthracene	ND	270	1600		µg/Kg	5	9/4/2008 03:19 PM
Benzidine (M)	ND	550	8200		µg/Kg	5	9/4/2008 03:19 PM
Benzo(a)anthracene	ND	430	1600		µg/Kg	5	9/4/2008 03:19 PM
Benzo(a)pyrene	ND	440	1600		µg/Kg	5	9/4/2008 03:19 PM
Benzo(b)fluoranthene	ND	480	1600		µg/Kg	5	9/4/2008 03:19 PM
Benzo(g,h,i)perylene	ND	380	1600		µg/Kg	5	9/4/2008 03:19 PM
Benzo(k)fluoranthene	ND	520	1600		µg/Kg	5	9/4/2008 03:19 PM
Benzoic acid	ND	780	8200		µg/Kg	5	9/4/2008 03:19 PM
Benzyl alcohol	ND	290	3300		µg/Kg	5	9/4/2008 03:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-011

Client Sample ID: B-179N-2.0-2.5
Collection Date: 8/25/2008 12:05:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	360	1600		µg/Kg	5	9/4/2008 03:19 PM
Bis(2-chloroethyl)ether	ND	230	1600		µg/Kg	5	9/4/2008 03:19 PM
Bis(2-chloroisopropyl)ether	ND	320	1600		µg/Kg	5	9/4/2008 03:19 PM
Bis(2-ethylhexyl)phthalate	ND	1300	1600		µg/Kg	5	9/4/2008 03:19 PM
Butylbenzylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 03:19 PM
Chrysene	ND	390	1600		µg/Kg	5	9/4/2008 03:19 PM
Di-n-butylphthalate	ND	320	1600		µg/Kg	5	9/4/2008 03:19 PM
Di-n-octylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 03:19 PM
Dibenz(a,h)anthracene	ND	380	1600		µg/Kg	5	9/4/2008 03:19 PM
Dibenzofuran	ND	300	1600		µg/Kg	5	9/4/2008 03:19 PM
Diethylphthalate	ND	510	1600		µg/Kg	5	9/4/2008 03:19 PM
Dimethylphthalate	ND	370	1600		µg/Kg	5	9/4/2008 03:19 PM
Fluoranthene	ND	410	1600		µg/Kg	5	9/4/2008 03:19 PM
Fluorene	ND	280	1600		µg/Kg	5	9/4/2008 03:19 PM
Hexachlorobenzene	ND	380	1600		µg/Kg	5	9/4/2008 03:19 PM
Hexachlorobutadiene	ND	270	3300		µg/Kg	5	9/4/2008 03:19 PM
Hexachlorocyclopentadiene	ND	780	3300		µg/Kg	5	9/4/2008 03:19 PM
Hexachloroethane	ND	310	1600		µg/Kg	5	9/4/2008 03:19 PM
Indeno(1,2,3-cd)pyrene	ND	370	1600		µg/Kg	5	9/4/2008 03:19 PM
Isophorone	ND	310	1600		µg/Kg	5	9/4/2008 03:19 PM
N-Nitrosodi-n-propylamine	ND	430	1600		µg/Kg	5	9/4/2008 03:19 PM
N-Nitrosodiphenylamine	ND	380	1600		µg/Kg	5	9/4/2008 03:19 PM
Naphthalene	ND	270	1600		µg/Kg	5	9/4/2008 03:19 PM
Nitrobenzene	ND	350	1600		µg/Kg	5	9/4/2008 03:19 PM
Pentachlorophenol	ND	630	8200		µg/Kg	5	9/4/2008 03:19 PM
Phenanthrene	ND	330	1600		µg/Kg	5	9/4/2008 03:19 PM
Phenol	ND	290	1600		µg/Kg	5	9/4/2008 03:19 PM
Pyrene	ND	410	1600		µg/Kg	5	9/4/2008 03:19 PM
Surr: 1,2-Dichlorobenzene-d4	68.4	0	40-97		%REC	5	9/4/2008 03:19 PM
Surr: 2,4,6-Tribromophenol	58.3	0	31-148		%REC	5	9/4/2008 03:19 PM
Surr: 2-Chlorophenol-d4	74.1	0	49-103		%REC	5	9/4/2008 03:19 PM
Surr: 2-Fluorobiphenyl	79.9	0	55-102		%REC	5	9/4/2008 03:19 PM
Surr: 2-Fluorophenol	75.6	0	45-105		%REC	5	9/4/2008 03:19 PM
Surr: 4-Terphenyl-d14	93.3	0	52-124		%REC	5	9/4/2008 03:19 PM
Surr: Nitrobenzene-d5	85.1	0	48-109		%REC	5	9/4/2008 03:19 PM
Surr: Phenol-d5	78.7	0	47-108		%REC	5	9/4/2008 03:19 PM

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	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-012

Client Sample ID: B-179N-4.5-5.0
Collection Date: 8/25/2008 12:15:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902D**	QC Batch: **48450**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 04:07 PM
Arsenic	3.7	0.14	1.0		mg/Kg	1	9/2/2008 04:07 PM
Barium	68	0.070	1.0		mg/Kg	1	9/2/2008 04:07 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 04:07 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 04:07 PM
Chromium	15	0.075	1.0		mg/Kg	1	9/2/2008 04:07 PM
Cobalt	4.7	0.070	1.0		mg/Kg	1	9/2/2008 04:07 PM
Copper	15	0.10	2.0		mg/Kg	1	9/2/2008 04:07 PM
Lead	120	0.25	1.0		mg/Kg	1	9/2/2008 04:07 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 04:07 PM
Nickel	11	0.18	1.0		mg/Kg	1	9/2/2008 04:07 PM
Selenium	1.1	0.52	1.0		mg/Kg	1	9/2/2008 04:07 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 04:07 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 04:07 PM
Vanadium	27	0.073	1.0		mg/Kg	1	9/2/2008 04:07 PM
Zinc	53	0.57	1.0		mg/Kg	1	9/2/2008 04:07 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/28/2008 04:12 AM
Surr: Bromofluorobenzene (FID)	105	0	42-142		%REC	1	8/28/2008 04:12 AM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/28/2008 04:12 AM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/28/2008 04:12 AM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/28/2008 04:12 AM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/28/2008 04:12 AM
Toluene	ND	0.96	5.0		µg/Kg	1	8/28/2008 04:12 AM
Surr: Bromofluorobenzene (PID)	99.8	0	71-139		%REC	1	8/28/2008 04:12 AM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

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CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-012

Client Sample ID: B-179N-4.5-5.0
Collection Date: 8/25/2008 12:15:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 01:08 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 07:02 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:02 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:02 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 07:02 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:02 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 07:02 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:02 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:02 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:02 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:02 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:02 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 07:02 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:02 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 07:02 PM

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CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-012

Client Sample ID: B-179N-4.5-5.0
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Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:02 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:02 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:02 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:02 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 07:02 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:02 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:02 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:02 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:02 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:02 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:02 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 07:02 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 07:02 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:02 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:02 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 07:02 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:02 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 07:02 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:02 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:02 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:02 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:02 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 07:02 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 07:02 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 07:02 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:02 PM
Surr: 1,2-Dichloroethane-d4	110	0	70-130		%REC	1	8/27/2008 07:02 PM
Surr: 4-Bromofluorobenzene	87.1	0	70-130		%REC	1	8/27/2008 07:02 PM
Surr: Dibromofluoromethane	106	0	70-130		%REC	1	8/27/2008 07:02 PM
Surr: Toluene-d8	94.2	0	70-130		%REC	1	8/27/2008 07:02 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080903B**	QC Batch: **48506**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	340	1600		µg/Kg	5	9/4/2008 03:49 PM
1,2-Dichlorobenzene	ND	210	1600		µg/Kg	5	9/4/2008 03:49 PM

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RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	270	1600		µg/Kg	5	9/4/2008 03:49 PM
1,4-Dichlorobenzene	ND	230	1600		µg/Kg	5	9/4/2008 03:49 PM
2,4,5-Trichlorophenol	ND	390	1600		µg/Kg	5	9/4/2008 03:49 PM
2,4,6-Trichlorophenol	ND	350	1600		µg/Kg	5	9/4/2008 03:49 PM
2,4-Dichlorophenol	ND	380	8200		µg/Kg	5	9/4/2008 03:49 PM
2,4-Dimethylphenol	ND	260	1600		µg/Kg	5	9/4/2008 03:49 PM
2,4-Dinitrophenol	ND	960	8200		µg/Kg	5	9/4/2008 03:49 PM
2,4-Dinitrotoluene	ND	380	1600		µg/Kg	5	9/4/2008 03:49 PM
2,6-Dinitrotoluene	ND	500	1600		µg/Kg	5	9/4/2008 03:49 PM
2-Chloronaphthalene	ND	290	1600		µg/Kg	5	9/4/2008 03:49 PM
2-Chlorophenol	ND	240	1600		µg/Kg	5	9/4/2008 03:49 PM
2-Methylnaphthalene	ND	310	1600		µg/Kg	5	9/4/2008 03:49 PM
2-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 03:49 PM
2-Nitroaniline	ND	450	8200		µg/Kg	5	9/4/2008 03:49 PM
2-Nitrophenol	ND	440	1600		µg/Kg	5	9/4/2008 03:49 PM
3,3´-Dichlorobenzidine	ND	1300	3300		µg/Kg	5	9/4/2008 03:49 PM
3-Nitroaniline	ND	340	8200		µg/Kg	5	9/4/2008 03:49 PM
4,6-Dinitro-2-methylphenol	ND	1000	8200		µg/Kg	5	9/4/2008 03:49 PM
4-Bromophenyl-phenylether	ND	450	1600		µg/Kg	5	9/4/2008 03:49 PM
4-Chloro-3-methylphenol	ND	300	3300		µg/Kg	5	9/4/2008 03:49 PM
4-Chloroaniline	ND	870	3300		µg/Kg	5	9/4/2008 03:49 PM
4-Chlorophenyl-phenylether	ND	320	1600		µg/Kg	5	9/4/2008 03:49 PM
4-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 03:49 PM
4-Nitroaniline	ND	580	8200		µg/Kg	5	9/4/2008 03:49 PM
4-Nitrophenol	ND	800	8200		µg/Kg	5	9/4/2008 03:49 PM
Acenaphthene	ND	350	1600		µg/Kg	5	9/4/2008 03:49 PM
Acenaphthylene	ND	360	1600		µg/Kg	5	9/4/2008 03:49 PM
Anthracene	ND	270	1600		µg/Kg	5	9/4/2008 03:49 PM
Benzidine (M)	ND	550	8200		µg/Kg	5	9/4/2008 03:49 PM
Benzo(a)anthracene	ND	430	1600		µg/Kg	5	9/4/2008 03:49 PM
Benzo(a)pyrene	ND	440	1600		µg/Kg	5	9/4/2008 03:49 PM
Benzo(b)fluoranthene	ND	480	1600		µg/Kg	5	9/4/2008 03:49 PM
Benzo(g,h,i)perylene	ND	380	1600		µg/Kg	5	9/4/2008 03:49 PM
Benzo(k)fluoranthene	ND	520	1600		µg/Kg	5	9/4/2008 03:49 PM
Benzoic acid	ND	780	8200		µg/Kg	5	9/4/2008 03:49 PM
Benzyl alcohol	ND	290	3300		µg/Kg	5	9/4/2008 03:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-012

Client Sample ID: B-179N-4.5-5.0
Collection Date: 8/25/2008 12:15:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	360	1600		µg/Kg	5	9/4/2008 03:49 PM
Bis(2-chloroethyl)ether	ND	230	1600		µg/Kg	5	9/4/2008 03:49 PM
Bis(2-chloroisopropyl)ether	ND	320	1600		µg/Kg	5	9/4/2008 03:49 PM
Bis(2-ethylhexyl)phthalate	ND	1300	1600		µg/Kg	5	9/4/2008 03:49 PM
Butylbenzylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 03:49 PM
Chrysene	ND	390	1600		µg/Kg	5	9/4/2008 03:49 PM
Di-n-butylphthalate	ND	320	1600		µg/Kg	5	9/4/2008 03:49 PM
Di-n-octylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 03:49 PM
Dibenz(a,h)anthracene	ND	380	1600		µg/Kg	5	9/4/2008 03:49 PM
Dibenzofuran	ND	300	1600		µg/Kg	5	9/4/2008 03:49 PM
Diethylphthalate	ND	510	1600		µg/Kg	5	9/4/2008 03:49 PM
Dimethylphthalate	ND	370	1600		µg/Kg	5	9/4/2008 03:49 PM
Fluoranthene	ND	410	1600		µg/Kg	5	9/4/2008 03:49 PM
Fluorene	ND	280	1600		µg/Kg	5	9/4/2008 03:49 PM
Hexachlorobenzene	ND	380	1600		µg/Kg	5	9/4/2008 03:49 PM
Hexachlorobutadiene	ND	270	3300		µg/Kg	5	9/4/2008 03:49 PM
Hexachlorocyclopentadiene	ND	780	3300		µg/Kg	5	9/4/2008 03:49 PM
Hexachloroethane	ND	310	1600		µg/Kg	5	9/4/2008 03:49 PM
Indeno(1,2,3-cd)pyrene	ND	370	1600		µg/Kg	5	9/4/2008 03:49 PM
Isophorone	ND	310	1600		µg/Kg	5	9/4/2008 03:49 PM
N-Nitrosodi-n-propylamine	ND	430	1600		µg/Kg	5	9/4/2008 03:49 PM
N-Nitrosodiphenylamine	ND	380	1600		µg/Kg	5	9/4/2008 03:49 PM
Naphthalene	ND	270	1600		µg/Kg	5	9/4/2008 03:49 PM
Nitrobenzene	ND	350	1600		µg/Kg	5	9/4/2008 03:49 PM
Pentachlorophenol	ND	630	8200		µg/Kg	5	9/4/2008 03:49 PM
Phenanthrene	ND	330	1600		µg/Kg	5	9/4/2008 03:49 PM
Phenol	ND	290	1600		µg/Kg	5	9/4/2008 03:49 PM
Pyrene	ND	410	1600		µg/Kg	5	9/4/2008 03:49 PM
Surr: 1,2-Dichlorobenzene-d4	71.6	0	40-97		%REC	5	9/4/2008 03:49 PM
Surr: 2,4,6-Tribromophenol	64.6	0	31-148		%REC	5	9/4/2008 03:49 PM
Surr: 2-Chlorophenol-d4	77.8	0	49-103		%REC	5	9/4/2008 03:49 PM
Surr: 2-Fluorobiphenyl	83.5	0	55-102		%REC	5	9/4/2008 03:49 PM
Surr: 2-Fluorophenol	78.8	0	45-105		%REC	5	9/4/2008 03:49 PM
Surr: 4-Terphenyl-d14	99.2	0	52-124		%REC	5	9/4/2008 03:49 PM
Surr: Nitrobenzene-d5	86.8	0	48-109		%REC	5	9/4/2008 03:49 PM
Surr: Phenol-d5	83.0	0	47-108		%REC	5	9/4/2008 03:49 PM

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-013

Client Sample ID: B-175N-0-0.5
Collection Date: 8/25/2008 12:40:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902D**	QC Batch: **48450**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 04:11 PM
Arsenic	3.6	0.14	1.0		mg/Kg	1	9/2/2008 04:11 PM
Barium	80	0.070	1.0		mg/Kg	1	9/2/2008 04:11 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 04:11 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 04:11 PM
Chromium	17	0.075	1.0		mg/Kg	1	9/2/2008 04:11 PM
Cobalt	7.1	0.070	1.0		mg/Kg	1	9/2/2008 04:11 PM
Copper	15	0.10	2.0		mg/Kg	1	9/2/2008 04:11 PM
Lead	11	0.25	1.0		mg/Kg	1	9/2/2008 04:11 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 04:11 PM
Nickel	13	0.18	1.0		mg/Kg	1	9/2/2008 04:11 PM
Selenium	1.4	0.52	1.0		mg/Kg	1	9/2/2008 04:11 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 04:11 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 04:11 PM
Vanadium	39	0.073	1.0		mg/Kg	1	9/2/2008 04:11 PM
Zinc	54	0.57	1.0		mg/Kg	1	9/2/2008 04:11 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/28/2008 01:45 AM
Surr: Bromofluorobenzene (FID)	107	0	42-142		%REC	1	8/28/2008 01:45 AM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/28/2008 01:45 AM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/28/2008 01:45 AM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/28/2008 01:45 AM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/28/2008 01:45 AM
Toluene	ND	0.96	5.0		µg/Kg	1	8/28/2008 01:45 AM
Surr: Bromofluorobenzene (PID)	105	0	71-139		%REC	1	8/28/2008 01:45 AM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-013

Client Sample ID: B-175N-0-0.5
Collection Date: 8/25/2008 12:40:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902B**	QC Batch: **48445**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 12:37 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 07:18 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:18 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:18 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 07:18 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:18 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 07:18 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:18 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:18 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:18 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:18 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:18 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 07:18 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:18 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 07:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-013

Client Sample ID: B-175N-0-0.5
Collection Date: 8/25/2008 12:40:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:18 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:18 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:18 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:18 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 07:18 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:18 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:18 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:18 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:18 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:18 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:18 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 07:18 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 07:18 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:18 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:18 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 07:18 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:18 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 07:18 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:18 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:18 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:18 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:18 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 07:18 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 07:18 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 07:18 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:18 PM
Surr: 1,2-Dichloroethane-d4	112	0	70-130		%REC	1	8/27/2008 07:18 PM
Surr: 4-Bromofluorobenzene	88.8	0	70-130		%REC	1	8/27/2008 07:18 PM
Surr: Dibromofluoromethane	110	0	70-130		%REC	1	8/27/2008 07:18 PM
Surr: Toluene-d8	96.9	0	70-130		%REC	1	8/27/2008 07:18 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080903B**	QC Batch: **48506**				PrepDate: **9/2/2008**		Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	68	330		µg/Kg	1	9/4/2008 02:20 PM
1,2-Dichlorobenzene	ND	42	330		µg/Kg	1	9/4/2008 02:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-013

Client Sample ID: B-175N-0-0.5
Collection Date: 8/25/2008 12:40:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	54	330		µg/Kg	1	9/4/2008 02:20 PM
1,4-Dichlorobenzene	ND	46	330		µg/Kg	1	9/4/2008 02:20 PM
2,4,5-Trichlorophenol	ND	78	330		µg/Kg	1	9/4/2008 02:20 PM
2,4,6-Trichlorophenol	ND	71	330		µg/Kg	1	9/4/2008 02:20 PM
2,4-Dichlorophenol	ND	75	1600		µg/Kg	1	9/4/2008 02:20 PM
2,4-Dimethylphenol	ND	52	330		µg/Kg	1	9/4/2008 02:20 PM
2,4-Dinitrophenol	ND	190	1600		µg/Kg	1	9/4/2008 02:20 PM
2,4-Dinitrotoluene	ND	76	330		µg/Kg	1	9/4/2008 02:20 PM
2,6-Dinitrotoluene	ND	100	330		µg/Kg	1	9/4/2008 02:20 PM
2-Chloronaphthalene	ND	59	330		µg/Kg	1	9/4/2008 02:20 PM
2-Chlorophenol	ND	47	330		µg/Kg	1	9/4/2008 02:20 PM
2-Methylnaphthalene	ND	63	330		µg/Kg	1	9/4/2008 02:20 PM
2-Methylphenol	ND	61	330		µg/Kg	1	9/4/2008 02:20 PM
2-Nitroaniline	ND	90	1600		µg/Kg	1	9/4/2008 02:20 PM
2-Nitrophenol	ND	87	330		µg/Kg	1	9/4/2008 02:20 PM
3,3´-Dichlorobenzidine	ND	260	660		µg/Kg	1	9/4/2008 02:20 PM
3-Nitroaniline	ND	67	1600		µg/Kg	1	9/4/2008 02:20 PM
4,6-Dinitro-2-methylphenol	ND	200	1600		µg/Kg	1	9/4/2008 02:20 PM
4-Bromophenyl-phenylether	ND	90	330		µg/Kg	1	9/4/2008 02:20 PM
4-Chloro-3-methylphenol	ND	60	660		µg/Kg	1	9/4/2008 02:20 PM
4-Chloroaniline	ND	170	660		µg/Kg	1	9/4/2008 02:20 PM
4-Chlorophenyl-phenylether	ND	63	330		µg/Kg	1	9/4/2008 02:20 PM
4-Methylphenol	ND	61	330		µg/Kg	1	9/4/2008 02:20 PM
4-Nitroaniline	ND	120	1600		µg/Kg	1	9/4/2008 02:20 PM
4-Nitrophenol	ND	160	1600		µg/Kg	1	9/4/2008 02:20 PM
Acenaphthene	ND	70	330		µg/Kg	1	9/4/2008 02:20 PM
Acenaphthylene	ND	73	330		µg/Kg	1	9/4/2008 02:20 PM
Anthracene	ND	55	330		µg/Kg	1	9/4/2008 02:20 PM
Benzidine (M)	ND	110	1600		µg/Kg	1	9/4/2008 02:20 PM
Benzo(a)anthracene	ND	86	330		µg/Kg	1	9/4/2008 02:20 PM
Benzo(a)pyrene	ND	87	330		µg/Kg	1	9/4/2008 02:20 PM
Benzo(b)fluoranthene	ND	96	330		µg/Kg	1	9/4/2008 02:20 PM
Benzo(g,h,i)perylene	ND	76	330		µg/Kg	1	9/4/2008 02:20 PM
Benzo(k)fluoranthene	ND	100	330		µg/Kg	1	9/4/2008 02:20 PM
Benzoic acid	ND	160	1600		µg/Kg	1	9/4/2008 02:20 PM
Benzyl alcohol	ND	58	660		µg/Kg	1	9/4/2008 02:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-013

Client Sample ID: B-175N-0-0.5
Collection Date: 8/25/2008 12:40:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	72	330		µg/Kg	1	9/4/2008 02:20 PM
Bis(2-chloroethyl)ether	ND	47	330		µg/Kg	1	9/4/2008 02:20 PM
Bis(2-chloroisopropyl)ether	ND	64	330		µg/Kg	1	9/4/2008 02:20 PM
Bis(2-ethylhexyl)phthalate	ND	250	330		µg/Kg	1	9/4/2008 02:20 PM
Butylbenzylphthalate	ND	320	330		µg/Kg	1	9/4/2008 02:20 PM
Chrysene	ND	78	330		µg/Kg	1	9/4/2008 02:20 PM
Di-n-butylphthalate	ND	63	330		µg/Kg	1	9/4/2008 02:20 PM
Di-n-octylphthalate	ND	320	330		µg/Kg	1	9/4/2008 02:20 PM
Dibenz(a,h)anthracene	ND	76	330		µg/Kg	1	9/4/2008 02:20 PM
Dibenzofuran	ND	59	330		µg/Kg	1	9/4/2008 02:20 PM
Diethylphthalate	ND	100	330		µg/Kg	1	9/4/2008 02:20 PM
Dimethylphthalate	ND	74	330		µg/Kg	1	9/4/2008 02:20 PM
Fluoranthene	ND	82	330		µg/Kg	1	9/4/2008 02:20 PM
Fluorene	ND	57	330		µg/Kg	1	9/4/2008 02:20 PM
Hexachlorobenzene	ND	75	330		µg/Kg	1	9/4/2008 02:20 PM
Hexachlorobutadiene	ND	54	660		µg/Kg	1	9/4/2008 02:20 PM
Hexachlorocyclopentadiene	ND	160	660		µg/Kg	1	9/4/2008 02:20 PM
Hexachloroethane	ND	61	330		µg/Kg	1	9/4/2008 02:20 PM
Indeno(1,2,3-cd)pyrene	ND	74	330		µg/Kg	1	9/4/2008 02:20 PM
Isophorone	ND	62	330		µg/Kg	1	9/4/2008 02:20 PM
N-Nitrosodi-n-propylamine	ND	86	330		µg/Kg	1	9/4/2008 02:20 PM
N-Nitrosodiphenylamine	ND	75	330		µg/Kg	1	9/4/2008 02:20 PM
Naphthalene	ND	53	330		µg/Kg	1	9/4/2008 02:20 PM
Nitrobenzene	ND	70	330		µg/Kg	1	9/4/2008 02:20 PM
Pentachlorophenol	ND	130	1600		µg/Kg	1	9/4/2008 02:20 PM
Phenanthrene	ND	66	330		µg/Kg	1	9/4/2008 02:20 PM
Phenol	ND	58	330		µg/Kg	1	9/4/2008 02:20 PM
Pyrene	ND	82	330		µg/Kg	1	9/4/2008 02:20 PM
Surr: 1,2-Dichlorobenzene-d4	81.0	0	40-97		%REC	1	9/4/2008 02:20 PM
Surr: 2,4,6-Tribromophenol	77.1	0	31-148		%REC	1	9/4/2008 02:20 PM
Surr: 2-Chlorophenol-d4	90.0	0	49-103		%REC	1	9/4/2008 02:20 PM
Surr: 2-Fluorobiphenyl	90.7	0	55-102		%REC	1	9/4/2008 02:20 PM
Surr: 2-Fluorophenol	90.5	0	45-105		%REC	1	9/4/2008 02:20 PM
Surr: 4-Terphenyl-d14	109	0	52-124		%REC	1	9/4/2008 02:20 PM
Surr: Nitrobenzene-d5	96.6	0	48-109		%REC	1	9/4/2008 02:20 PM
Surr: Phenol-d5	94.9	0	47-108		%REC	1	9/4/2008 02:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-014

Client Sample ID: B-175N-2.0-2.5
Collection Date: 8/25/2008 12:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902D**	QC Batch: **48450**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 04:16 PM
Arsenic	3.9	0.14	1.0		mg/Kg	1	9/2/2008 04:16 PM
Barium	62	0.070	1.0		mg/Kg	1	9/2/2008 04:16 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 04:16 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 04:16 PM
Chromium	14	0.075	1.0		mg/Kg	1	9/2/2008 04:16 PM
Cobalt	5.0	0.070	1.0		mg/Kg	1	9/2/2008 04:16 PM
Copper	11	0.10	2.0		mg/Kg	1	9/2/2008 04:16 PM
Lead	100	0.25	1.0		mg/Kg	1	9/2/2008 04:16 PM
Molybdenum	ND	0.072	1.0		mg/Kg	1	9/2/2008 04:16 PM
Nickel	11	0.18	1.0		mg/Kg	1	9/2/2008 04:16 PM
Selenium	1.2	0.52	1.0		mg/Kg	1	9/2/2008 04:16 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 04:16 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 04:16 PM
Vanadium	30	0.073	1.0		mg/Kg	1	9/2/2008 04:16 PM
Zinc	53	0.57	1.0		mg/Kg	1	9/2/2008 04:16 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/28/2008 04:41 AM
Surr: Bromofluorobenzene (FID)	105	0	42-142		%REC	1	8/28/2008 04:41 AM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/28/2008 04:41 AM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/28/2008 04:41 AM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/28/2008 04:41 AM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/28/2008 04:41 AM
Toluene	ND	0.96	5.0		µg/Kg	1	8/28/2008 04:41 AM
Surr: Bromofluorobenzene (PID)	101	0	71-139		%REC	1	8/28/2008 04:41 AM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902D**	QC Batch: **48446**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-014

Client Sample ID: B-175N-2.0-2.5
Collection Date: 8/25/2008 12:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902D**	QC Batch: **48446**				PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 03:13 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 07:35 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:35 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:35 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 07:35 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:35 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 07:35 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:35 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:35 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:35 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:35 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:35 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 07:35 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:35 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 07:35 PM

Qualifiers:

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S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-014

Client Sample ID: B-175N-2.0-2.5
Collection Date: 8/25/2008 12:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:35 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:35 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:35 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:35 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 07:35 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:35 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:35 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:35 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:35 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:35 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:35 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 07:35 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 07:35 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:35 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:35 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 07:35 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:35 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 07:35 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:35 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:35 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:35 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:35 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 07:35 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 07:35 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 07:35 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:35 PM
Surr: 1,2-Dichloroethane-d4	102	0	70-130		%REC	1	8/27/2008 07:35 PM
Surr: 4-Bromofluorobenzene	86.5	0	70-130		%REC	1	8/27/2008 07:35 PM
Surr: Dibromofluoromethane	99.2	0	70-130		%REC	1	8/27/2008 07:35 PM
Surr: Toluene-d8	92.4	0	70-130		%REC	1	8/27/2008 07:35 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
	EPA 3550B			**EPA 8270C**			
RunID: **MS6_080903B**	QC Batch: **48506**				PrepDate:	**9/2/2008**	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	340	1600		µg/Kg	5	9/4/2008 04:48 PM
1,2-Dichlorobenzene	ND	210	1600		µg/Kg	5	9/4/2008 04:48 PM

Qualifiers:

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DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-014

Client Sample ID: B-175N-2.0-2.5
Collection Date: 8/25/2008 12:50:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	270	1600		µg/Kg	5	9/4/2008 04:48 PM
1,4-Dichlorobenzene	ND	230	1600		µg/Kg	5	9/4/2008 04:48 PM
2,4,5-Trichlorophenol	ND	390	1600		µg/Kg	5	9/4/2008 04:48 PM
2,4,6-Trichlorophenol	ND	350	1600		µg/Kg	5	9/4/2008 04:48 PM
2,4-Dichlorophenol	ND	380	8200		µg/Kg	5	9/4/2008 04:48 PM
2,4-Dimethylphenol	ND	260	1600		µg/Kg	5	9/4/2008 04:48 PM
2,4-Dinitrophenol	ND	960	8200		µg/Kg	5	9/4/2008 04:48 PM
2,4-Dinitrotoluene	ND	380	1600		µg/Kg	5	9/4/2008 04:48 PM
2,6-Dinitrotoluene	ND	500	1600		µg/Kg	5	9/4/2008 04:48 PM
2-Chloronaphthalene	ND	290	1600		µg/Kg	5	9/4/2008 04:48 PM
2-Chlorophenol	ND	240	1600		µg/Kg	5	9/4/2008 04:48 PM
2-Methylnaphthalene	ND	310	1600		µg/Kg	5	9/4/2008 04:48 PM
2-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 04:48 PM
2-Nitroaniline	ND	450	8200		µg/Kg	5	9/4/2008 04:48 PM
2-Nitrophenol	ND	440	1600		µg/Kg	5	9/4/2008 04:48 PM
3,3´-Dichlorobenzidine	ND	1300	3300		µg/Kg	5	9/4/2008 04:48 PM
3-Nitroaniline	ND	340	8200		µg/Kg	5	9/4/2008 04:48 PM
4,6-Dinitro-2-methylphenol	ND	1000	8200		µg/Kg	5	9/4/2008 04:48 PM
4-Bromophenyl-phenylether	ND	450	1600		µg/Kg	5	9/4/2008 04:48 PM
4-Chloro-3-methylphenol	ND	300	3300		µg/Kg	5	9/4/2008 04:48 PM
4-Chloroaniline	ND	870	3300		µg/Kg	5	9/4/2008 04:48 PM
4-Chlorophenyl-phenylether	ND	320	1600		µg/Kg	5	9/4/2008 04:48 PM
4-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 04:48 PM
4-Nitroaniline	ND	580	8200		µg/Kg	5	9/4/2008 04:48 PM
4-Nitrophenol	ND	800	8200		µg/Kg	5	9/4/2008 04:48 PM
Acenaphthene	ND	350	1600		µg/Kg	5	9/4/2008 04:48 PM
Acenaphthylene	ND	360	1600		µg/Kg	5	9/4/2008 04:48 PM
Anthracene	ND	270	1600		µg/Kg	5	9/4/2008 04:48 PM
Benzidine (M)	ND	550	8200		µg/Kg	5	9/4/2008 04:48 PM
Benzo(a)anthracene	ND	430	1600		µg/Kg	5	9/4/2008 04:48 PM
Benzo(a)pyrene	ND	440	1600		µg/Kg	5	9/4/2008 04:48 PM
Benzo(b)fluoranthene	ND	480	1600		µg/Kg	5	9/4/2008 04:48 PM
Benzo(g,h,i)perylene	ND	380	1600		µg/Kg	5	9/4/2008 04:48 PM
Benzo(k)fluoranthene	ND	520	1600		µg/Kg	5	9/4/2008 04:48 PM
Benzoic acid	ND	780	8200		µg/Kg	5	9/4/2008 04:48 PM
Benzyl alcohol	ND	290	3300		µg/Kg	5	9/4/2008 04:48 PM

Qualifiers:

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DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
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CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-014

Client Sample ID: B-175N-2.0-2.5
Collection Date: 8/25/2008 12:50:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	360	1600		µg/Kg	5	9/4/2008 04:48 PM
Bis(2-chloroethyl)ether	ND	230	1600		µg/Kg	5	9/4/2008 04:48 PM
Bis(2-chloroisopropyl)ether	ND	320	1600		µg/Kg	5	9/4/2008 04:48 PM
Bis(2-ethylhexyl)phthalate	ND	1300	1600		µg/Kg	5	9/4/2008 04:48 PM
Butylbenzylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 04:48 PM
Chrysene	ND	390	1600		µg/Kg	5	9/4/2008 04:48 PM
Di-n-butylphthalate	ND	320	1600		µg/Kg	5	9/4/2008 04:48 PM
Di-n-octylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 04:48 PM
Dibenz(a,h)anthracene	ND	380	1600		µg/Kg	5	9/4/2008 04:48 PM
Dibenzofuran	ND	300	1600		µg/Kg	5	9/4/2008 04:48 PM
Diethylphthalate	ND	510	1600		µg/Kg	5	9/4/2008 04:48 PM
Dimethylphthalate	ND	370	1600		µg/Kg	5	9/4/2008 04:48 PM
Fluoranthene	ND	410	1600		µg/Kg	5	9/4/2008 04:48 PM
Fluorene	ND	280	1600		µg/Kg	5	9/4/2008 04:48 PM
Hexachlorobenzene	ND	380	1600		µg/Kg	5	9/4/2008 04:48 PM
Hexachlorobutadiene	ND	270	3300		µg/Kg	5	9/4/2008 04:48 PM
Hexachlorocyclopentadiene	ND	780	3300		µg/Kg	5	9/4/2008 04:48 PM
Hexachloroethane	ND	310	1600		µg/Kg	5	9/4/2008 04:48 PM
Indeno(1,2,3-cd)pyrene	ND	370	1600		µg/Kg	5	9/4/2008 04:48 PM
Isophorone	ND	310	1600		µg/Kg	5	9/4/2008 04:48 PM
N-Nitrosodi-n-propylamine	ND	430	1600		µg/Kg	5	9/4/2008 04:48 PM
N-Nitrosodiphenylamine	ND	380	1600		µg/Kg	5	9/4/2008 04:48 PM
Naphthalene	ND	270	1600		µg/Kg	5	9/4/2008 04:48 PM
Nitrobenzene	ND	350	1600		µg/Kg	5	9/4/2008 04:48 PM
Pentachlorophenol	ND	630	8200		µg/Kg	5	9/4/2008 04:48 PM
Phenanthrene	ND	330	1600		µg/Kg	5	9/4/2008 04:48 PM
Phenol	ND	290	1600		µg/Kg	5	9/4/2008 04:48 PM
Pyrene	ND	410	1600		µg/Kg	5	9/4/2008 04:48 PM
Surr: 1,2-Dichlorobenzene-d4	73.4	0	40-97		%REC	5	9/4/2008 04:48 PM
Surr: 2,4,6-Tribromophenol	65.6	0	31-148		%REC	5	9/4/2008 04:48 PM
Surr: 2-Chlorophenol-d4	81.1	0	49-103		%REC	5	9/4/2008 04:48 PM
Surr: 2-Fluorobiphenyl	87.3	0	55-102		%REC	5	9/4/2008 04:48 PM
Surr: 2-Fluorophenol	82.2	0	45-105		%REC	5	9/4/2008 04:48 PM
Surr: 4-Terphenyl-d14	94.0	0	52-124		%REC	5	9/4/2008 04:48 PM
Surr: Nitrobenzene-d5	91.3	0	48-109		%REC	5	9/4/2008 04:48 PM
Surr: Phenol-d5	84.8	0	47-108		%REC	5	9/4/2008 04:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-015

Client Sample ID: B-175N-4.5-5
Collection Date: 8/25/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_080902D**	QC Batch: **48450**				PrepDate:	**8/29/2008**	Analyst: **LKN**
Antimony	ND	0.21	2.0		mg/Kg	1	9/2/2008 04:20 PM
Arsenic	10	0.14	1.0		mg/Kg	1	9/2/2008 04:20 PM
Barium	400	0.070	1.0		mg/Kg	1	9/2/2008 04:20 PM
Beryllium	ND	0.055	1.0		mg/Kg	1	9/2/2008 04:20 PM
Cadmium	ND	0.088	1.0		mg/Kg	1	9/2/2008 04:20 PM
Chromium	16	0.075	1.0		mg/Kg	1	9/2/2008 04:20 PM
Cobalt	5.3	0.070	1.0		mg/Kg	1	9/2/2008 04:20 PM
Copper	12	0.10	2.0		mg/Kg	1	9/2/2008 04:20 PM
Lead	170	0.25	1.0		mg/Kg	1	9/2/2008 04:20 PM
Molybdenum	1.0	0.072	1.0		mg/Kg	1	9/2/2008 04:20 PM
Nickel	11	0.18	1.0		mg/Kg	1	9/2/2008 04:20 PM
Selenium	1.1	0.52	1.0		mg/Kg	1	9/2/2008 04:20 PM
Silver	ND	0.097	1.0		mg/Kg	1	9/2/2008 04:20 PM
Thallium	ND	0.25	1.0		mg/Kg	1	9/2/2008 04:20 PM
Vanadium	31	0.073	1.0		mg/Kg	1	9/2/2008 04:20 PM
Zinc	52	0.57	1.0		mg/Kg	1	9/2/2008 04:20 PM
GASOLINE RANGE ORGANICS BY GC/FID							
					EPA 8015B(M)		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
GRO	ND	0.19	1.0		mg/Kg	1	8/28/2008 05:11 AM
Surr: Bromofluorobenzene (FID)	107	0	42-142		%REC	1	8/28/2008 05:11 AM
VOLATILE ORGANIC COMPOUNDS BY GC/PID							
					EPA 8021B		
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
Benzene	ND	0.97	5.0		µg/Kg	1	8/28/2008 05:11 AM
Ethylbenzene	ND	1.1	5.0		µg/Kg	1	8/28/2008 05:11 AM
m,p-Xylene	ND	1.9	10		µg/Kg	1	8/28/2008 05:11 AM
o-Xylene	ND	0.96	5.0		µg/Kg	1	8/28/2008 05:11 AM
Toluene	ND	0.96	5.0		µg/Kg	1	8/28/2008 05:11 AM
Surr: Bromofluorobenzene (PID)	102	0	71-139		%REC	1	8/28/2008 05:11 AM
MERCURY BY COLD VAPOR TECHNIQUE							
					EPA 7471A		
RunID: **AA5_080902D**	QC Batch: **48446**				PrepDate:	**8/28/2008**	Analyst: **AMT**

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-015

Client Sample ID: B-175N-4.5-5
Collection Date: 8/25/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE							
			EPA 7471A				
RunID: **AA5_080902D** QC Batch: **48446**					PrepDate: **8/28/2008**		Analyst: **AMT**
Mercury	ND	0.038	0.10		mg/Kg	1	9/2/2008 03:08 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B** QC Batch: **K08VS402**					PrepDate:		Analyst: **CBB**
1,1,1,2-Tetrachloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,1,1-Trichloroethane	ND	0.61	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,1,2,2-Tetrachloroethane	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,1,2-Trichloroethane	ND	0.97	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,1-Dichloroethane	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,1-Dichloroethene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,1-Dichloropropene	ND	0.98	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2,3-Trichlorobenzene	ND	2.4	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2,3-Trichloropropane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2,4-Trichlorobenzene	ND	1.4	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2,4-Trimethylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2-Dibromo-3-chloropropane	ND	3.0	10		µg/Kg	1	8/27/2008 07:51 PM
1,2-Dibromoethane	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2-Dichlorobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2-Dichloroethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,2-Dichloropropane	ND	0.77	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,3,5-Trimethylbenzene	ND	0.72	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,3-Dichlorobenzene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,3-Dichloropropane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:51 PM
1,4-Dichlorobenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:51 PM
2,2-Dichloropropane	ND	0.62	5.0		µg/Kg	1	8/27/2008 07:51 PM
2-Chlorotoluene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:51 PM
4-Chlorotoluene	ND	0.84	5.0		µg/Kg	1	8/27/2008 07:51 PM
4-Isopropyltoluene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:51 PM
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:51 PM
Bromobenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:51 PM
Bromodichloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:51 PM
Bromoform	ND	0.69	5.0		µg/Kg	1	8/27/2008 07:51 PM
Bromomethane	ND	2.7	5.0		µg/Kg	1	8/27/2008 07:51 PM
Carbon tetrachloride	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:51 PM
Chlorobenzene	ND	0.93	5.0		µg/Kg	1	8/27/2008 07:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-015

Client Sample ID: B-175N-4.5-5
Collection Date: 8/25/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
Chloroethane	ND	1.1	5.0		µg/Kg	1	8/27/2008 07:51 PM
Chloroform	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:51 PM
Chloromethane	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:51 PM
cis-1,2-Dichloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:51 PM
cis-1,3-Dichloropropene	ND	0.76	5.0		µg/Kg	1	8/27/2008 07:51 PM
Dibromochloromethane	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:51 PM
Dibromomethane	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:51 PM
Dichlorodifluoromethane	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:51 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:51 PM
Hexachlorobutadiene	ND	1.2	5.0		µg/Kg	1	8/27/2008 07:51 PM
Isopropylbenzene	ND	0.80	5.0		µg/Kg	1	8/27/2008 07:51 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 07:51 PM
Methylene chloride	ND	5.0	5.0		µg/Kg	1	8/27/2008 07:51 PM
n-Butylbenzene	ND	0.78	5.0		µg/Kg	1	8/27/2008 07:51 PM
n-Propylbenzene	ND	0.82	5.0		µg/Kg	1	8/27/2008 07:51 PM
Naphthalene	ND	3.0	5.0		µg/Kg	1	8/27/2008 07:51 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 07:51 PM
sec-Butylbenzene	ND	0.68	5.0		µg/Kg	1	8/27/2008 07:51 PM
Styrene	ND	0.83	5.0		µg/Kg	1	8/27/2008 07:51 PM
tert-Butylbenzene	ND	0.73	5.0		µg/Kg	1	8/27/2008 07:51 PM
Tetrachloroethene	ND	0.89	5.0		µg/Kg	1	8/27/2008 07:51 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 07:51 PM
trans-1,2-Dichloroethene	ND	0.95	5.0		µg/Kg	1	8/27/2008 07:51 PM
Trichloroethene	ND	0.75	5.0		µg/Kg	1	8/27/2008 07:51 PM
Trichlorofluoromethane	ND	0.79	5.0		µg/Kg	1	8/27/2008 07:51 PM
Vinyl chloride	ND	0.85	5.0		µg/Kg	1	8/27/2008 07:51 PM
Surr: 1,2-Dichloroethane-d4	103	0	70-130		%REC	1	8/27/2008 07:51 PM
Surr: 4-Bromofluorobenzene	88.9	0	70-130		%REC	1	8/27/2008 07:51 PM
Surr: Dibromofluoromethane	103	0	70-130		%REC	1	8/27/2008 07:51 PM
Surr: Toluene-d8	93.4	0	70-130		%REC	1	8/27/2008 07:51 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS							
		EPA 3550B			**EPA 8270C**		
RunID: **MS6_080903B**	QC Batch: **48506**				PrepDate: **9/2/2008**		Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	340	1600		µg/Kg	5	9/4/2008 04:18 PM
1,2-Dichlorobenzene	ND	210	1600		µg/Kg	5	9/4/2008 04:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-015

Client Sample ID: B-175N-4.5-5
Collection Date: 8/25/2008 1:00:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS
EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,3-Dichlorobenzene	ND	270	1600		µg/Kg	5	9/4/2008 04:18 PM
1,4-Dichlorobenzene	ND	230	1600		µg/Kg	5	9/4/2008 04:18 PM
2,4,5-Trichlorophenol	ND	390	1600		µg/Kg	5	9/4/2008 04:18 PM
2,4,6-Trichlorophenol	ND	350	1600		µg/Kg	5	9/4/2008 04:18 PM
2,4-Dichlorophenol	ND	380	8200		µg/Kg	5	9/4/2008 04:18 PM
2,4-Dimethylphenol	ND	260	1600		µg/Kg	5	9/4/2008 04:18 PM
2,4-Dinitrophenol	ND	960	8200		µg/Kg	5	9/4/2008 04:18 PM
2,4-Dinitrotoluene	ND	380	1600		µg/Kg	5	9/4/2008 04:18 PM
2,6-Dinitrotoluene	ND	500	1600		µg/Kg	5	9/4/2008 04:18 PM
2-Chloronaphthalene	ND	290	1600		µg/Kg	5	9/4/2008 04:18 PM
2-Chlorophenol	ND	240	1600		µg/Kg	5	9/4/2008 04:18 PM
2-Methylnaphthalene	ND	310	1600		µg/Kg	5	9/4/2008 04:18 PM
2-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 04:18 PM
2-Nitroaniline	ND	450	8200		µg/Kg	5	9/4/2008 04:18 PM
2-Nitrophenol	ND	440	1600		µg/Kg	5	9/4/2008 04:18 PM
3,3´-Dichlorobenzidine	ND	1300	3300		µg/Kg	5	9/4/2008 04:18 PM
3-Nitroaniline	ND	340	8200		µg/Kg	5	9/4/2008 04:18 PM
4,6-Dinitro-2-methylphenol	ND	1000	8200		µg/Kg	5	9/4/2008 04:18 PM
4-Bromophenyl-phenylether	ND	450	1600		µg/Kg	5	9/4/2008 04:18 PM
4-Chloro-3-methylphenol	ND	300	3300		µg/Kg	5	9/4/2008 04:18 PM
4-Chloroaniline	ND	870	3300		µg/Kg	5	9/4/2008 04:18 PM
4-Chlorophenyl-phenylether	ND	320	1600		µg/Kg	5	9/4/2008 04:18 PM
4-Methylphenol	ND	300	1600		µg/Kg	5	9/4/2008 04:18 PM
4-Nitroaniline	ND	580	8200		µg/Kg	5	9/4/2008 04:18 PM
4-Nitrophenol	ND	800	8200		µg/Kg	5	9/4/2008 04:18 PM
Acenaphthene	ND	350	1600		µg/Kg	5	9/4/2008 04:18 PM
Acenaphthylene	ND	360	1600		µg/Kg	5	9/4/2008 04:18 PM
Anthracene	ND	270	1600		µg/Kg	5	9/4/2008 04:18 PM
Benzidine (M)	ND	550	8200		µg/Kg	5	9/4/2008 04:18 PM
Benzo(a)anthracene	ND	430	1600		µg/Kg	5	9/4/2008 04:18 PM
Benzo(a)pyrene	ND	440	1600		µg/Kg	5	9/4/2008 04:18 PM
Benzo(b)fluoranthene	ND	480	1600		µg/Kg	5	9/4/2008 04:18 PM
Benzo(g,h,i)perylene	ND	380	1600		µg/Kg	5	9/4/2008 04:18 PM
Benzo(k)fluoranthene	ND	520	1600		µg/Kg	5	9/4/2008 04:18 PM
Benzoic acid	ND	780	8200		µg/Kg	5	9/4/2008 04:18 PM
Benzyl alcohol	ND	290	3300		µg/Kg	5	9/4/2008 04:18 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-015

Client Sample ID: B-175N-4.5-5
Collection Date: 8/25/2008 1:00:00 PM
Matrix: SOIL

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B **EPA 8270C**

RunID: **MS6_080903B** QC Batch: **48506** PrepDate: **9/2/2008** Analyst: **SMH**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Bis(2-chloroethoxy)methane	ND	360	1600		µg/Kg	5	9/4/2008 04:18 PM
Bis(2-chloroethyl)ether	ND	230	1600		µg/Kg	5	9/4/2008 04:18 PM
Bis(2-chloroisopropyl)ether	ND	320	1600		µg/Kg	5	9/4/2008 04:18 PM
Bis(2-ethylhexyl)phthalate	ND	1300	1600		µg/Kg	5	9/4/2008 04:18 PM
Butylbenzylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 04:18 PM
Chrysene	ND	390	1600		µg/Kg	5	9/4/2008 04:18 PM
Di-n-butylphthalate	ND	320	1600		µg/Kg	5	9/4/2008 04:18 PM
Di-n-octylphthalate	ND	1600	1600		µg/Kg	5	9/4/2008 04:18 PM
Dibenz(a,h)anthracene	ND	380	1600		µg/Kg	5	9/4/2008 04:18 PM
Dibenzofuran	ND	300	1600		µg/Kg	5	9/4/2008 04:18 PM
Diethylphthalate	ND	510	1600		µg/Kg	5	9/4/2008 04:18 PM
Dimethylphthalate	ND	370	1600		µg/Kg	5	9/4/2008 04:18 PM
Fluoranthene	ND	410	1600		µg/Kg	5	9/4/2008 04:18 PM
Fluorene	ND	280	1600		µg/Kg	5	9/4/2008 04:18 PM
Hexachlorobenzene	ND	380	1600		µg/Kg	5	9/4/2008 04:18 PM
Hexachlorobutadiene	ND	270	3300		µg/Kg	5	9/4/2008 04:18 PM
Hexachlorocyclopentadiene	ND	780	3300		µg/Kg	5	9/4/2008 04:18 PM
Hexachloroethane	ND	310	1600		µg/Kg	5	9/4/2008 04:18 PM
Indeno(1,2,3-cd)pyrene	ND	370	1600		µg/Kg	5	9/4/2008 04:18 PM
Isophorone	ND	310	1600		µg/Kg	5	9/4/2008 04:18 PM
N-Nitrosodi-n-propylamine	ND	430	1600		µg/Kg	5	9/4/2008 04:18 PM
N-Nitrosodiphenylamine	ND	380	1600		µg/Kg	5	9/4/2008 04:18 PM
Naphthalene	ND	270	1600		µg/Kg	5	9/4/2008 04:18 PM
Nitrobenzene	ND	350	1600		µg/Kg	5	9/4/2008 04:18 PM
Pentachlorophenol	ND	630	8200		µg/Kg	5	9/4/2008 04:18 PM
Phenanthrene	ND	330	1600		µg/Kg	5	9/4/2008 04:18 PM
Phenol	ND	290	1600		µg/Kg	5	9/4/2008 04:18 PM
Pyrene	ND	410	1600		µg/Kg	5	9/4/2008 04:18 PM
Surr: 1,2-Dichlorobenzene-d4	70.4	0	40-97		%REC	5	9/4/2008 04:18 PM
Surr: 2,4,6-Tribromophenol	65.8	0	31-148		%REC	5	9/4/2008 04:18 PM
Surr: 2-Chlorophenol-d4	78.7	0	49-103		%REC	5	9/4/2008 04:18 PM
Surr: 2-Fluorobiphenyl	86.2	0	55-102		%REC	5	9/4/2008 04:18 PM
Surr: 2-Fluorophenol	80.9	0	45-105		%REC	5	9/4/2008 04:18 PM
Surr: 4-Terphenyl-d14	101	0	52-124		%REC	5	9/4/2008 04:18 PM
Surr: Nitrobenzene-d5	88.2	0	48-109		%REC	5	9/4/2008 04:18 PM
Surr: Phenol-d5	83.5	0	47-108		%REC	5	9/4/2008 04:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-180N-0-.5
Lab Order:	100642	**Collection Date:**	8/25/2008 1:05:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	85	0.11	5.0		mg/Kg	1	9/2/2008 11:25 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-181N-0-.5
Lab Order:	100642	**Collection Date:**	8/25/2008 2:05:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	80	0.11	5.0		mg/Kg	1	9/2/2008 11:30 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-018

Client Sample ID: B-182N-0-.5
Collection Date: 8/25/2008 2:20:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**		Analyst: **SRB**
Lead	200	0.11	5.0		mg/Kg	1	9/2/2008 11:33 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-019

Client Sample ID: B-182N-1-1.5
Collection Date: 8/25/2008 2:23:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**		Analyst: **SRB**
Lead	21	0.11	5.0		mg/Kg	1	9/2/2008 11:37 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-184N-0-.5
Lab Order:	100642	**Collection Date:**	8/25/2008 2:35:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	74	0.11	5.0		mg/Kg	1	9/2/2008 11:41 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-186N-0-.5
Lab Order:	100642	**Collection Date:**	8/25/2008 3:03:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	7.9	0.11	5.0		mg/Kg	1	9/2/2008 11:45 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-1
Lab Order:	100642	**Collection Date:**	8/25/2008 3:25:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	100642-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080903B**	QC Batch: **48512**				PrepDate:	**9/2/2008**	Analyst: **LKN**
Lead	ND	0.0046	0.25		mg/L	1	9/3/2008 11:15 AM

CLIENT:	TRC	**Client Sample ID:**	B-183N-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 8:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	53	0.11	5.0		mg/Kg	1	9/2/2008 11:49 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-184N-1-1.5
Lab Order:	100642	**Collection Date:**	8/26/2008 8:40:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	13	0.11	5.0		mg/Kg	1	9/2/2008 11:53 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-184N-2-2.5
Lab Order:	100642	**Collection Date:**	8/26/2008 8:45:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	7.0	0.11	5.0		mg/Kg	1	9/2/2008 12:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-187N-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 8:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	8.8	0.11	5.0		mg/Kg	1	9/2/2008 12:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-187N-1-1.5
Lab Order:	100642	**Collection Date:**	8/26/2008 9:00:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	6.3	0.11	5.0		mg/Kg	1	9/2/2008 12:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-029

Client Sample ID: B-188N-0-0.5
Collection Date: 8/26/2008 9:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 03:40 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 03:40 AM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/5/2008 03:40 AM
T/R Hydrocarbons: C28-C36	ND	10	10		mg/Kg	1	9/5/2008 03:40 AM
T/R Hydrocarbons: C36-C40	ND	10	10		mg/Kg	1	9/5/2008 03:40 AM
T/R Hydrocarbons: C8-C40 Total	ND	10	10		mg/Kg	1	9/5/2008 03:40 AM
Surr: p-Terphenyl	87.6	0	62-133		%REC	1	9/5/2008 03:40 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 05:40 AM
Surr: Bromofluorobenzene (FID)	104	0	42-142		%REC	1	8/28/2008 05:40 AM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080827B**	QC Batch: **K08VS402**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/27/2008 08:07 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/27/2008 08:07 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/27/2008 08:07 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/27/2008 08:07 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/27/2008 08:07 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/27/2008 08:07 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/27/2008 08:07 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/27/2008 08:07 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/27/2008 08:07 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/27/2008 08:07 PM
Surr: 1,2-Dichloroethane-d4	105	0	70-130		%REC	1	8/27/2008 08:07 PM
Surr: 4-Bromofluorobenzene	86.4	0	70-130		%REC	1	8/27/2008 08:07 PM
Surr: Dibromofluoromethane	106	0	70-130		%REC	1	8/27/2008 08:07 PM
Surr: Toluene-d8	95.0	0	70-130		%REC	1	8/27/2008 08:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-030

Client Sample ID: B-188N-2-2.5
Collection Date: 8/26/2008 9:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 04:07 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 04:07 AM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/5/2008 04:07 AM
T/R Hydrocarbons: C28-C36	ND	10	10		mg/Kg	1	9/5/2008 04:07 AM
T/R Hydrocarbons: C36-C40	ND	10	10		mg/Kg	1	9/5/2008 04:07 AM
T/R Hydrocarbons: C8-C40 Total	ND	10	10		mg/Kg	1	9/5/2008 04:07 AM
Surr: p-Terphenyl	90.5	0	62-133		%REC	1	9/5/2008 04:07 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 06:09 AM
Surr: Bromofluorobenzene (FID)	108	0	42-142		%REC	1	8/28/2008 06:09 AM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:13 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 01:13 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 01:13 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 01:13 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 01:13 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:13 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 01:13 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:13 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 01:13 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:13 PM
Surr: 1,2-Dichloroethane-d4	114	0	70-130		%REC	1	8/28/2008 01:13 PM
Surr: 4-Bromofluorobenzene	93.0	0	70-130		%REC	1	8/28/2008 01:13 PM
Surr: Dibromofluoromethane	105	0	70-130		%REC	1	8/28/2008 01:13 PM
Surr: Toluene-d8	93.6	0	70-130		%REC	1	8/28/2008 01:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-031

Client Sample ID: B-188N-4.5-5
Collection Date: 8/26/2008 9:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	100	100		mg/Kg	10	9/5/2008 07:46 AM
T/R Hydrocarbons: C10-C18	ND	100	100		mg/Kg	10	9/5/2008 07:46 AM
T/R Hydrocarbons: C18-C28	610	100	100		mg/Kg	10	9/5/2008 07:46 AM
T/R Hydrocarbons: C28-C36	2100	100	100		mg/Kg	10	9/5/2008 07:46 AM
T/R Hydrocarbons: C36-C40	1600	100	100		mg/Kg	10	9/5/2008 07:46 AM
T/R Hydrocarbons: C8-C40 Total	4300	100	100		mg/Kg	10	9/5/2008 07:46 AM
Surr: p-Terphenyl	0	0	62-133	SDO	%REC	10	9/5/2008 07:46 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 06:39 AM
Surr: Bromofluorobenzene (FID)	100	0	42-142		%REC	1	8/28/2008 06:39 AM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:29 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 01:29 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 01:29 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 01:29 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 01:29 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:29 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 01:29 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:29 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 01:29 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:29 PM
Surr: 1,2-Dichloroethane-d4	98.4	0	70-130		%REC	1	8/28/2008 01:29 PM
Surr: 4-Bromofluorobenzene	77.8	0	70-130		%REC	1	8/28/2008 01:29 PM
Surr: Dibromofluoromethane	99.6	0	70-130		%REC	1	8/28/2008 01:29 PM
Surr: Toluene-d8	86.5	0	70-130		%REC	1	8/28/2008 01:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-032

Client Sample ID: B-189N-0-0.5
Collection Date: 8/26/2008 9:40:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 06:24 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 06:24 AM
T/R Hydrocarbons: C18-C28	58	10	10		mg/Kg	1	9/5/2008 06:24 AM
T/R Hydrocarbons: C28-C36	210	10	10		mg/Kg	1	9/5/2008 06:24 AM
T/R Hydrocarbons: C36-C40	110	10	10		mg/Kg	1	9/5/2008 06:24 AM
T/R Hydrocarbons: C8-C40 Total	370	10	10		mg/Kg	1	9/5/2008 06:24 AM
Surr: p-Terphenyl	91.5	0	62-133		%REC	1	9/5/2008 06:24 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 07:08 AM
Surr: Bromofluorobenzene (FID)	99.2	0	42-142		%REC	1	8/28/2008 07:08 AM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:45 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 01:45 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 01:45 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 01:45 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 01:45 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:45 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 01:45 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:45 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 01:45 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 01:45 PM
Surr: 1,2-Dichloroethane-d4	98.4	0	70-130		%REC	1	8/28/2008 01:45 PM
Surr: 4-Bromofluorobenzene	75.5	0	70-130		%REC	1	8/28/2008 01:45 PM
Surr: Dibromofluoromethane	77.5	0	70-130		%REC	1	8/28/2008 01:45 PM
Surr: Toluene-d8	87.0	0	70-130		%REC	1	8/28/2008 01:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-033

Client Sample ID: B-189N-2.0-2.5
Collection Date: 8/26/2008 9:45:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate: **8/29/2008**		Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 04:35 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 04:35 AM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/5/2008 04:35 AM
T/R Hydrocarbons: C28-C36	ND	10	10		mg/Kg	1	9/5/2008 04:35 AM
T/R Hydrocarbons: C36-C40	ND	10	10		mg/Kg	1	9/5/2008 04:35 AM
T/R Hydrocarbons: C8-C40 Total	ND	10	10		mg/Kg	1	9/5/2008 04:35 AM
Surr: p-Terphenyl	85.3	0	62-133		%REC	1	9/5/2008 04:35 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080827B**	QC Batch: **D08VS139**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 07:38 AM
Surr: Bromofluorobenzene (FID)	107	0	42-142		%REC	1	8/28/2008 07:38 AM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:10 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 02:10 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 02:10 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 02:10 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 02:10 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:10 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 02:10 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:10 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 02:10 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:10 PM
Surr: 1,2-Dichloroethane-d4	107	0	70-130		%REC	1	8/28/2008 02:10 PM
Surr: 4-Bromofluorobenzene	89.4	0	70-130		%REC	1	8/28/2008 02:10 PM
Surr: Dibromofluoromethane	106	0	70-130		%REC	1	8/28/2008 02:10 PM
Surr: Toluene-d8	96.5	0	70-130		%REC	1	8/28/2008 02:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-034

Client Sample ID: B-189N-4.5-5
Collection Date: 8/26/2008 9:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 05:02 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 05:02 AM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/5/2008 05:02 AM
T/R Hydrocarbons: C28-C36	28	10	10		mg/Kg	1	9/5/2008 05:02 AM
T/R Hydrocarbons: C36-C40	17	10	10		mg/Kg	1	9/5/2008 05:02 AM
T/R Hydrocarbons: C8-C40 Total	44	10	10		mg/Kg	1	9/5/2008 05:02 AM
Surr: p-Terphenyl	90.4	0	62-133		%REC	1	9/5/2008 05:02 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 12:42 PM
Surr: Bromofluorobenzene (FID)	106	0	42-142		%REC	1	8/28/2008 12:42 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 12:40 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 12:40 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 12:40 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 12:40 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 12:40 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 12:40 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 12:40 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 12:40 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 12:40 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 12:40 PM
Surr: 1,2-Dichloroethane-d4	92.4	0	70-130		%REC	1	8/28/2008 12:40 PM
Surr: 4-Bromofluorobenzene	88.0	0	70-130		%REC	1	8/28/2008 12:40 PM
Surr: Dibromofluoromethane	94.1	0	70-130		%REC	1	8/28/2008 12:40 PM
Surr: Toluene-d8	91.0	0	70-130		%REC	1	8/28/2008 12:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-035

Client Sample ID: B-190N-0-0.5
Collection Date: 8/26/2008 10:15:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 06:51 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 06:51 AM
T/R Hydrocarbons: C18-C28	51	10	10		mg/Kg	1	9/5/2008 06:51 AM
T/R Hydrocarbons: C28-C36	260	10	10		mg/Kg	1	9/5/2008 06:51 AM
T/R Hydrocarbons: C36-C40	280	10	10		mg/Kg	1	9/5/2008 06:51 AM
T/R Hydrocarbons: C8-C40 Total	600	10	10		mg/Kg	1	9/5/2008 06:51 AM
Surr: p-Terphenyl	85.2	0	62-133		%REC	1	9/5/2008 06:51 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 03:39 PM
Surr: Bromofluorobenzene (FID)	106	0	42-142		%REC	1	8/28/2008 03:39 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:26 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 02:26 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 02:26 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 02:26 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 02:26 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:26 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 02:26 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:26 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 02:26 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:26 PM
Surr: 1,2-Dichloroethane-d4	94.2	0	70-130		%REC	1	8/28/2008 02:26 PM
Surr: 4-Bromofluorobenzene	90.5	0	70-130		%REC	1	8/28/2008 02:26 PM
Surr: Dibromofluoromethane	97.0	0	70-130		%REC	1	8/28/2008 02:26 PM
Surr: Toluene-d8	93.8	0	70-130		%REC	1	8/28/2008 02:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-036

Client Sample ID: B-190N-2-2.5
Collection Date: 8/26/2008 10:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 05:57 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 05:57 AM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/5/2008 05:57 AM
T/R Hydrocarbons: C28-C36	27	10	10		mg/Kg	1	9/5/2008 05:57 AM
T/R Hydrocarbons: C36-C40	22	10	10		mg/Kg	1	9/5/2008 05:57 AM
T/R Hydrocarbons: C8-C40 Total	49	10	10		mg/Kg	1	9/5/2008 05:57 AM
Surr: p-Terphenyl	90.1	0	62-133		%REC	1	9/5/2008 05:57 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 04:08 PM
Surr: Bromofluorobenzene (FID)	103	0	42-142		%REC	1	8/28/2008 04:08 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:43 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 02:43 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 02:43 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 02:43 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 02:43 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:43 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 02:43 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:43 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 02:43 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:43 PM
Surr: 1,2-Dichloroethane-d4	106	0	70-130		%REC	1	8/28/2008 02:43 PM
Surr: 4-Bromofluorobenzene	91.1	0	70-130		%REC	1	8/28/2008 02:43 PM
Surr: Dibromofluoromethane	104	0	70-130		%REC	1	8/28/2008 02:43 PM
Surr: Toluene-d8	95.9	0	70-130		%REC	1	8/28/2008 02:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-037

Client Sample ID: B-190N-4.5-5
Collection Date: 8/26/2008 10:30:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 07:18 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 07:18 AM
T/R Hydrocarbons: C18-C28	110	10	10		mg/Kg	1	9/5/2008 07:18 AM
T/R Hydrocarbons: C28-C36	320	10	10		mg/Kg	1	9/5/2008 07:18 AM
T/R Hydrocarbons: C36-C40	230	10	10		mg/Kg	1	9/5/2008 07:18 AM
T/R Hydrocarbons: C8-C40 Total	660	10	10		mg/Kg	1	9/5/2008 07:18 AM
Surr: p-Terphenyl	94.8	0	62-133		%REC	1	9/5/2008 07:18 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 04:38 PM
Surr: Bromofluorobenzene (FID)	108	0	42-142		%REC	1	8/28/2008 04:38 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:59 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 02:59 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 02:59 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 02:59 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 02:59 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:59 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 02:59 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:59 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 02:59 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 02:59 PM
Surr: 1,2-Dichloroethane-d4	108	0	70-130		%REC	1	8/28/2008 02:59 PM
Surr: 4-Bromofluorobenzene	88.9	0	70-130		%REC	1	8/28/2008 02:59 PM
Surr: Dibromofluoromethane	106	0	70-130		%REC	1	8/28/2008 02:59 PM
Surr: Toluene-d8	93.5	0	70-130		%REC	1	8/28/2008 02:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-038

Client Sample ID: B-191N-0-0.5
Collection Date: 8/26/2008 10:50:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903E**	QC Batch: **48476**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/5/2008 05:29 AM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/5/2008 05:29 AM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/5/2008 05:29 AM
T/R Hydrocarbons: C28-C36	21	10	10		mg/Kg	1	9/5/2008 05:29 AM
T/R Hydrocarbons: C36-C40	15	10	10		mg/Kg	1	9/5/2008 05:29 AM
T/R Hydrocarbons: C8-C40 Total	37	10	10		mg/Kg	1	9/5/2008 05:29 AM
Surr: p-Terphenyl	91.7	0	62-133		%REC	1	9/5/2008 05:29 AM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 05:07 PM
Surr: Bromofluorobenzene (FID)	104	0	42-142		%REC	1	8/28/2008 05:07 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:15 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 03:15 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 03:15 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 03:15 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 03:15 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:15 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 03:15 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:15 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 03:15 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:15 PM
Surr: 1,2-Dichloroethane-d4	109	0	70-130		%REC	1	8/28/2008 03:15 PM
Surr: 4-Bromofluorobenzene	90.0	0	70-130		%REC	1	8/28/2008 03:15 PM
Surr: Dibromofluoromethane	107	0	70-130		%REC	1	8/28/2008 03:15 PM
Surr: Toluene-d8	94.7	0	70-130		%REC	1	8/28/2008 03:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-039

Client Sample ID: B-191N-2-2.5
Collection Date: 8/26/2008 11:00:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903A**	QC Batch: **48475**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/4/2008 07:24 PM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/4/2008 07:24 PM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/4/2008 07:24 PM
T/R Hydrocarbons: C28-C36	28	10	10		mg/Kg	1	9/4/2008 07:24 PM
T/R Hydrocarbons: C36-C40	20	10	10		mg/Kg	1	9/4/2008 07:24 PM
T/R Hydrocarbons: C8-C40 Total	48	10	10		mg/Kg	1	9/4/2008 07:24 PM
Surr: p-Terphenyl	96.0	0	62-133		%REC	1	9/4/2008 07:24 PM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 08:04 PM
Surr: Bromofluorobenzene (FID)	101	0	42-142		%REC	1	8/28/2008 08:04 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080828A**	QC Batch: **K08VS403**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:32 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/28/2008 03:32 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/28/2008 03:32 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/28/2008 03:32 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/28/2008 03:32 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:32 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/28/2008 03:32 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:32 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/28/2008 03:32 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/28/2008 03:32 PM
Surr: 1,2-Dichloroethane-d4	114	0	70-130		%REC	1	8/28/2008 03:32 PM
Surr: 4-Bromofluorobenzene	84.7	0	70-130		%REC	1	8/28/2008 03:32 PM
Surr: Dibromofluoromethane	103	0	70-130		%REC	1	8/28/2008 03:32 PM
Surr: Toluene-d8	95.1	0	70-130		%REC	1	8/28/2008 03:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-040

Client Sample ID: B-191N-4.5-5
Collection Date: 8/26/2008 11:10:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903A**	QC Batch: **48475**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/4/2008 06:56 PM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/4/2008 06:56 PM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/4/2008 06:56 PM
T/R Hydrocarbons: C28-C36	10	10	10		mg/Kg	1	9/4/2008 06:56 PM
T/R Hydrocarbons: C36-C40	ND	10	10		mg/Kg	1	9/4/2008 06:56 PM
T/R Hydrocarbons: C8-C40 Total	10	10	10		mg/Kg	1	9/4/2008 06:56 PM
Surr: p-Terphenyl	102	0	62-133		%REC	1	9/4/2008 06:56 PM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 08:34 PM
Surr: Bromofluorobenzene (FID)	109	0	42-142		%REC	1	8/28/2008 08:34 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080829A**	QC Batch: **K08VS404**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:57 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/29/2008 12:57 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/29/2008 12:57 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/29/2008 12:57 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/29/2008 12:57 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:57 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/29/2008 12:57 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:57 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/29/2008 12:57 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:57 PM
Surr: 1,2-Dichloroethane-d4	119	0	70-130		%REC	1	8/29/2008 12:57 PM
Surr: 4-Bromofluorobenzene	92.5	0	70-130		%REC	1	8/29/2008 12:57 PM
Surr: Dibromofluoromethane	112	0	70-130		%REC	1	8/29/2008 12:57 PM
Surr: Toluene-d8	95.8	0	70-130		%REC	1	8/29/2008 12:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-041

Client Sample ID: B-192N-0-.5
Collection Date: 8/26/2008 11:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903A**	QC Batch: **48475**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/4/2008 08:48 PM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/4/2008 08:48 PM
T/R Hydrocarbons: C18-C28	51	10	10		mg/Kg	1	9/4/2008 08:48 PM
T/R Hydrocarbons: C28-C36	220	10	10		mg/Kg	1	9/4/2008 08:48 PM
T/R Hydrocarbons: C36-C40	170	10	10		mg/Kg	1	9/4/2008 08:48 PM
T/R Hydrocarbons: C8-C40 Total	440	10	10		mg/Kg	1	9/4/2008 08:48 PM
Surr: p-Terphenyl	102	0	62-133		%REC	1	9/4/2008 08:48 PM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 09:03 PM
Surr: Bromofluorobenzene (FID)	101	0	42-142		%REC	1	8/28/2008 09:03 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080829A**	QC Batch: **K08VS404**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:14 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/29/2008 01:14 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/29/2008 01:14 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/29/2008 01:14 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/29/2008 01:14 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:14 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/29/2008 01:14 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:14 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/29/2008 01:14 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:14 PM
Surr: 1,2-Dichloroethane-d4	107	0	70-130		%REC	1	8/29/2008 01:14 PM
Surr: 4-Bromofluorobenzene	86.7	0	70-130		%REC	1	8/29/2008 01:14 PM
Surr: Dibromofluoromethane	105	0	70-130		%REC	1	8/29/2008 01:14 PM
Surr: Toluene-d8	94.9	0	70-130		%REC	1	8/29/2008 01:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-042

Client Sample ID: B-192N-2-2.5
Collection Date: 8/26/2008 11:30:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903A**	QC Batch: **48475**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/4/2008 06:28 PM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/4/2008 06:28 PM
T/R Hydrocarbons: C18-C28	ND	10	10		mg/Kg	1	9/4/2008 06:28 PM
T/R Hydrocarbons: C28-C36	13	10	10		mg/Kg	1	9/4/2008 06:28 PM
T/R Hydrocarbons: C36-C40	10	10	10		mg/Kg	1	9/4/2008 06:28 PM
T/R Hydrocarbons: C8-C40 Total	23	10	10		mg/Kg	1	9/4/2008 06:28 PM
Surr: p-Terphenyl	93.6	0	62-133		%REC	1	9/4/2008 06:28 PM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 09:33 PM
Surr: Bromofluorobenzene (FID)	105	0	42-142		%REC	1	8/28/2008 09:33 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080829A**	QC Batch: **K08VS404**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:31 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/29/2008 01:31 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/29/2008 01:31 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/29/2008 01:31 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/29/2008 01:31 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:31 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/29/2008 01:31 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:31 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/29/2008 01:31 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/29/2008 01:31 PM
Surr: 1,2-Dichloroethane-d4	111	0	70-130		%REC	1	8/29/2008 01:31 PM
Surr: 4-Bromofluorobenzene	88.2	0	70-130		%REC	1	8/29/2008 01:31 PM
Surr: Dibromofluoromethane	109	0	70-130		%REC	1	8/29/2008 01:31 PM
Surr: Toluene-d8	97.1	0	70-130		%REC	1	8/29/2008 01:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-043

Client Sample ID: B-192N-4.5-5
Collection Date: 8/26/2008 11:40:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION							
LUFT			**EPA 8015B(M)**				
RunID: **GC8_BACK_080903A**	QC Batch: **48475**				PrepDate:	**8/29/2008**	Analyst: **CBR**
T/R Hydrocarbons: C8-C10	ND	10	10		mg/Kg	1	9/4/2008 08:20 PM
T/R Hydrocarbons: C10-C18	ND	10	10		mg/Kg	1	9/4/2008 08:20 PM
T/R Hydrocarbons: C18-C28	33	10	10		mg/Kg	1	9/4/2008 08:20 PM
T/R Hydrocarbons: C28-C36	140	10	10		mg/Kg	1	9/4/2008 08:20 PM
T/R Hydrocarbons: C36-C40	89	10	10		mg/Kg	1	9/4/2008 08:20 PM
T/R Hydrocarbons: C8-C40 Total	260	10	10		mg/Kg	1	9/4/2008 08:20 PM
Surr: p-Terphenyl	97.1	0	62-133		%REC	1	9/4/2008 08:20 PM
HYDROCARBON CHAIN IDENTIFICATION							
			EPA 8015B				
RunID: **GC1_080828A**	QC Batch: **D08VS140**				PrepDate:		Analyst: **KHN**
T/R Hydrocarbons: C5-C12	ND	0.19	1.0		mg/Kg	1	8/28/2008 10:02 PM
Surr: Bromofluorobenzene (FID)	104	0	42-142		%REC	1	8/28/2008 10:02 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS							
			EPA 8260B				
RunID: **MS4_080829A**	QC Batch: **K08VS404**				PrepDate:		Analyst: **CBB**
Benzene	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:24 PM
Di-isopropyl ether	ND	0.77	5.0		µg/Kg	1	8/29/2008 12:24 PM
Ethyl Tert-butyl ether	ND	0.94	5.0		µg/Kg	1	8/29/2008 12:24 PM
Ethylbenzene	ND	0.83	5.0		µg/Kg	1	8/29/2008 12:24 PM
m,p-Xylene	ND	1.6	10		µg/Kg	1	8/29/2008 12:24 PM
MTBE	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:24 PM
o-Xylene	ND	0.81	5.0		µg/Kg	1	8/29/2008 12:24 PM
Tert-amyl methyl ether	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:24 PM
Tert-Butanol	ND	17	100		µg/Kg	1	8/29/2008 12:24 PM
Toluene	ND	1.0	5.0		µg/Kg	1	8/29/2008 12:24 PM
Surr: 1,2-Dichloroethane-d4	109	0	70-130		%REC	1	8/29/2008 12:24 PM
Surr: 4-Bromofluorobenzene	96.6	0	70-130		%REC	1	8/29/2008 12:24 PM
Surr: Dibromofluoromethane	106	0	70-130		%REC	1	8/29/2008 12:24 PM
Surr: Toluene-d8	96.7	0	70-130		%REC	1	8/29/2008 12:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-234N-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 1:30:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-044		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	16	0.11	5.0		mg/Kg	1	9/2/2008 12:28 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-234NA-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 1:33:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-045		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	17	0.11	5.0		mg/Kg	1	9/2/2008 12:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100642
Project: Caltrans West County Connectors, 151396
Lab ID: 100642-046

Client Sample ID: B-235N-0-.5
Collection Date: 8/26/2008 1:37:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**		Analyst: **SRB**
Lead	12	0.11	5.0		mg/Kg	1	9/2/2008 12:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-236N-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 1:42:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-047		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	8.7	0.11	5.0		mg/Kg	1	9/2/2008 12:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-250N-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 1:55:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-048		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	83	0.11	5.0		mg/Kg	1	9/2/2008 12:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-193N-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 2:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-049		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	32	0.11	5.0		mg/Kg	1	9/2/2008 12:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-194N-0-.5
Lab Order:	100642	**Collection Date:**	8/26/2008 2:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-050		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	18	0.11	5.0		mg/Kg	1	9/2/2008 01:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-185N-0-.5
Lab Order:	100642	**Collection Date:**	8/25/2008 2:45:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100642-051		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080902A**	QC Batch: **48462**				PrepDate: **8/29/2008**	Analyst: **SRB**	
Lead	ND	0.11	5.0		mg/Kg	1	9/2/2008 01:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48448**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98997**
Client ID: **PBS**	Batch ID: **48448**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/2/2008**	SeqNo: **1532500**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	0.193	1.0									
Beryllium	ND	1.0									
Cadmium	0.021	1.0									
Chromium	0.101	1.0									
Cobalt	0.027	1.0									
Copper	ND	2.0									
Lead	0.125	1.0									
Molybdenum	0.095	1.0									
Nickel	0.079	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	0.089	1.0									
Zinc	0.441	1.0									

Sample ID: **LCS-48448**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98997**
Client ID: **LCSS**	Batch ID: **48448**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/2/2008**	SeqNo: **1532501**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	51.727	2.0	50.00	0	103	80	120				
Arsenic	55.422	1.0	50.00	0	111	80	120				
Barium	53.057	1.0	50.00	0.1931	106	80	120				
Beryllium	51.970	1.0	50.00	0	104	80	120				
Cadmium	53.932	1.0	50.00	0.02129	108	80	120				
Chromium	52.418	1.0	50.00	0.1007	105	80	120				
Cobalt	53.819	1.0	50.00	0.02689	108	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-48448** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98997**
Client ID: **LCSS** Batch ID: **48448** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532501**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Copper	49.725	2.0	50.00	0	99.4	80	120				
Lead	54.243	1.0	50.00	0.1250	108	80	120				
Molybdenum	52.943	1.0	50.00	0.09506	106	80	120				
Nickel	52.410	1.0	50.00	0.07904	105	80	120				
Selenium	54.816	1.0	50.00	0	110	80	120				
Silver	49.503	1.0	50.00	0	99.0	80	120				
Thallium	48.267	1.0	50.00	0	96.5	80	120				
Vanadium	51.846	1.0	50.00	0.08853	104	80	120				
Zinc	54.761	1.0	50.00	0.4407	109	80	120				

Sample ID: **100642-010A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98997**
Client ID: **B-179N-0-0.5** Batch ID: **48448** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532512**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	4.907	1.0						5.347	8.57	20	
Barium	106.065	1.0						114.6	7.74	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.528	1.0						0.6051	0	20	
Chromium	21.225	1.0						20.61	2.94	20	
Cobalt	8.828	1.0						8.164	7.81	20	
Copper	19.900	2.0						19.95	0.241	20	
Lead	12.226	1.0						17.29	34.3	20	R
Molybdenum	0.801	1.0						0.9457	0	20	
Nickel	16.812	1.0						16.34	2.84	20	
Selenium	1.368	1.0						1.911	33.1	20	R
Silver	ND	1.0						0	0	20	
Thallium	0.304	1.0						0	0	20	
Vanadium	44.967	1.0						44.65	0.713	20	
Zinc	62.259	1.0						61.87	0.621	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100642-010A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98997**
Client ID: **B-179N-0-0.5** Batch ID: **48448** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532513**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	74.963	2.0	125.0	0	60.0	24	109				
Arsenic	106.682	1.0	125.0	5.347	81.1	52	106				
Barium	205.497	1.0	125.0	114.6	72.7	31	129				
Beryllium	97.218	1.0	125.0	0	77.8	55	110				
Cadmium	96.869	1.0	125.0	0.6051	77.0	51	110				
Chromium	113.712	1.0	125.0	20.61	74.5	50	114				
Cobalt	106.420	1.0	125.0	8.164	78.6	51	109				
Copper	124.193	2.0	125.0	19.95	83.4	55	122				
Lead	109.192	1.0	125.0	17.29	73.5	45	110				
Molybdenum	98.660	1.0	125.0	0.9457	78.2	52	109				
Nickel	114.449	1.0	125.0	16.34	78.5	47	111				
Selenium	100.236	1.0	125.0	1.911	78.7	48	108				
Silver	98.064	1.0	125.0	0	78.5	55	110				
Thallium	87.261	1.0	125.0	0	69.8	43	105				
Vanadium	144.564	1.0	125.0	44.65	79.9	54	115				
Zinc	160.845	1.0	125.0	61.87	79.2	39	120				

Sample ID: **100642-010A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98997**
Client ID: **B-179N-0-0.5** Batch ID: **48448** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532514**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	75.159	2.0	125.0	0	60.1	24	109	74.96	0.260	20	
Arsenic	103.772	1.0	125.0	5.347	78.7	52	106	106.7	2.77	20	
Barium	210.140	1.0	125.0	114.6	76.4	31	129	205.5	2.23	20	
Beryllium	95.763	1.0	125.0	0	76.6	55	110	97.22	1.51	20	
Cadmium	95.692	1.0	125.0	0.6051	76.1	51	110	96.87	1.22	20	
Chromium	114.525	1.0	125.0	20.61	75.1	50	114	113.7	0.712	20	
Cobalt	104.355	1.0	125.0	8.164	77.0	51	109	106.4	1.96	20	
Copper	124.145	2.0	125.0	19.95	83.4	55	122	124.2	0.0384	20	
Lead	107.868	1.0	125.0	17.29	72.5	45	110	109.2	1.22	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100642-010A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98997**
Client ID: **B-179N-0-0.5** Batch ID: **48448** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532514**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	96.638	1.0	125.0	0.9457	76.6	52	109	98.66	2.07	20	
Nickel	112.797	1.0	125.0	16.34	77.2	47	111	114.4	1.45	20	
Selenium	97.504	1.0	125.0	1.911	76.5	48	108	100.2	2.76	20	
Silver	96.946	1.0	125.0	0	77.6	55	110	98.06	1.15	20	
Thallium	85.809	1.0	125.0	0	68.6	43	105	87.26	1.68	20	
Vanadium	145.609	1.0	125.0	44.65	80.8	54	115	144.6	0.720	20	
Zinc	159.102	1.0	125.0	61.87	77.8	39	120	160.8	1.09	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48450** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98972**
Client ID: **PBS** Batch ID: **48450** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532632**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	0.145	1.0									
Beryllium	ND	1.0									
Cadmium	0.031	1.0									
Chromium	ND	1.0									
Cobalt	0.037	1.0									
Copper	ND	2.0									
Lead	0.272	1.0									
Molybdenum	ND	1.0									
Nickel	0.041	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	0.072	1.0									
Zinc	ND	1.0									

Sample ID: **100642-011A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98972**
Client ID: **B-179N-2.0-2.5** Batch ID: **48450** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532635**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.526	2.0						0.3726	0	20	
Arsenic	3.686	1.0						3.665	0.576	20	
Barium	65.225	1.0						66.84	2.44	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.477	1.0						0.6652	0	20	
Chromium	9.135	1.0						8.650	5.46	20	
Cobalt	3.729	1.0						4.037	7.92	20	
Copper	13.901	2.0						15.91	13.5	20	
Lead	521.067	1.0						432.4	18.6	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100642-011A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98972**
Client ID: **B-179N-2.0-2.5** Batch ID: **48450** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532635**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	0.591	1.0						0.7998	0	20	
Nickel	8.592	1.0						8.297	3.48	20	
Selenium	0.826	1.0						1.036	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	18.360	1.0						17.48	4.90	20	
Zinc	72.298	1.0						72.90	0.826	20	

Sample ID: **100642-011A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98972**
Client ID: **B-179N-2.0-2.5** Batch ID: **48450** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532636**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	98.704	2.0	125.0	0.3726	78.7	24	109				
Arsenic	113.230	1.0	125.0	3.665	87.7	52	106				
Barium	172.917	1.0	125.0	66.84	84.9	31	129				
Beryllium	106.141	1.0	125.0	0	84.9	55	110				
Cadmium	107.270	1.0	125.0	0.6652	85.3	51	110				
Chromium	110.626	1.0	125.0	8.650	81.6	50	114				
Cobalt	110.006	1.0	125.0	4.037	84.8	51	109				
Copper	123.255	2.0	125.0	15.91	85.9	55	122				
Lead	603.238	1.0	125.0	432.4	137	45	110				S
Molybdenum	108.385	1.0	125.0	0.7998	86.1	52	109				
Nickel	115.407	1.0	125.0	8.297	85.7	47	111				
Selenium	109.931	1.0	125.0	1.036	87.1	48	108				
Silver	103.089	1.0	125.0	0	82.5	55	110				
Thallium	97.947	1.0	125.0	0	78.4	43	105				
Vanadium	124.806	1.0	125.0	17.48	85.9	54	115				
Zinc	179.211	1.0	125.0	72.90	85.1	39	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100642-011A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98972**
Client ID: **B-179N-2.0-2.5** Batch ID: **48450** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532637**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	100.679	2.0	125.0	0.3726	80.2	24	109	98.70	1.98	20	
Arsenic	114.826	1.0	125.0	3.665	88.9	52	106	113.2	1.40	20	
Barium	182.774	1.0	125.0	66.84	92.7	31	129	172.9	5.54	20	
Beryllium	108.336	1.0	125.0	0	86.7	55	110	106.1	2.05	20	
Cadmium	109.725	1.0	125.0	0.6652	87.2	51	110	107.3	2.26	20	
Chromium	113.140	1.0	125.0	8.650	83.6	50	114	110.6	2.25	20	
Cobalt	112.947	1.0	125.0	4.037	87.1	51	109	110.0	2.64	20	
Copper	129.478	2.0	125.0	15.91	90.9	55	122	123.3	4.92	20	
Lead	607.549	1.0	125.0	432.4	140	45	110	603.2	0.712	20	S
Molybdenum	109.774	1.0	125.0	0.7998	87.2	52	109	108.4	1.27	20	
Nickel	118.750	1.0	125.0	8.297	88.4	47	111	115.4	2.86	20	
Selenium	110.634	1.0	125.0	1.036	87.7	48	108	109.9	0.637	20	
Silver	105.927	1.0	125.0	0	84.7	55	110	103.1	2.72	20	
Thallium	99.182	1.0	125.0	0	79.3	43	105	97.95	1.25	20	
Vanadium	130.155	1.0	125.0	17.48	90.1	54	115	124.8	4.20	20	
Zinc	187.702	1.0	125.0	72.90	91.8	39	120	179.2	4.63	20	

Sample ID: **LCS-48450** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98972**
Client ID: **LCSS** Batch ID: **48450** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	49.849	2.0	50.00	0	99.7	80	120				
Arsenic	53.459	1.0	50.00	0	107	80	120				
Barium	51.045	1.0	50.00	0.1449	102	80	120				
Beryllium	50.197	1.0	50.00	0	100	80	120				
Cadmium	51.963	1.0	50.00	0.03065	104	80	120				
Chromium	50.285	1.0	50.00	0	101	80	120				
Cobalt	51.789	1.0	50.00	0.03656	104	80	120				
Copper	47.286	2.0	50.00	0	94.6	80	120				
Lead	55.014	1.0	50.00	0.2716	109	80	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-48450** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **98972**
Client ID: **LCSS** Batch ID: **48450** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/2/2008** SeqNo: **1532643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	50.804	1.0	50.00	0	102	80	120				
Nickel	50.680	1.0	50.00	0.04119	101	80	120				
Selenium	53.240	1.0	50.00	0	106	80	120				
Silver	46.916	1.0	50.00	0	93.8	80	120				
Thallium	46.945	1.0	50.00	0	93.9	80	120				
Vanadium	49.681	1.0	50.00	0.07184	99.2	80	120				
Zinc	52.699	1.0	50.00	0	105	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48462A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **PBS**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532420**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48462**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **LCSS**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532421**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	275.024	5.0	250.0	0	110	80	120				

Sample ID: **100642-027A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **B-187N-0-.5**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532432**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.360	5.0						8.802	5.15	20	

Sample ID: **100642-027A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **B-187N-0-.5**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532433**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	192.654	5.0	250.0	8.802	73.5	45	110				

Sample ID: **MB-48462B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **PBS**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532434**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100642-051A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **B-185N-0-.5**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532444**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.190	5.0						3.885	0	20	

Sample ID: **100642-051A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **B-185N-0-.5**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532445**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	239.617	5.0	250.0	3.885	94.3	45	110				

Sample ID: **100642-051A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98988**
Client ID: **B-185N-0-.5**	Batch ID: **48462**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/2/2008**	SeqNo: **1532446**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	194.744	5.0	250.0	3.885	76.3	45	110	239.6	20.7	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **LCS-48512**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/2/2008**	RunNo: **99032**
Client ID: **LCSW**	Batch ID: **48512**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.002	0.25	1.000	0	100	85	115				

Sample ID: **100760-002A-MS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/2/2008**	RunNo: **99032**
Client ID: **ZZZZZZ**	Batch ID: **48512**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.334	0.25	2.500	0	93.4	71	118				

Sample ID: **100760-002A-MSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/2/2008**	RunNo: **99032**
Client ID: **ZZZZZZ**	Batch ID: **48512**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533027**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.343	0.25	2.500	0	93.7	71	118	2.334	0.366	20	

Sample ID: **MB-48512**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/2/2008**	RunNo: **99032**
Client ID: **PBW**	Batch ID: **48512**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533029**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-48444**	SampType: **MBLK**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98962**
Client ID: **PBS**	Batch ID: **48444**	TestNo: **EPA 7471A**		Analysis Date: **8/29/2008**	SeqNo: **1531997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-48444**	SampType: **LCS**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98962**
Client ID: **LCSS**	Batch ID: **48444**	TestNo: **EPA 7471A**		Analysis Date: **8/29/2008**	SeqNo: **1531998**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.898	0.10	0.8300	0	108	80	120				

Sample ID: **100602-011A-MS**	SampType: **MS**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98962**
Client ID: **ZZZZZZ**	Batch ID: **48444**	TestNo: **EPA 7471A**		Analysis Date: **8/29/2008**	SeqNo: **1531999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.695	0.10	0.8300	0.02333	80.9	70	130				

Sample ID: **100602-011A-MSD**	SampType: **MSD**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98962**
Client ID: **ZZZZZZ**	Batch ID: **48444**	TestNo: **EPA 7471A**		Analysis Date: **8/29/2008**	SeqNo: **1532000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.780	0.10	0.8300	0.02333	91.2	70	130	0.6948	11.6	20	

Sample ID: **100602-011A-DUP**	SampType: **DUP**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **98962**
Client ID: **ZZZZZZ**	Batch ID: **48444**	TestNo: **EPA 7471A**		Analysis Date: **8/29/2008**	SeqNo: **1532002**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.036	0.10						0.02333	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-48445**	SampType: **MBLK**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **98995**
Client ID: **PBS**	Batch ID: **48445**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532466**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-48445**	SampType: **LCS**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **98995**
Client ID: **LCSS**	Batch ID: **48445**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532467**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.903	0.10	0.8300	0	109	80	120				

Sample ID: **100642-013A-MS**	SampType: **MS**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **98995**
Client ID: **B-175N-0-0.5**	Batch ID: **48445**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532468**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.880	0.10	0.8300	0	106	70	130				

Sample ID: **100642-013A-MSD**	SampType: **MSD**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **98995**
Client ID: **B-175N-0-0.5**	Batch ID: **48445**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532469**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.860	0.10	0.8300	0	104	70	130	0.8796	2.23	20	

Sample ID: **100642-013A-DUP**	SampType: **DUP**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **98995**
Client ID: **B-175N-0-0.5**	Batch ID: **48445**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532471**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-48446**	SampType: **MBLK**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **99002**
Client ID: **PBS**	Batch ID: **48446**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532557**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-48446**	SampType: **LCS**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **99002**
Client ID: **LCSS**	Batch ID: **48446**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532558**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.806	0.10	0.8300	0	97.1	80	120				

Sample ID: **100642-015A-MS**	SampType: **MS**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **99002**
Client ID: **B-175N-4.5-5**	Batch ID: **48446**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532559**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.844	0.10	0.8300	0	102	70	130				

Sample ID: **100642-015A-MSD**	SampType: **MSD**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **99002**
Client ID: **B-175N-4.5-5**	Batch ID: **48446**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532560**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.830	0.10	0.8300	0	100	70	130	0.8439	1.68	20	

Sample ID: **100642-015A-DUP**	SampType: **DUP**	TestCode: **7471_S**	Units: **mg/Kg**	Prep Date: **8/28/2008**	RunNo: **99002**
Client ID: **B-175N-4.5-5**	Batch ID: **48446**	TestNo: **EPA 7471A**		Analysis Date: **9/2/2008**	SeqNo: **1532562**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **D080827MB1** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98870**
Client ID: **PBS** Batch ID: **D08VS138** TestNo: **EPA 8015B(M** Analysis Date: **8/27/2008** SeqNo: **1530283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									
Surr: Bromofluorobenzene (FID)	103.585		100.0		104	42	142				

Sample ID: **100646-001AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98870**
Client ID: **ZZZZZZ** Batch ID: **D08VS138** TestNo: **EPA 8015B(M** Analysis Date: **8/27/2008** SeqNo: **1530285**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.429	1.0	5.000	0	88.6	33	120				
Surr: Bromofluorobenzene (FID)	111.499		100.0		111	42	142				

Sample ID: **100646-001AMSD** SampType: **MSD** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98870**
Client ID: **ZZZZZZ** Batch ID: **D08VS138** TestNo: **EPA 8015B(M** Analysis Date: **8/27/2008** SeqNo: **1530286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.363	1.0	5.000	0	87.3	33	120	4.429	1.50	20	
Surr: Bromofluorobenzene (FID)	111.673		100.0		112	42	142		0	20	

Sample ID: **D080827LCS1** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98870**
Client ID: **LCSS** Batch ID: **D08VS138** TestNo: **EPA 8015B(M** Analysis Date: **8/27/2008** SeqNo: **1530294**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.848	1.0	5.000	0	97.0	74	108				
Surr: Bromofluorobenzene (FID)	110.517		100.0		111	42	142				

Sample ID: **100642-001ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98870**
Client ID: **B-176N-0-0.5** Batch ID: **D08VS138** TestNo: **EPA 8015B(M** Analysis Date: **8/27/2008** SeqNo: **1530297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **100642-001ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98870**
Client ID: **B-176N-0-0.5** Batch ID: **D08VS138** TestNo: **EPA 8015B(M** Analysis Date: **8/27/2008** SeqNo: **1530297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	103.892		100.0		104	42	142		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **D080827MB2** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **PBS** Batch ID: **D08VS139** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1530657**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									
Surr: Bromofluorobenzene (FID)	102.039		100.0		102	42	142				

Sample ID: **100642-013ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1530659**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (FID)	108.729		100.0		109	42	142		0	0	

Sample ID: **100642-013AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1530660**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.655	1.0	5.000	0	73.1	33	120				
Surr: Bromofluorobenzene (FID)	108.594		100.0		109	42	142				

Sample ID: **100642-013AMSD** SampType: **MSD** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1530661**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.326	1.0	5.000	0	86.5	33	120	3.655	16.8	20	
Surr: Bromofluorobenzene (FID)	111.617		100.0		112	42	142		0	20	

Sample ID: **D080827LCS3** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **LCSS** Batch ID: **D08VS139** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1530672**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.632	1.0	5.000	0	92.6	74	108				

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **D080827LCS3** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **LCSS** Batch ID: **D08VS139** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1530672**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	107.124		100.0		107	42	142				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **D080828MB1** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **PBS** Batch ID: **D08VS140** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1531189**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									
Surr: Bromofluorobenzene (FID)	101.503		100.0		102	42	142				

Sample ID: **100642-034ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1531191**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (FID)	107.634		100.0		108	42	142		0	0	

Sample ID: **100642-034AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1531192**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.772	1.0	5.000	0	75.4	33	120				
Surr: Bromofluorobenzene (FID)	107.173		100.0		107	42	142				

Sample ID: **100642-034AMSD** SampType: **MSD** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1531193**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.710	1.0	5.000	0	74.2	33	120	3.772	1.66	20	
Surr: Bromofluorobenzene (FID)	107.667		100.0		108	42	142		0	20	

Sample ID: **D080828LCS1** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **LCSS** Batch ID: **D08VS140** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1531199**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.742	1.0	5.000	0	94.8	74	108				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **D080828LCS1** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **LCSS** Batch ID: **D08VS140** TestNo: **EPA 8015B(M** Analysis Date: **8/28/2008** SeqNo: **1531199**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	110.559		100.0		111	42	142				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **D080827MB1** SampType: **MBLK** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98870**
Client ID: **PBS** Batch ID: **D08VS138** TestNo: **EPA 8021B** Analysis Date: **8/27/2008** SeqNo: **1530326**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0									
Ethylbenzene	ND	5.0									
m,p-Xylene	ND	10									
o-Xylene	ND	5.0									
Toluene	ND	5.0									
Surr: Bromofluorobenzene (PID)	100.011		100.0		100	71	139				

Sample ID: **100646-001AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98870**
Client ID: **ZZZZZZ** Batch ID: **D08VS138** TestNo: **EPA 8021B** Analysis Date: **8/27/2008** SeqNo: **1530328**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	35.043	5.0	35.75	0	98.0	39	113				
Ethylbenzene	52.384	5.0	49.65	0	106	38	112				
m,p-Xylene	180.438	10	199.6	0	90.4	42	110				
o-Xylene	72.830	5.0	78.40	0	92.9	35	100				
Toluene	179.669	5.0	172.2	0	104	50	110				
Surr: Bromofluorobenzene (PID)	118.734		100.0		119	71	139				

Sample ID: **100646-001AMSD** SampType: **MSD** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98870**
Client ID: **ZZZZZZ** Batch ID: **D08VS138** TestNo: **EPA 8021B** Analysis Date: **8/27/2008** SeqNo: **1530329**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	34.512	5.0	35.75	0	96.5	39	113	35.04	1.53	20	
Ethylbenzene	51.613	5.0	49.65	0	104	38	112	52.38	1.48	20	
m,p-Xylene	176.741	10	199.6	0	88.6	42	110	180.4	2.07	20	
o-Xylene	71.949	5.0	78.40	0	91.8	35	100	72.83	1.22	20	
Toluene	174.062	5.0	172.2	0	101	50	110	179.7	3.17	20	
Surr: Bromofluorobenzene (PID)	119.217		100.0		119	71	139		0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **D080827LCS2** SampType: **LCS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98870**
Client ID: **LCSS** Batch ID: **D08VS138** TestNo: **EPA 8021B** Analysis Date: **8/27/2008** SeqNo: **1530338**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	98.754	5.0	100.0	0	98.8	81	115				
Ethylbenzene	100.249	5.0	100.0	0	100	82	116				
m,p-Xylene	199.495	10	200.0	0	99.7	83	120				
o-Xylene	100.918	5.0	100.0	0	101	84	120				
Toluene	99.037	5.0	100.0	0	99.0	82	118				
Surr: Bromofluorobenzene (PID)	103.581		100.0		104	71	139				

Sample ID: **100642-001ADUP** SampType: **DUP** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98870**
Client ID: **B-176N-0-0.5** Batch ID: **D08VS138** TestNo: **EPA 8021B** Analysis Date: **8/27/2008** SeqNo: **1530340**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methyl tert-butyl ether	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: Bromofluorobenzene (PID)	100.702		100.0		101	71	139		0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **D080827MB2** SampType: **MBLK** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98888**
Client ID: **PBS** Batch ID: **D08VS139** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1530732**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0									
Ethylbenzene	ND	5.0									
m,p-Xylene	ND	10									
o-Xylene	ND	5.0									
Toluene	ND	5.0									
Surr: Bromofluorobenzene (PID)	99.238		100.0		99.2	71	139				

Sample ID: **100642-013ADUP** SampType: **DUP** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1530734**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methyl tert-butyl ether	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: Bromofluorobenzene (PID)	101.949		100.0		102	71	139		0	20	

Sample ID: **100642-013AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1530735**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	27.222	5.0	35.75	0	76.1	39	113				
Ethylbenzene	40.047	5.0	49.65	0	80.7	38	112				
m,p-Xylene	134.804	10	199.6	0	67.6	42	110				
Methyl tert-butyl ether	394.960	5.0	578.9	0	68.2	51	131				
o-Xylene	53.760	5.0	78.40	0	68.6	35	100				
Toluene	138.126	5.0	172.2	0	80.2	50	110				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **100642-013AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1530735**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Xylenes, Total	188.564	15	278.0	0	67.8	70	130				S
Surr: Bromofluorobenzene (PID)	112.721		100.0		113	71	139				

Sample ID: **100642-013AMSD** SampType: **MSD** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1530736**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	32.093	5.0	35.75	0	89.8	39	113	27.22	16.4	20	
Ethylbenzene	47.921	5.0	49.65	0	96.5	38	112	40.05	17.9	20	
m,p-Xylene	159.479	10	199.6	0	79.9	42	110	134.8	16.8	20	
Methyl tert-butyl ether	451.152	5.0	578.9	0	77.9	51	131	395.0	13.3	20	
o-Xylene	64.825	5.0	78.40	0	82.7	35	100	53.76	18.7	20	
Toluene	161.287	5.0	172.2	0	93.6	50	110	138.1	15.5	20	
Xylenes, Total	224.304	15	278.0	0	80.7	70	130	188.6	17.3	20	
Surr: Bromofluorobenzene (PID)	117.734		100.0		118	71	139		0	20	

Sample ID: **D080827LCS4** SampType: **LCS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98888**
Client ID: **LCSS** Batch ID: **D08VS139** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1530748**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	100.419	5.0	100.0	0	100	81	115				
Ethylbenzene	101.499	5.0	100.0	0	101	82	116				
m,p-Xylene	199.256	10	200.0	0	99.6	83	120				
o-Xylene	101.248	5.0	100.0	0	101	84	120				
Toluene	100.879	5.0	100.0	0	101	82	118				
Surr: Bromofluorobenzene (PID)	104.006		100.0		104	71	139				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **D080828MB1** SampType: **MBLK** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98917**
Client ID: **PBS** Batch ID: **D08VS140** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1531208**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0									
Ethylbenzene	ND	5.0									
m,p-Xylene	ND	10									
o-Xylene	ND	5.0									
Toluene	ND	5.0									
Surr: Bromofluorobenzene (PID)	97.661		100.0		97.7	71	139				

Sample ID: **100642-034ADUP** SampType: **DUP** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1531210**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methyl tert-butyl ether	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: Bromofluorobenzene (PID)	104.615		100.0		105	71	139		0	20	

Sample ID: **100642-034AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1531211**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	28.437	5.0	35.75	0	79.5	39	113				
Ethylbenzene	37.088	5.0	49.65	0	74.7	38	112				
m,p-Xylene	124.876	10	199.6	0	62.6	42	110				
Methyl tert-butyl ether	426.410	5.0	578.9	0	73.7	51	131				
o-Xylene	49.599	5.0	78.40	0	63.3	35	100				
Toluene	135.278	5.0	172.2	0	78.5	50	110				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **100642-034AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1531211**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (PID)	113.864		100.0		114	71	139				

Sample ID: **100642-034AMSD** SampType: **MSD** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1531212**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	29.065	5.0	35.75	0	81.3	39	113	28.44	2.18	20	
Ethylbenzene	37.008	5.0	49.65	0	74.5	38	112	37.09	0.216	20	
m,p-Xylene	126.402	10	199.6	0	63.3	42	110	124.9	1.21	20	
Methyl tert-butyl ether	422.364	5.0	578.9	0	73.0	51	131	426.4	0.953	20	
o-Xylene	49.478	5.0	78.40	0	63.1	35	100	49.60	0.244	20	
Toluene	138.773	5.0	172.2	0	80.6	50	110	135.3	2.55	20	
Surr: Bromofluorobenzene (PID)	112.124		100.0		112	71	139		0	20	

Sample ID: **D080828LCS2** SampType: **LCS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **98917**
Client ID: **LCSS** Batch ID: **D08VS140** TestNo: **EPA 8021B** Analysis Date: **8/28/2008** SeqNo: **1531214**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	99.103	5.0	100.0	0	99.1	81	115				
Ethylbenzene	100.886	5.0	100.0	0	101	82	116				
m,p-Xylene	200.309	10	200.0	0	100	83	120				
o-Xylene	100.804	5.0	100.0	0	101	84	120				
Toluene	98.226	5.0	100.0	0	98.2	82	118				
Surr: Bromofluorobenzene (PID)	101.582		100.0		102	71	139				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827LCS1** SampType: **LCS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **LCSS** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530074**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	45.470	5.0	50.00	0	90.9	70	130				
Benzene	87.060	5.0	100.0	0	87.1	70	130				
Chlorobenzene	47.380	5.0	50.00	0	94.8	70	130				
MTBE	40.880	5.0	50.00	0	81.8	70	130				
Toluene	90.780	5.0	100.0	0	90.8	70	130				
Trichloroethene	45.250	5.0	50.00	0	90.5	70	130				
Surr: 1,2-Dichloroethane-d4	48.350		50.00		96.7	70	130				
Surr: 4-Bromofluorobenzene	48.090		50.00		96.2	70	130				
Surr: Dibromofluoromethane	49.690		50.00		99.4	70	130				
Surr: Toluene-d8	47.720		50.00		95.4	70	130				

Sample ID: **K080827MB2MS** SampType: **MS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **ZZZZZZ** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530075**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	44.730	5.0	50.00	0	89.5	70	130				
Benzene	89.120	5.0	100.0	0	89.1	70	130				
Chlorobenzene	48.720	5.0	50.00	0	97.4	70	130				
MTBE	39.710	5.0	50.00	0	79.4	70	130				
Toluene	92.890	5.0	100.0	0	92.9	70	130				
Trichloroethene	46.100	5.0	50.00	0	92.2	70	130				
Surr: 1,2-Dichloroethane-d4	46.880		50.00		93.8	70	130				
Surr: 4-Bromofluorobenzene	48.420		50.00		96.8	70	130				
Surr: Dibromofluoromethane	49.400		50.00		98.8	70	130				
Surr: Toluene-d8	48.520		50.00		97.0	70	130				

Sample ID: **K080827MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **ZZZZZZ** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **ZZZZZZ** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	44.810	5.0	50.00	0	89.6	70	130	44.73	0.179	20	
Benzene	87.650	5.0	100.0	0	87.6	70	130	89.12	1.66	20	
Chlorobenzene	48.040	5.0	50.00	0	96.1	70	130	48.72	1.41	20	
MTBE	40.220	5.0	50.00	0	80.4	70	130	39.71	1.28	20	
Toluene	92.990	5.0	100.0	0	93.0	70	130	92.89	0.108	20	
Trichloroethene	46.410	5.0	50.00	0	92.8	70	130	46.10	0.670	20	
Surr: 1,2-Dichloroethane-d4	47.940		50.00		95.9	70	130		0	20	
Surr: 4-Bromofluorobenzene	48.980		50.00		98.0	70	130		0	20	
Surr: Dibromofluoromethane	49.450		50.00		98.9	70	130		0	20	
Surr: Toluene-d8	49.120		50.00		98.2	70	130		0	20	

Sample ID: **K080827MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **PBS** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530077**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0									
1,1,1-Trichloroethane	ND	5.0									
1,1,2,2-Tetrachloroethane	ND	5.0									
1,1,2-Trichloroethane	ND	5.0									
1,1-Dichloroethane	ND	5.0									
1,1-Dichloroethene	ND	5.0									
1,1-Dichloropropene	ND	5.0									
1,2,3-Trichlorobenzene	ND	5.0									
1,2,3-Trichloropropane	ND	5.0									
1,2,4-Trichlorobenzene	ND	5.0									
1,2,4-Trimethylbenzene	ND	5.0									
1,2-Dibromo-3-chloropropane	ND	10									
1,2-Dibromoethane	ND	5.0									
1,2-Dichlorobenzene	ND	5.0									
1,2-Dichloroethane	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **PBS** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530077**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2-Dichloropropane	ND	5.0									
1,3,5-Trimethylbenzene	ND	5.0									
1,3-Dichlorobenzene	ND	5.0									
1,3-Dichloropropane	ND	5.0									
1,4-Dichlorobenzene	ND	5.0									
2,2-Dichloropropane	ND	5.0									
2-Chlorotoluene	ND	5.0									
4-Chlorotoluene	ND	5.0									
4-Isopropyltoluene	ND	5.0									
Benzene	ND	5.0									
Bromobenzene	ND	5.0									
Bromodichloromethane	ND	5.0									
Bromoform	ND	5.0									
Bromomethane	ND	5.0									
Carbon tetrachloride	ND	5.0									
Chlorobenzene	ND	5.0									
Chloroethane	ND	5.0									
Chloroform	ND	5.0									
Chloromethane	ND	5.0									
cis-1,2-Dichloroethene	ND	5.0									
cis-1,3-Dichloropropene	ND	5.0									
Di-isopropyl ether	ND	5.0									
Dibromochloromethane	ND	5.0									
Dibromomethane	ND	5.0									
Dichlorodifluoromethane	ND	5.0									
Ethyl Tert-butyl ether	ND	5.0									
Ethylbenzene	ND	5.0									
Hexachlorobutadiene	ND	5.0									
Isopropylbenzene	ND	5.0									
m,p-Xylene	ND	10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **PBS** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530077**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methylene chloride	ND	5.0									
MTBE	ND	5.0									
n-Butylbenzene	ND	5.0									
n-Propylbenzene	ND	5.0									
Naphthalene	ND	5.0									
o-Xylene	ND	5.0									
sec-Butylbenzene	ND	5.0									
Styrene	ND	5.0									
Tert-amyl methyl ether	ND	5.0									
Tert-Butanol	ND	100									
tert-Butylbenzene	ND	5.0									
Tetrachloroethene	ND	5.0									
Toluene	ND	5.0									
trans-1,2-Dichloroethene	ND	5.0									
Trichloroethene	ND	5.0									
Trichlorofluoromethane	ND	5.0									
Vinyl chloride	ND	5.0									
Surr: 1,2-Dichloroethane-d4	50.060		50.00		100	70	130				
Surr: 4-Bromofluorobenzene	43.940		50.00		87.9	70	130				
Surr: Dibromofluoromethane	49.460		50.00		98.9	70	130				
Surr: Toluene-d8	48.520		50.00		97.0	70	130				

Sample ID: **100642-001A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **B-176N-0-0.5** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,1-Trichloroethane	ND	5.0						0	0	20	
1,1,2,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,2-Trichloroethane	ND	5.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-001A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **B-176N-0-0.5** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethane	ND	5.0						0	0	20	
1,1-Dichloroethene	ND	5.0						0	0	20	
1,1-Dichloropropene	ND	5.0						0	0	20	
1,2,3-Trichlorobenzene	ND	5.0						0	0	20	
1,2,3-Trichloropropane	ND	5.0						0	0	20	
1,2,4-Trichlorobenzene	ND	5.0						0	0	20	
1,2,4-Trimethylbenzene	ND	5.0						0	0	20	
1,2-Dibromo-3-chloropropane	ND	10						0	0	20	
1,2-Dibromoethane	ND	5.0						0	0	20	
1,2-Dichlorobenzene	ND	5.0						0	0	20	
1,2-Dichloroethane	ND	5.0						0	0	20	
1,2-Dichloropropane	ND	5.0						0	0	20	
1,3,5-Trimethylbenzene	ND	5.0						0	0	20	
1,3-Dichlorobenzene	ND	5.0						0	0	20	
1,3-Dichloropropane	ND	5.0						0	0	20	
1,4-Dichlorobenzene	ND	5.0						0	0	20	
2,2-Dichloropropane	ND	5.0						0	0	20	
2-Butanone	ND	50						0	0	20	
2-Chloroethyl vinyl ether	ND	5.0						0	0	20	
2-Chlorotoluene	ND	5.0						0	0	20	
2-Hexanone	ND	50						0	0	20	
4-Chlorotoluene	ND	5.0						0	0	20	
4-Isopropyltoluene	ND	5.0						0	0	20	
4-Methyl-2-pentanone	ND	50						0	0	20	
Acetone	ND	50						0	0	20	
Acrolein	ND	50						0	0	20	
Acrylonitrile	ND	50						0	0	20	
Benzene	ND	5.0						0	0	20	
Bromobenzene	ND	5.0						0	0	20	
Bromochloromethane	ND	5.0						0	0	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-001A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **B-176N-0-0.5** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromodichloromethane	ND	5.0						0	0	20	
Bromoform	ND	5.0						0	0	20	
Bromomethane	ND	5.0						0	0	20	
Carbon disulfide	ND	5.0						0	0	20	
Carbon tetrachloride	ND	5.0						0	0	20	
Chlorobenzene	ND	5.0						0	0	20	
Chloroethane	ND	5.0						0	0	20	
Chloroform	ND	5.0						0	0	20	
Chloromethane	ND	5.0						0	0	20	
cis-1,2-Dichloroethene	ND	5.0						0	0	20	
cis-1,3-Dichloropropene	ND	5.0						0	0	20	
Cyclohexanone	ND	50						0	0	20	
Di-isopropyl ether	ND	5.0						0	0	20	
Dibromochloromethane	ND	5.0						0	0	20	
Dibromomethane	ND	5.0						0	0	20	
Dichlorodifluoromethane	ND	5.0						0	0	20	
Ethyl Acetate	ND	50						0	0	20	
Ethyl Ether	ND	50						0	0	20	
Ethyl Tert-butyl ether	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
Freon-113	ND	5.0						0	0	20	
Hexachlorobutadiene	ND	5.0						0	0	20	
Iodomethane	ND	5.0						0	0	20	
Isopropylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methylene chloride	ND	5.0						0	0	20	
MTBE	ND	5.0						0	0	20	
n-Butylbenzene	ND	5.0						0	0	20	
n-Propylbenzene	ND	5.0						0	0	20	
Naphthalene	ND	5.0						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-001A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98863**
Client ID: **B-176N-0-0.5** Batch ID: **K08VS401** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
o-Xylene	ND	5.0						0	0	20	
sec-Butylbenzene	ND	5.0						0	0	20	
Styrene	ND	5.0						0	0	20	
Tert-amyl methyl ether	ND	5.0						0	0	20	
Tert-Butanol	ND	100						0	0	20	
tert-Butylbenzene	ND	5.0						0	0	20	
Tetrachloroethene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
trans-1,2-Dichloroethene	ND	5.0						0	0	20	
trans-1,3-Dichloropropene	ND	5.0						0	0	20	
Trichloroethene	ND	5.0						0	0	20	
Trichlorofluoromethane	ND	5.0						0	0	20	
Vinyl acetate	ND	50						0	0	20	
Vinyl chloride	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: 1,2-Dichloroethane-d4	50.200		50.00		100	70	130		0	20	
Surr: 4-Bromofluorobenzene	43.800		50.00		87.6	70	130		0	20	
Surr: Dibromofluoromethane	52.030		50.00		104	70	130		0	20	
Surr: Toluene-d8	47.780		50.00		95.6	70	130		0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827LCS2** SampType: **LCS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **LCSS** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530422**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	46.580	5.0	50.00	0	93.2	70	130				
Benzene	88.800	5.0	100.0	0	88.8	70	130				
Chlorobenzene	48.310	5.0	50.00	0	96.6	70	130				
MTBE	40.590	5.0	50.00	0	81.2	70	130				
Toluene	93.060	5.0	100.0	0	93.1	70	130				
Trichloroethene	46.230	5.0	50.00	0	92.5	70	130				
Surr: 1,2-Dichloroethane-d4	48.880		50.00		97.8	70	130				
Surr: 4-Bromofluorobenzene	48.020		50.00		96.0	70	130				
Surr: Dibromofluoromethane	48.590		50.00		97.2	70	130				
Surr: Toluene-d8	47.780		50.00		95.6	70	130				

Sample ID: **K080827MB4MS** SampType: **MS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **ZZZZZZ** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530423**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	45.700	5.0	50.00	0	91.4	70	130				
Benzene	87.870	5.0	100.0	0	87.9	70	130				
Chlorobenzene	48.610	5.0	50.00	0	97.2	70	130				
MTBE	39.660	5.0	50.00	0	79.3	70	130				
Toluene	92.100	5.0	100.0	0	92.1	70	130				
Trichloroethene	46.430	5.0	50.00	0	92.9	70	130				
Surr: 1,2-Dichloroethane-d4	47.070		50.00		94.1	70	130				
Surr: 4-Bromofluorobenzene	47.260		50.00		94.5	70	130				
Surr: Dibromofluoromethane	48.990		50.00		98.0	70	130				
Surr: Toluene-d8	47.730		50.00		95.5	70	130				

Sample ID: **K080827MB4MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **ZZZZZZ** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530424**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827MB4MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **ZZZZZZ** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530424**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	46.320	5.0	50.00	0	92.6	70	130	45.70	1.35	20	
Benzene	89.470	5.0	100.0	0	89.5	70	130	87.87	1.80	20	
Chlorobenzene	49.850	5.0	50.00	0	99.7	70	130	48.61	2.52	20	
MTBE	41.520	5.0	50.00	0	83.0	70	130	39.66	4.58	20	
Toluene	93.410	5.0	100.0	0	93.4	70	130	92.10	1.41	20	
Trichloroethene	46.770	5.0	50.00	0	93.5	70	130	46.43	0.730	20	
Surr: 1,2-Dichloroethane-d4	47.750		50.00		95.5	70	130		0	20	
Surr: 4-Bromofluorobenzene	48.360		50.00		96.7	70	130		0	20	
Surr: Dibromofluoromethane	50.060		50.00		100	70	130		0	20	
Surr: Toluene-d8	48.110		50.00		96.2	70	130		0	20	

Sample ID: **K080827MB4** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **PBS** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530425**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0									
1,1,1-Trichloroethane	ND	5.0									
1,1,2,2-Tetrachloroethane	ND	5.0									
1,1,2-Trichloroethane	ND	5.0									
1,1-Dichloroethane	ND	5.0									
1,1-Dichloroethene	ND	5.0									
1,1-Dichloropropene	ND	5.0									
1,2,3-Trichlorobenzene	ND	5.0									
1,2,3-Trichloropropane	ND	5.0									
1,2,4-Trichlorobenzene	ND	5.0									
1,2,4-Trimethylbenzene	ND	5.0									
1,2-Dibromo-3-chloropropane	ND	10									
1,2-Dibromoethane	ND	5.0									
1,2-Dichlorobenzene	ND	5.0									
1,2-Dichloroethane	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827MB4** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **PBS** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530425**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2-Dichloropropane	ND	5.0									
1,3,5-Trimethylbenzene	ND	5.0									
1,3-Dichlorobenzene	ND	5.0									
1,3-Dichloropropane	ND	5.0									
1,4-Dichlorobenzene	ND	5.0									
2,2-Dichloropropane	ND	5.0									
2-Chlorotoluene	ND	5.0									
4-Chlorotoluene	ND	5.0									
4-Isopropyltoluene	ND	5.0									
Benzene	ND	5.0									
Bromobenzene	ND	5.0									
Bromodichloromethane	ND	5.0									
Bromoform	ND	5.0									
Bromomethane	ND	5.0									
Carbon tetrachloride	ND	5.0									
Chlorobenzene	ND	5.0									
Chloroethane	ND	5.0									
Chloroform	ND	5.0									
Chloromethane	ND	5.0									
cis-1,2-Dichloroethene	ND	5.0									
cis-1,3-Dichloropropene	ND	5.0									
Di-isopropyl ether	ND	5.0									
Dibromochloromethane	ND	5.0									
Dibromomethane	ND	5.0									
Dichlorodifluoromethane	ND	5.0									
Ethyl Tert-butyl ether	ND	5.0									
Ethylbenzene	ND	5.0									
Hexachlorobutadiene	ND	5.0									
Isopropylbenzene	ND	5.0									
m,p-Xylene	ND	10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080827MB4** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **PBS** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530425**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methylene chloride	ND	5.0									
MTBE	ND	5.0									
n-Butylbenzene	ND	5.0									
n-Propylbenzene	ND	5.0									
Naphthalene	ND	5.0									
o-Xylene	ND	5.0									
sec-Butylbenzene	ND	5.0									
Styrene	ND	5.0									
Tert-amyl methyl ether	ND	5.0									
Tert-Butanol	ND	100									
tert-Butylbenzene	ND	5.0									
Tetrachloroethene	ND	5.0									
Toluene	ND	5.0									
trans-1,2-Dichloroethene	ND	5.0									
Trichloroethene	ND	5.0									
Trichlorofluoromethane	ND	5.0									
Vinyl chloride	ND	5.0									
Surr: 1,2-Dichloroethane-d4	51.010		50.00		102	70	130				
Surr: 4-Bromofluorobenzene	44.870		50.00		89.7	70	130				
Surr: Dibromofluoromethane	51.710		50.00		103	70	130				
Surr: Toluene-d8	48.220		50.00		96.4	70	130				

Sample ID: **100642-011A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **B-179N-2.0-2.5** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530427**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,1-Trichloroethane	ND	5.0						0	0	20	
1,1,2,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,2-Trichloroethane	ND	5.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-011A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **B-179N-2.0-2.5** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530427**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethane	ND	5.0						0	0	20	
1,1-Dichloroethene	ND	5.0						0	0	20	
1,1-Dichloropropene	ND	5.0						0	0	20	
1,2,3-Trichlorobenzene	ND	5.0						0	0	20	
1,2,3-Trichloropropane	ND	5.0						0	0	20	
1,2,4-Trichlorobenzene	ND	5.0						0	0	20	
1,2,4-Trimethylbenzene	ND	5.0						0	0	20	
1,2-Dibromo-3-chloropropane	ND	10						0	0	20	
1,2-Dibromoethane	ND	5.0						0	0	20	
1,2-Dichlorobenzene	ND	5.0						0	0	20	
1,2-Dichloroethane	ND	5.0						0	0	20	
1,2-Dichloropropane	ND	5.0						0	0	20	
1,3,5-Trimethylbenzene	ND	5.0						0	0	20	
1,3-Dichlorobenzene	ND	5.0						0	0	20	
1,3-Dichloropropane	ND	5.0						0	0	20	
1,4-Dichlorobenzene	ND	5.0						0	0	20	
2,2-Dichloropropane	ND	5.0						0	0	20	
2-Butanone	ND	50						0	0	20	
2-Chloroethyl vinyl ether	ND	5.0						0	0	20	
2-Chlorotoluene	ND	5.0						0	0	20	
2-Hexanone	ND	50						0	0	20	
4-Chlorotoluene	ND	5.0						0	0	20	
4-Isopropyltoluene	ND	5.0						0	0	20	
4-Methyl-2-pentanone	ND	50						0	0	20	
Acetone	ND	50						0	0	20	
Acrolein	ND	50						0	0	20	
Acrylonitrile	ND	50						0	0	20	
Benzene	ND	5.0						0	0	20	
Bromobenzene	ND	5.0						0	0	20	
Bromochloromethane	ND	5.0						0	0	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-011A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **B-179N-2.0-2.5** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530427**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromodichloromethane	ND	5.0						0	0	20	
Bromoform	ND	5.0						0	0	20	
Bromomethane	ND	5.0						0	0	20	
Carbon disulfide	ND	5.0						0	0	20	
Carbon tetrachloride	ND	5.0						0	0	20	
Chlorobenzene	ND	5.0						0	0	20	
Chloroethane	ND	5.0						0	0	20	
Chloroform	ND	5.0						0	0	20	
Chloromethane	ND	5.0						0	0	20	
cis-1,2-Dichloroethene	ND	5.0						0	0	20	
cis-1,3-Dichloropropene	ND	5.0						0	0	20	
Cyclohexanone	ND	50						0	0	20	
Di-isopropyl ether	ND	5.0						0	0	20	
Dibromochloromethane	ND	5.0						0	0	20	
Dibromomethane	ND	5.0						0	0	20	
Dichlorodifluoromethane	ND	5.0						0	0	20	
Ethyl Acetate	ND	50						0	0	20	
Ethyl Ether	ND	50						0	0	20	
Ethyl Tert-butyl ether	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
Freon-113	ND	5.0						0	0	20	
Hexachlorobutadiene	ND	5.0						0	0	20	
Iodomethane	ND	5.0						0	0	20	
Isopropylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methylene chloride	ND	5.0						0	0	20	
MTBE	ND	5.0						0	0	20	
n-Butylbenzene	ND	5.0						0	0	20	
n-Propylbenzene	ND	5.0						0	0	20	
Naphthalene	ND	5.0						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-011A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98875**
Client ID: **B-179N-2.0-2.5** Batch ID: **K08VS402** TestNo: **EPA 8260B** Analysis Date: **8/27/2008** SeqNo: **1530427**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
o-Xylene	ND	5.0						0	0	20	
sec-Butylbenzene	ND	5.0						0	0	20	
Styrene	ND	5.0						0	0	20	
Tert-amyl methyl ether	ND	5.0						0	0	20	
Tert-Butanol	ND	100						0	0	20	
tert-Butylbenzene	ND	5.0						0	0	20	
Tetrachloroethene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
trans-1,2-Dichloroethene	ND	5.0						0	0	20	
trans-1,3-Dichloropropene	ND	5.0						0	0	20	
Trichloroethene	ND	5.0						0	0	20	
Trichlorofluoromethane	ND	5.0						0	0	20	
Vinyl acetate	ND	50						0	0	20	
Vinyl chloride	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: 1,2-Dichloroethane-d4	51.290		50.00		103	70	130		0	20	
Surr: 4-Bromofluorobenzene	40.660		50.00		81.3	70	130		0	20	
Surr: Dibromofluoromethane	52.570		50.00		105	70	130		0	20	
Surr: Toluene-d8	46.130		50.00		92.3	70	130		0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080828LCS1** SampType: **LCS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **LCSS** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531532**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	46.170	5.0	50.00	0	92.3	70	130				
Benzene	88.010	5.0	100.0	0	88.0	70	130				
Chlorobenzene	48.580	5.0	50.00	0	97.2	70	130				
MTBE	39.490	5.0	50.00	0	79.0	70	130				
Toluene	91.260	5.0	100.0	0	91.3	70	130				
Trichloroethene	45.860	5.0	50.00	0	91.7	70	130				
Surr: 1,2-Dichloroethane-d4	48.990		50.00		98.0	70	130				
Surr: 4-Bromofluorobenzene	49.280		50.00		98.6	70	130				
Surr: Dibromofluoromethane	51.300		50.00		103	70	130				
Surr: Toluene-d8	47.760		50.00		95.5	70	130				

Sample ID: **K080828MB2MS** SampType: **MS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **ZZZZZZ** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531533**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	43.860	5.0	50.00	0	87.7	70	130				
Benzene	87.120	5.0	100.0	0	87.1	70	130				
Chlorobenzene	48.250	5.0	50.00	0	96.5	70	130				
MTBE	38.940	5.0	50.00	0	77.9	70	130				
Toluene	90.050	5.0	100.0	0	90.0	70	130				
Trichloroethene	45.000	5.0	50.00	0	90.0	70	130				
Surr: 1,2-Dichloroethane-d4	49.330		50.00		98.7	70	130				
Surr: 4-Bromofluorobenzene	48.820		50.00		97.6	70	130				
Surr: Dibromofluoromethane	50.810		50.00		102	70	130				
Surr: Toluene-d8	47.620		50.00		95.2	70	130				

Sample ID: **K080828MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **ZZZZZZ** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531534**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080828MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **ZZZZZZ** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531534**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	45.630	5.0	50.00	0	91.3	70	130	43.86	3.96	20	
Benzene	89.020	5.0	100.0	0	89.0	70	130	87.12	2.16	20	
Chlorobenzene	49.900	5.0	50.00	0	99.8	70	130	48.25	3.36	20	
MTBE	38.860	5.0	50.00	0	77.7	70	130	38.94	0.206	20	
Toluene	92.760	5.0	100.0	0	92.8	70	130	90.05	2.96	20	
Trichloroethene	46.310	5.0	50.00	0	92.6	70	130	45.00	2.87	20	
Surr: 1,2-Dichloroethane-d4	46.700		50.00		93.4	70	130		0	20	
Surr: 4-Bromofluorobenzene	48.900		50.00		97.8	70	130		0	20	
Surr: Dibromofluoromethane	49.350		50.00		98.7	70	130		0	20	
Surr: Toluene-d8	47.500		50.00		95.0	70	130		0	20	

Sample ID: **K080828MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **PBS** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0									
1,1,1-Trichloroethane	ND	5.0									
1,1,2,2-Tetrachloroethane	ND	5.0									
1,1,2-Trichloroethane	ND	5.0									
1,1-Dichloroethane	ND	5.0									
1,1-Dichloroethene	ND	5.0									
1,1-Dichloropropene	ND	5.0									
1,2,3-Trichlorobenzene	ND	5.0									
1,2,3-Trichloropropane	ND	5.0									
1,2,4-Trichlorobenzene	ND	5.0									
1,2,4-Trimethylbenzene	ND	5.0									
1,2-Dibromo-3-chloropropane	ND	10									
1,2-Dibromoethane	ND	5.0									
1,2-Dichlorobenzene	ND	5.0									
1,2-Dichloroethane	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080828MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **PBS** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2-Dichloropropane	ND	5.0									
1,3,5-Trimethylbenzene	ND	5.0									
1,3-Dichlorobenzene	ND	5.0									
1,3-Dichloropropane	ND	5.0									
1,4-Dichlorobenzene	ND	5.0									
2,2-Dichloropropane	ND	5.0									
2-Chlorotoluene	ND	5.0									
4-Chlorotoluene	ND	5.0									
4-Isopropyltoluene	ND	5.0									
Benzene	ND	5.0									
Bromobenzene	ND	5.0									
Bromodichloromethane	ND	5.0									
Bromoform	ND	5.0									
Bromomethane	ND	5.0									
Carbon tetrachloride	ND	5.0									
Chlorobenzene	ND	5.0									
Chloroethane	ND	5.0									
Chloroform	ND	5.0									
Chloromethane	ND	5.0									
cis-1,2-Dichloroethene	ND	5.0									
cis-1,3-Dichloropropene	ND	5.0									
Di-isopropyl ether	ND	5.0									
Dibromochloromethane	ND	5.0									
Dibromomethane	ND	5.0									
Dichlorodifluoromethane	ND	5.0									
Ethyl Tert-butyl ether	ND	5.0									
Ethylbenzene	ND	5.0									
Hexachlorobutadiene	ND	5.0									
Isopropylbenzene	ND	5.0									
m,p-Xylene	ND	10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080828MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **PBS** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methylene chloride	ND	5.0									
MTBE	ND	5.0									
n-Butylbenzene	ND	5.0									
n-Propylbenzene	ND	5.0									
Naphthalene	ND	5.0									
o-Xylene	ND	5.0									
sec-Butylbenzene	ND	5.0									
Styrene	ND	5.0									
Tert-amyl methyl ether	ND	5.0									
Tert-Butanol	ND	100									
tert-Butylbenzene	ND	5.0									
Tetrachloroethene	ND	5.0									
Toluene	ND	5.0									
trans-1,2-Dichloroethene	ND	5.0									
Trichloroethene	ND	5.0									
Trichlorofluoromethane	ND	5.0									
Vinyl chloride	ND	5.0									
Surr: 1,2-Dichloroethane-d4	47.090		50.00		94.2	70	130				
Surr: 4-Bromofluorobenzene	41.350		50.00		82.7	70	130				
Surr: Dibromofluoromethane	47.230		50.00		94.5	70	130				
Surr: Toluene-d8	43.270		50.00		86.5	70	130				

Sample ID: **100642-034A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **B-189N-4.5-5** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531538**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,1-Trichloroethane	ND	5.0						0	0	20	
1,1,2,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,2-Trichloroethane	ND	5.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-034A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **B-189N-4.5-5** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531538**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethane	ND	5.0						0	0	20	
1,1-Dichloroethene	ND	5.0						0	0	20	
1,1-Dichloropropene	ND	5.0						0	0	20	
1,2,3-Trichlorobenzene	ND	5.0						0	0	20	
1,2,3-Trichloropropane	ND	5.0						0	0	20	
1,2,4-Trichlorobenzene	ND	5.0						0	0	20	
1,2,4-Trimethylbenzene	ND	5.0						0	0	20	
1,2-Dibromo-3-chloropropane	ND	10						0	0	20	
1,2-Dibromoethane	ND	5.0						0	0	20	
1,2-Dichlorobenzene	ND	5.0						0	0	20	
1,2-Dichloroethane	ND	5.0						0	0	20	
1,2-Dichloropropane	ND	5.0						0	0	20	
1,3,5-Trimethylbenzene	ND	5.0						0	0	20	
1,3-Dichlorobenzene	ND	5.0						0	0	20	
1,3-Dichloropropane	ND	5.0						0	0	20	
1,4-Dichlorobenzene	ND	5.0						0	0	20	
2,2-Dichloropropane	ND	5.0						0	0	20	
2-Butanone	ND	50						0	0	20	
2-Chloroethyl vinyl ether	ND	5.0						0	0	20	
2-Chlorotoluene	ND	5.0						0	0	20	
2-Hexanone	ND	50						0	0	20	
4-Chlorotoluene	ND	5.0						0	0	20	
4-Isopropyltoluene	ND	5.0						0	0	20	
4-Methyl-2-pentanone	ND	50						0	0	20	
Acetone	ND	50						0	0	20	
Acrolein	ND	50						0	0	20	
Acrylonitrile	ND	50						0	0	20	
Benzene	ND	5.0						0	0	20	
Bromobenzene	ND	5.0						0	0	20	
Bromochloromethane	ND	5.0						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-034A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **B-189N-4.5-5** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531538**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromodichloromethane	ND	5.0						0	0	20	
Bromoform	ND	5.0						0	0	20	
Bromomethane	ND	5.0						0	0	20	
Carbon disulfide	ND	5.0						0	0	20	
Carbon tetrachloride	ND	5.0						0	0	20	
Chlorobenzene	ND	5.0						0	0	20	
Chloroethane	ND	5.0						0	0	20	
Chloroform	ND	5.0						0	0	20	
Chloromethane	ND	5.0						0	0	20	
cis-1,2-Dichloroethene	ND	5.0						0	0	20	
cis-1,3-Dichloropropene	ND	5.0						0	0	20	
Cyclohexanone	ND	50						0	0	20	
Di-isopropyl ether	ND	5.0						0	0	20	
Dibromochloromethane	ND	5.0						0	0	20	
Dibromomethane	ND	5.0						0	0	20	
Dichlorodifluoromethane	ND	5.0						0	0	20	
Ethyl Acetate	ND	50						0	0	20	
Ethyl Ether	ND	50						0	0	20	
Ethyl Tert-butyl ether	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
Freon-113	ND	5.0						0	0	20	
Hexachlorobutadiene	ND	5.0						0	0	20	
Iodomethane	ND	5.0						0	0	20	
Isopropylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methylene chloride	ND	5.0						0	0	20	
MTBE	ND	5.0						0	0	20	
n-Butylbenzene	ND	5.0						0	0	20	
n-Propylbenzene	ND	5.0						0	0	20	
Naphthalene	ND	5.0						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-034A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98881**
Client ID: **B-189N-4.5-5** Batch ID: **K08VS403** TestNo: **EPA 8260B** Analysis Date: **8/28/2008** SeqNo: **1531538**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
o-Xylene	ND	5.0						0	0	20	
sec-Butylbenzene	ND	5.0						0	0	20	
Styrene	ND	5.0						0	0	20	
Tert-amyl methyl ether	ND	5.0						0	0	20	
Tert-Butanol	ND	100						0	0	20	
tert-Butylbenzene	ND	5.0						0	0	20	
Tetrachloroethene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
trans-1,2-Dichloroethene	ND	5.0						0	0	20	
trans-1,3-Dichloropropene	ND	5.0						0	0	20	
Trichloroethene	ND	5.0						0	0	20	
Trichlorofluoromethane	ND	5.0						0	0	20	
Vinyl acetate	ND	50						0	0	20	
Vinyl chloride	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: 1,2-Dichloroethane-d4	52.740		50.00		105	70	130		0	20	
Surr: 4-Bromofluorobenzene	41.520		50.00		83.0	70	130		0	20	
Surr: Dibromofluoromethane	50.550		50.00		101	70	130		0	20	
Surr: Toluene-d8	48.080		50.00		96.2	70	130		0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080829LCS1** SampType: **LCS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **LCSS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531827**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	46.950	5.0	50.00	0	93.9	70	130				
Benzene	92.660	5.0	100.0	0	92.7	70	130				
Chlorobenzene	48.870	5.0	50.00	0	97.7	70	130				
MTBE	43.980	5.0	50.00	0	88.0	70	130				
Toluene	93.150	5.0	100.0	0	93.2	70	130				
Trichloroethene	46.990	5.0	50.00	0	94.0	70	130				
Surr: 1,2-Dichloroethane-d4	51.490		50.00		103	70	130				
Surr: 4-Bromofluorobenzene	48.480		50.00		97.0	70	130				
Surr: Dibromofluoromethane	50.170		50.00		100	70	130				
Surr: Toluene-d8	48.690		50.00		97.4	70	130				

Sample ID: **K080829MB2MS** SampType: **MS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **ZZZZZZ** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531828**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	45.830	5.0	50.00	0	91.7	70	130				
Benzene	93.080	5.0	100.0	0	93.1	70	130				
Chlorobenzene	49.000	5.0	50.00	0	98.0	70	130				
MTBE	43.690	5.0	50.00	0	87.4	70	130				
Toluene	94.530	5.0	100.0	0	94.5	70	130				
Trichloroethene	47.940	5.0	50.00	0	95.9	70	130				
Surr: 1,2-Dichloroethane-d4	49.670		50.00		99.3	70	130				
Surr: 4-Bromofluorobenzene	49.200		50.00		98.4	70	130				
Surr: Dibromofluoromethane	50.790		50.00		102	70	130				
Surr: Toluene-d8	48.170		50.00		96.3	70	130				

Sample ID: **K080829MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **ZZZZZZ** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531829**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080829MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **ZZZZZZ** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531829**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	47.070	5.0	50.00	0	94.1	70	130	45.83	2.67	20	
Benzene	94.940	5.0	100.0	0	94.9	70	130	93.08	1.98	20	
Chlorobenzene	50.830	5.0	50.00	0	102	70	130	49.00	3.67	20	
MTBE	42.910	5.0	50.00	0	85.8	70	130	43.69	1.80	20	
Toluene	96.620	5.0	100.0	0	96.6	70	130	94.53	2.19	20	
Trichloroethene	48.630	5.0	50.00	0	97.3	70	130	47.94	1.43	20	
Surr: 1,2-Dichloroethane-d4	47.690		50.00		95.4	70	130		0	20	
Surr: 4-Bromofluorobenzene	49.890		50.00		99.8	70	130		0	20	
Surr: Dibromofluoromethane	49.640		50.00		99.3	70	130		0	20	
Surr: Toluene-d8	47.810		50.00		95.6	70	130		0	20	

Sample ID: **K080829MB1** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **PBS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0									
1,1,1-Trichloroethane	ND	5.0									
1,1,2,2-Tetrachloroethane	ND	5.0									
1,1,2-Trichloroethane	ND	5.0									
1,1-Dichloroethane	ND	5.0									
1,1-Dichloroethene	ND	5.0									
1,1-Dichloropropene	ND	5.0									
1,2,3-Trichlorobenzene	ND	5.0									
1,2,3-Trichloropropane	ND	5.0									
1,2,4-Trichlorobenzene	ND	5.0									
1,2,4-Trimethylbenzene	ND	5.0									
1,2-Dibromo-3-chloropropane	ND	10									
1,2-Dibromoethane	ND	5.0									
1,2-Dichlorobenzene	ND	5.0									
1,2-Dichloroethane	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080829MB1** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **PBS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2-Dichloropropane	ND	5.0									
1,3,5-Trimethylbenzene	ND	5.0									
1,3-Dichlorobenzene	ND	5.0									
1,3-Dichloropropane	ND	5.0									
1,4-Dichlorobenzene	ND	5.0									
2,2-Dichloropropane	ND	5.0									
2-Chlorotoluene	ND	5.0									
4-Chlorotoluene	ND	5.0									
4-Isopropyltoluene	ND	5.0									
Benzene	ND	5.0									
Bromobenzene	ND	5.0									
Bromodichloromethane	ND	5.0									
Bromoform	ND	5.0									
Bromomethane	ND	5.0									
Carbon tetrachloride	ND	5.0									
Chlorobenzene	ND	5.0									
Chloroethane	ND	5.0									
Chloroform	ND	5.0									
Chloromethane	ND	5.0									
cis-1,2-Dichloroethene	ND	5.0									
cis-1,3-Dichloropropene	ND	5.0									
Di-isopropyl ether	ND	5.0									
Dibromochloromethane	ND	5.0									
Dibromomethane	ND	5.0									
Dichlorodifluoromethane	ND	5.0									
Ethyl Tert-butyl ether	ND	5.0									
Ethylbenzene	ND	5.0									
Hexachlorobutadiene	ND	5.0									
Isopropylbenzene	ND	5.0									
m,p-Xylene	ND	10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080829MB1** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **PBS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methylene chloride	ND	5.0									
MTBE	ND	5.0									
n-Butylbenzene	ND	5.0									
n-Propylbenzene	ND	5.0									
Naphthalene	ND	5.0									
o-Xylene	ND	5.0									
sec-Butylbenzene	ND	5.0									
Styrene	ND	5.0									
Tert-amyl methyl ether	ND	5.0									
Tert-Butanol	ND	100									
tert-Butylbenzene	ND	5.0									
Tetrachloroethene	ND	5.0									
Toluene	ND	5.0									
trans-1,2-Dichloroethene	ND	5.0									
Trichloroethene	ND	5.0									
Trichlorofluoromethane	ND	5.0									
Vinyl chloride	ND	5.0									
Surr: 1,2-Dichloroethane-d4	49.100		50.00		98.2	70	130				
Surr: 4-Bromofluorobenzene	42.420		50.00		84.8	70	130				
Surr: Dibromofluoromethane	50.260		50.00		101	70	130				
Surr: Toluene-d8	48.230		50.00		96.5	70	130				

Sample ID: **K080829MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **PBS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531831**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0									
1,1,1-Trichloroethane	ND	5.0									
1,1,2,2-Tetrachloroethane	ND	5.0									
1,1,2-Trichloroethane	ND	5.0									

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080829MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **PBS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531831**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethane	ND	5.0									
1,1-Dichloroethene	ND	5.0									
1,1-Dichloropropene	ND	5.0									
1,2,3-Trichlorobenzene	ND	5.0									
1,2,3-Trichloropropane	ND	5.0									
1,2,4-Trichlorobenzene	ND	5.0									
1,2,4-Trimethylbenzene	ND	5.0									
1,2-Dibromo-3-chloropropane	ND	10									
1,2-Dibromoethane	ND	5.0									
1,2-Dichlorobenzene	ND	5.0									
1,2-Dichloroethane	ND	5.0									
1,2-Dichloropropane	ND	5.0									
1,3,5-Trimethylbenzene	ND	5.0									
1,3-Dichlorobenzene	ND	5.0									
1,3-Dichloropropane	ND	5.0									
1,4-Dichlorobenzene	ND	5.0									
2,2-Dichloropropane	ND	5.0									
2-Chlorotoluene	ND	5.0									
4-Chlorotoluene	ND	5.0									
4-Isopropyltoluene	ND	5.0									
Benzene	ND	5.0									
Bromobenzene	ND	5.0									
Bromodichloromethane	ND	5.0									
Bromoform	ND	5.0									
Bromomethane	ND	5.0									
Carbon tetrachloride	ND	5.0									
Chlorobenzene	ND	5.0									
Chloroethane	ND	5.0									
Chloroform	ND	5.0									
Chloromethane	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080829MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **PBS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531831**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
cis-1,2-Dichloroethene	ND	5.0									
cis-1,3-Dichloropropene	ND	5.0									
Di-isopropyl ether	ND	5.0									
Dibromochloromethane	ND	5.0									
Dibromomethane	ND	5.0									
Dichlorodifluoromethane	ND	5.0									
Ethyl Tert-butyl ether	ND	5.0									
Ethylbenzene	ND	5.0									
Hexachlorobutadiene	ND	5.0									
Isopropylbenzene	ND	5.0									
m,p-Xylene	ND	10									
Methylene chloride	ND	5.0									
MTBE	ND	5.0									
n-Butylbenzene	ND	5.0									
n-Propylbenzene	ND	5.0									
Naphthalene	ND	5.0									
o-Xylene	ND	5.0									
sec-Butylbenzene	ND	5.0									
Styrene	ND	5.0									
Tert-amyl methyl ether	ND	5.0									
Tert-Butanol	ND	100									
tert-Butylbenzene	ND	5.0									
Tetrachloroethene	ND	5.0									
Toluene	ND	5.0									
trans-1,2-Dichloroethene	ND	5.0									
Trichloroethene	ND	5.0									
Trichlorofluoromethane	ND	5.0									
Vinyl chloride	ND	5.0									
Surr: 1,2-Dichloroethane-d4	49.700		50.00		99.4	70	130				
Surr: 4-Bromofluorobenzene	45.570		50.00		91.1	70	130				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K080829MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **PBS** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1531831**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Dibromofluoromethane	49.800		50.00		99.6	70	130				
Surr: Toluene-d8	47.540		50.00		95.1	70	130				

Sample ID: **100642-043A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **B-192N-4.5-5** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1532614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,1-Trichloroethane	ND	5.0						0	0	20	
1,1,2,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,2-Trichloroethane	ND	5.0						0	0	20	
1,1-Dichloroethane	ND	5.0						0	0	20	
1,1-Dichloroethene	ND	5.0						0	0	20	
1,1-Dichloropropene	ND	5.0						0	0	20	
1,2,3-Trichlorobenzene	ND	5.0						0	0	20	
1,2,3-Trichloropropane	ND	5.0						0	0	20	
1,2,4-Trichlorobenzene	ND	5.0						0	0	20	
1,2,4-Trimethylbenzene	ND	5.0						0	0	20	
1,2-Dibromo-3-chloropropane	ND	10						0	0	20	
1,2-Dibromoethane	ND	5.0						0	0	20	
1,2-Dichlorobenzene	ND	5.0						0	0	20	
1,2-Dichloroethane	ND	5.0						0	0	20	
1,2-Dichloropropane	ND	5.0						0	0	20	
1,3,5-Trimethylbenzene	ND	5.0						0	0	20	
1,3-Dichlorobenzene	ND	5.0						0	0	20	
1,3-Dichloropropane	ND	5.0						0	0	20	
1,4-Dichlorobenzene	ND	5.0						0	0	20	
2,2-Dichloropropane	ND	5.0						0	0	20	
2-Butanone	ND	50						0	0	20	
2-Chloroethyl vinyl ether	ND	5.0						0	0	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-043A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **B-192N-4.5-5** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1532614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Chlorotoluene	ND	5.0						0	0	20	
2-Hexanone	ND	50						0	0	20	
4-Chlorotoluene	ND	5.0						0	0	20	
4-Isopropyltoluene	ND	5.0						0	0	20	
4-Methyl-2-pentanone	ND	50						0	0	20	
Acetone	ND	50						0	0	20	
Acrolein	ND	50						0	0	20	
Acrylonitrile	ND	50						0	0	20	
Benzene	ND	5.0						0	0	20	
Bromobenzene	ND	5.0						0	0	20	
Bromochloromethane	ND	5.0						0	0	20	
Bromodichloromethane	ND	5.0						0	0	20	
Bromoform	ND	5.0						0	0	20	
Bromomethane	ND	5.0						0	0	20	
Carbon disulfide	ND	5.0						0	0	20	
Carbon tetrachloride	ND	5.0						0	0	20	
Chlorobenzene	ND	5.0						0	0	20	
Chloroethane	ND	5.0						0	0	20	
Chloroform	ND	5.0						0	0	20	
Chloromethane	ND	5.0						0	0	20	
cis-1,2-Dichloroethene	ND	5.0						0	0	20	
cis-1,3-Dichloropropene	ND	5.0						0	0	20	
Cyclohexanone	ND	50						0	0	20	
Di-isopropyl ether	ND	5.0						0	0	20	
Dibromochloromethane	ND	5.0						0	0	20	
Dibromomethane	ND	5.0						0	0	20	
Dichlorodifluoromethane	ND	5.0						0	0	20	
Ethyl Acetate	ND	50						0	0	20	
Ethyl Ether	ND	50						0	0	20	
Ethyl Tert-butyl ether	ND	5.0						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **100642-043A-DUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **98951**
Client ID: **B-192N-4.5-5** Batch ID: **K08VS404** TestNo: **EPA 8260B** Analysis Date: **8/29/2008** SeqNo: **1532614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	ND	5.0						0	0	20	
Freon-113	ND	5.0						0	0	20	
Hexachlorobutadiene	ND	5.0						0	0	20	
Iodomethane	ND	5.0						0	0	20	
Isopropylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methylene chloride	ND	5.0						0	0	20	
MTBE	ND	5.0						0	0	20	
n-Butylbenzene	ND	5.0						0	0	20	
n-Propylbenzene	ND	5.0						0	0	20	
Naphthalene	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
sec-Butylbenzene	ND	5.0						0	0	20	
Styrene	ND	5.0						0	0	20	
Tert-amyl methyl ether	ND	5.0						0	0	20	
Tert-Butanol	ND	100						0	0	20	
tert-Butylbenzene	ND	5.0						0	0	20	
Tetrachloroethene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
trans-1,2-Dichloroethene	ND	5.0						0	0	20	
trans-1,3-Dichloropropene	ND	5.0						0	0	20	
Trichloroethene	ND	5.0						0	0	20	
Trichlorofluoromethane	ND	5.0						0	0	20	
Vinyl acetate	ND	50						0	0	20	
Vinyl chloride	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: 1,2-Dichloroethane-d4	53.840		50.00		108	70	130		0	20	
Surr: 4-Bromofluorobenzene	46.200		50.00		92.4	70	130		0	20	
Surr: Dibromofluoromethane	53.150		50.00		106	70	130		0	20	
Surr: Toluene-d8	47.000		50.00		94.0	70	130		0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100746-002AMS** SampType: **MS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **ZZZZZZ** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/2/2008** SeqNo: **1533275**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	2947.000	330	3330	0	88.5	50	102				
1,4-Dichlorobenzene	2457.667	330	3330	0	73.8	46	94				
2,4-Dinitrotoluene	3766.667	330	3330	0	113	63	125				
2-Chlorophenol	2786.667	330	3330	0	83.7	49	101				
4-Chloro-3-methylphenol	3627.333	660	3330	0	109	60	128				
4-Nitrophenol	3254.333	1600	3330	0	97.7	48	135				
Acenaphthene	3046.667	330	3330	0	91.5	57	109				
N-Nitrosodi-n-propylamine	2966.667	330	3330	0	89.1	48	123				
Pentachlorophenol	2810.333	1600	3330	0	84.4	62	135				
Phenol	2855.333	330	3330	0	85.7	50	113				
Pyrene	3429.667	330	3330	0	103	52	126				
Surr: 1,2-Dichlorobenzene-d4	2387.667		3330		71.7	40	97				
Surr: 2,4,6-Tribromophenol	3448.333		3330		104	31	148				
Surr: 2-Chlorophenol-d4	2722.333		3330		81.8	49	103				
Surr: 2-Fluorobiphenyl	2899.333		3330		87.1	55	102				
Surr: 2-Fluorophenol	2566.333		3330		77.1	45	105				
Surr: 4-Terphenyl-d14	3445.333		3330		103	52	124				
Surr: Nitrobenzene-d5	2642.667		3330		79.4	48	109				
Surr: Phenol-d5	2688.667		3330		80.7	47	108				

Sample ID: **100746-002AMSD** SampType: **MSD** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **ZZZZZZ** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/2/2008** SeqNo: **1533276**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	2978.333	330	3330	0	89.4	50	102	2947	1.06	20	
1,4-Dichlorobenzene	2463.000	330	3330	0	74.0	46	94	2458	0.217	20	
2,4-Dinitrotoluene	3849.667	330	3330	0	116	63	125	3767	2.18	20	
2-Chlorophenol	2845.333	330	3330	0	85.4	49	101	2787	2.08	20	
4-Chloro-3-methylphenol	3710.000	660	3330	0	111	60	128	3627	2.25	20	
4-Nitrophenol	3331.333	1600	3330	0	100	48	135	3254	2.34	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100746-002AMSD** SampType: **MSD** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **ZZZZZZ** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/2/2008** SeqNo: **1533276**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	3137.667	330	3330	0	94.2	57	109	3047	2.94	20	
N-Nitrosodi-n-propylamine	3034.000	330	3330	0	91.1	48	123	2967	2.24	20	
Pentachlorophenol	2870.667	1600	3330	0	86.2	62	135	2810	2.12	20	
Phenol	2918.333	330	3330	0	87.6	50	113	2855	2.18	20	
Pyrene	3480.667	330	3330	0	105	52	126	3430	1.48	20	
Surr: 1,2-Dichlorobenzene-d4	2449.000		3330		73.5	40	97		0	20	
Surr: 2,4,6-Tribromophenol	3599.667		3330		108	31	148		0	20	
Surr: 2-Chlorophenol-d4	2827.667		3330		84.9	49	103		0	20	
Surr: 2-Fluorobiphenyl	3066.000		3330		92.1	55	102		0	20	
Surr: 2-Fluorophenol	2662.333		3330		79.9	45	105		0	20	
Surr: 4-Terphenyl-d14	3522.000		3330		106	52	124		0	20	
Surr: Nitrobenzene-d5	2713.667		3330		81.5	48	109		0	20	
Surr: Phenol-d5	2806.333		3330		84.3	47	108		0	20	

Sample ID: **LCS-48505** SampType: **LCS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **LCSS** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/2/2008** SeqNo: **1533277**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	3382.000	330	3330	0	102	60	98				S
1,4-Dichlorobenzene	2952.667	330	3330	0	88.7	58	91				
2,4-Dinitrotoluene	3800.000	330	3330	0	114	69	123				
2-Chlorophenol	3145.000	330	3330	0	94.4	58	97				
4-Chloro-3-methylphenol	3721.000	660	3330	0	112	69	123				
4-Nitrophenol	3286.667	1600	3330	0	98.7	61	128				
Acenaphthene	3218.333	330	3330	0	96.6	66	104				
N-Nitrosodi-n-propylamine	3260.000	330	3330	0	97.9	56	120				
Pentachlorophenol	3063.667	1600	3330	0	92.0	77	127				
Phenol	3143.000	330	3330	0	94.4	61	108				
Pyrene	3389.333	330	3330	0	102	57	119				
Surr: 1,2-Dichlorobenzene-d4	2914.667		3330		87.5	40	97				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **LCS-48505**	SampType: **LCS**	TestCode: **8270_S_FUL**	Units: **µg/Kg**	Prep Date: **9/2/2008**	RunNo: **99059**
Client ID: **LCSS**	Batch ID: **48505**	TestNo: **EPA 8270C**	**EPA 3550B**	Analysis Date: **9/2/2008**	SeqNo: **1533277**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: 2,4,6-Tribromophenol	3566.667		3330		107	31	148				
Surr: 2-Chlorophenol-d4	3094.000		3330		92.9	49	103				
Surr: 2-Fluorobiphenyl	3119.000		3330		93.7	55	102				
Surr: 2-Fluorophenol	2968.667		3330		89.1	45	105				
Surr: 4-Terphenyl-d14	3428.333		3330		103	52	124				
Surr: Nitrobenzene-d5	3001.667		3330		90.1	48	109				
Surr: Phenol-d5	2976.667		3330		89.4	47	108				

Sample ID: **MB-48505**	SampType: **MBLK**	TestCode: **8270_S_FUL**	Units: **µg/Kg**	Prep Date: **9/2/2008**	RunNo: **99059**
Client ID: **PBS**	Batch ID: **48505**	TestNo: **EPA 8270C**	**EPA 3550B**	Analysis Date: **9/3/2008**	SeqNo: **1533279**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	330									
1,2-Dichlorobenzene	ND	330									
1,3-Dichlorobenzene	ND	330									
1,4-Dichlorobenzene	ND	330									
2,4,5-Trichlorophenol	ND	330									
2,4,6-Trichlorophenol	ND	330									
2,4-Dichlorophenol	ND	1600									
2,4-Dimethylphenol	ND	330									
2,4-Dinitrophenol	ND	1600									
2,4-Dinitrotoluene	ND	330									
2,6-Dinitrotoluene	ND	330									
2-Chloronaphthalene	ND	330									
2-Chlorophenol	ND	330									
2-Methylnaphthalene	ND	330									
2-Methylphenol	ND	330									
2-Nitroaniline	ND	1600									
2-Nitrophenol	ND	330									
3,3´-Dichlorobenzidine	ND	660									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **MB-48505** SampType: **MBLK** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **PBS** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/3/2008** SeqNo: **1533279**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
3-Nitroaniline	ND	1600									
4,6-Dinitro-2-methylphenol	ND	1600									
4-Bromophenyl-phenylether	ND	330									
4-Chloro-3-methylphenol	ND	660									
4-Chloroaniline	ND	660									
4-Chlorophenyl-phenylether	ND	330									
4-Methylphenol	ND	330									
4-Nitroaniline	ND	1600									
4-Nitrophenol	ND	1600									
Acenaphthene	ND	330									
Acenaphthylene	ND	330									
Anthracene	ND	330									
Benzidine (M)	ND	1600									
Benzo(a)anthracene	ND	330									
Benzo(a)pyrene	ND	330									
Benzo(b)fluoranthene	ND	330									
Benzo(g,h,i)perylene	ND	330									
Benzo(k)fluoranthene	ND	330									
Benzoic acid	ND	1600									
Benzyl alcohol	ND	660									
Bis(2-chloroethoxy)methane	ND	330									
Bis(2-chloroethyl)ether	ND	330									
Bis(2-chloroisopropyl)ether	ND	330									
Bis(2-ethylhexyl)phthalate	ND	330									
Butylbenzylphthalate	ND	330									
Chrysene	ND	330									
Di-n-butylphthalate	ND	330									
Di-n-octylphthalate	ND	330									
Dibenz(a,h)anthracene	ND	330									
Dibenzofuran	ND	330									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **MB-48505** SampType: **MBLK** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **PBS** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/3/2008** SeqNo: **1533279**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diethylphthalate	ND	330									
Dimethylphthalate	ND	330									
Fluoranthene	ND	330									
Fluorene	ND	330									
Hexachlorobenzene	ND	330									
Hexachlorobutadiene	ND	660									
Hexachlorocyclopentadiene	ND	660									
Hexachloroethane	ND	330									
Indeno(1,2,3-cd)pyrene	ND	330									
Isophorone	ND	330									
N-Nitrosodi-n-propylamine	ND	330									
N-Nitrosodiphenylamine	ND	330									
Naphthalene	ND	330									
Nitrobenzene	ND	330									
Pentachlorophenol	ND	1600									
Phenanthrene	ND	330									
Phenol	ND	330									
Pyrene	ND	330									
Surr: 1,2-Dichlorobenzene-d4	2960.000		3330		88.9	40	97				
Surr: 2,4,6-Tribromophenol	2809.000		3330		84.4	31	148				
Surr: 2-Chlorophenol-d4	3027.333		3330		90.9	49	103				
Surr: 2-Fluorobiphenyl	3091.000		3330		92.8	55	102				
Surr: 2-Fluorophenol	3054.667		3330		91.7	45	105				
Surr: 4-Terphenyl-d14	3560.667		3330		107	52	124				
Surr: Nitrobenzene-d5	3275.667		3330		98.4	48	109				
Surr: Phenol-d5	3110.000		3330		93.4	47	108				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100642-003ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **B-176N-4.5-5** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/3/2008** SeqNo: **1533480**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	330						0	0	20	
1,2-Dichlorobenzene	ND	330						0	0	20	
1,2-Diphenylhydrazine	ND	330						0	0	20	
1,3-Dichlorobenzene	ND	330						0	0	20	
1,4-Dichlorobenzene	ND	330						0	0	20	
1,4-Dioxane	ND	330						0	0	20	
2,4,5-Trichlorophenol	ND	330						0	0	20	
2,4,6-Trichlorophenol	ND	330						0	0	20	
2,4-Dichlorophenol	ND	1600						0	0	20	
2,4-Dimethylphenol	ND	330						0	0	20	
2,4-Dinitrophenol	ND	1600						0	0	20	
2,4-Dinitrotoluene	ND	330						0	0	20	
2,6-Dinitrotoluene	ND	330						0	0	20	
2-Chloronaphthalene	ND	330						0	0	20	
2-Chlorophenol	ND	330						0	0	20	
2-Methylnaphthalene	ND	330						0	0	20	
2-Methylphenol	ND	330						0	0	20	
2-Nitroaniline	ND	1600						0	0	20	
2-Nitrophenol	ND	330						0	0	20	
3,3´-Dichlorobenzidine	ND	660						0	0	20	
3-Nitroaniline	ND	1600						0	0	20	
4,6-Dinitro-2-methylphenol	ND	1600						0	0	20	
4-Bromophenyl-phenylether	ND	330						0	0	20	
4-Chloro-3-methylphenol	ND	660						0	0	20	
4-Chloroaniline	ND	660						0	0	20	
4-Chlorophenyl-phenylether	ND	330						0	0	20	
3/4-Methylphenol	ND	330						0	0	20	
4-Methylphenol	ND	330						0	0	20	
4-Nitroaniline	ND	1600						0	0	20	
4-Nitrophenol	ND	1600						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100642-003ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **B-176N-4.5-5** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/3/2008** SeqNo: **1533480**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	330						0	0	20	
Acenaphthylene	ND	330						0	0	20	
Aniline	ND	330						0	0	20	
Anthracene	ND	330						0	0	20	
Benzidine (M)	ND	1600						0	0	20	
Benzo(a)anthracene	ND	330						0	0	20	
Benzo(a)pyrene	ND	330						0	0	20	
Benzo(b)fluoranthene	ND	330						0	0	20	
Benzo(g,h,i)perylene	ND	330						0	0	20	
Benzo(k)fluoranthene	ND	330						0	0	20	
Benzoic acid	ND	1600						0	0	20	
Benzyl alcohol	ND	660						0	0	20	
Bis(2-chloroethoxy)methane	ND	330						0	0	20	
Bis(2-chloroethyl)ether	ND	330						0	0	20	
Bis(2-chloroisopropyl)ether	ND	330						0	0	20	
Bis(2-ethylhexyl)phthalate	ND	330						0	0	20	
Butylbenzylphthalate	ND	330						0	0	20	
Carbazole	ND	330						0	0	20	
Chrysene	ND	330						0	0	20	
Di-n-butylphthalate	ND	330						0	0	20	
Di-n-octylphthalate	ND	330						0	0	20	
Dibenz(a,h)anthracene	ND	330						0	0	20	
Dibenzofuran	ND	330						0	0	20	
Diethylphthalate	ND	330						0	0	20	
Dimethylphthalate	ND	330						0	0	20	
Fluoranthene	ND	330						0	0	20	
Fluorene	ND	330						0	0	20	
Hexachlorobenzene	ND	330						0	0	20	
Hexachlorobutadiene	ND	660						0	0	20	
Hexachlorocyclopentadiene	ND	660						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100642-003ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99059**
Client ID: **B-176N-4.5-5** Batch ID: **48505** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/3/2008** SeqNo: **1533480**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachloroethane	ND	330						0	0	20	
Indeno(1,2,3-cd)pyrene	ND	330						0	0	20	
Isophorone	ND	330						0	0	20	
N-Nitrosodi-n-propylamine	ND	330						0	0	20	
N-Nitrosodimethylamine	ND	330						0	0	20	
N-Nitrosodiphenylamine	ND	330						0	0	20	
Naphthalene	ND	330						0	0	20	
Nitrobenzene	ND	330						0	0	20	
Pentachlorophenol	ND	1600						0	0	20	
Phenanthrene	ND	330						0	0	20	
Phenol	ND	330						0	0	20	
Pyrene	ND	330						0	0	20	
Pyridine	ND	1600						0	0	20	
Surr: 1,2-Dichlorobenzene-d4	2757.000		3330		82.8	40	97		0	0	
Surr: 2,4,6-Tribromophenol	2935.333		3330		88.1	31	148		0	0	
Surr: 2-Chlorophenol-d4	2923.000		3330		87.8	49	103		0	0	
Surr: 2-Fluorobiphenyl	2973.000		3330		89.3	55	102		0	0	
Surr: 2-Fluorophenol	2930.667		3330		88.0	45	105		0	0	
Surr: 4-Terphenyl-d14	3636.000		3330		109	52	124		0	0	
Surr: Nitrobenzene-d5	3096.667		3330		93.0	48	109		0	0	
Surr: Phenol-d5	3006.333		3330		90.3	47	108		0	0	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **MB-48506** SampType: **MBLK** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **PBS** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533908**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	330									
1,2-Dichlorobenzene	ND	330									
1,3-Dichlorobenzene	ND	330									
1,4-Dichlorobenzene	ND	330									
2,4,5-Trichlorophenol	ND	330									
2,4,6-Trichlorophenol	ND	330									
2,4-Dichlorophenol	ND	1600									
2,4-Dimethylphenol	ND	330									
2,4-Dinitrophenol	ND	1600									
2,4-Dinitrotoluene	ND	330									
2,6-Dinitrotoluene	ND	330									
2-Chloronaphthalene	ND	330									
2-Chlorophenol	ND	330									
2-Methylnaphthalene	ND	330									
2-Methylphenol	ND	330									
2-Nitroaniline	ND	1600									
2-Nitrophenol	ND	330									
3,3´-Dichlorobenzidine	ND	660									
3-Nitroaniline	ND	1600									
4,6-Dinitro-2-methylphenol	ND	1600									
4-Bromophenyl-phenylether	ND	330									
4-Chloro-3-methylphenol	ND	660									
4-Chloroaniline	ND	660									
4-Chlorophenyl-phenylether	ND	330									
4-Methylphenol	ND	330									
4-Nitroaniline	ND	1600									
4-Nitrophenol	ND	1600									
Acenaphthene	ND	330									
Acenaphthylene	ND	330									
Anthracene	ND	330									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **MB-48506** SampType: **MBLK** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **PBS** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533908**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzidine (M)	ND	1600									
Benzo(a)anthracene	ND	330									
Benzo(a)pyrene	ND	330									
Benzo(b)fluoranthene	ND	330									
Benzo(g,h,i)perylene	ND	330									
Benzo(k)fluoranthene	ND	330									
Benzoic acid	ND	1600									
Benzyl alcohol	ND	660									
Bis(2-chloroethoxy)methane	ND	330									
Bis(2-chloroethyl)ether	ND	330									
Bis(2-chloroisopropyl)ether	ND	330									
Bis(2-ethylhexyl)phthalate	ND	330									
Butylbenzylphthalate	ND	330									
Chrysene	ND	330									
Di-n-butylphthalate	ND	330									
Di-n-octylphthalate	ND	330									
Dibenz(a,h)anthracene	ND	330									
Dibenzofuran	ND	330									
Diethylphthalate	ND	330									
Dimethylphthalate	ND	330									
Fluoranthene	ND	330									
Fluorene	ND	330									
Hexachlorobenzene	ND	330									
Hexachlorobutadiene	ND	660									
Hexachlorocyclopentadiene	ND	660									
Hexachloroethane	ND	330									
Indeno(1,2,3-cd)pyrene	ND	330									
Isophorone	ND	330									
N-Nitrosodi-n-propylamine	ND	330									
N-Nitrosodiphenylamine	ND	330									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **MB-48506** SampType: **MBLK** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **PBS** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533908**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	330									
Nitrobenzene	ND	330									
Pentachlorophenol	ND	1600									
Phenanthrene	ND	330									
Phenol	ND	330									
Pyrene	ND	330									
Surr: 1,2-Dichlorobenzene-d4	3064.667		3330		92.0	40	97				
Surr: 2,4,6-Tribromophenol	2578.000		3330		77.4	31	148				
Surr: 2-Chlorophenol-d4	3329.667		3330		100	49	103				
Surr: 2-Fluorobiphenyl	3199.000		3330		96.1	55	102				
Surr: 2-Fluorophenol	3335.000		3330		100	45	105				
Surr: 4-Terphenyl-d14	3745.667		3330		112	52	124				
Surr: Nitrobenzene-d5	3558.667		3330		107	48	109				
Surr: Phenol-d5	3457.333		3330		104	47	108				

Sample ID: **LCS-48506** SampType: **LCS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **LCSS** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533909**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	3117.000	330	3330	0	93.6	60	98				
1,4-Dichlorobenzene	2771.000	330	3330	0	83.2	58	91				
2,4-Dinitrotoluene	3477.667	330	3330	0	104	69	123				
2-Chlorophenol	2988.000	330	3330	0	89.7	58	97				
4-Chloro-3-methylphenol	3644.667	660	3330	0	109	69	123				
4-Nitrophenol	3319.000	1600	3330	0	99.7	61	128				
Acenaphthene	3109.667	330	3330	0	93.4	66	104				
N-Nitrosodi-n-propylamine	3463.667	330	3330	0	104	56	120				
Pentachlorophenol	2736.667	1600	3330	0	82.2	77	127				
Phenol	3122.667	330	3330	0	93.8	61	108				
Pyrene	3183.000	330	3330	0	95.6	57	119				

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **LCS-48506** SampType: **LCS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **LCSS** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533909**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: 1,2-Dichlorobenzene-d4	2752.667		3330		82.7	40	97				
Surr: 2,4,6-Tribromophenol	3184.667		3330		95.6	31	148				
Surr: 2-Chlorophenol-d4	2967.333		3330		89.1	49	103				
Surr: 2-Fluorobiphenyl	3048.667		3330		91.6	55	102				
Surr: 2-Fluorophenol	2876.667		3330		86.4	45	105				
Surr: 4-Terphenyl-d14	3437.333		3330		103	52	124				
Surr: Nitrobenzene-d5	3133.667		3330		94.1	48	109				
Surr: Phenol-d5	3020.667		3330		90.7	47	108				

Sample ID: **100732-002AMS** SampType: **MS** TestCode: **8270_S_FUL** Units: **µg/Kg-dry** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **ZZZZZZ** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	3026.021	330	3337	0	90.7	50	102				
1,4-Dichlorobenzene	2678.959	330	3337	0	80.3	46	94				
2,4-Dinitrotoluene	3480.309	330	3337	0	104	63	125				
2-Chlorophenol	3005.979	330	3337	0	90.1	49	101				
4-Chloro-3-methylphenol	3638.975	660	3337	0	109	60	128				
4-Nitrophenol	3229.448	1700	3337	0	96.8	48	135				
Acenaphthene	3071.116	330	3337	0	92.0	57	109				
N-Nitrosodi-n-propylamine	3484.651	330	3337	0	104	48	123				
Pentachlorophenol	1728.296	1700	3337	0	51.8	62	135				S
Phenol	3190.366	330	3337	0	95.6	50	113				
Pyrene	3130.240	330	3337	0	93.8	52	126				
Surr: 1,2-Dichlorobenzene-d4	2581.087		3337		77.3	40	97				
Surr: 2,4,6-Tribromophenol	2976.250		3337		89.2	31	148				
Surr: 2-Chlorophenol-d4	2856.666		3337		85.6	49	103				
Surr: 2-Fluorobiphenyl	2955.206		3337		88.6	55	102				
Surr: 2-Fluorophenol	2763.804		3337		82.8	45	105				
Surr: 4-Terphenyl-d14	3360.056		3337		101	52	124				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100732-002AMS** SampType: **MS** TestCode: **8270_S_FUL** Units: **µg/Kg-dry** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **ZZZZZZ** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Nitrobenzene-d5	2947.189		3337		88.3	48	109				
Surr: Phenol-d5	2934.496		3337		87.9	47	108				

Sample ID: **100732-002AMSD** SampType: **MSD** TestCode: **8270_S_FUL** Units: **µg/Kg-dry** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **ZZZZZZ** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1533911**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	2933.494	330	3337	0	87.9	50	102	3026	3.11	20	
1,4-Dichlorobenzene	2625.179	330	3337	0	78.7	46	94	2679	2.03	20	
2,4-Dinitrotoluene	3420.516	330	3337	0	103	63	125	3480	1.73	20	
2-Chlorophenol	2907.773	330	3337	0	87.1	49	101	3006	3.32	20	
4-Chloro-3-methylphenol	3575.843	660	3337	0	107	60	128	3639	1.75	20	
4-Nitrophenol	3129.572	1700	3337	0	93.8	48	135	3229	3.14	20	
Acenaphthene	2929.819	330	3337	0	87.8	57	109	3071	4.71	20	
N-Nitrosodi-n-propylamine	3367.405	330	3337	0	101	48	123	3485	3.42	20	
Pentachlorophenol	1723.620	1700	3337	0	51.7	62	135	1728	0.271	20	S
Phenol	3089.822	330	3337	0	92.6	50	113	3190	3.20	20	
Pyrene	3089.822	330	3337	0	92.6	52	126	3130	1.30	20	
Surr: 1,2-Dichlorobenzene-d4	2567.726		3337		76.9	40	97		0	20	
Surr: 2,4,6-Tribromophenol	2951.866		3337		88.5	31	148		0	20	
Surr: 2-Chlorophenol-d4	2794.201		3337		83.7	49	103		0	20	
Surr: 2-Fluorobiphenyl	2846.979		3337		85.3	55	102		0	20	
Surr: 2-Fluorophenol	2738.083		3337		82.1	45	105		0	20	
Surr: 4-Terphenyl-d14	3265.190		3337		97.8	52	124		0	20	
Surr: Nitrobenzene-d5	2911.113		3337		87.2	48	109		0	20	
Surr: Phenol-d5	2885.727		3337		86.5	47	108		0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100642-013ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **B-175N-0-0.5** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1534028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	330						0	0	20	
1,2-Dichlorobenzene	ND	330						0	0	20	
1,2-Diphenylhydrazine	ND	330						0	0	20	
1,3-Dichlorobenzene	ND	330						0	0	20	
1,4-Dichlorobenzene	ND	330						0	0	20	
1,4-Dioxane	ND	330						0	0	20	
2,4,5-Trichlorophenol	ND	330						0	0	20	
2,4,6-Trichlorophenol	ND	330						0	0	20	
2,4-Dichlorophenol	ND	1600						0	0	20	
2,4-Dimethylphenol	ND	330						0	0	20	
2,4-Dinitrophenol	ND	1600						0	0	20	
2,4-Dinitrotoluene	ND	330						0	0	20	
2,6-Dinitrotoluene	ND	330						0	0	20	
2-Chloronaphthalene	ND	330						0	0	20	
2-Chlorophenol	ND	330						0	0	20	
2-Methylnaphthalene	ND	330						0	0	20	
2-Methylphenol	ND	330						0	0	20	
2-Nitroaniline	ND	1600						0	0	20	
2-Nitrophenol	ND	330						0	0	20	
3,3´-Dichlorobenzidine	ND	660						0	0	20	
3-Nitroaniline	ND	1600						0	0	20	
4,6-Dinitro-2-methylphenol	ND	1600						0	0	20	
4-Bromophenyl-phenylether	ND	330						0	0	20	
4-Chloro-3-methylphenol	ND	660						0	0	20	
4-Chloroaniline	ND	660						0	0	20	
4-Chlorophenyl-phenylether	ND	330						0	0	20	
3/4-Methylphenol	ND	330						0	0	20	
4-Methylphenol	ND	330						0	0	20	
4-Nitroaniline	ND	1600						0	0	20	
4-Nitrophenol	ND	1600						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100642-013ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **B-175N-0-0.5** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1534028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	330						0	0	20	
Acenaphthylene	ND	330						0	0	20	
Aniline	ND	330						0	0	20	
Anthracene	ND	330						0	0	20	
Benzidine (M)	ND	1600						0	0	20	
Benzo(a)anthracene	ND	330						0	0	20	
Benzo(a)pyrene	ND	330						0	0	20	
Benzo(b)fluoranthene	ND	330						0	0	20	
Benzo(g,h,i)perylene	ND	330						0	0	20	
Benzo(k)fluoranthene	ND	330						0	0	20	
Benzoic acid	ND	1600						0	0	20	
Benzyl alcohol	ND	660						0	0	20	
Bis(2-chloroethoxy)methane	ND	330						0	0	20	
Bis(2-chloroethyl)ether	ND	330						0	0	20	
Bis(2-chloroisopropyl)ether	ND	330						0	0	20	
Bis(2-ethylhexyl)phthalate	ND	330						0	0	20	
Butylbenzylphthalate	ND	330						0	0	20	
Carbazole	ND	330						0	0	20	
Chrysene	ND	330						0	0	20	
Di-n-butylphthalate	ND	330						0	0	20	
Di-n-octylphthalate	ND	330						0	0	20	
Dibenz(a,h)anthracene	ND	330						0	0	20	
Dibenzofuran	ND	330						0	0	20	
Diethylphthalate	ND	330						0	0	20	
Dimethylphthalate	ND	330						0	0	20	
Fluoranthene	ND	330						0	0	20	
Fluorene	ND	330						0	0	20	
Hexachlorobenzene	ND	330						0	0	20	
Hexachlorobutadiene	ND	660						0	0	20	
Hexachlorocyclopentadiene	ND	660						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **100642-013ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **9/2/2008** RunNo: **99090**
Client ID: **B-175N-0-0.5** Batch ID: **48506** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **9/4/2008** SeqNo: **1534028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachloroethane	ND	330						0	0	20	
Indeno(1,2,3-cd)pyrene	ND	330						0	0	20	
Isophorone	ND	330						0	0	20	
N-Nitrosodi-n-propylamine	ND	330						0	0	20	
N-Nitrosodimethylamine	ND	330						0	0	20	
N-Nitrosodiphenylamine	ND	330						0	0	20	
Naphthalene	ND	330						0	0	20	
Nitrobenzene	ND	330						0	0	20	
Pentachlorophenol	ND	1600						0	0	20	
Phenanthrene	ND	330						0	0	20	
Phenol	ND	330						0	0	20	
Pyrene	ND	330						0	0	20	
Pyridine	ND	1600						0	0	20	
Surr: 1,2-Dichlorobenzene-d4	2330.667		3330		70.0	40	97		0	0	
Surr: 2,4,6-Tribromophenol	2290.667		3330		68.8	31	148		0	0	
Surr: 2-Chlorophenol-d4	2607.667		3330		78.3	49	103		0	0	
Surr: 2-Fluorobiphenyl	2754.000		3330		82.7	55	102		0	0	
Surr: 2-Fluorophenol	2637.667		3330		79.2	45	105		0	0	
Surr: 4-Terphenyl-d14	3396.333		3330		102	52	124		0	0	
Surr: Nitrobenzene-d5	2843.000		3330		85.4	48	109		0	0	
Surr: Phenol-d5	2772.667		3330		83.3	47	108		0	0	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: HC_S_ATL

Sample ID: **MB-48475** SampType: **MBLK** TestCode: **HC_S_ATL** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **99093**
Client ID: **PBS** Batch ID: **48475** TestNo: **EPA 8015B(M LUFT** Analysis Date: **9/3/2008** SeqNo: **1534882**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C8-C10	ND	10									
T/R Hydrocarbons: C10-C18	ND	10									
T/R Hydrocarbons: C18-C28	ND	10									
T/R Hydrocarbons: C28-C36	ND	10									
T/R Hydrocarbons: C36-C40	ND	10									
T/R Hydrocarbons: C8-C40 Total	ND	10									
Surr: p-Terphenyl	73.995		80.00		92.5	62	133				

Sample ID: **100642-043ADUP** SampType: **DUP** TestCode: **HC_S_ATL** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **99093**
Client ID: **B-192N-4.5-5** Batch ID: **48475** TestNo: **EPA 8015B(M LUFT** Analysis Date: **9/4/2008** SeqNo: **1534886**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C8-C10	ND	10						0	0	20	
T/R Hydrocarbons: C10-C18	ND	10						0	0	20	
T/R Hydrocarbons: C18-C28	30.089	10						32.50	7.71	20	
T/R Hydrocarbons: C28-C36	125.920	10						138.7	9.67	20	
T/R Hydrocarbons: C36-C40	73.253	10						89.30	19.7	20	
T/R Hydrocarbons: C8-C40 Total	229.262	10						260.5	12.8	20	
Surr: p-Terphenyl	77.457		80.00		96.8	62	133		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: HC_S_ATL

Sample ID: **MB-48476** SampType: **MBLK** TestCode: **HC_S_ATL** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **99157**
Client ID: **PBS** Batch ID: **48476** TestNo: **EPA 8015B(M LUFT** Analysis Date: **9/5/2008** SeqNo: **1534731**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C8-C10	ND	10									
T/R Hydrocarbons: C10-C18	ND	10									
T/R Hydrocarbons: C18-C28	ND	10									
T/R Hydrocarbons: C28-C36	ND	10									
T/R Hydrocarbons: C36-C40	ND	10									
T/R Hydrocarbons: C8-C40 Total	ND	10									
Surr: p-Terphenyl	74.427		80.00		93.0	62	133				

Sample ID: **100642-029ADUP** SampType: **DUP** TestCode: **HC_S_ATL** Units: **mg/Kg** Prep Date: **8/29/2008** RunNo: **99157**
Client ID: **B-188N-0-0.5** Batch ID: **48476** TestNo: **EPA 8015B(M LUFT** Analysis Date: **9/5/2008** SeqNo: **1534732**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C8-C10	ND	10						0	0	20	
T/R Hydrocarbons: C10-C18	ND	10						0	0	20	
T/R Hydrocarbons: C18-C28	ND	10						0	0	20	
T/R Hydrocarbons: C28-C36	ND	10						0	0	20	
T/R Hydrocarbons: C36-C40	ND	10						0	0	20	
T/R Hydrocarbons: C8-C40 Total	ND	10						0	0	20	
Surr: p-Terphenyl	70.775		80.00		88.5	62	133		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: HC_S_VOA

Sample ID: **D080827MB2** SampType: **MBLK** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **PBS** Batch ID: **D08VS139** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1530749**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	ND	1.0									
Surr: Bromofluorobenzene (FID)	102.039		100.0		102	42	142				

Sample ID: **100642-013ADUP** SampType: **DUP** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1530751**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (FID)	108.729		100.0		109	42	142		0	0	

Sample ID: **100642-013AMS** SampType: **MS** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1530752**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	3.655	1.0	5.000	0	73.1	33	120				
Surr: Bromofluorobenzene (FID)	108.594		100.0		109	42	142				

Sample ID: **100642-013AMSD** SampType: **MSD** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **B-175N-0-0.5** Batch ID: **D08VS139** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1530753**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	4.326	1.0	5.000	0	86.5	33	120	3.655	16.8	20	
Surr: Bromofluorobenzene (FID)	111.617		100.0		112	42	142		0	20	

Sample ID: **D080827LCS3** SampType: **LCS** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **LCSS** Batch ID: **D08VS139** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1530766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	4.632	1.0	5.000	0	92.6	74	108				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: HC_S_VOA

Sample ID: **D080827LCS3** SampType: **LCS** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98888**
Client ID: **LCSS** Batch ID: **D08VS139** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1530766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	107.124		100.0		107	42	142				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: HC_S_VOA

Sample ID: **D080828MB1** SampType: **MBLK** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **PBS** Batch ID: **D08VS140** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1531237**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	ND	1.0									
Surr: Bromofluorobenzene (FID)	101.503		100.0		102	42	142				

Sample ID: **100642-034ADUP** SampType: **DUP** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1531239**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (FID)	107.634		100.0		108	42	142		0	0	

Sample ID: **100642-034AMS** SampType: **MS** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1531240**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	3.772	1.0	5.000	0	75.4	33	120				
Surr: Bromofluorobenzene (FID)	107.173		100.0		107	42	142				

Sample ID: **100642-034AMSD** SampType: **MSD** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **B-189N-4.5-5** Batch ID: **D08VS140** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1531241**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	3.710	1.0	5.000	0	74.2	33	120	3.772	1.66	20	
Surr: Bromofluorobenzene (FID)	107.667		100.0		108	42	142		0	20	

Sample ID: **D080828LCS1** SampType: **LCS** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **LCSS** Batch ID: **D08VS140** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1531247**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
T/R Hydrocarbons: C5-C12	4.742	1.0	5.000	0	94.8	74	108				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: HC_S_VOA

Sample ID: **D080828LCS1** SampType: **LCS** TestCode: **HC_S_VOA** Units: **mg/Kg** Prep Date: RunNo: **98917**
Client ID: **LCSS** Batch ID: **D08VS140** TestNo: **EPA 8015B** Analysis Date: **8/28/2008** SeqNo: **1531247**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	110.559		100.0		111	42	142				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 48476

Sample ID: **LCS-48476**	SampType: **LCS**	TestCode: **8015_S_DM**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **99157**
Client ID: **LCSS**	Batch ID: **48476**	TestNo: **EPA 8015B(M**	**LUFT**	Analysis Date: **9/5/2008**	SeqNo: **1534726**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	974.074	10	1000	0	97.4	71	122				
Surr: p-Terphenyl	74.354		80.00		92.9	62	133				

Sample ID: **100642-029AMS**	SampType: **MS**	TestCode: **8015_S_DM**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **99157**
Client ID: **B-188N-0-0.5**	Batch ID: **48476**	TestNo: **EPA 8015B(M**	**LUFT**	Analysis Date: **9/5/2008**	SeqNo: **1534727**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	969.114	10	1000	0	96.9	68	123				
Surr: p-Terphenyl	70.271		80.00		87.8	62	133				

Sample ID: **100642-029AMSD**	SampType: **MSD**	TestCode: **8015_S_DM**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **99157**
Client ID: **B-188N-0-0.5**	Batch ID: **48476**	TestNo: **EPA 8015B(M**	**LUFT**	Analysis Date: **9/5/2008**	SeqNo: **1534728**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	961.422	10	1000	0	96.1	68	123	969.1	0.797	20	
Surr: p-Terphenyl	72.192		80.00		90.2	62	133		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 48475

Sample ID: **LCS-48475**	SampType: **LCS**	TestCode: **8015_S_DM**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **99093**
Client ID: **LCSS**	Batch ID: **48475**	TestNo: **EPA 8015B(M**	**LUFT**	Analysis Date: **9/3/2008**	SeqNo: **1534878**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	1093.686	10	1000	0	109	71	122				
Surr: p-Terphenyl	82.318		80.00		103	62	133				

Sample ID: **100672-001AMS**	SampType: **MS**	TestCode: **8015_S_DM**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **99093**
Client ID: **ZZZZZZ**	Batch ID: **48475**	TestNo: **EPA 8015B(M**	**LUFT**	Analysis Date: **9/3/2008**	SeqNo: **1534879**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	1086.685	10	1000	16.28	107	68	123				
Surr: p-Terphenyl	78.847		80.00		98.6	62	133				

Sample ID: **100672-001AMSD**	SampType: **MSD**	TestCode: **8015_S_DM**	Units: **mg/Kg**	Prep Date: **8/29/2008**	RunNo: **99093**
Client ID: **ZZZZZZ**	Batch ID: **48475**	TestNo: **EPA 8015B(M**	**LUFT**	Analysis Date: **9/3/2008**	SeqNo: **1534880**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	1094.946	10	1000	16.28	108	68	123	1087	0.757	20	
Surr: p-Terphenyl	78.964		80.00		98.7	62	133		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
100642-001C	0808470-01	Soil	08/25/08 09:35	08/27/08 12:08
100642-002C	0808470-02	Soil	08/25/08 09:45	08/27/08 12:08
100642-003C	0808470-03	Soil	08/25/08 09:55	08/27/08 12:08
100642-004C	0808470-04	Soil	08/25/08 10:05	08/27/08 12:08
100642-005C	0808470-05	Soil	08/25/08 10:10	08/27/08 12:08
100642-006C	0808470-06	Soil	08/25/08 10:15	08/27/08 12:08
100642-007C	0808470-07	Soil	08/25/08 10:55	08/27/08 12:08
100642-008C	0808470-08	Soil	08/25/08 11:05	08/27/08 12:08
100642-009C	0808470-09	Soil	08/25/08 11:45	08/27/08 12:08
100642-010C	0808470-10	Soil	08/25/08 11:55	08/27/08 12:08

CASE NARRATIVE

SAMPLE RECEIPT:	Samples were received intact, at 4 °C, and accompanied by chain of custody documentation.
PRESERVATION:	Samples requiring preservation were verified prior to sample preparation and analysis.
HOLDING TIMES:	All holding times were met, unless otherwise noted in the report with data qualifiers.
QA/QC CRITERIA:	All quality objective criteria were met, except as noted in the report with data qualifiers.

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26052 MERIT CIRCLE SUITE 105, LAGUNA HILLS, CALIFORNIA 92653
TELEPHONE: (949) 348-9389 FAX: (949) 348-9115
E-MAIL: SIERRALABS @ SIERRALABS.NET

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100642-001C (0808470-01) Soil Sampled: 08/25/08 09:35 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/03/08 23:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*51.0 %*		*35-150*	"	"	"	"	
100642-002C (0808470-02) Soil Sampled: 08/25/08 09:45 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 00:41	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*51.6 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100642-003C (0808470-03) Soil Sampled: 08/25/08 09:55 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 01:28	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*28.9 %*		*35-150*	"	"	"	"	*S-04*
100642-004C (0808470-04) Soil Sampled: 08/25/08 10:05 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 02:14	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*73.1 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100642-005C (0808470-05) Soil Sampled: 08/25/08 10:10 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 03:00	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*91.5 %*		*35-150*	"	"	"	"	
100642-006C (0808470-06) Soil Sampled: 08/25/08 10:15 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 03:47	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*98.6 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100642-007C (0808470-07) Soil Sampled: 08/25/08 10:55 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 04:33	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*90.6 %*		*35-150*	"	"	"	"	
100642-008C (0808470-08) Soil Sampled: 08/25/08 11:05 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 05:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*81.2 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100642-009C (0808470-09) Soil Sampled: 08/25/08 11:45 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 06:06	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*71.5 %*		*35-150*	"	"	"	"	
100642-010C (0808470-10) Soil Sampled: 08/25/08 11:55 Received: 08/27/08 12:08									
2,4,5-T	ND	1.6	µg/kg	1	B8I0318	09/03/08	09/04/08 06:52	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*76.4 %*		*35-150*	"	"	"	"	

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3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I0318 - EPA 8151A Herbicides										
Blank (B8I0318-BLK1)				Prepared & Analyzed: 09/03/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							
Dinoseb	ND	1.6	"							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*102*		*"*	*100*		*102*	*35-150*			
LCS (B8I0318-BS1)				Prepared & Analyzed: 09/03/08						
2,4,5-T	6.84	1.6	µg/kg	10.0		68.4	20-150			
2,4,5-TP (Silvex)	9.68	1.6	"	10.0		96.8	20-150			
Dichlorprop	6.60	1.6	"	10.0		66.0	20-150			
Dinoseb	3.42	1.6	"	10.0		34.2	20-150			
Duplicate (B8I0318-DUP1)	**Source: 0808470-10**			Prepared: 09/03/08 Analyzed: 09/04/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/04/08 10:48

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I0318 - EPA 8151A Herbicides										
Matrix Spike (B8I0318-MS1)	**Source: 0808470-01**			Prepared & Analyzed: 09/03/08						
2,4,5-T	13.8	1.6	µg/kg	10.0	ND	138	20-150			
2,4,5-TP (Silvex)	13.9	1.6	"	10.0	ND	139	20-150			
Dichlorprop	9.88	1.6	"	10.0	ND	98.8	20-150			
Dinoseb	5.86	1.6	"	10.0	ND	58.6	20-150			
Matrix Spike Dup (B8I0318-MSD1)	**Source: 0808470-01**			Prepared & Analyzed: 09/03/08						
2,4,5-T	12.0	1.6	µg/kg	10.0	ND	120	20-150	14.0	30	
2,4,5-TP (Silvex)	13.4	1.6	"	10.0	ND	134	20-150	3.66	30	
Dichlorprop	8.08	1.6	"	10.0	ND	80.8	20-150	20.0	30	
Dinoseb	4.48	1.6	"	10.0	ND	44.8	20-150	26.7	30	

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Advanced Technology Labs	Project:	NA	
3275 Walnut Avenue	Project Number:	PO#SC03895	**Reported:**
Signal Hill CA, 90755	Project Manager:	Hoa Huynh	09/04/08 10:48

Notes and Definitions

S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755-5225
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TEL: (562) 989-4045 FAX: (562) 989-4040

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

Sierra Laboratories
26052 Merit Circle Suite 105
Laguna Hills, CA 92653

TEL: (949) 348-9389
FAX: (949) 348-9115
Acct #:

26-Aug-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8151		
100642-001C / B-176N-0-0.5	Soil	8/25/2008 9:35:00 **AM**	40ZG	1		
100642-002C / B-176N-2-2.5	Soil	8/25/2008 9:45:00 **AM**	40ZG	1		
100642-003C / B-176N-4.5-5	Soil	8/25/2008 9:55:00 AM	40ZG	1		
100642-004C 1 B-177N-0-0.5	Soil	8/25/2008 10:05:00 AM	40ZG	1		
100642-0056 / B-177N-2-2.5	Soil	8/25/2008 10:10:00 **AM**	4OZG	1		
100642-006C / B-177N-4.5-5	Soil	8/25/2008 10:15:00 AM	4OZG	1		
100642-007C / 8-178N-0-0.5	Soil	8/25/2008 10:55:00 AM	40ZG	1		
100642-008C 1 B-178N-2-2.5	Soil	8/25/2008 11:05:00 **AM**	40ZG	1		
100642-009C / B-178N-4.5-5	Soil	8/25/2008 11:45:00 **AM**	40ZG	1		
100642-010C / B-179N-0-0.5	Soil	8/25/2008 11:55:00 **AM**	4OZG	1		

General Comments: Please email sample receipt acknowledgementto the PM.

Please use PO#: SC03895 Please fax results by:NORMAL TAT

PLEASE SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:	Kals ang	8/26/08	**Received by:**		8/27/08 1115
Relinquished by:		8/27/08 1205	**Received by:**		8-27-08 12:08

D-TEK Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	**9/5/08**
Sampling Date:	**8/25/08**
Date Sample Received:	**8/27/08**
Date Extracted:	**8/27/08**
Date Analyzed:	**August 28,2008**
Analyzed By:	**EA**
Method:	**EPA 8141A**
Sample Type:	**Soil**
Work Order Number:	**100642**
Sample Log Number:	**08-5727 to 08-5736**

The sample(s) were analyzed with EPA methodology or equivalent methods as specified on the attached "Analyses Results" report.

The results of these analyses and the quality control data are enclosed.

Ellen Atienza
Operations Manager

D-TEK Analytical 'Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 9201.0
Tel: (760) 930-2555 Fax: *(760)* 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	*9/5/08*
Sampling Date:	**8/25/08**
Date Sample Received:	**8/27/08**
Date Extracted:	**8/27/08**
Date Analyzed:	**August 28,2008**
Analyzed By:	**FA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-5727 100642-001B B-176N-0-0.5	08-5728 100642-002B B-176N-2-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Nalcd	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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Carlsbad, CA 92010
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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	*915108*
Sampling Date:	**8/25/08**
Date Sample Received:	**8/27/08**
Date Extracted:	**8/27/08**
Date Analyzed:	**August 28, 2008**
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	**µg/kg**

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-5729 100642-003B B-176N-4.5-5	08-5730 100642-004B B-177N-0-0.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gal-dona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	N'D
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	**9/5/08**
Sampling Date:	**8/25/08**
Date Sample Received:	**8/27/08**
Date Extracted:	**8/27/08**
Date Analyzed:	**August 28,2008**
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-5731 100642-005B B-177N-2-2.5	08-5732 100642-006B B-177N-4.5-5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		NB	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut: Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	**9/5/08**
Sampling Date:	**8/25/08**
Date Sample Received:	**8/27/08**
Dote Extracted:	**8/27/08**
Date Analyzed:	**August 28,2008**
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	**µg/kg**

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-5733 100642-007B B-178N-0-0.5	08-5734 100642-008B B-178N-2-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical Laboratories, Inc.
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Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/5/08
Sampling Date:	8/25/08
Date Sample Received	8/27/08
Date Extracted:	8/27/08
Date Analyzed:	August 28, 2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-5735	08-5736
		Sample ID:	100642-009B	100642-010B
Analysis	PQL		B-178N-4.5-5	B-179N-0-0.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (765) 930-2510

QUALITY CONTROL DATA REPORT

Date:	**9/5/08**
Attn:	**Ms. Hoa Huynh**
Date Extracted:	**8/27/08**
Date Analyzed:	**August 28,2008**
Analysis Method:	**EPA 8141A**
Log#:	**08-5727 to 08-5736**

METHOD BLANK

No target analytes were detected in the method blank.

LABORATORY CONTROL SAMPLE

Compound	% Recovery	QC Limits:*
Diazinon	127	40-130
Methyl Parathion	120	40-130
Dursban (Chlorpyrifos)	117	40-130
Gardona(Stirophos)	127	40-130

Matrix Spike (08-5718)

Compound	Spike % Recovery	Spike Dup. % Recovery	MS/MSD RPD %	RPD Limits
Diazinon	118	121.	3	30
Methyl Parathion	1.02	115	1.2	30
Dursban (Chlorpyrifos)	1.09	1.09	1	30
Gardona (Stirophos)	122	122	15	30

*QC limits applies to LCS, MS and MSD

QUALITY CONTROL TERMINOLOGY

- **LCS** - LABORATORY CONTROL SAMPLE. Reported as % recovery of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable ranpe is based on historical laboratory control data and EPA requirements. Any out-of-control QC data is clearly indicated.
- **Spike**- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated. Reported as % recovery. Acceptable range for "Normal Matrix Sample" Is based on historical laboratory control data. Any out-of-control QC data is clearly indicated.
- **Surrogates**- Compounds representative of a group of compounds, Surrogates are spiked into environmental samples and % recovery of concentration spiked is calculated and reported. Acceptable range varies depending on sample matrix and analysis method. Any out-of-control QC data is clearly indicated.

D-TEK Analytical Laboratories, Inc.
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Tel: (760) 930-2555 Fax: (765) 930-2510

SURROGATE RECOVERIES
(Tributylphosphate)

Log #	Percent Recovery:
Method Blank	116
08-5727	122
08-5728	118
08-5729	109
08-5730	108
08-5731	114
08-5732	107
08-5733	111
08-5734	102
08-5735	101
08-5736	104
LCS	81
08-5718 MS	93
08-5718 MSD	90

QC Limits: 50 to 170%

Ellen Atienza
Operations Manager

QUALITY CONTROL TERMINOLOGY

- LCS - LABORATORY CONTROL SAMPLE. Reported as % recovcy of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EPA requirements. Any out-of-control QC data is clearly indicated.
- Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated. Reported as % recovery. Acceptable range for "Normal Matrix Sample" is based on historical laboratory control data. Any out-of-control QC data is clearly indicated.
- Surrogates- Compounds representative of a group of compounds. Surrogates are spiked into environmental samples and % recovery of concentration spiked is calculated and reported. Acceptable rnnge vnries depending on sample matrix and analysis method. Any out-of-control QC data is clearly indicated.

0818863

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755-5225
www.atglobal.com
TEL: (562) 989-4045 FAX: (562) 989-4040

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

D-Tek
2722 Loker Ave. West, Suite B
Carlsbad, CA 92010

TEL: (760) 930-2555
FAX: (760) 930-2510
Acct #:

26-Aug-08

Sample ID		Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8141A	
100642-001B	/ B-176N-0-0.5	Soil	8/25/2008 9:35:00 AM	4OZG	1	08-5727
100642-002B	/ B-176N-2-2.5	Soil	8/25/2008 9:45:00 AM	4OZG	1	08-5728
100642-003B	/ B-176N-4.5-5	Soil	8/25/2008 9:55:00 AM	4OZG	1	08-5729
100642-004B	/ B-177N-0-0.5	Soil	8/25/2008 10:05:00 AM	4OZG	1	08-5730
100642-005B	/ B-177N-2-2.5	Soil	8/25/2008 10:10:00 AM	4OZG	1	08-5731
100642-006B	/ B-177N-4.5-5	Soil	8/25/2008 10:15:00 AM	4OZG	1	08-5732
100642-007B	/ B-178N-0-0.5	Soil	8/25/2008 10:55:00 AM	4OZG	1	08-5733
100642-008B	/ B-178N-2-2.5	Soil	8/25/2008 11:05:00 AM	4OZG	1	08-5734
100642-009B	/ B-178N-4.5-5	Soil	8/25/2008 11:45:00 AM	4OZG	1	08-5735
100642-010B	/ B-179N-0-0.5	Soil	8/25/2008 11:55:00 AM	4OZG	1	08-5736

General Comments: Please email sample receipt acknowledgement to the PM.

Please use PO#: SC03894 Please fax results by: NORMAL TAT

PLEASE SE D RE ORT TO Ho Mu yn

		Date/Time			Date/Time
Relinquished by:		8/26/08	Received by:		8/27/08 1115
Relinquished by:		8/27/08 1306	Received by:		8/27/08 1310

with Yellow Pink to submitter

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 8/26/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 4.0 Y☑ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: David Lennan
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/26/08	Time: 1520	Received by: (Signature and Printed Name) Neal Ferguson	Date: 8/26/08	Time: 1520
Relinquished by: (Signature and Printed Name) Neal Ferguson	Date: 8/29/08	Time: 1720	Received by: (Signature and Printed Name) Kal	Date: 8/29/08	Time: 1720
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennan
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA) SVOCs	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Herbicides 8151	Pesticides 8141	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100642-1	B-176N-0-0.5	8/25/08	935	X	X		X				X	X	X	X					E	3	J/T	
	2	B-176N-2-2.5		945																			
	3	B-176N-4.5-5		955																			
	4	B-177N-0-0.5		1005																			
	5	B-177N-2-2.5		1010																			
	6	B-177N-4.5-5		1015																			
	7	B-178N-0-0.5		1055																			
	8	B-178N-2-2.5		1105																			
	9	B-178N-4.5-5		1145																			
	10	B-179N-0-0.5	↓	1155																			

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report Yellow to folder Pink to submitter

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennan
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 8/26/08 Time: 15:20 Received by: (Signature and Printed Name) Chad Berger Date: 8/26/08 Time: 1520
Relinquished by: (Signature and Printed Name) Chad Berger Date: 8/26/08 Time: 1720 Received by: (Signature and Printed Name) Date: 8/26/08 Time: 1720
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature

Send Report To:
Attn: David Lennan
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA) SVOCs	6010B (Total Metal) - LEAD	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 - Herbicides	8141 - Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100642-11	B-179N-2.0-2.5	8/25/08	1205	X	X	X	X	X	X	X	X	X	X	X	X				E	3	J/T	
	12	B-179N-4.5-5.0		1245	X	X	X	X	X	X	X	X	X	X	X						3	J/T	
	13	B-175N-0-0.5		1240	X	X	X	X	X	X	X	X	X	X	X						3	J/T	
	14	B-175N-2.0-2.5		1250	X	X	X	X	X	X	X	X	X	X	X						3	J/T	
	15	B-175N-4.5-5		100	X	X	X	X	X	X	X	X	X	X	X						3	J/T	
	16	B-180N-0-.5		105				X													1	J	
	17	B-181N-0-.5		205				X													1	J	
	18	B-182N-0-.5		220				X													1	J	
	19	B-182N-1-1.5		223				X													1	J	
	20	B-184N-0-.5		235				X													1	J	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/26/08	Time: 15:20	Received by: (Signature and Printed Name) Neal Bagwell	Date: 8/26/08	Time: 1520
Relinquished by: (Signature and Printed Name) Neal Bagwell	Date: 8/26/08	Time: 1720	Received by: (Signature and Printed Name) Kal Bagwell	Date: 8/26/08	Time: 1720
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); 8260B-TPH-g, BTEX, DHS

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER; Rinsate

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	906642-21	B-186N-0-.5	8/25/08	303	E	1	J	
	22	B-186N-1-1.5		305		1	J	
	23	ER-1		325		1	P	
	24	B-183N-0-.5	8/26/08	0830		1	J	
	25	B-184N-1-1.5		0840		1	J	
	26	B-184N-2-2.5		0845		1	J	
	27	B-187N-0-.5		0855		1	J	
	28	B-187N-1-1.5		0900		1	J	
	29	B-188N-0-0.5		910		1	T	
	30	B-188N-2-2.5		915		1	T	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
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FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans, West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/26/08	Time: 15:20	Received by: (Signature and Printed Name) Neal Bryson	Date: 8/26/08	Time: 1520
Relinquished by: (Signature and Printed Name) Neal Bryson	Date: 8/26/08	Time: 1720	Received by: (Signature and Printed Name)	Date: 8/26/08	Time: 1720
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

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- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time
	100642-31	B-188N - 4.5-5	8/26/08	920
	32	B-189N - 0-0.5		940
	33	B-189N - 2.0-2.5		945
	34	B-189N - 4.5-5		955
	35	B-190N - 0-0.5		1015
	36	B-190N - 2-2.5		1020
	37	B-190N - 4.5-5		1030
	38	B-191N - 0-0.5		1050
	39	B-191N - 2-2.5		1100
	40	B-191N - 4.5-5		1110

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal); 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); 6240B TPH, BTEX, OXYS

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

TAT	Container(s) #	Container(s) Type
E	1	T

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

REMARKS

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

Yellow ...bmitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/26/08	Time: 15:20	Received by: (Signature and Printed Name) Neal Pegher	Date: 8/26/08	Time: 1520
Relinquished by: (Signature and Printed Name) Neal Pegher	Date: 8/26/08	Time: 1720	Received by: (Signature and Printed Name) Kal	Date: 8/26/08	Time: 1720
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

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SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION: Container(s) # / Type; TAT

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	#	Type	REMARKS
	100642-41	B-192N-0-.5	8/26/08	1120	E	1	T	
	42	B-192N-2-2.5		1130			T	
	43	B-192N-4.5-5		1140			T	
	44	B-234N-0-.5		130			J	
	45	B-234NA-0-.5		133			J	
	46	B-235N-0-.5		137			J	
	47	B-236N-0-.5		142			J	
	48	B-250N-0-.5		155			J	
	49	B-193N-0-.5		215			J	
	50	B-194N-0-.5		220			J	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

Hoa Huynh

From: Carmen Aguila
Sent: Thursday, August 28,2008 9:07 AM
To: Hoa Huynh
Subject: FW: Changes to COC

-----Original Message-----
From: Keller, Kelly (Irvine,CA-US) [mailto:kkeller@trcsolutions.com]
Sent: Wednesday, August 27, 2008 7:28 PM
To: Carmen Aguila
Cc: Surrency, Ross (Irvine,CA-US)
Subject: Changes to COC

Carmen,
Per our conversation today, please make the following changes to the lab order/COCs received 8/26/08:

1. Add sample B-185N-0-.5, analysis for lead (60610B). Sample submitted but not recorded on COC.
2. Cancel sample B-186N-1-1.5 analysis.
3. ER-1, which was on the COC but not received by the lab, will be included with the samples to be picked up on Friday. ER-2 will be on the COCs submitted on Friday.
4. Unlabled tubes (2) can be discarded, since there is enough material in the jars for analysis.

Thanks and we'll double-check all samples before submitting. Kelly

September 23,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100642

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 26,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: 9/23/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100642
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/26/2008 5:20:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100642-016A	B-180N-0-.5	0.81	mg/L	R99773	0.086	0.25		1	8/25/2008	9/22/2008
100642-017A	B-181N-0-.5	5.0	mg/L	R99773	0.086	0.25		1	8/25/2008	9/22/2008
100642-018A	B-182N-0-.5	15	mg/L	R99773	0.17	0.50		2	8/25/2008	9/22/2008
100642-020A	B-184N-0-.5	2.6	mg/L	R99773	0.086	0.25		1	8/25/2008	9/22/2008
100642-024A	B-183N-0-.5	3.3	mg/L	R99773	0.086	0.25		1	8/26/2008	9/22/2008
100642-048A	B-250N-0-.5	3.7	mg/L	R99773	0.086	0.25		1	8/26/2008	9/22/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99773

Sample ID: **MB-48908A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **PBS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545829**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48908**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **LCSS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.034	0.25	5.000	0	101	80	120				

Sample ID: **100739-007A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.438	0.25						3.455	0.486	20	

Sample ID: **100739-007A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.714	0.25	5.000	3.455	85.2	80	120				

Sample ID: **MB-48908B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **PBS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99773

Sample ID: **100740-014A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545854**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	79.851	2.5						80.11	0.320	20	

Sample ID: **100740-014A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545855**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	88.648	2.5	5.000	80.11	171	80	120				S

Sample ID: **100740-014A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	83.571	2.5	5.000	80.11	69.3	80	120	88.65	5.90	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

October 01,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAF No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100642

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 26,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 10/1/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	TRC	**Lab Order:**	100642
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/26/2008 5:20:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100642-017A	B-181N-0-.5	ND	mg/L	R100133	0.086	0.25		1	8/25/2008	10/1/2008
100642-018A	B-182N-0-.5	ND	mg/L	R100133	0.086	0.25		1	8/25/2008	10/1/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **MB-49176A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49176**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **LCSS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.829	0.25	1.000	0	82.9	80	120				

Sample ID: **100741-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.013	0.25						1.013	0.0553	20	

Sample ID: **100741-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552305**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.248	0.25	2.500	1.013	89.4	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100642
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **100741-009A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552306**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.096	0.25	2.500	1.013	83.3	70	130	3.248	4.78	20	

Sample ID: **MB-40176B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **100740-015A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552317**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.675	0.25						1.376	19.6	20	

Sample ID: **100740-015A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552318**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.506	0.25	2.500	1.376	125	70	130				

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

September 04,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100739

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	B-245S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 8:45:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	75	0.11	5.0		mg/Kg	1	9/3/2008 04:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-238S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 8:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	9.4	0.11	5.0		mg/Kg	1	9/3/2008 04:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100739
Project: Caltrans West County Connectors, 151396
Lab ID: 100739-003

Client Sample ID: B-240S-0-.5
Collection Date: 8/29/2008 9:05:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**		Analyst: **SRB**
Lead	19	0.11	5.0		mg/Kg	1	9/3/2008 04:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-241S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 9:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	24	0.11	5.0		mg/Kg	1	9/3/2008 04:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-239S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 9:15:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	150	0.11	5.0		mg/Kg	1	9/3/2008 04:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-247S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 9:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	860	0.11	5.0		mg/Kg	1	9/3/2008 04:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-249S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 10:15:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	150	0.11	5.0		mg/Kg	1	9/3/2008 04:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-248S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 10:40:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	540	0.11	5.0		mg/Kg	1	9/3/2008 04:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-164N-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 11:15:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	10	0.11	5.0		mg/Kg	1	9/3/2008 04:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-164NA-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 11:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	6.3	0.11	5.0		mg/Kg	1	9/3/2008 04:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-165N-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 11:35:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-011		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	81	0.11	5.0		mg/Kg	1	9/3/2008 04:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-171N-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 11:45:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	330	0.11	5.0		mg/Kg	1	9/3/2008 04:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-171NA-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 11:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	430	0.11	5.0		mg/Kg	1	9/3/2008 04:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100739
Project: Caltrans West County Connectors, 151396
Lab ID: 100739-014

Client Sample ID: B-208N-0-.5
Collection Date: 8/29/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	97	0.11	5.0		mg/Kg	1	9/3/2008 04:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-208N-1-1.5
Lab Order:	100739	**Collection Date:**	8/29/2008 1:05:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	16	0.11	5.0		mg/Kg	1	9/3/2008 04:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-208N-2-2.5
Lab Order:	100739	**Collection Date:**	8/29/2008 1:10:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	72	0.11	5.0		mg/Kg	1	9/3/2008 05:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-256S-0-.5
Lab Order:	100739	**Collection Date:**	8/29/2008 1:30:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100739-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	54	0.11	5.0		mg/Kg	1	9/3/2008 05:04 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100739
Project: Caltrans West County Connectors, 151396
Lab ID: 100739-018

Client Sample ID: B-256SA-0-.5
Collection Date: 8/29/2008 1:40:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	77	0.11	5.0		mg/Kg	1	9/3/2008 05:06 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-5
Lab Order:	100739	**Collection Date:**	8/29/2008 1:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	100739-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080903G**	QC Batch: **48523**				PrepDate:	**9/3/2008**	Analyst: **LKN**
Lead	ND	0.0046	0.25		mg/L	1	9/3/2008 03:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48490A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **PBS**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533481**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48490**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **LCSS**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533482**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	282.466	5.0	250.0	0	113	80	120				

Sample ID: **100739-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **B-164NA-0-.5**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.943	5.0						6.339	22.5	20	R

Sample ID: **100739-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **B-164NA-0-.5**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533494**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	218.161	5.0	250.0	6.339	84.7	45	110				

Sample ID: **MB-48490B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **PBS**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533495**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100740-003A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **ZZZZZZ**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533506**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.716	5.0						3.805	0	20	

Sample ID: **100740-003A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **ZZZZZZ**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533507**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	216.264	5.0	250.0	3.805	85.0	45	110				

Sample ID: **100740-003A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **ZZZZZZ**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533508**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	215.274	5.0	250.0	3.805	84.6	45	110	216.3	0.459	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-48523**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **PBW**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533355**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48523**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **LCSW**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533356**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.948	0.25	1.000	0	94.8	85	115				

Sample ID: **100770-001H-DUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **100770-001H-MS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.418	0.25	2.500	0	96.7	71	118				

Sample ID: **100770-001H-MSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533360**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.395	0.25	2.500	0	95.8	71	118	2.418	0.961	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 2

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 8/29/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED 5.0 Y☑ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennan
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 15T396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date 8/29/08	Time 1405	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1405
Relinquished by: (Signature and Printed Name)	Date: 8/29/08	Time 1800	Received by: (Signature and Printed Name) Kal	Date: 8/29/08	Time: 1800
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennan
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) Lead, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	100739-1	B-245S-0-.5	8/29/08	845	E	1	J	
	2	B-238S-0-.5		855				
	3	B-240S-0-.5		905				
	4	B-241S-0-.5		910				
	5	B-239S-0-.5		915				
	6	B-247S-0-.5		955				
	7	B-249S-0-.5		1015				
	8	B-248S-0-.5		1040				
	9	B-164N-0-.5		1115				
	10	B-164NA-0-.5		1120				

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report. **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 4. SEALED Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/29/08	Time: 1405	Received by: (Signature and Printed Name) Ben Lopez	Date: 8/29/08	Time: 1405
Relinquished by: (Signature and Printed Name) Ben Lopez	Date: 8/29/08	Time: 1800	Received by: (Signature and Printed Name) Karl	Date: 8/29/08	Time: 1800
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	Rinsate	TAT	Container(s) #	Container(s) Type	REMARKS
	1007391 11	B-165N-0-.5	8/29/08	1135										X					E	1	J	
	12	B-171N-0-.5		1145																		
	13	B-171NA-0-.5		1150																		
	14	B-208N-0-.5		1300																		
	15	B-208N-1-1.5		1305																		
	16	B-208N-2-2.5		1310																		
	17	B-256S-0-.5		1330																		
	18	B-256SA-0-.5		1340																		
	19	ER-5		1350													X			P		

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report **Yellow** to folder, **Pink** to submitter.

Hoa Huynh

From: Keller, Kelly (Irvine,CA-US) [kkeller@trcsolutions.com]
Sent: Thursday, September 04, 2008 10:12 AM
To: Hoa Huynh
Subject: RE: Question about samples received on 8/29/08

Yes, the analysis is for lead (6010B). Thanks.

From: Hoa Huynh [mailto:hoa@atlglobal.com]
Sent: Tuesday, September 02, 2008 11:04 AM
To: Keller, Kelly (Irvine,CA-US)
Subject: Question about samples received on 8/29/08

Good morning Kelly,

Attached is a copy of coc for samples received on 8/29/08.
On the second page, you did not mark the analysis. I'd like to know if these are all for Lead by 6010B?

Thanks

Hoa Huynh
Project Coordinator

Advanced Technology Laboratories
www.atlglobal.com
Tel: (562) 989-4045 ext. 249
Fax: (562) 989-4040

Advanced Technology Laboratories is a full-service environmental lab providing organic and inorganic analyses of soil, water, wastewater, storm water and hazardous waste samples. ATL is accredited by the State of California, NELAP and State of Nevada and holds various SBE, DBE and MBE certificates and a USDA soil permit. ATL takes pride in providing our customers with quick turnaround time, excellent customer service and defensible data while offering very competitive rates. Advanced Technology Labs - Your Partner for Quality Environmental Testing

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September 23,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100739

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories

Date: 9/23/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100739
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100739-001A	B-245S-0-.5	2.3	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-005A	B-239S-0-.5	3.0	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-006A	B-247S-0-.5	26	mg/L	R99773	0.34	1.0		4	8/29/2008	9/22/2008
100739-007A	B-249S-0-.5	3.5	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-008A	B-248S-0-.5	6.4	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-011A	B-165N-0-.5	1.2	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-012A	B-171N-0-.5	22	mg/L	R99773	0.34	1.0		4	8/29/2008	9/22/2008
100739-013A	B-171NA-0-.5	28	mg/L	R99773	0.34	1.0		4	8/29/2008	9/22/2008
100739-014A	B-208N-0-.5	6.0	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-016A	B-208N-2-2.5	3.3	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-017A	B-256S-0-.5	3.9	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008
100739-018A	B-256SA-0-.5	3.5	mg/L	R99773	0.086	0.25		1	8/29/2008	9/22/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99773

Sample ID: **MB-48908A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **PBS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545829**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48908**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **LCSS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.034	0.25	5.000	0	101	80	120				

Sample ID: **100739-007A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **B-249S-0-.5**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.438	0.25						3.455	0.486	20	

Sample ID: **100739-007A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **B-249S-0-.5**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.714	0.25	5.000	3.455	85.2	80	120				

Sample ID: **MB-48908B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **PBS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99773

Sample ID: **100740-014A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545854**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	79.851	2.5						80.11	0.320	20	

Sample ID: **100740-014A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545855**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	88.648	2.5	5.000	80.11	171	80	120				S

Sample ID: **100740-014A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	83.571	2.5	5.000	80.11	69.3	80	120	88.65	5.90	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

October 03,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
N E W No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100739

RE: Caltrans West County Connectors, 151396

Attention: David Lemon

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This is an addendum report. Please incorporate with documentation previously submitted.

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Sincerely,

Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION
WET DI/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100739
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100739-006A	B-247S-0-.5	0.37	mg/L	R100185	0.19	0.25		1	8/29/2008	10/2/2008
100739-008A	B-248S-0-.5	0.60	mg/L	R100185	0.19	0.25		1	8/29/2008	10/2/2008
100739-013A	B-171NA-0-.5	0.28	mg/L	R100185	0.19	0.25		1	8/29/2008	10/2/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	TRC	**Lab Order:**	100739
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100739-006A	B-247S-0-.5	0.46	mg/L	R100133	0.086	0.25		1	8/29/2008	10/1/2008
100739-008A	B-248S-0-.5	ND	mg/L	R100133	0.086	0.25		1	8/29/2008	10/1/2008
100739-012A	B-171N-0-.5	0.63	mg/L	R100133	0.086	0.25		1	8/29/2008	10/1/2008
100739-013A	B-171NA-0-.5	0.59	mg/L	R100133	0.086	0.25		1	8/29/2008	10/1/2008
100739-014A	B-208N-0-.5	ND	mg/L	R100133	0.086	0.25		1	8/29/2008	10/1/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **MB-49176A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49176**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **LCSS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.829	0.25	1.000	0	82.9	80	120				

Sample ID: **100741-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.013	0.25						1.013	0.0553	20	

Sample ID: **100741-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552305**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.248	0.25	2.500	1.013	89.4	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **100741-009A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552306**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.096	0.25	2.500	1.013	83.3	70	130	3.248	4.78	20	

Sample ID: **MB-40176B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **100740-015A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552317**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.675	0.25						1.376	19.6	20	

Sample ID: **100740-015A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552318**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.506	0.25	2.500	1.376	125	70	130				

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **MB-49149**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **PBS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553474**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49149**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **LCSS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553475**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.896	0.25	5.000	0	97.9	80	120				

Sample ID: **100797-063A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.038	0.25						1.501	36.5	20	R

Sample ID: **100797-063A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.582	0.25	5.000	1.501	81.6	70	130				

Sample ID: **MB-49149B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **PBS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553488**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.219	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100739
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **100797-072A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.191	0.25						0.3272	0	20	

Sample ID: **100797-072A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553492**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.009	0.25	5.000	0.3272	93.6	70	130				

Sample ID: **100797-072A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.942	0.25	5.000	0.3272	92.3	70	130	5.009	1.35	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

September 04,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100740

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	ER-2
Lab Order:	100740	**Collection Date:**	8/26/2008 2:45:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	100740-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080903G**	QC Batch: **48523**				PrepDate:	**9/3/2008**	Analyst: **LKN**
Lead	ND	0.0046	0.25		mg/L	1	9/3/2008 03:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-253S-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 9:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	5.5	0.25	5.0		mg/Kg	1	9/3/2008 05:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-253S-1-1.5
Lab Order:	100740	**Collection Date:**	8/27/2008 9:23:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903C**	QC Batch: **48490**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.25	5.0		mg/Kg	1	9/3/2008 05:10 PM

CLIENT:	TRC	**Client Sample ID:**	B-253S-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 9:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	8.8	0.25	5.0		mg/Kg	1	9/3/2008 05:28 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-254S-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 9:35:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	30	0.25	5.0		mg/Kg	1	9/3/2008 05:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-254S-1-1.5
Lab Order:	100740	**Collection Date:**	8/27/2008 9:37:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	8.9	0.25	5.0		mg/Kg	1	9/3/2008 05:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-254S-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 9:40:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.25	5.0		mg/Kg	1	9/3/2008 05:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-255S-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 9:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	16	0.25	5.0		mg/Kg	1	9/3/2008 05:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-009

Client Sample ID: B-255S-1-1.5
Collection Date: 8/27/2008 9:55:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	7.8	0.25	5.0		mg/Kg	1	9/3/2008 05:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-010

Client Sample ID: B-255S-2-2.5
Collection Date: 8/27/2008 10:00:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	7.1	0.25	5.0		mg/Kg	1	9/3/2008 05:41 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-011

Client Sample ID: B-204N-0-.5
Collection Date: 8/27/2008 12:15:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**		Analyst: **SRB**
Lead	510	0.25	5.0		mg/Kg	1	9/3/2008 05:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-012

Client Sample ID: B-204N-1-1.5
Collection Date: 8/27/2008 12:17:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.25	5.0		mg/Kg	1	9/3/2008 05:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-204N-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 12:25:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	8.2	0.25	5.0		mg/Kg	1	9/3/2008 05:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-205N-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 12:30:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-014		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	1100	0.25	5.0		mg/Kg	1	9/3/2008 06:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-205N-1-1.5
Lab Order:	100740	**Collection Date:**	8/27/2008 12:32:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	790	0.25	5.0		mg/Kg	1	9/3/2008 06:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-205N-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 12:35:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	250	0.25	5.0		mg/Kg	1	9/3/2008 06:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-206N-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 12:43:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	290	0.25	5.0		mg/Kg	1	9/3/2008 06:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-018

Client Sample ID: B-206N-1-1.5
Collection Date: 8/27/2008 12:45:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	17	0.25	5.0		mg/Kg	1	9/3/2008 06:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-206N-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 12:50:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	5.6	0.25	5.0		mg/Kg	1	9/3/2008 06:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-020

Client Sample ID: B-207N-0-.5
Collection Date: 8/27/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	61	0.25	5.0		mg/Kg	1	9/3/2008 06:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-021

Client Sample ID: B-207N-1-1.5
Collection Date: 8/27/2008 1:03:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	7.3	0.25	5.0		mg/Kg	1	9/3/2008 06:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-207N-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 1:07:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	6.8	0.25	5.0		mg/Kg	1	9/3/2008 06:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-209N-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 1:30:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903D**	QC Batch: **48491**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	500	0.25	5.0		mg/Kg	1	9/3/2008 06:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-024

Client Sample ID: B-209N-1-1.5
Collection Date: 8/27/2008 1:35:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	ND	0.25	5.0		mg/Kg	1	9/3/2008 06:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-209N-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 1:40:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.25	5.0		mg/Kg	1	9/3/2008 06:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-210S-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 1:55:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	200	0.25	5.0		mg/Kg	1	9/3/2008 06:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-027

Client Sample ID: B-210S-1-1.5
Collection Date: 8/27/2008 1:57:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	240	0.25	5.0		mg/Kg	1	9/3/2008 06:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100740
Project: Caltrans West County Connectors, 151396
Lab ID: 100740-028

Client Sample ID: B-210S-2-2.5
Collection Date: 8/27/2008 2:10:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	6.0	0.25	5.0		mg/Kg	1	9/3/2008 06:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-211S-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 2:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	33	0.25	5.0		mg/Kg	1	9/3/2008 06:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-211S-1-1.5
Lab Order:	100740	**Collection Date:**	8/27/2008 2:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-030		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.25	5.0		mg/Kg	1	9/3/2008 06:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-211S-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 2:25:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.25	5.0		mg/Kg	1	9/3/2008 06:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-212S-0-.5
Lab Order:	100740	**Collection Date:**	8/27/2008 2:30:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	190	0.25	5.0		mg/Kg	1	9/3/2008 07:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-212S-1-1.5
Lab Order:	100740	**Collection Date:**	8/27/2008 2:35:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	37	0.25	5.0		mg/Kg	1	9/3/2008 07:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-212S-2-2.5
Lab Order:	100740	**Collection Date:**	8/27/2008 2:40:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100740-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	10	0.25	5.0		mg/Kg	1	9/3/2008 07:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48490A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **PBS**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533481**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48490**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **LCSS**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533482**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	282.466	5.0	250.0	0	113	80	120				

Sample ID: **100739-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **ZZZZZZ**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.943	5.0						6.339	22.5	20	R

Sample ID: **100739-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **ZZZZZZ**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533494**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	218.161	5.0	250.0	6.339	84.7	45	110				

Sample ID: **MB-48490B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **PBS**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533495**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100740-003A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **B-253S-1-1.5**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533506**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.716	5.0						3.805	0	20	

Sample ID: **100740-003A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **B-253S-1-1.5**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533507**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	216.264	5.0	250.0	3.805	85.0	45	110				

Sample ID: **100740-003A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99075**
Client ID: **B-253S-1-1.5**	Batch ID: **48490**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533508**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	215.274	5.0	250.0	3.805	84.6	45	110	216.3	0.459	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48491A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **PBS**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533698**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48491**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **LCSS**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533699**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	284.075	5.0	250.0	0	114	80	120				

Sample ID: **100740-013A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **B-204N-2-2.5**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533710**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.248	5.0						8.230	0.227	20	

Sample ID: **100740-013A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **B-204N-2-2.5**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533711**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	208.429	5.0	250.0	8.230	80.1	45	110				

Sample ID: **MB-48491B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **PBS**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533712**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100740-023A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **B-209N-0-.5**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533723**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	310.512	5.0						500.1	46.8	20	R

Sample ID: **100740-023A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **B-209N-0-.5**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533724**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	572.000	5.0	250.0	500.1	28.8	45	110				S

Sample ID: **100740-023A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99084**
Client ID: **B-209N-0-.5**	Batch ID: **48491**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533725**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	379.092	5.0	250.0	500.1	-48.4	45	110	572.0	40.6	20	SR

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48492A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **PBS**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533726**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48492**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **LCSS**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533727**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	279.590	5.0	250.0	0	112	80	120				

Sample ID: **100740-033A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **B-212S-1-1.5**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533738**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	35.259	5.0						37.24	5.47	20	

Sample ID: **100740-033A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **B-212S-1-1.5**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533739**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	269.406	5.0	250.0	37.24	92.9	45	110				

Sample ID: **MB-48492B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **PBS**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533740**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100741-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **ZZZZZZ**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533751**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	213.181	5.0						210.9	1.07	20	

Sample ID: **100741-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **ZZZZZZ**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533752**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	393.130	5.0	250.0	210.9	72.9	45	110				

Sample ID: **100741-010A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **ZZZZZZ**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533753**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	362.916	5.0	250.0	210.9	60.8	45	110	393.1	7.99	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-48523**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **PBW**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533355**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48523**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **LCSW**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533356**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.948	0.25	1.000	0	94.8	85	115				

Sample ID: **100770-001H-DUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **100770-001H-MS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.418	0.25	2.500	0	96.7	71	118				

Sample ID: **100770-001H-MSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533360**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.395	0.25	2.500	0	95.8	71	118	2.418	0.961	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: K Date: 8/29/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 5.0 Y☑ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 15396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/29/08	Time: 1405	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1405
Relinquished by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER Rinsate	TAT	Container(s) #	Container(s) Type	REMARKS
	100740-1	ER-2	8/26/08	1445				X									X	E	1	P	
	2	B-253S-0-.5	8/27/08	920										X						J	
	3	B-253S-1-1.5		923																	
	4	B-253S-2-2.5		925																	
	5	B-254S-0-.5		935																	
	6	B-254S-1-1.5		937																	
	7	B-254S-2-2.5		940																	
	8	B-255S-0-.5		950																	
	9	B-255S-1-1.5		955																	
	10	B-255S-2-2.5		1000																	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt

1. CHILLED	Y☐ N☐	4. SEALED	Y☐ N☐
2. HEADSPACE (VOA)	Y☐ N☐	5. # OF SPLS MATCH COC	Y☐ N☐
3. CONTAINER INTACT	Y☐ N☐	6. PRESERVED	Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/29/08	Time: 1405	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1405
Relinquished by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800	Received by: (Signature and Printed Name) Kal	Date: 8/29/08	Time: 1820
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (SVOA); 6010B (Total Metal) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	1007110 — 11	B-204N-0-.5	8/27/08	1215	E	1	J	
	12	B-204N-1-1.5		1217				
	13	B-204N-2-2.5		1225				
	14	B-205N-0-.5		1230				
	15	B-205N-1-1.5		1232				
	16	B-205N-2-2.5		1235				
	17	B-206N-0-.5		1243				
	18	B-206N-1-1.5		1245				
	19	B-206N-2-2.5		1250				
	20	B-207N-0-.5		1300				

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report Yellow to folder Pink to submitter.

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3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date 8/29/08 Time 1405
Received by: (Signature and Printed Name) [illegible] Date: 8/29/08 Time: 1405

Relinquished by: (Signature and Printed Name) [illegible] Date 8/29/08 Time 1800
Received by: (Signature and Printed Name) [illegible] Date: 8/29/08 Time: 1822

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: _____
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	106706-21	B-207N-1-1.5	8/27/08	1303				X						X				E	1	J	
	22	B-207N-2-2.5		1307																	
	23	B-209N-0-.5		1330																	
	24	B-209N-1-1.5		1335																	
	25	B-209N-2-2.5		1340																	
	26	B-210S-0-.5		1355																	
	27	B-210S-1-1.5		1357																	
	28	B-210S-2-2.5		1410																	
	29	B-211S-0-.5		1415																	
	30	B-211S-1-1.5		1420																	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/29/08	Time: 1405	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1405
Relinquished by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	700740-31	B-21S-2-2.5	8/27/08	1425				X										E	1	J	
	32	B-21S-0-.5		1430																	
	33	B-21S-1-1.5		1435																	
	34	B-21S-2-2.5		1440																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

September 23,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100740

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 9/23/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100740
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100740-011A	B-204N-0-.5	41	mg/L	R99773	0.43	1.2		5	8/27/2008	9/22/2008
100740-014A	B-205N-0-.5	80	mg/L	R99773	0.86	2.5		10	8/27/2008	9/22/2008
100740-015A	B-205N-1-1.5	28	mg/L	R99774	0.34	1.0		4	8/27/2008	9/22/2008
100740-016A	B-205N-2-2.5	12	mg/L	R99774	0.17	0.50		2	8/27/2008	9/22/2008
100740-017A	B-206N-0-.5	24	mg/L	R99774	0.34	1.0		4	8/27/2008	9/22/2008
100740-020A	B-207N-0-.5	8.3	mg/L	R99774	0.086	0.25		1	8/27/2008	9/22/2008
100740-023A	B-209N-0-.5	15	mg/L	R99774	0.17	0.50		2	8/27/2008	9/22/2008
100740-026A	B-210S-0-.5	14	mg/L	R99774	0.17	0.50		2	8/27/2008	9/22/2008
100740-027A	B-210S-1-1.5	16	mg/L	R99774	0.17	0.50		2	8/27/2008	9/22/2008
100740-032A	B-212S-0-.5	12	mg/L	R99774	0.17	0.50		2	8/27/2008	9/22/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99773

Sample ID: **MB-48908A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **PBS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545829**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48908**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **LCSS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.034	0.25	5.000	0	101	80	120				

Sample ID: **100739-007A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.438	0.25						3.455	0.486	20	

Sample ID: **100739-007A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **ZZZZZZ**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.714	0.25	5.000	3.455	85.2	80	120				

Sample ID: **MB-48908B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **PBS**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99773

Sample ID: **100740-014A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **B-205N-0-.5**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545854**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	79.851	2.5						80.11	0.320	20	

Sample ID: **100740-014A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **B-205N-0-.5**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545855**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	88.648	2.5	5.000	80.11	171	80	120				S

Sample ID: **100740-014A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99773**
Client ID: **B-205N-0-.5**	Batch ID: **R99773**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	83.571	2.5	5.000	80.11	69.3	80	120	88.65	5.90	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99774

Sample ID: **MB-48909A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **PBS**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.093	0.25									

Sample ID: **LCS-48909**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **LCSS**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.153	0.25	5.000	0.09288	101	80	120				

Sample ID: **100741-005A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **ZZZZZZ**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545869**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.062	0.50						16.64	3.53	20	

Sample ID: **100741-005A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **ZZZZZZ**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545870**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.742	0.50	5.000	16.64	42.0	80	120				S

Sample ID: **MB-48909B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **PBS**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545871**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
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CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99774

Sample ID: **100741-030A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **ZZZZZZ**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545882**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.904	0.25						6.732	31.4	20	R

Sample ID: **100741-030A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **ZZZZZZ**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545883**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.898	0.50	5.000	6.732	83.3	80	120				

Sample ID: **100741-030A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **ZZZZZZ**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545884**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.493	0.50	5.000	6.732	95.2	80	120	10.90	5.32	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

October 03,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAF No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100740

RE: Caltrans West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot he reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION
WET DI/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100740
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100740-011A	B-204N-0-.5	1.4	mg/L	R100185	0.19	0.25		1	8/27/2008	10/2/2008
100740-014A	B-205N-0-.5	0.32	mg/L	R100185	0.19	0.25		1	8/27/2008	10/2/2008
100740-015A	B-205N-1-1.5	ND	mg/L	R100185	0.19	0.25		1	8/27/2008	10/2/2008
100740-023A	B-209N-0-.5	ND	mg/L	R100185	0.19	0.25		1	8/27/2008	10/2/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	TRC	**Lab Order:**	100740
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100740-011A	B-204N-0-.5	1.6	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-014A	B-205N-0-.5	5.5	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-015A	B-205N-1-1.5	1.4	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-016A	B-205N-2-2.5	0.44	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-017A	B-206N-0-.5	0.35	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-020A	B-207N-0-.5	ND	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-023A	B-209N-0-.5	0.63	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-026A	B-210S-0-.5	0.41	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-027A	B-210S-1-1.5	0.28	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008
100740-032A	B-212S-0-.5	0.73	mg/L	R100133	0.086	0.25		1	8/27/2008	10/1/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **MB-49176A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49176**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **LCSS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.829	0.25	1.000	0	82.9	80	120				

Sample ID: **100741-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.013	0.25						1.013	0.0553	20	

Sample ID: **100741-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552305**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.248	0.25	2.500	1.013	89.4	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **100741-009A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552306**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.096	0.25	2.500	1.013	83.3	70	130	3.248	4.78	20	

Sample ID: **MB-40176B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **100740-015A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **B-205N-1-1.5**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552317**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.675	0.25						1.376	19.6	20	

Sample ID: **100740-015A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **B-205N-1-1.5**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552318**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.506	0.25	2.500	1.376	125	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **MB-49149**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **PBS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553474**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49149**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **LCSS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553475**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.896	0.25	5.000	0	97.9	80	120				

Sample ID: **100797-063A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.038	0.25						1.501	36.5	20	R

Sample ID: **100797-063A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.582	0.25	5.000	1.501	81.6	70	130				

Sample ID: **MB-49149B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **PBS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553488**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.219	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100740
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **100797-072A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.191	0.25						0.3272	0	20	

Sample ID: **100797-072A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553492**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.009	0.25	5.000	0.3272	93.6	70	130				

Sample ID: **100797-072A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.942	0.25	5.000	0.3272	92.3	70	130	5.009	1.35	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

September 04,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100741

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie P. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	ER-3
Lab Order:	100741	**Collection Date:**	8/28/2008 8:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	100741-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080903G**	QC Batch: **48523**				PrepDate:	**9/3/2008**	Analyst: **LKN**
Lead	ND	0.0046	0.25		mg/L	1	9/3/2008 03:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-166N-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 9:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	70	0.11	5.0		mg/Kg	1	9/3/2008 07:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-167N-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 9:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	19	0.11	5.0		mg/Kg	1	9/3/2008 07:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-168N-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 9:35:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	36	0.11	5.0		mg/Kg	1	9/3/2008 07:22 PM

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-005

Client Sample ID: B-169N-0-.5
Collection Date: 8/28/2008 9:40:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	170	0.11	5.0		mg/Kg	1	9/3/2008 07:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-170N-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 9:45:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	30	0.11	5.0		mg/Kg	1	9/3/2008 07:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-007

Client Sample ID: B-173N-0-.5
Collection Date: 8/28/2008 10:20:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	23	0.11	5.0		mg/Kg	1	9/3/2008 07:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-173N-1-1.5
Lab Order:	100741	**Collection Date:**	8/28/2008 10:25:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	130	0.11	5.0		mg/Kg	1	9/3/2008 07:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-173N-2-2.5
Lab Order:	100741	**Collection Date:**	8/28/2008 10:30:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	160	0.11	5.0		mg/Kg	1	9/3/2008 07:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-010

Client Sample ID: B-172N-0-.5
Collection Date: 8/28/2008 10:33:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903E**	QC Batch: **48492**				PrepDate: **9/2/2008**		Analyst: **SRB**
Lead	210	0.11	5.0		mg/Kg	1	9/3/2008 07:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-011

Client Sample ID: B-172N-1-1.5
Collection Date: 8/28/2008 10:37:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	130	0.11	5.0		mg/Kg	1	9/3/2008 07:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-012

Client Sample ID: B-172N-2-2.5
Collection Date: 8/28/2008 10:40:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	22	0.11	5.0		mg/Kg	1	9/3/2008 07:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	B-174N-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 10:45:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-013		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	25	0.11	5.0		mg/Kg	1	9/3/2008 07:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-014

Client Sample ID: B-174N-1-1.5
Collection Date: 8/28/2008 10:50:00 AM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	58	0.11	5.0		mg/Kg	1	9/3/2008 08:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-174N-2-2.5
Lab Order:	100741	**Collection Date:**	8/28/2008 10:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	64	0.11	5.0		mg/Kg	1	9/3/2008 08:07 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-203N-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 11:10:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-016		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	340	0.11	5.0		mg/Kg	1	9/3/2008 08:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-203N-1-1.5
Lab Order:	100741	**Collection Date:**	8/28/2008 11:15:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-017		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	12	0.11	5.0		mg/Kg	1	9/3/2008 08:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-203N-2-2.5
Lab Order:	100741	**Collection Date:**	8/28/2008 11:20:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	43	0.11	5.0		mg/Kg	1	9/3/2008 08:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-214S-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 11:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	40	0.11	5.0		mg/Kg	1	9/3/2008 08:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-214S-1-1.5
Lab Order:	100741	**Collection Date:**	8/28/2008 11:55:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	22	0.11	5.0		mg/Kg	1	9/3/2008 08:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-021

Client Sample ID: B-214S-2-2.5
Collection Date: 8/28/2008 12:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	15	0.11	5.0		mg/Kg	1	9/3/2008 08:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-215S-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 12:05:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-022		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	26	0.11	5.0		mg/Kg	1	9/3/2008 08:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-215S-1-1.5
Lab Order:	100741	**Collection Date:**	8/28/2008 12:10:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	8.4	0.11	5.0		mg/Kg	1	9/3/2008 08:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-215S-2-2.5
Lab Order:	100741	**Collection Date:**	8/28/2008 12:15:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.11	5.0		mg/Kg	1	9/3/2008 08:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-213S-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 12:25:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-025		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	610	0.11	5.0		mg/Kg	1	9/3/2008 08:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-213S-1-1.5
Lab Order:	100741	**Collection Date:**	8/28/2008 12:30:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	7.9	0.11	5.0		mg/Kg	1	9/3/2008 08:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-213S-2-2.5
Lab Order:	100741	**Collection Date:**	8/28/2008 12:35:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate:	**9/2/2008**	Analyst: **SRB**
Lead	ND	0.11	5.0		mg/Kg	1	9/3/2008 08:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-028

Client Sample ID: B-244N-0-.5
Collection Date: 8/28/2008 1:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	16	0.11	5.0		mg/Kg	1	9/3/2008 08:47 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-029

Client Sample ID: B-243N-0-.5
Collection Date: 8/28/2008 2:00:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	55	0.11	5.0		mg/Kg	1	9/3/2008 08:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-030

Client Sample ID: B-242N-0-.5
Collection Date: 8/28/2008 2:10:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903F**	QC Batch: **48493**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	76	0.11	5.0		mg/Kg	1	9/3/2008 08:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-246N-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 2:20:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903G**	QC Batch: **48494**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	24	0.11	5.0		mg/Kg	1	9/3/2008 09:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100741
Project: Caltrans West County Connectors, 151396
Lab ID: 100741-032

Client Sample ID: B-237SA-0-.5
Collection Date: 8/28/2008 2:50:00 PM
Matrix: SOIL

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903G**	QC Batch: **48494**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	66	0.11	5.0		mg/Kg	1	9/3/2008 09:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-237S-0-.5
Lab Order:	100741	**Collection Date:**	8/28/2008 2:40:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100741-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3050M				**EPA 6010B**		
RunID: **ICP6_080903G**	QC Batch: **48494**				PrepDate: **9/2/2008**	Analyst: **SRB**	
Lead	37	0.11	5.0		mg/Kg	1	9/3/2008 09:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	ER-4
Lab Order:	100741	**Collection Date:**	8/28/2008 3:00:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	RINSEATE
Lab ID:	100741-034		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ICP							
	EPA 3010A				**EPA 6010B**		
RunID: **ICP8_080903G**	QC Batch: **48523**				PrepDate:	**9/3/2008**	Analyst: **LKN**
Lead	ND	0.0046	0.25		mg/L	1	9/3/2008 03:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48492A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **PBS**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533726**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48492**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **LCSS**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533727**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	279.590	5.0	250.0	0	112	80	120				

Sample ID: **100740-033A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **ZZZZZZ**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533738**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	35.259	5.0						37.24	5.47	20	

Sample ID: **100740-033A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **ZZZZZZ**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533739**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	269.406	5.0	250.0	37.24	92.9	45	110				

Sample ID: **MB-48492B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **PBS**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533740**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100741-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **B-172N-0-.5**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533751**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	213.181	5.0						210.9	1.07	20	

Sample ID: **100741-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **B-172N-0-.5**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533752**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	393.130	5.0	250.0	210.9	72.9	45	110				

Sample ID: **100741-010A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99085**
Client ID: **B-172N-0-.5**	Batch ID: **48492**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533753**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	362.916	5.0	250.0	210.9	60.8	45	110	393.1	7.99	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48493A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **PBS**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533762**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48493**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **LCSS**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533763**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	275.074	5.0	250.0	0	110	80	120				

Sample ID: **100741-020A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **B-214S-1-1.5**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533774**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.904	5.0						21.64	13.5	20	

Sample ID: **100741-020A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **B-214S-1-1.5**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	226.336	5.0	250.0	21.64	81.9	45	110				

Sample ID: **MB-48493B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **PBS**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100741-030A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **B-242N-0-.5**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533787**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	72.986	5.0						76.38	4.55	20	

Sample ID: **100741-030A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **B-242N-0-.5**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533788**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	290.034	5.0	250.0	76.38	85.5	45	110				

Sample ID: **100741-030A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99086**
Client ID: **B-242N-0-.5**	Batch ID: **48493**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533789**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	263.008	5.0	250.0	76.38	74.6	45	110	290.0	9.77	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48494**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99087**
Client ID: **PBS**	Batch ID: **48494**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533807**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48494**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99087**
Client ID: **LCSS**	Batch ID: **48494**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533808**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	269.308	5.0	250.0	0	108	80	120				

Sample ID: **100741-033A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99087**
Client ID: **B-237S-0-.5**	Batch ID: **48494**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533812**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	24.363	5.0						36.86	40.8	20	R

Sample ID: **100741-033A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99087**
Client ID: **B-237S-0-.5**	Batch ID: **48494**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533813**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	223.854	5.0	250.0	36.86	74.8	45	110				

Sample ID: **100741-033A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/2/2008**	RunNo: **99087**
Client ID: **B-237S-0-.5**	Batch ID: **48494**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/3/2008**	SeqNo: **1533814**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	249.587	5.0	250.0	36.86	85.1	45	110	223.9	10.9	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-48523**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **PBW**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533355**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48523**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **LCSW**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533356**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.948	0.25	1.000	0	94.8	85	115				

Sample ID: **100770-001H-DUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **100770-001H-MS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.418	0.25	2.500	0	96.7	71	118				

Sample ID: **100770-001H-MSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/3/2008**	RunNo: **99066**
Client ID: **ZZZZZZ**	Batch ID: **48523**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/3/2008**	SeqNo: **1533360**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.395	0.25	2.500	0	95.8	71	118	2.418	0.961	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: K Date: 8/29/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 5° Y☑ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/29/08	Time: 1405	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1405
Relinquished by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time
	100741 - 1	ER-3	8/28/08	810
	2	B-166N-0-.5		920
	3	B-167N-0-.5		930
	4	B-168N-0-.5		935
	5	B-169N-0-.5		940
	6	B-170N-0-.5		945
	7	B-173N-0-.5		1020
	8	B-173N-0-1.5		1025
	9	B-173N-2-2.5		1030
	10	B-172N-0-.5		1033

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER; Rinsate (X)

TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
E	1	P		
		J		

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report **Yellow** to folder **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/29/08	Time: 1405	Received by: (Signature and Printed Name)	Date: 8/29/08	Time: 1400
Relinquished by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800	Received by: (Signature and Printed Name) Kel	Date: 8/29/08	Time: 1800
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) Lead, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	100741 11	B-172N-1-1.5	8/28/08	1037	E	1	J	
	12	B-172N-2-2.5		1040				
	13	B-174N-0-.5		1045				
	14	B-174N-1-1.5		1050				
	15	B-174N-2-2.5		1055				
	16	B-203N-0-.5		1110				
	17	B-203N-1-1.5		1115				
	18	B-203N-2-2.5		1120				
	19	B-214S-0-.5		1150				
	20	B-214S-1-1.5		1155				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 8/29/08 Time: 1405
Received by: (Signature and Printed Name) [signature] Date: 8/29/08 Time: 1405
Relinquished by: (Signature and Printed Name) [signature] Date: 8/29/08 Time: 1800
Received by: (Signature and Printed Name) KM Date: 8/29/08 Time: 1800
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State_____ Zip_____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State_____ Zip_____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) / 8082 (PCB) / 8260B (Volatiles) / 8270C (BNA) / 6010B (Total Metal) Lead / 8015B (GRO) / 8020 (BTEX) / 8015B (DRO) / 8021 (BTEX) / TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL / WATER / GROUND WATER / WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B Lead	8015B (GRO)	8020	8015B (DRO)	8021	TITLE 22	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100741-21	B-214S-2-2.5	8/28/08	1200				X							X				E	1	J	
	22	B-215S-0-.5		1205																		
	23	B-215S-1-1.5		1210																		
	24	B-215S-2-2.5		1215																		
	25	B-213S-0-.5		1225																		
	26	B-213S-1-1.5		1230																		
	27	B-213S-2-2.5		1235																		
	28	B-244N-0-.5		1350																		
	29	B-243N-0-.5		1400																		
	30	B-242N-0-.5		1410																		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 8/29/08	Time: 1405	Received by: (Signature and Printed Name)		Date: 8/29/08	Time: 1405
Relinquished by: (Signature and Printed Name)	Date: 8/29/08	Time: 1800	Received by: (Signature and Printed Name)	Kel	Date: 8/29/08	Time: 1800
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER; Kinsate

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	100741-31	B-246N-0-.5	8/28/08	1420	E	1	J	
	32	B-237SA-0-.5		1450				
	33	B-237S-0-.5		1440				
	34	ER-4		1500			P	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

September 23,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100741

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 9/23/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100741
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100741-002A	B-166N-0-.5	2.3	mg/L	R99774	0.086	0.25		1	8/28/2008	9/22/2008
100741-005A	B-169N-0-.5	17	mg/L	R99774	0.17	0.50		2	8/28/2008	9/22/2008
100741-008A	B-173N-1-1.5	11	mg/L	R99774	0.17	0.50		2	8/28/2008	9/22/2008
100741-009A	B-173N-2-2.5	13	mg/L	R99774	0.17	0.50		2	8/28/2008	9/22/2008
100741-010A	B-172N-0-.5	12	mg/L	R99774	0.17	0.50		2	8/28/2008	9/22/2008
100741-011A	B-172N-1-1.5	9.9	mg/L	R99774	0.086	0.25		1	8/28/2008	9/22/2008
100741-014A	B-174N-1-1.5	4.1	mg/L	R99774	0.086	0.25		1	8/28/2008	9/22/2008
100741-015A	B-174N-2-2.5	3.4	mg/L	R99774	0.086	0.25		1	8/28/2008	9/22/2008
100741-016A	B-203N-0-.5	27	mg/L	R99774	0.34	1.0		4	8/28/2008	9/22/2008
100741-025A	B-213S-0-.5	47	mg/L	R99774	0.43	1.2		5	8/28/2008	9/22/2008
100741-029A	B-243N-0-.5	9.7	mg/L	R99774	0.086	0.25		1	8/28/2008	9/22/2008
100741-030A	B-242N-0-.5	6.7	mg/L	R99774	0.086	0.25		1	8/28/2008	9/22/2008
100741-032A	B-237SA-0-.5	3.6	mg/L	R99775	0.086	0.25		1	8/28/2008	9/22/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99774

Sample ID: **MB-48909A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **PBS**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.093	0.25									

Sample ID: **LCS-48909**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **LCSS**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.153	0.25	5.000	0.09288	101	80	120				

Sample ID: **100741-005A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **B-169N-0-.5**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545869**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.062	0.50						16.64	3.53	20	

Sample ID: **100741-005A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **B-169N-0-.5**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545870**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.742	0.50	5.000	16.64	42.0	80	120				S

Sample ID: **MB-48909B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **PBS**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545871**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99774

Sample ID: **100741-030A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **B-242N-0-.5**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545882**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.904	0.25						6.732	31.4	20	R

Sample ID: **100741-030A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **B-242N-0-.5**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545883**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	10.898	0.50	5.000	6.732	83.3	80	120				

Sample ID: **100741-030A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99774**
Client ID: **B-242N-0-.5**	Batch ID: **R99774**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545884**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.493	0.50	5.000	6.732	95.2	80	120	10.90	5.32	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99775

Sample ID: **MB-48910A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **PBS**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48910**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **LCSS**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545906**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.341	0.25	5.000	0	107	80	120				

Sample ID: **100797-072A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **ZZZZZZ**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545917**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	39.256	1.2						39.51	0.642	20	

Sample ID: **100797-072A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **ZZZZZZ**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	42.905	1.2	5.000	39.51	67.9	80	120				S

Sample ID: **100797-072A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **ZZZZZZ**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	43.065	1.2	5.000	39.51	71.1	80	120	42.90	0.373	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

October 03,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100741

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 29,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION
WET DI/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100741
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100741-025A	B-213S-0-.5	0.32	mg/L	R100185	0.19	0.25		1	8/28/2008	10/2/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	TRC	**Lab Order:**	100741
Project:	Caltrans West County Connectors, 151396	**Date Received**	8/29/2008 6:00:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100741-005A	B-169N-0-.5	ND	mg/L	R100133	0.086	0.25		1	8/28/2008	10/1/2008
100741-008A	B-173N-1-1.5	1.2	mg/L	R100133	0.086	0.25		1	8/28/2008	10/1/2008
100741-009A	B-173N-2-2.5	1.0	mg/L	R100133	0.086	0.25		1	8/28/2008	10/1/2008
100741-010A	B-172N-0-.5	0.80	mg/L	49177	0.086	0.25		1	8/28/2008	10/1/2008
100741-011A	B-172N-1-1.5	0.78	mg/L	49177	0.086	0.25		1	8/28/2008	10/1/2008
100741-016A	B-203N-0-.5	3.2	mg/L	49177	0.086	0.25		1	8/28/2008	10/1/2008
100741-025A	B-213S-0-.5	2.1	mg/L	49177	0.086	0.25		1	8/28/2008	10/1/2008
100741-029A	B-243N-0-.5	0.31	mg/L	49177	0.086	0.25		1	8/28/2008	10/1/2008
100741-030A	B-242N-0-.5	0.37	mg/L	49177	0.086	0.25		1	8/28/2008	10/1/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **MB-49149** SampType: **MBLK** TestCode: **7420_DI** Units: **mg/L** Prep Date: RunNo: **100185**
Client ID: **PBS** Batch ID: **R100185** TestNo: **WET DI/ EPA** Analysis Date: **10/2/2008** SeqNo: **1553474**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49149** SampType: **LCS** TestCode: **7420_DI** Units: **mg/L** Prep Date: RunNo: **100185**
Client ID: **LCSS** Batch ID: **R100185** TestNo: **WET DI/ EPA** Analysis Date: **10/2/2008** SeqNo: **1553475**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.896	0.25	5.000	0	97.9	80	120				

Sample ID: **100797-063A-DUP** SampType: **DUP** TestCode: **7420_DI** Units: **mg/L** Prep Date: RunNo: **100185**
Client ID: **ZZZZZZ** Batch ID: **R100185** TestNo: **WET DI/ EPA** Analysis Date: **10/2/2008** SeqNo: **1553486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.038	0.25						1.501	36.5	20	R

Sample ID: **100797-063A-MS** SampType: **MS** TestCode: **7420_DI** Units: **mg/L** Prep Date: RunNo: **100185**
Client ID: **ZZZZZZ** Batch ID: **R100185** TestNo: **WET DI/ EPA** Analysis Date: **10/2/2008** SeqNo: **1553487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.582	0.25	5.000	1.501	81.6	70	130				

Sample ID: **MB-49149B** SampType: **MBLK** TestCode: **7420_DI** Units: **mg/L** Prep Date: RunNo: **100185**
Client ID: **PBS** Batch ID: **R100185** TestNo: **WET DI/ EPA** Analysis Date: **10/2/2008** SeqNo: **1553488**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.219	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **100797-072A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.191	0.25						0.3272	0	20	

Sample ID: **100797-072A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553492**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.009	0.25	5.000	0.3272	93.6	70	130				

Sample ID: **100797-072A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **ZZZZZZ**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.942	0.25	5.000	0.3272	92.3	70	130	5.009	1.35	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **MB-49176A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552296**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552297**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49176**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **LCSS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.829	0.25	1.000	0	82.9	80	120				

Sample ID: **100741-009A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **B-173N-2-2.5**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.013	0.25						1.013	0.0553	20	

Sample ID: **100741-009A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **B-173N-2-2.5**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552305**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.248	0.25	2.500	1.013	89.4	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100133

Sample ID: **100741-009A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **B-173N-2-2.5**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552306**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.096	0.25	2.500	1.013	83.3	70	130	3.248	4.78	20	

Sample ID: **MB-40176B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49128B TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **PBS**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **100740-015A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552317**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.675	0.25						1.376	19.6	20	

Sample ID: **100740-015A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date:	RunNo: **100133**
Client ID: **ZZZZZZ**	Batch ID: **R100133**	TestNo: **EPA 1311/ 74**		Analysis Date: **10/1/2008**	SeqNo: **1552318**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.506	0.25	2.500	1.376	125	70	130				

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49177

Sample ID: **MB-49177A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **PBS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552268**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.100	0.25									

Sample ID: **MB-49129A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **PBS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552269**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.087	0.25									

Sample ID: **LCS-49177**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **LCSS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552270**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.858	0.25	1.000	0	85.8	80	120				

Sample ID: **100797-062A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **ZZZZZZ**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552281**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.058	0.25						1.841	11.1	20	

Sample ID: **100797-062A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **ZZZZZZ**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.891	0.25	2.500	1.841	82.0	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100741
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49177

Sample ID: **MB-49177B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **PBS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.173	0.25									

Sample ID: **100797-071A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **ZZZZZZ**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552288**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.129	0.25						1.328	16.2	20	

Sample ID: **100797-071A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **ZZZZZZ**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552289**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.399	0.25	2.500	1.328	82.8	70	130				

Sample ID: **100797-071A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **ZZZZZZ**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552290**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.333	0.25	2.500	1.328	80.2	70	130	3.399	1.98	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

September 09,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: A20689
CSDLAC No.: 10196
Workorder No.: 100797

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on September 03, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 9/9/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	SRB

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-001A	B-195N-0-.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-002A	B-195N-1-1.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-003A	B-195N-2-2.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-004A	B-196N-0-.5	5.1	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-005A	B-196N-1-1.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-006A	B-196N-2-2.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-007A	B-197N-0-.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-008A	B-197N-1-1.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-009A	B-197N-2-2.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-010A	B-198N-0-.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-011A	B-198N-1-1.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-012A	B-198N-2-2.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-013A	B-199N-0-.5	6.0	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-014A	B-199N-1-1.5	7.0	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-015A	B-199N-2-2.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-016A	B-200N-0-.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-017A	B-200N-1-1.5	51	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-018A	B-200N-2-2.5	ND	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/9/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	SRB

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-019A	B-201N-0-.5	120	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-020A	B-201N-1-1.5	210	mg/Kg	48589	0.11	5.0		1	9/2/2008	9/8/2008
100797-021A	B-201N-2-2.5	120	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-022A	B-217S-0-.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-023A	B-217S-1-1.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-024A	B-217S-2-2.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-025A	B-218S-0-.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-026A	B-218S-1-1.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-027A	B-218S-2-2.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-028A	B-218SA-0-.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-029A	B-218SA-1-1.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-030A	B-218SA-2-2.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-031A	B-219S-0-.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-032A	B-219S-1-1.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-033A	B-219S-2-2.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-034A	B-220S-0-.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-035A	B-220S-1-1.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-036A	B-220S-2-2.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/9/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	SRB

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-037A	B-221S-0-.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-038A	B-221S-1-1.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-039A	B-221S-2-2.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-040A	B-222S-0-.5	ND	mg/Kg	48590	0.11	5.0		1	9/2/2008	9/8/2008
100797-041A	B-222S-1-1.5	ND	mg/Kg	48591	0.11	5.0		1	9/2/2008	9/8/2008
100797-042A	B-222S-2-2.5	ND	mg/Kg	48591	0.11	5.0		1	9/2/2008	9/8/2008
100797-044A	B-202N-0-.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-045A	B-202N-1-1.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-046A	B-202N-2-2.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-047A	B-202NA-0-.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-048A	B-202NA-1-1.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-049A	B-202NA-2-2.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-050A	B-216S-0-.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-051A	B-216S-1-1.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-052A	B-216S-2-2.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-053A	B-223S-0-.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-054A	B-223S-1-1.5	5.6	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-055A	B-223S-2-2.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008

Qualifiers:

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H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
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Advanced Technology Laboratories

Date: 9/9/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	SRB

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-056A	B-224S-0-.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-057A	B-224S-1-1.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-058A	B-224S-2-2.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-059A	B-225S-0-.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-060A	B-225S-1-1.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-061A	B-225S-2-2.5	ND	mg/Kg	48591	0.11	5.0		1	9/3/2008	9/8/2008
100797-062A	B-251S-0-.5	2500	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-063A	B-252S-0-.5	710	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-064A	B-227S-0-.5	20	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-065A	B-227S-1-1.5	ND	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-066A	B-227S-2-2.5	ND	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-067A	B-228S-0-.5	5.6	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-068A	B-228S-1-1.5	15	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-069A	B-228S-2-2.5	9.6	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-070A	B-229S-0-.5	1200	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-071A	B-229S-1-1.5	320	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008
100797-072A	B-229S-2-2.5	680	mg/Kg	48592	0.11	5.0		1	9/3/2008	9/8/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/9/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Rinseate
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-043A	ER-6	ND	mg/L	48634	0.0046	0.25		1	9/2/2008	9/9/2008
100797-073A	ER-7	ND	mg/L	48634	0.0046	0.25		1	9/3/2008	9/9/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48589A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **PBS**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535741**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48589**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **LCSS**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	298.744	5.0	250.0	0	119	80	120				

Sample ID: **100797-010A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **B-198N-0-.5**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535753**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.654	5.0						3.276	0	20	

Sample ID: **100797-010A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **B-198N-0-.5**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535754**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	258.456	5.0	250.0	3.276	102	45	110				

Sample ID: **MB-48589B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **PBS**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535755**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100797-020A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **B-201N-1-1.5**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	210.441	5.0						213.2	1.28	20	

Sample ID: **100797-020A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **B-201N-1-1.5**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535767**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	495.783	5.0	250.0	213.2	113	45	110				S

Sample ID: **100797-020A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99206**
Client ID: **B-201N-1-1.5**	Batch ID: **48589**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535768**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	416.616	5.0	250.0	213.2	81.4	45	110	495.8	17.4	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48590A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **PBS**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535833**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48590**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **LCSS**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535834**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	279.480	5.0	250.0	0	112	80	120				

Sample ID: **100797-030A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **B-218SA-2-2.5**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535845**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.063	5.0						1.205	0	20	

Sample ID: **100797-030A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **B-218SA-2-2.5**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535846**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	232.186	5.0	250.0	1.205	92.4	45	110				

Sample ID: **MB-48590B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **PBS**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100797-040A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **B-222S-0-.5**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.998	5.0						3.657	0	20	

Sample ID: **100797-040A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **B-222S-0-.5**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535859**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	252.656	5.0	250.0	3.657	99.6	45	110				

Sample ID: **100797-040A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99210**
Client ID: **B-222S-0-.5**	Batch ID: **48590**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535860**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	238.628	5.0	250.0	3.657	94.0	45	110	252.7	5.71	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48591A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **PBS**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535971**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.115	5.0									

Sample ID: **LCS-48591**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **LCSS**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	286.939	5.0	250.0	0.1147	115	80	120				

Sample ID: **100797-051A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **B-216S-1-1.5**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535983**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.435	5.0						1.954	0	20	

Sample ID: **100797-051A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **B-216S-1-1.5**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535984**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	241.038	5.0	250.0	1.954	95.6	45	110				

Sample ID: **MB-48591B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **PBS**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535985**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100797-061A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **B-225S-2-2.5**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535996**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.982	5.0						1.396	0	20	

Sample ID: **100797-061A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **B-225S-2-2.5**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	238.976	5.0	250.0	1.396	95.0	45	110				

Sample ID: **100797-061A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99218**
Client ID: **B-225S-2-2.5**	Batch ID: **48591**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535998**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	237.236	5.0	250.0	1.396	94.3	45	110	239.0	0.731	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48592A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **PBS**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1535999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48592**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **LCSS**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1536000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	274.621	5.0	250.0	0	110	80	120				

Sample ID: **100797-071A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **B-229S-1-1.5**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1536011**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	306.917	5.0						322.1	4.82	20	

Sample ID: **100797-071A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **B-229S-1-1.5**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1536012**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	520.119	5.0	250.0	322.1	79.2	45	110				

Sample ID: **MB-48592B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **PBS**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/8/2008**	SeqNo: **1536013**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100824-014A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **ZZZZZZ**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/9/2008**	SeqNo: **1536191**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	396.440	5.0						308.5	25.0	20	R

Sample ID: **100824-014A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **ZZZZZZ**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/9/2008**	SeqNo: **1536192**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	731.098	5.0	250.0	308.5	169	45	110				S

Sample ID: **100824-014A-MSD**	SampType: **MSD**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/5/2008**	RunNo: **99219**
Client ID: **ZZZZZZ**	Batch ID: **48592**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/9/2008**	SeqNo: **1536193**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	822.667	5.0	250.0	308.5	206	45	110	731.1	11.8	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-48634**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/8/2008**	RunNo: **99242**
Client ID: **PBW**	Batch ID: **48634**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/9/2008**	SeqNo: **1536441**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48634**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/8/2008**	RunNo: **99242**
Client ID: **LCSW**	Batch ID: **48634**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/9/2008**	SeqNo: **1536442**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.085	0.25	1.000	0	108	85	115				

Sample ID: **100810-001A-DUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/8/2008**	RunNo: **99242**
Client ID: **ZZZZZZ**	Batch ID: **48634**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/9/2008**	SeqNo: **1536447**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	2.5						0	0	20	

Sample ID: **100810-001A-MS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/8/2008**	RunNo: **99242**
Client ID: **ZZZZZZ**	Batch ID: **48634**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/9/2008**	SeqNo: **1536448**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.739	2.5	2.500	0	110	71	118				

Sample ID: **100810-001A-MSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/8/2008**	RunNo: **99242**
Client ID: **ZZZZZZ**	Batch ID: **48634**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/9/2008**	SeqNo: **1536449**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.935	2.5	2.500	0	117	71	118	2.739	6.90	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

DISTRIBUTION: White with report Yellow to folder Pink to submitter

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: K Date: 9/3/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 4.0 Y☑ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N☐ N/A 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☑ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 9/3/08	Time: 14:45	Received by: (Signature and Printed Name)	Date: 9/3/08	Time: 1445
Relinquished by: (Signature and Printed Name)	Date: 9/3/08	Time: 1505	Received by: (Signature and Printed Name) KM	Date: 9/3/08	Time: 1505
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100797 - 1	B-195N - 0-.5	9/2/08	900					X					X				E	1	T	
	2	B-195N - 1-1.5		903																	
	3	B-195N - 2-2.5		905																	
	4	B-196N - 0-.5		915																	
	5	B-196N - 1-1.5		918																	
	6	B-196N - 2-2.5		920																	
	7	B-197N - 0-.5		935																	
	8	B-197N - 1-1.5		938																	
	9	B-197N - 2-2.5		940																	
	10	B-198N - 0-.5		950																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: Yellow Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 9/3/08	Time: 14:45	Received by: (Signature and Printed Name)	Date: 9/3/08	Time: 1445
Relinquished by: (Signature and Printed Name)	Date: 9/3/08	Time: 1505	Received by: (Signature and Printed Name)	Date: 9/3/08	Time: 1585
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metals) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100797-11	B-198N-1-1.5	9/2/08	953				X						X				E	1	T	
	12	B-198N-2-2.5		955																	
	13	B-199N-0-.5		1000																	
	14	B-199N-1-1.5		1003																	
	15	B-199N-2-2.5		1005																	
	16	B-200N-0-.5		1015																	
	17	B-200N-1-1.5		1018																	
	18	B-200N-2-2.5		1020																	
	19	B-201N-0-.5		1035																	
	20	B-201N-1-1.5		1038																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 157396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 9/3/08	Time: 14:45	Received by: (Signature and Printed Name)	Date: 9/3/08	Time: 1445
Relinquished by: (Signature and Printed Name)	Date: 9/3/08	Time: 1505	Received by: (Signature and Printed Name) Kel	Date: 9/3/08	Time: 1505
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100797-21	B-201N-2-2.5	9/2/08	1040				X						X				E	1	T	
	22	B-217S-0-.5		1145																	
	23	B-217S-1-1.5		1148																	
	24	B-217S-2-2.5		1150																	
	25	B-218S-0-.5		1205																	
	26	B-218S-1-1.5		1208																	
	27	B-218S-2-2.5		1210																	
	28	B-218SA-0-.5		1215																	
	29	B-218SA-1-1.5		1218																	
	30	B-218SA-2-2.5		1220																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report Yellow to folder Pink to submitter

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 9/3/08 Time: 14:45
Received by: (Signature and Printed Name) [signature] Date: 9/3/08 Time: 1445

Relinquished by: (Signature and Printed Name) [signature] Date: 9/3/08 Time: 1500
Received by: (Signature and Printed Name) [signature] Date: 9/3/08 Time: 1505

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100797-31	B-219S-0-.5	9/2/08	1235				X						X				E	1	T	
	32	B-219S-1-1.5		1238																	
	33	B-219S-2-2.5		1240																	
	34	B-220S-0-.5		1315																	
	35	B-220S-1-1.5		1318																	
	36	B-220S-2-2.5		1320																	
	37	B-221S-0-.5		1330																	
	38	B-221S-1-1.5		1333																	
	39	B-221S-2-2.5		1335																	
	40	B-222S-0-.5		1345																	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report. **Yellow** to folder. **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date 9/3/08	Time: 14:45	Received by: (Signature and Printed Name)	Date: 9/4/08	Time: 1445
Relinquished by: (Signature and Printed Name)	Date 9/3/08	Time: 1505	Received by: (Signature and Printed Name) K.J	Date: 9/3/08	Time: 1505
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER; Rinsate

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	(10079)-41	B-222S-1-1.5	9/2/08	1348	E	1	T	
	42	B-222S-2-2.5		1350			T	
	43	ER-6		1400			P	
	44	B-202N-0-.5	9/3/08	850			T	
	45	B-202N-1-1.5		853				
	46	B-202N-2-2.5		BAD				8:55
	47	B-202NA-0-.5		900				
	48	B-202NA-1-1.5		903				
	49	B-202NA-2-2.5		905				
	50	B-216S-0-.5		9:35				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report **Yellow** to folder. **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennm
Address: 21 Technology
City: Irvine State: CA Zip Code: 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller	Date: 9/3/08	Time: 1445	Received by: (Signature and Printed Name)		Date: 9/3/08	Time: 1445
Relinquished by: (Signature and Printed Name)	Date: 9/3/08	Time: 1505	Received by: (Signature and Printed Name)		Date: 9/3/08	Time: 1505
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To: Attn: David Lennm
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To: Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metals) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	100797-51	B-2165-1-1.5	9/3/08	938	E	1	T	
	52	B-2165-2-2.5		940				
	53	B-2235-0-0.5		1000				
	54	B-2235-1-1.5		1003				
	55	B-2235-2-2.5		1005				
	56	B-2245-0-.5		1015				
	57	B-2245-1-1.5		1018				
	58	B-2245-2-2.5		1020				
	59	B-2250.5-0-.5		1035				
	60	B-2255-1-1.5		1038				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

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DISTRIBUTION: **White** with report **Yellow** to folder. **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Cal Trans West County Connectors Project #: 151346
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 9/3/08 Time: 1445
Received by: (Signature and Printed Name) Date: 9/3/08 Time: 1445

Relinquished by: (Signature and Printed Name) Date: 9/3/08 Time: 1505
Received by: (Signature and Printed Name) Date: 9/3/08 Time: 1505

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal) Lead; 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Container(s): Type	REMARKS
	100797-61	B-2255-2-2.5	9/3/08	1040	E	1	T	
	62	B-2515-0-.5		1130			J	
	63	B-2525-0.5		1140			J	0-.5
	64	B-2275-0.5		1240			T	0-.5
	65	B-2275-1-1.5		1243				
	66	B-2275-2-2.5		1245				
	67	B-2285-0-.5		1255				
	68	B-2285-1-1.5		1258				
	69	B-2285-2-2.5		1300				
	70	B-2295-0-.5		1315			J	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report. **Yellow** to folder. **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRE
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors
Project #:
Sampler: (Printed Name) Kelly S. Keller (Signature) Kelly S. Keller

Relinquished by: (Signature and Printed Name) Kelly S. Keller Date: 9/3/08 Time: 1445
Received by: (Signature and Printed Name) [illegible] Date: 9/3/08 Time: 1445
Relinquished by: (Signature and Printed Name) [illegible] Date: 9/3/08 Time: 1505
Received by: (Signature and Printed Name) [illegible] Date: 9/3/08 Time: 1505
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time
	100797-71	B-2295-1-1.5	9/3/08	1320
	72	B-2295-2-2.5	9/3/08	1325
	73	GR-7	9/3/08	1400

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal); 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); LEAD

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER; Rinsate

ITEM	TAT	Container(s) #	Container(s) Type	PRESERVATION
	E	1	J	
	E	1	J	
	E	1	P	

QA / QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____ REMARKS

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

Hoa Huynh

From: Carmen Aguila
Sent: Friday, September 05, 2008 10:51 AM
To: Hoa Huynh
Subject: FW: Caltrans Sample ID Confirmation

WO#100797
-----Original Message-----
From: Keller, Kelly (Irvine,CA-US) [mailto:kkeller@trcsolutions.com]
Sent: Friday, September 05, 2008 9:52 AM
To: Carmen Aguila
Subject: Caltrans Sample ID Confirmation

Carmen,
This is to confirm my conversation with one of your analysts on Wednesday, Sept. 3:

The sample labeled as B-124S-0.5 should be labeled as B-224S-0.5
The non-labeled sample with red caps should be labeled B-218S-0.5.
The non-labeled sample with black caps should be labeled B-221S-0.5

Thanks,

Kelly S. Keller
Senior Staff Geologist

TRC

TRC
21 Technology Dr.
Irvine, CA 92618
949-727-7398 phone
949-727-3022 fax
562-577-9659cell

Please consider the environment before printing this email.

September 23,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100797

RE: Caltrans West County Connectors, 151396

Attention: David Lemon

Enclosed are the results for sample(s) received on September 03,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: 9/23/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-017A	B-200N-1-1.5	1.6	mg/L	R99775	0.086	0.25		1	9/2/2008	9/22/2008
100797-019A	B-201N-0-.5	28	mg/L	R99775	0.34	1.0		4	9/2/2008	9/22/2008
100797-020A	B-201N-1-1.5	14	mg/L	R99775	0.17	0.50		2	9/2/2008	9/22/2008
100797-021A	B-201N-2-2.5	24	mg/L	R99775	0.34	1.0		4	9/2/2008	9/22/2008
100797-062A	B-251S-0-.5	170	mg/L	R99775	1.7	5.0		20	9/3/2008	9/22/2008
100797-063A	B-252S-0-.5	56	mg/L	R99775	0.86	2.5		10	9/3/2008	9/22/2008
100797-070A	B-229S-0-.5	57	mg/L	R99775	0.86	2.5		10	9/3/2008	9/22/2008
100797-071A	B-229S-1-1.5	22	mg/L	R99775	0.34	1.0		4	9/3/2008	9/22/2008
100797-072A	B-229S-2-2.5	40	mg/L	R99775	0.43	1.2		5	9/3/2008	9/22/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R99775

Sample ID: **MB-48910A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **PBS**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545905**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48910**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **LCSS**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545906**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.341	0.25	5.000	0	107	80	120				

Sample ID: **100797-072A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **B-229S-2-2.5**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545917**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	39.256	1.2						39.51	0.642	20	

Sample ID: **100797-072A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **B-229S-2-2.5**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	42.905	1.2	5.000	39.51	67.9	80	120				S

Sample ID: **100797-072A-MSD**	SampType: **MSD**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99775**
Client ID: **B-229S-2-2.5**	Batch ID: **R99775**	TestNo: **WET/ EPA 74**		Analysis Date: **9/22/2008**	SeqNo: **1545919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	43.065	1.2	5.000	39.51	71.1	80	120	42.90	0.373	20	S

Qualifiers:

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DO	Surrogate Diluted Out		Calculations are based on raw values		

October 03,2008

David Lemon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
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RE: Caltrans West County Connectors, 151396

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Sincerely,

for Eddie F. Rodriguez
Laboratory Director

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Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION
WET DI/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-062A	B-251S-0-.5	2.0	mg/L	R100185	0.19	0.25		1	9/3/2008	10/2/2008
100797-063A	B-252S-0-.5	1.5	mg/L	R100185	0.19	0.25		1	9/3/2008	10/2/2008
100797-070A	B-229S-0-.5	0.60	mg/L	R100185	0.19	0.25		1	9/3/2008	10/2/2008
100797-072A	B-229S-2-2.5	0.33	mg/L	R100185	0.19	0.25		1	9/3/2008	10/2/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 10/3/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	TRC	**Lab Order:**	100797
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/3/2008 3:05:00 PM
Project No:	151396	**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100797-019A	B-201N-0-.5	0.64	mg/L	49177	0.086	0.25		1	9/2/2008	10/1/2008
100797-020A	B-201N-1-1.5	0.72	mg/L	49177	0.086	0.25		1	9/2/2008	10/1/2008
100797-021A	B-201N-2-2.5	1.2	mg/L	49177	0.086	0.25		1	9/2/2008	10/1/2008
100797-062A	B-251S-0-.5	1.8	mg/L	49177	0.086	0.25		1	9/3/2008	10/1/2008
100797-063A	B-252S-0-.5	1.1	mg/L	49177	0.086	0.25		1	9/3/2008	10/1/2008
100797-070A	B-229S-0-.5	1.3	mg/L	49177	0.086	0.25		1	9/3/2008	10/1/2008
100797-071A	B-229S-1-1.5	1.3	mg/L	49177	0.086	0.25		1	9/3/2008	10/1/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **MB-49149**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **PBS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553474**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49149**	SampType: **LCS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **LCSS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553475**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.896	0.25	5.000	0	97.9	80	120				

Sample ID: **100797-063A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **B-252S-0-.5**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.038	0.25						1.501	36.5	20	R

Sample ID: **100797-063A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **B-252S-0-.5**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.582	0.25	5.000	1.501	81.6	70	130				

Sample ID: **MB-49149B**	SampType: **MBLK**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **PBS**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553488**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.219	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: R100185

Sample ID: **100797-072A-DUP**	SampType: **DUP**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **B-229S-2-2.5**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.191	0.25						0.3272	0	20	

Sample ID: **100797-072A-MS**	SampType: **MS**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **B-229S-2-2.5**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553492**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.009	0.25	5.000	0.3272	93.6	70	130				

Sample ID: **100797-072A-MSD**	SampType: **MSD**	TestCode: **7420_DI**	Units: **mg/L**	Prep Date:	RunNo: **100185**
Client ID: **B-229S-2-2.5**	Batch ID: **R100185**	TestNo: **WET DI/ EPA**		Analysis Date: **10/2/2008**	SeqNo: **1553493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.942	0.25	5.000	0.3272	92.3	70	130	5.009	1.35	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49177

Sample ID: **MB-49177A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **PBS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552268**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.100	0.25									

Sample ID: **MB-49129A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **PBS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552269**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.087	0.25									

Sample ID: **LCS-49177**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **LCSS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552270**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.858	0.25	1.000	0	85.8	80	120				

Sample ID: **100797-062A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **B-251S-0-.5**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552281**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.058	0.25						1.841	11.1	20	

Sample ID: **100797-062A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **B-251S-0-.5**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.891	0.25	2.500	1.841	82.0	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49177

Sample ID: **MB-49177B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **PBS**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.173	0.25									

Sample ID: **100797-071A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **B-229S-1-1.5**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552288**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.129	0.25						1.328	16.2	20	

Sample ID: **100797-071A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **B-229S-1-1.5**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552289**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.399	0.25	2.500	1.328	82.8	70	130				

Sample ID: **100797-071A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100132**
Client ID: **B-229S-1-1.5**	Batch ID: **49177**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/1/2008**	SeqNo: **1552290**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.333	0.25	2.500	1.328	80.2	70	130	3.399	1.98	20	

Qualifiers:

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October 07,2008

David Lennon
TRC
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TEL: (949) 341-7458
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NELAP No.: 02107CA
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CSDLAC No.: 10196
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Eddie F. Rodriguez
Laboratory Director

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CLIENT:	TRC	**Client Sample ID:**	B-229S-2-2.5
Lab Order:	100797	**Collection Date:**	9/3/2008 1:25:00 PM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100797-072A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
	EPA3010A				**EPA 1311/ 7420**		
RunID: **AA2_081007A**	QC Batch: **49289**				PrepDate: **10/7/2008**		Analyst: **AMT**
Lead	5.2	0.086	0.25		mg/L	1	10/7/2008 12:19 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49289

Sample ID: **MB-49289**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **10/7/2008**	RunNo: **100289**
Client ID: **PBS**	Batch ID: **49289**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/7/2008**	SeqNo: **1555837**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.141	0.25									

Sample ID: **MB-49273 TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **10/7/2008**	RunNo: **100289**
Client ID: **PBS**	Batch ID: **49289**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/7/2008**	SeqNo: **1555838**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.126	0.25									

Sample ID: **LCS-49289**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **10/7/2008**	RunNo: **100289**
Client ID: **LCSS**	Batch ID: **49289**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/7/2008**	SeqNo: **1555839**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.066	0.25	1.000	0.1414	92.4	80	120				

Sample ID: **100797-072A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **10/7/2008**	RunNo: **100289**
Client ID: **B-229S-2-2.5**	Batch ID: **49289**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/7/2008**	SeqNo: **1555841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.345	0.25						5.236	18.6	20	

Sample ID: **100797-072A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **10/7/2008**	RunNo: **100289**
Client ID: **B-229S-2-2.5**	Batch ID: **49289**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/7/2008**	SeqNo: **1555842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.124	0.25	2.500	5.236	-4.48	70	130				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100797
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49289

Sample ID: **100797-072A-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **10/7/2008** RunNo: **100289**
Client ID: **B-229S-2-2.5** Batch ID: **49289** TestNo: **EPA 1311/ 74** **EPA3010A** Analysis Date: **10/7/2008** SeqNo: **1555843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.338	0.25	2.500	5.236	4.10	70	130	5.124	4.10	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

September 17, 2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100836

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on September 05,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Project: Caltrans West County Connectors, 151396
Lab Order: 100836

CASE NARRATIVE

Samples for Herbicides (EPA 8151) were subcontracted to Sierra Laboratories with ELAP Cert.#2320.

The samples for EPA 8141 analysis were subcontracted to D-tek Analytical Laboratories, Inc. with ELAP Cert. 2344.

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Arsenic	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-001A	B-257S 0.0-0.5	6.0	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-002A	B-257S 1.0-1.5	4.5	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-003A	B-257S 2.0-2.5	4.8	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-004A	B-258S 0.0-0.5	4.3	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-005A	B-258S 1.0-1.5	4.6	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-006A	B-258S 2.0-2.5	4.1	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-007A	B-259S 0.0-0.5	9.2	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-008A	B-259S 1.0-1.5	5.7	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-009A	B-259S 2.0-2.5	3.9	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-010A	B-260S 0.0-0.5	3.6	mg/Kg	48664	0.27	1.0		1	9/4/2008	9/11/2008
100836-011A	B-260S 1.0-1.5	3.0	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-012A	B-260S 2.0-2.5	2.8	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-013A	B-261S 0.0-0.5	4.0	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-014A	B-261S 1.0-1.5	4.6	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-015A	B-261S 2.0-2.5	2.3	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-016A	B-262S 0.0-0.5	5.6	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-017A	B-262S 1.0-1.5	5.9	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-018A	B-262S 2.0-2.5	3.4	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Arsenic	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-019A	B-263S 0.0-0.5	6.0	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-020A	B-263S 1.0-1.5	3.5	mg/Kg	48665	0.27	1.0		1	9/4/2008	9/11/2008
100836-021A	B-263S 2.0-2.5	3.8	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-022A	B-264S 0.0-0.5	5.5	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-023A	B-264S 1.0-1.5	3.8	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-024A	B-264S 2.0-2.5	4.1	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-025A	B-264SDup 0.0-0.5	5.7	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-026A	B-264SDup 1.0-1.5	4.1	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-027A	B-264SDup 2.0-2.5	4.1	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-028A	B-265S 0.0-0.5	5.4	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-029A	B-265S 1.0-1.5	4.0	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-030A	B-265S 2.0-2.5	4.1	mg/Kg	48666	0.27	1.0		1	9/4/2008	9/11/2008
100836-031A	B-266S 0.0-0.5	6.2	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-032A	B-266S 1.0-1.5	5.9	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-033A	B-266S 2.0-2.5	3.0	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-034A	B-267S 0.0-0.5	6.6	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-035A	B-267S 1.0-1.5	5.1	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Arsenic	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-036A	B-267S 2.0-2.5	6.4	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-037A	B-268S 0.0-0.5	5.7	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-038A	B-268S 1.0-1.5	4.9	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-039A	B-268S 2.0-2.5	4.0	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-040A	B-269S 0.0-0.5	5.2	mg/Kg	48667	0.27	1.0		1	9/4/2008	9/11/2008
100836-041A	B-269S 1.0-1.5	3.6	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-042A	B-269S 2.0-2.5	3.8	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-043A	B-270S 0.0-0.5	3.3	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-044A	B-270S 1.0-1.5	3.6	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-045A	B-270S 2.0-2.5	3.0	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-046A	B-271S 0.0-0.5	4.2	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-047A	B-271S 1.0-1.5	3.0	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-048A	B-271S 2.0-2.5	1.6	mg/Kg	48668	0.27	1.0		1	9/4/2008	9/12/2008
100836-050A	B-272S 0.0-0.5	4.2	mg/Kg	48668	0.27	1.0		1	9/5/2008	9/12/2008
100836-051A	B-272S 1.0-1.5	3.0	mg/Kg	48668	0.27	1.0		1	9/5/2008	9/12/2008
100836-052A	B-272S 2.0-2.5	3.2	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-053A	B-273S 0.0-0.5	5.1	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-054A	B-273S 1.0-1.5	5.4	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT: TRC
Project: Caltrans West County Connectors, 151396
Project No:
Analyte: Arsenic

Lab Order: 100836
Date Received 9/5/2008 12:05:00 PM
Matrix: Soil
Analyst: LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-055A	B-273S 2.0-2.5	3.6	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-056A	B-274S 0.0-0.5	5.2	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-057A	B-274S 1.0-1.5	2.4	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-058A	B-274S 2.0-2.5	2.6	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-059A	B-272SDUP 0.0-0.5	5.4	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-060A	B-272SDUP 1.0-1.5	3.4	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-061A	B-272SDUP 2.0-2.5	2.7	mg/Kg	48669	0.27	1.0		1	9/5/2008	9/11/2008
100836-062A	B-275S 0.0-0.5	6.1	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-063A	B-275S 1.0-1.5	4.1	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-064A	B-275S 2.0-2.5	1.8	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-065A	B-276S 0.0-0.5	2.7	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-066A	B-276S 1.0-1.5	2.5	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-067A	B-276S 2.0-2.5	2.8	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-068A	B-277S 0.0-0.5	4.8	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-069A	B-277S 1.0-1.5	4.6	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-070A	B-277S 2.0-2.5	2.8	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008
100836-071A	B-278S 0.0-0.5	3.9	mg/Kg	48670	0.27	1.0		1	9/5/2008	9/12/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Arsenic	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-072A	B-278S 1.0-1.5	4.4	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-073A	B-278S 2.0-2.5	3.3	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-074A	B-279S 0.0-0.5	6.1	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-075A	B-279S 1.0-1.5	5.6	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-076A	B-279S 2.0-2.5	4.3	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-077A	B-280S 0.0-0.5	4.2	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-078A	B-280S 1.0-1.5	3.9	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-079A	B-280S 2.0-2.5	3.3	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-080A	B-280S-DUP 0.0-0.5	4.1	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-081A	B-280S-DUP 1.0-1.5	4.5	mg/Kg	48671	0.27	1.0		1	9/5/2008	9/11/2008
100836-082A	B-280S-DUP 2.0-2.5	4.1	mg/Kg	48672	0.27	1.0		1	9/5/2008	9/10/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT: TRC
Project: Caltrans West County Connectors, 151396
Project No:
Analyte: Lead

Lab Order: 100836
Date Received 9/5/2008 12:05:00 PM
Matrix: Soil
Analyst: LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-001A	B-257S 0.0-0.5	69	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-002A	B-257S 1.0-1.5	19	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-003A	B-257S 2.0-2.5	28	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-004A	B-258S 0.0-0.5	120	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-005A	B-258S 1.0-1.5	59	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-006A	B-258S 2.0-2.5	7.2	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-007A	B-259S 0.0-0.5	110	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-008A	B-259S 1.0-1.5	49	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-009A	B-259S 2.0-2.5	8.4	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-010A	B-260S 0.0-0.5	52	mg/Kg	48664	0.11	1.0		1	9/4/2008	9/11/2008
100836-011A	B-260S 1.0-1.5	12	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-012A	B-260S 2.0-2.5	13	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-013A	B-261S 0.0-0.5	150	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-014A	B-261S 1.0-1.5	52	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-015A	B-261S 2.0-2.5	6.5	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-016A	B-262S 0.0-0.5	55	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-017A	B-262S 1.0-1.5	45	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-018A	B-262S 2.0-2.5	5.4	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-019A	B-263S 0.0-0.5	57	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-020A	B-263S 1.0-1.5	24	mg/Kg	48665	0.11	1.0		1	9/4/2008	9/11/2008
100836-021A	B-263S 2.0-2.5	6.5	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-022A	B-264S 0.0-0.5	63	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-023A	B-264S 1.0-1.5	21	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-024A	B-264S 2.0-2.5	15	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-025A	B-264SDup 0.0-0.5	39	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-026A	B-264SDup 1.0-1.5	15	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-027A	B-264SDup 2.0-2.5	15	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-028A	B-265S 0.0-0.5	46	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-029A	B-265S 1.0-1.5	34	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-030A	B-265S 2.0-2.5	19	mg/Kg	48666	0.11	1.0		1	9/4/2008	9/11/2008
100836-031A	B-266S 0.0-0.5	39	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-032A	B-266S 1.0-1.5	41	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-033A	B-266S 2.0-2.5	7.6	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-034A	B-267S 0.0-0.5	34	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-035A	B-267S 1.0-1.5	30	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-036A	B-267S 2.0-2.5	31	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-037A	B-268S 0.0-0.5	32	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-038A	B-268S 1.0-1.5	22	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-039A	B-268S 2.0-2.5	23	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-040A	B-269S 0.0-0.5	43	mg/Kg	48667	0.11	1.0		1	9/4/2008	9/11/2008
100836-041A	B-269S 1.0-1.5	16	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-042A	B-269S 2.0-2.5	7.4	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-043A	B-270S 0.0-0.5	17	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-044A	B-270S 1.0-1.5	37	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-045A	B-270S 2.0-2.5	23	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-046A	B-271S 0.0-0.5	44	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-047A	B-271S 1.0-1.5	8.4	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-048A	B-271S 2.0-2.5	3.5	mg/Kg	48668	0.11	1.0		1	9/4/2008	9/12/2008
100836-050A	B-272S 0.0-0.5	36	mg/Kg	48668	0.11	1.0		1	9/5/2008	9/12/2008
100836-051A	B-272S 1.0-1.5	4.3	mg/Kg	48668	0.11	1.0		1	9/5/2008	9/12/2008
100836-052A	B-272S 2.0-2.5	5.4	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-053A	B-273S 0.0-0.5	56	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-054A	B-273S 1.0-1.5	30	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-055A	B-273S 2.0-2.5	7.2	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-056A	B-274S 0.0-0.5	59	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-057A	B-274S 1.0-1.5	5.0	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-058A	B-274S 2.0-2.5	5.3	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-059A	B-272SDUP 0.0-0.5	42	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-060A	B-272SDUP 1.0-1.5	4.7	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-061A	B-272SDUP 2.0-2.5	4.6	mg/Kg	48669	0.11	1.0		1	9/5/2008	9/11/2008
100836-062A	B-275S 0.0-0.5	60	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-063A	B-275S 1.0-1.5	30	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-064A	B-275S 2.0-2.5	3.7	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-065A	B-276S 0.0-0.5	36	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-066A	B-276S 1.0-1.5	26	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-067A	B-276S 2.0-2.5	6.1	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-068A	B-277S 0.0-0.5	40	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-069A	B-277S 1.0-1.5	8.8	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-070A	B-277S 2.0-2.5	4.8	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008
100836-071A	B-278S 0.0-0.5	24	mg/Kg	48670	0.11	1.0		1	9/5/2008	9/12/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

ICP METALS
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-072A	B-278S 1.0-1.5	22	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-073A	B-278S 2.0-2.5	27	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-074A	B-279S 0.0-0.5	27	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-075A	B-279S 1.0-1.5	34	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-076A	B-279S 2.0-2.5	13	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-077A	B-280S 0.0-0.5	83	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-078A	B-280S 1.0-1.5	92	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-079A	B-280S 2.0-2.5	22	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-080A	B-280S-DUP 0.0-0.5	71	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-081A	B-280S-DUP 1.0-1.5	54	mg/Kg	48671	0.11	1.0		1	9/5/2008	9/11/2008
100836-082A	B-280S-DUP 2.0-2.5	160	mg/Kg	48672	0.11	1.0		1	9/5/2008	9/10/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/17/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Water
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-049A	ER-8	ND	mg/L	48682	0.0046	0.25		1	9/4/2008	9/11/2008
100836-083A	ER-9	ND	mg/L	48682	0.0046	0.25		1	9/5/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48664** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99397**
Client ID: **PBS** Batch ID: **48664** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1538937**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	ND	1.0									

Sample ID: **LCS-48664** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99397**
Client ID: **LCSS** Batch ID: **48664** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1538938**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	49.541	1.0	50.00	0	99.1	80	120				
Lead	52.441	1.0	50.00	0	105	80	120				

Sample ID: **100836-010A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99429**
Client ID: **B-260S 0.0-0.5** Batch ID: **48664** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1539549**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	3.374	1.0						3.637	7.49	20	
Lead	43.648	1.0						52.31	18.1	20	

Sample ID: **100836-010A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99429**
Client ID: **B-260S 0.0-0.5** Batch ID: **48664** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1539550**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	102.887	1.0	125.0	3.637	79.4	52	106				
Lead	150.756	1.0	125.0	52.31	78.8	45	110				

Sample ID: **100836-010A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99429**
Client ID: **B-260S 0.0-0.5** Batch ID: **48664** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1539551**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-010A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99429**
Client ID: **B-260S 0.0-0.5** Batch ID: **48664** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1539551**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	89.070	1.0	125.0	3.637	68.3	52	106	102.9	14.4	20	
Lead	125.644	1.0	125.0	52.31	58.7	45	110	150.8	18.2	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48665**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99395**
Client ID: **PBS**	Batch ID: **48665**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538912**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	0.168	1.0									

Sample ID: **LCS-48665**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99395**
Client ID: **LCSS**	Batch ID: **48665**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538913**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	48.434	1.0	50.00	0	96.9	80	120				
Lead	53.563	1.0	50.00	0.1683	107	80	120				

Sample ID: **100836-020A-DUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99395**
Client ID: **B-263S 1.0-1.5**	Batch ID: **48665**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538924**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	3.433	1.0						3.548	3.28	20	
Lead	29.991	1.0						23.81	23.0	20	R

Sample ID: **100836-020A-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99395**
Client ID: **B-263S 1.0-1.5**	Batch ID: **48665**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538925**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	104.542	1.0	125.0	3.548	80.8	52	106				
Lead	130.010	1.0	125.0	23.81	85.0	45	110				

Sample ID: **100836-020A-MSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99395**
Client ID: **B-263S 1.0-1.5**	Batch ID: **48665**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538926**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	103.065	1.0	125.0	3.548	79.6	52	106	104.5	1.42	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-020A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99395**
Client ID: **B-263S 1.0-1.5** Batch ID: **48665** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1538926**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	120.102	1.0	125.0	23.81	77.0	45	110	130.0	7.92	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48666**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99399**
Client ID: **PBS**	Batch ID: **48666**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538941**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	0.206	1.0									

Sample ID: **LCS-48666**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99399**
Client ID: **LCSS**	Batch ID: **48666**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538942**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	51.948	1.0	50.00	0	104	80	120				
Lead	57.782	1.0	50.00	0.2060	115	80	120				

Sample ID: **100836-030A-DUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99399**
Client ID: **B-265S 2.0-2.5**	Batch ID: **48666**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538953**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	4.144	1.0						4.106	0.917	20	
Lead	19.337	1.0						18.87	2.44	20	

Sample ID: **100836-030A-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99399**
Client ID: **B-265S 2.0-2.5**	Batch ID: **48666**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538954**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	108.274	1.0	125.0	4.106	83.3	52	106				
Lead	120.569	1.0	125.0	18.87	81.4	45	110				

Sample ID: **100836-030A-MSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99399**
Client ID: **B-265S 2.0-2.5**	Batch ID: **48666**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1538955**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	110.315	1.0	125.0	4.106	85.0	52	106	108.3	1.87	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-030A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99399**
Client ID: **B-265S 2.0-2.5** Batch ID: **48666** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1538955**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	119.453	1.0	125.0	18.87	80.5	45	110	120.6	0.930	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48667**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99432**
Client ID: **PBS**	Batch ID: **48667**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539562**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	0.199	1.0									

Sample ID: **LCS-48667**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99432**
Client ID: **LCSS**	Batch ID: **48667**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539563**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	50.388	1.0	50.00	0	101	80	120				
Lead	55.142	1.0	50.00	0.1989	110	80	120				

Sample ID: **100836-040A-DUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99432**
Client ID: **B-269S 0.0-0.5**	Batch ID: **48667**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539574**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	4.868	1.0						5.193	6.45	20	
Lead	37.519	1.0						43.39	14.5	20	

Sample ID: **100836-040A-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99432**
Client ID: **B-269S 0.0-0.5**	Batch ID: **48667**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1539685**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	107.171	1.0	125.0	5.193	81.6	52	106				
Lead	130.985	1.0	125.0	43.39	70.1	45	110				

Sample ID: **100836-040A-MSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99432**
Client ID: **B-269S 0.0-0.5**	Batch ID: **48667**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1539686**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	99.521	1.0	125.0	5.193	75.5	52	106	107.2	7.40	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-040A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99432**
Client ID: **B-269S 0.0-0.5** Batch ID: **48667** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/12/2008** SeqNo: **1539686**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	124.054	1.0	125.0	43.39	64.5	45	110	131.0	5.43	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48668**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99436**
Client ID: **PBS**	Batch ID: **48668**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1539746**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	0.134	1.0									

Sample ID: **LCS-48668**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99436**
Client ID: **LCSS**	Batch ID: **48668**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1539747**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	51.885	1.0	50.00	0	104	80	120				
Lead	55.370	1.0	50.00	0.1338	110	80	120				

Sample ID: **100836-051A-DUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99436**
Client ID: **B-272S 1.0-1.5**	Batch ID: **48668**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540121**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	2.759	1.0						2.994	8.17	20	
Lead	5.027	1.0						4.307	15.4	20	

Sample ID: **100836-051A-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99436**
Client ID: **B-272S 1.0-1.5**	Batch ID: **48668**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540122**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	93.093	1.0	125.0	2.994	72.1	52	106				
Lead	91.969	1.0	125.0	4.307	70.1	45	110				

Sample ID: **100836-051A-MSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99436**
Client ID: **B-272S 1.0-1.5**	Batch ID: **48668**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540123**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	98.893	1.0	125.0	2.994	76.7	52	106	93.09	6.04	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-051A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99436**
Client ID: **B-272S 1.0-1.5** Batch ID: **48668** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/12/2008** SeqNo: **1540123**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	98.925	1.0	125.0	4.307	75.7	45	110	91.97	7.29	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48669**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99411**
Client ID: **PBS**	Batch ID: **48669**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539232**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	0.117	1.0									

Sample ID: **LCS-48669**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99411**
Client ID: **LCSS**	Batch ID: **48669**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	50.618	1.0	50.00	0	101	80	120				
Lead	53.794	1.0	50.00	0.1175	107	80	120				

Sample ID: **100836-061A-DUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99411**
Client ID: **B-272SDUP 2.0-2.5**	Batch ID: **48669**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539244**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	3.227	1.0						2.695	17.9	20	
Lead	5.047	1.0						4.648	8.22	20	

Sample ID: **100836-061A-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99411**
Client ID: **B-272SDUP 2.0-2.5**	Batch ID: **48669**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539245**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	103.259	1.0	125.0	2.695	80.5	52	106				
Lead	100.324	1.0	125.0	4.648	76.5	45	110				

Sample ID: **100836-061A-MSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/9/2008**	RunNo: **99411**
Client ID: **B-272SDUP 2.0-2.5**	Batch ID: **48669**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	107.266	1.0	125.0	2.695	83.7	52	106	103.3	3.81	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-061A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/9/2008** RunNo: **99411**
Client ID: **B-272SDUP 2.0-2.5** Batch ID: **48669** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1539246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	103.863	1.0	125.0	4.648	79.4	45	110	100.3	3.47	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48670**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99464**
Client ID: **PBS**	Batch ID: **48670**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540166**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	0.201	1.0									

Sample ID: **LCS-48670**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99464**
Client ID: **LCSS**	Batch ID: **48670**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540167**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	45.376	1.0	50.00	0	90.8	80	120				
Lead	48.360	1.0	50.00	0.2007	96.3	80	120				

Sample ID: **100836-071A-DUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99464**
Client ID: **B-278S 0.0-0.5**	Batch ID: **48670**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540178**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	3.538	1.0						3.882	9.27	20	
Lead	21.883	1.0						24.45	11.1	20	

Sample ID: **100836-071A-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99464**
Client ID: **B-278S 0.0-0.5**	Batch ID: **48670**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	101.047	1.0	125.0	3.882	77.7	52	106				
Lead	138.199	1.0	125.0	24.45	91.0	45	110				

Sample ID: **100836-071A-MSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99464**
Client ID: **B-278S 0.0-0.5**	Batch ID: **48670**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/12/2008**	SeqNo: **1540180**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	96.549	1.0	125.0	3.882	74.1	52	106	101.0	4.55	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-071A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/11/2008** RunNo: **99464**
Client ID: **B-278S 0.0-0.5** Batch ID: **48670** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/12/2008** SeqNo: **1540180**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	114.077	1.0	125.0	24.45	71.7	45	110	138.2	19.1	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48671**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99433**
Client ID: **PBS**	Batch ID: **48671**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539577**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	0.517	1.0									

Sample ID: **LCS-48671**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99433**
Client ID: **LCSS**	Batch ID: **48671**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539578**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	48.567	1.0	50.00	0	97.1	80	120				
Lead	55.551	1.0	50.00	0.5171	110	80	120				

Sample ID: **100836-081A-DUP**	SampType: **DUP**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99433**
Client ID: **B-280S-DUP 1.0-1.**	Batch ID: **48671**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539589**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	4.205	1.0						4.484	6.43	20	
Lead	57.395	1.0						53.72	6.61	20	

Sample ID: **100836-081A-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99433**
Client ID: **B-280S-DUP 1.0-1.**	Batch ID: **48671**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539590**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	106.845	1.0	125.0	4.484	81.9	52	106				
Lead	163.123	1.0	125.0	53.72	87.5	45	110				

Sample ID: **100836-081A-MSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99433**
Client ID: **B-280S-DUP 1.0-1.**	Batch ID: **48671**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **9/11/2008**	SeqNo: **1539591**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	101.807	1.0	125.0	4.484	77.9	52	106	106.8	4.83	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-081A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/11/2008** RunNo: **99433**
Client ID: **B-280S-DUP 1.0-1.** Batch ID: **48671** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/11/2008** SeqNo: **1539591**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	155.461	1.0	125.0	53.72	81.4	45	110	163.1	4.81	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48672** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/10/2008** RunNo: **99335**
Client ID: **PBS** Batch ID: **48672** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/10/2008** SeqNo: **1537977**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.0									
Lead	ND	1.0									

Sample ID: **LCS-48672** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/10/2008** RunNo: **99335**
Client ID: **LCSS** Batch ID: **48672** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/10/2008** SeqNo: **1537978**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	50.415	1.0	50.00	0	101	80	120				
Lead	49.635	1.0	50.00	0	99.3	80	120				

Sample ID: **100836-082A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/10/2008** RunNo: **99335**
Client ID: **B-280S-DUP 2.0-2.** Batch ID: **48672** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/10/2008** SeqNo: **1537997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	2.888	2.0						0	200	20	R
Arsenic	7.015	1.0						4.117	52.1	20	R
Barium	74.618	1.0						82.71	10.3	20	
Beryllium	2.476	1.0						0	200	20	R
Cadmium	3.868	1.0						0.5751	148	20	R
Chromium	17.476	1.0						16.40	6.35	20	
Cobalt	9.476	1.0						6.854	32.1	20	R
Copper	19.080	2.0						19.00	0.401	20	
Lead	74.856	1.0						158.7	71.8	20	R
Molybdenum	4.081	1.0						1.075	117	20	R
Nickel	17.204	1.0						15.55	10.1	20	
Selenium	4.101	1.0						0.6763	143	20	R
Silver	2.550	1.0						0	200	20	R
Thallium	2.281	1.0						0	200	20	R
Vanadium	35.874	1.0						38.05	5.88	20	
Zinc	157.036	1.0						187.3	17.6	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-082A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/10/2008** RunNo: **99335**
Client ID: **B-280S-DUP 2.0-2.** Batch ID: **48672** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/10/2008** SeqNo: **1537998**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	80.436	2.0	125.0	0	64.3	24	109				
Arsenic	107.838	1.0	125.0	4.117	83.0	52	106				
Barium	172.470	1.0	125.0	82.71	71.8	31	129				
Beryllium	104.513	1.0	125.0	0	83.6	55	110				
Cadmium	98.650	1.0	125.0	0.5751	78.5	51	110				
Chromium	113.276	1.0	125.0	16.40	77.5	50	114				
Cobalt	106.260	1.0	125.0	6.854	79.5	51	109				
Copper	128.499	2.0	125.0	19.00	87.6	55	122				
Lead	180.656	1.0	125.0	158.7	17.6	45	110				S
Molybdenum	102.034	1.0	125.0	1.075	80.8	52	109				
Nickel	113.817	1.0	125.0	15.55	78.6	47	111				
Selenium	104.106	1.0	125.0	0.6763	82.7	48	108				
Silver	106.072	1.0	125.0	0	84.9	55	110				
Thallium	87.615	1.0	125.0	0	70.1	43	105				
Vanadium	139.680	1.0	125.0	38.05	81.3	54	115				
Zinc	245.372	1.0	125.0	187.3	46.5	39	120				

Sample ID: **100836-082A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/10/2008** RunNo: **99335**
Client ID: **B-280S-DUP 2.0-2.** Batch ID: **48672** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/10/2008** SeqNo: **1537999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	81.914	2.0	125.0	0	65.5	24	109	80.44	1.82	20	
Arsenic	111.708	1.0	125.0	4.117	86.1	52	106	107.8	3.53	20	
Barium	183.803	1.0	125.0	82.71	80.9	31	129	172.5	6.36	20	
Beryllium	107.946	1.0	125.0	0	86.4	55	110	104.5	3.23	20	
Cadmium	101.241	1.0	125.0	0.5751	80.5	51	110	98.65	2.59	20	
Chromium	117.740	1.0	125.0	16.40	81.1	50	114	113.3	3.86	20	
Cobalt	109.878	1.0	125.0	6.854	82.4	51	109	106.3	3.35	20	
Copper	134.067	2.0	125.0	19.00	92.1	55	122	128.5	4.24	20	
Lead	130.158	1.0	125.0	158.7	-22.8	45	110	180.7	32.5	20	SR

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **100836-082A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **9/10/2008** RunNo: **99335**
Client ID: **B-280S-DUP 2.0-2.** Batch ID: **48672** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **9/10/2008** SeqNo: **1537999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	105.270	1.0	125.0	1.075	83.4	52	109	102.0	3.12	20	
Nickel	118.738	1.0	125.0	15.55	82.5	47	111	113.8	4.23	20	
Selenium	107.490	1.0	125.0	0.6763	85.5	48	108	104.1	3.20	20	
Silver	109.779	1.0	125.0	0	87.8	55	110	106.1	3.44	20	
Thallium	89.809	1.0	125.0	0	71.8	43	105	87.61	2.47	20	
Vanadium	146.352	1.0	125.0	38.05	86.6	54	115	139.7	4.67	20	
Zinc	260.774	1.0	125.0	187.3	58.8	39	120	245.4	6.09	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-48682**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **PBW**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538402**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48682**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **LCSW**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538403**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.029	0.25	1.000	0	103	85	115				

Sample ID: **100863-008A-DUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **ZZZZZZ**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538407**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **100863-008A-MS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **ZZZZZZ**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538408**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.495	0.25	2.500	0	99.8	71	118				

Sample ID: **100863-008A-MSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **ZZZZZZ**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538409**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.502	0.25	2.500	0	100	71	118	2.495	0.278	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
100836-001C / B257S 0.0-0.5	0809118-01	Soil	09/04/08 09:00	09/08/08 12:35
100836-002C / B-257S 1.0-1.5	0809118-02	Soil	09/04/08 09:00	09/08/08 12:35
100836-003C / B-257S 2.0-2.5	0809118-03	Soil	09/04/08 09:00	09/08/08 12:35
100836-004C / B-258S 0.0-0.5	0809118-04	Soil	09/04/08 09:00	09/08/08 12:35
100836-005C / B-258S 1.0-1.5	0809118-05	Soil	09/04/08 09:00	09/08/08 12:35
100836-006C / B-258S 2.0-2.5	0809118-06	Soil	09/04/08 09:00	09/08/08 12:35
100836-007C / B-259S 0.0-0.5	0809118-07	Soil	09/04/08 09:20	09/08/08 12:35
100836-008C / B-259S 1.0-1.5	0809118-08	Soil	09/04/08 09:20	09/08/08 12:35
100836-009C / B-259S 2.0-2.5	0809118-09	Soil	09/04/08 09:20	09/08/08 12:35
100836-010C / B-260S 0.0-0.5	0809118-10	Soil	09/04/08 09:30	09/08/08 12:35
100836-011C / B-260S 1.0-1.5	0809118-11	Soil	09/04/08 09:30	09/08/08 12:35
100836-012C / B-260S 2.0-2.5	0809118-12	Soil	09/04/08 09:30	09/08/08 12:35
100836-013C / B-261S 0.0-0.5	0809118-13	Soil	09/04/08 09:50	09/08/08 12:35
100836-014C / B-261S 1.0-1.5	0809118-14	Soil	09/04/08 09:50	09/08/08 12:35
100836-015C / B-261S 2.0-2.5	0809118-15	Soil	09/04/08 09:50	09/08/08 12:35
100836-016C / B-262S 0.0-0.5	0809118-16	Soil	09/04/08 10:05	09/08/08 12:35
100836-017C / B-262S 1.0-1.5	0809118-17	Soil	09/04/08 10:05	09/08/08 12:35
100836-018C / B-262S 2.0-2.5	0809118-18	Soil	09/04/08 10:05	09/08/08 12:35
100836-019C / B-263S 0.0-0.5	0809118-19	Soil	09/04/08 10:20	09/08/08 12:35
100836-020C / B-263S 1.0-1.5	0809118-20	Soil	09/04/08 10:20	09/08/08 12:35
100836-021C / B-263S 2.0-2.5	0809118-21	Soil	09/04/08 10:20	09/08/08 12:35
100836-022C / B-264S 0.0-0.5	0809118-22	Soil	09/04/08 10:40	09/08/08 12:35
100836-023C / B-264S 1.0-1.5	0809118-23	Soil	09/04/08 10:40	09/08/08 12:35
100836-024C / B-264S 2.0-2.5	0809118-24	Soil	09/04/08 10:40	09/08/08 12:35
100836-028C / B-265S 0.0-0.5	0809118-25	Soil	09/04/08 11:00	09/08/08 12:35
100836-029C / B-265S 1.0-1.5	0809118-26	Soil	09/04/08 11:00	09/08/08 12:35
100836-030C / B-265S 2.0-2.5	0809118-27	Soil	09/04/08 11:00	09/08/08 12:35
100836-031C / B-266S 0.0-0.5	0809118-28	Soil	09/04/08 11:15	09/08/08 12:35
100836-032C / B-266S 1.0-1.5	0809118-29	Soil	09/04/08 11:15	09/08/08 12:35
100836-033C / B-266S 2.0-2.5	0809118-30	Soil	09/04/08 11:15	09/08/08 12:35

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

26052 MERIT CIRCLE SUITE 105, LAGUNA HILLS, CALIFORNIA 92653
TELEPHONE: (949) 348-9389 FAX: (949) 348-9115
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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
100836-034C / B-267S 0.0-0.5	0809118-31	Soil	09/04/08 11:30	09/08/08 12:35
100836-035C / B-267S 1.0-1.5	0809118-32	Soil	09/04/08 11:30	09/08/08 12:35
100836-036C / B-267S 2.0-2.5	0809118-33	Soil	09/04/08 11:30	09/08/08 12:35
100836-037C / B-268S 0.0-0.5	0809118-34	Soil	09/04/08 11:40	09/08/08 12:35
100836-038C / B-268S 1.0-1.5	0809118-35	Soil	09/04/08 11:40	09/08/08 12:35
100836-039C / B-268S 2.0-2.5	0809118-36	Soil	09/04/08 11:40	09/08/08 12:35
100836-040C / B-269S 0.0-0.5	0809118-37	Soil	09/04/08 11:55	09/08/08 12:35
100836-041C / B-269S 1.0-1.5	0809118-38	Soil	09/04/08 11:55	09/08/08 12:35
100836-042C / B-269S 2.0-2.5	0809118-39	Soil	09/04/08 11:55	09/08/08 12:35
100836-043C / B-270S 0.0-0.5	0809118-40	Soil	09/04/08 12:05	09/08/08 12:35
100836-044C / B-270S 1.0-1.5	0809118-41	Soil	09/04/08 12:05	09/08/08 12:35
100836-045C / B-270S 2.0-2.5	0809118-42	Soil	09/04/08 12:05	09/08/08 12:35
100836-046C / B-271S 0.0-0.5	0809118-43	Soil	09/04/08 12:20	09/08/08 12:35
100836-047C / B-271S 1.0-1.5	0809118-44	Soil	09/04/08 12:20	09/08/08 12:35
100836-048C / B-271S 2.0-2.5	0809118-45	Soil	09/04/08 12:20	09/08/08 12:35
100836-050C / B-272S 0.0-0.5	0809118-46	Soil	09/05/08 00:00	09/08/08 12:35
100836-051C / B-272S 1.0-1.5	0809118-47	Soil	09/05/08 00:00	09/08/08 12:35
100836-052C / B-272S 2.0-2.5	0809118-48	Soil	09/05/08 00:00	09/08/08 12:35
100836-053C / B-273S 0.0-0.5	0809118-49	Soil	09/05/08 00:00	09/08/08 12:35
100836-054C / B-273S 1.0-1.5	0809118-50	Soil	09/05/08 00:00	09/08/08 12:35
100836-055C / B-273S 2.0-2.5	0809118-51	Soil	09/05/08 00:00	09/08/08 12:35
100836-056C / B-274S 0.0-0.5	0809118-52	Soil	09/05/08 00:00	09/08/08 12:35
100836-057C / B-274S 1.0-1.5	0809118-53	Soil	09/05/08 00:00	09/08/08 12:35
100836-058C / B-274S 2.0-2.5	0809118-54	Soil	09/05/08 00:00	09/08/08 12:35
100836-062C / B-275S 0.0-0.5	0809118-55	Soil	09/05/08 00:00	09/08/08 12:35
100836-063C / B-275S 1.0-1.5	0809118-56	Soil	09/05/08 00:00	09/08/08 12:35
100836-064C / B-275S 2.0-2.5	0809118-57	Soil	09/05/08 00:00	09/08/08 12:35
100836-065C / B-276S 0.0-0.5	0809118-58	Soil	09/05/08 00:00	09/08/08 12:35
100836-066C / B-276S 1.0-1.5	0809118-59	Soil	09/05/08 00:00	09/08/08 12:35
100836-067C / B-276S 2.0-2.5	0809118-60	Soil	09/05/08 00:00	09/08/08 12:35

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
100836-068C / B-277S 0.0-0.5	0809118-61	Soil	09/05/08 00:00	09/08/08 12:35
100836-069C / B-277S 1.0-1.5	0809118-62	Soil	09/05/08 00:00	09/08/08 12:35
100836-070C / B-277S 2.0-2.5	0809118-63	Soil	09/05/08 00:00	09/08/08 12:35
100836-071C / B-278S 0.0-0.5	0809118-64	Soil	09/05/08 00:00	09/08/08 12:35
100836-072C / B-278S 1.0-1.5	0809118-65	Soil	09/05/08 00:00	09/08/08 12:35
100836-073C / B-278S 2.0-2.5	0809118-66	Soil	09/05/08 00:00	09/08/08 12:35
100836-074C / B-279S 0.0-0.5	0809118-67	Soil	09/05/08 00:00	09/08/08 12:35
100836-075C / B-279S 1.0-1.5	0809118-68	Soil	09/05/08 00:00	09/08/08 12:35
100836-076C / B-279S 2.0-2.5	0809118-69	Soil	09/05/08 00:00	09/08/08 12:35
100836-077C / B-280S 0.0-0.5	0809118-70	Soil	09/05/08 09:50	09/08/08 12:35
100836-078C / B-280S 1.0-1.5	0809118-71	Soil	09/05/08 09:50	09/08/08 12:35
100836-079C / B-280S 2.0-2.5	0809118-72	Soil	09/05/08 09:50	09/08/08 12:35

CASE NARRATIVE

SAMPLE RECEIPT:	Samples were received intact, at 4 °C, and accompanied by chain of custody documentation.
PRESERVATION:	Samples requiring preservation were verified prior to sample preparation and analysis.
HOLDING TIMES:	All holding times were met, unless otherwise noted in the report with data qualifiers.
QA/QC CRITERIA:	All quality objective criteria were met, except as noted in the report with data qualifiers.

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26052 MERIT CIRCLE SUITE 105, LAGUNA HILLS, CALIFORNIA 92653
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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-001C / B257S 0.0-0.5 (0809118-01) Soil Sampled: 09/04/08 09:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*46.0 %*		*35-150*	"	"	"	"	
100836-002C / B-257S 1.0-1.5 (0809118-02) Soil Sampled: 09/04/08 09:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*78.0 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-003C / B-257S 2.0-2.5 (0809118-03) Soil	**Sampled: 09/04/08 09:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 00:28	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*65.3 %*		*35-150*	"	"	"	"	
100836-004C / B-258S 0.0-0.5 (0809118-04) Soil	**Sampled: 09/04/08 09:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*74.9 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-005C / B-258S 1.0-1.5 (0809118-05) Soil Sampled: 09/04/08 09:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*48.8 %*		*35-150*	"	"	"	"	
100836-006C / B-258S 2.0-2.5 (0809118-06) Soil Sampled: 09/04/08 09:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*47.2 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-007C / B-259S 0.0-0.5 (0809118-07) Soil Sampled: 09/04/08 09:20 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*88.5 %*		*35-150*	"	"	"	"	
100836-008C / B-259S 1.0-1.5 (0809118-08) Soil Sampled: 09/04/08 09:20 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*70.5 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-009C / B-259S 2.0-2.5 (0809118-09) Soil	**Sampled: 09/04/08 09:20**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 01:15	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*50.1 %*		*35-150*	"	"	"	"	
100836-010C / B-260S 0.0-0.5 (0809118-10) Soil	**Sampled: 09/04/08 09:30**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*89.5 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-011C / B-260S 1.0-1.5 (0809118-11) Soil Sampled: 09/04/08 09:30 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*66.3 %*		*35-150*	"	"	"	"	
100836-012C / B-260S 2.0-2.5 (0809118-12) Soil Sampled: 09/04/08 09:30 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 02:01	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*65.6 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-013C / B-261S 0.0-0.5 (0809118-13) Soil Sampled: 09/04/08 09:50 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*65.0 %*		*35-150*	"	"	"	"	
100836-014C / B-261S 1.0-1.5 (0809118-14) Soil Sampled: 09/04/08 09:50 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*88.2 %*		*35-150*	"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-015C / B-261S 2.0-2.5 (0809118-15) Soil Sampled: 09/04/08 09:50 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 02:48	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*75.9 %*		*35-150*	"	"	"	"	
100836-016C / B-262S 0.0-0.5 (0809118-16) Soil Sampled: 09/04/08 10:05 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*54.0 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-017C / B-262S 1.0-1.5 (0809118-17) Soil Sampled: 09/04/08 10:05 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*70.8 %*		*35-150*	"	"	"	"	
100836-018C / B-262S 2.0-2.5 (0809118-18) Soil Sampled: 09/04/08 10:05 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*49.9 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-019C / B-263S 0.0-0.5 (0809118-19) Soil	**Sampled: 09/04/08 10:20**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*52.9 %*		*35-150*	"	"	"	"	
100836-020C / B-263S 1.0-1.5 (0809118-20) Soil	**Sampled: 09/04/08 10:20**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*73.0 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-021C / B-263S 2.0-2.5 (0809118-21) Soil	**Sampled: 09/04/08 10:20**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 04:03	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**1.6**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*51.2 %*		*35-150*		"	"	"	
100836-022C / B-264S 0.0-0.5 (0809118-22) Soil	**Sampled: 09/04/08 10:40**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 03:34	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*83.9 %*		*35-150*		"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-023C / B-264S 1.0-1.5 (0809118-23) Soil Sampled: 09/04/08 10:40 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*90.9 %*		*35-150*	"	"	"	"	
100836-024C / B-264S 2.0-2.5 (0809118-24) Soil Sampled: 09/04/08 10:40 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 04:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*48.7 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-028C / B-265S 0.0-0.5 (0809118-25) Soil Sampled: 09/04/08 11:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*75.9 %*		*35-150*	"	"	"	"	
100836-029C / B-265S 1.0-1.5 (0809118-26) Soil Sampled: 09/04/08 11:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*58.4 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-030C / B-265S 2.0-2.5 (0809118-27) Soil Sampled: 09/04/08 11:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*65.0 %*		*35-150*	"	"	"	"	
100836-031C / B-266S 0.0-0.5 (0809118-28) Soil Sampled: 09/04/08 11:15 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*72.1 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-032C / B-266S 1.0-1.5 (0809118-29) Soil Sampled: 09/04/08 11:15 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*47.0 %*		*35-150*	"	"	"	"	
100836-033C / B-266S 2.0-2.5 (0809118-30) Soil Sampled: 09/04/08 11:15 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*53.2 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-034C / B-267S 0.0-0.5 (0809118-31) Soil Sampled: 09/04/08 11:30 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*87.5 %*		*35-150*	"	"	"	"	
100836-035C / B-267S 1.0-1.5 (0809118-32) Soil Sampled: 09/04/08 11:30 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*72.4 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-036C / B-267S 2.0-2.5 (0809118-33) Soil	**Sampled: 09/04/08 11:30**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 05:36	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**1.6**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*80.3 %*		*35-150*		"	"	"	
100836-037C / B-268S 0.0-0.5 (0809118-34) Soil	**Sampled: 09/04/08 11:40**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 06:23	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*65.3 %*		*35-150*		"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-038C / B-268S 1.0-1.5 (0809118-35) Soil Sampled: 09/04/08 11:40 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*84.3 %*		*35-150*	"	"	"	"	
100836-039C / B-268S 2.0-2.5 (0809118-36) Soil Sampled: 09/04/08 11:40 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 07:09	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*45.4 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-040C / B-269S 0.0-0.5 (0809118-37) Soil Sampled: 09/04/08 11:55 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*53.4 %*		*35-150*	"	"	"	"	
100836-041C / B-269S 1.0-1.5 (0809118-38) Soil Sampled: 09/04/08 11:55 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*82.5 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-042C / B-269S 2.0-2.5 (0809118-39) Soil Sampled: 09/04/08 11:55 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/10/08 21:23	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*77.5 %*		*35-150*	"	"	"	"	
100836-043C / B-270S 0.0-0.5 (0809118-40) Soil Sampled: 09/04/08 12:05 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/09/08 19:14	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*6.80 %*		*35-150*	"	"	"	"	*S-04*

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-044C / B-270S 1.0-1.5 (0809118-41) Soil Sampled: 09/04/08 12:05 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/09/08 20:00	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*56.8 %*		*35-150*	"	"	"	"	
100836-045C / B-270S 2.0-2.5 (0809118-42) Soil Sampled: 09/04/08 12:05 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 07:56	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*49.0 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-046C / B-271S 0.0-0.5 (0809118-43) Soil Sampled: 09/04/08 12:20 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/09/08 20:47	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*28.9 %*		*35-150*	"	"	"	"	*S-04*
100836-047C / B-271S 1.0-1.5 (0809118-44) Soil Sampled: 09/04/08 12:20 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*%*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-048C / B-271S 2.0-2.5 (0809118-45) Soil Sampled: 09/04/08 12:20 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*62.9 %*		*35-150*	"	"	"	"	
100836-050C / B-272S 0.0-0.5 (0809118-46) Soil Sampled: 09/05/08 00:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/09/08 21:33	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*58.1 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-051C / B-272S 1.0-1.5 (0809118-47) Soil	**Sampled: 09/05/08 00:00**			**Received: 09/08/08 12:35**					
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 09:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**3.3**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*70.0 %*		*35-150*		"	"	"	
100836-052C / B-272S 2.0-2.5 (0809118-48) Soil	**Sampled: 09/05/08 00:00**			**Received: 09/08/08 12:35**					
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 09:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**1.7**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*59.1 %*		*35-150*		"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-053C / B-273S 0.0-0.5 (0809118-49) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 05:07	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*59.4 %*		*35-150*	"	"	"	"	
100836-054C / B-273S 1.0-1.5 (0809118-50) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 09:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*53.6 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-055C / B-273S 2.0-2.5 (0809118-51) Soil Sampled: 09/05/08 00:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/09/08 22:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*42.5 %*		*35-150*	"	"	"	"	
100836-056C / B-274S 0.0-0.5 (0809118-52) Soil Sampled: 09/05/08 00:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1112	09/11/08	09/12/08 09:13	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*42.6 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-057C / B-274S 1.0-1.5 (0809118-53) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/10/08 22:09	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*63.0 %*		*35-150*	"	"	"	"	
100836-058C / B-274S 2.0-2.5 (0809118-54) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*79.9 %*		*35-150*	"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-062C / B-275S 0.0-0.5 (0809118-55) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1205	09/12/08	09/16/08 08:49	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*41.0 %*		*35-150*	"	"	"	"	
100836-063C / B-275S 1.0-1.5 (0809118-56) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/09/08 23:06	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**2.4**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*45.4 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-064C / B-275S 2.0-2.5 (0809118-57) Soil Sampled: 09/05/08 00:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*44.4 %*		*35-150*	"	"	"	"	
100836-065C / B-276S 0.0-0.5 (0809118-58) Soil Sampled: 09/05/08 00:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1027	09/10/08	09/11/08 05:53	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*67.2 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-066C / B-276S 1.0-1.5 (0809118-59) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/09/08 23:53	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*11.8 %*		*35-150*	"	"	"	"	*S-04*
100836-067C / B-276S 2.0-2.5 (0809118-60) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/10/08 00:39	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*67.9 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-068C / B-277S 0.0-0.5 (0809118-61) Soil Sampled: 09/05/08 00:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1204	09/12/08	09/12/08 11:55	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**2.3**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*66.6 %*		*35-150*	"	"	"	"	
100836-069C / B-277S 1.0-1.5 (0809118-62) Soil Sampled: 09/05/08 00:00 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1205	09/12/08	09/16/08 08:49	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*66.2 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-070C / B-277S 2.0-2.5 (0809118-63) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*51.5 %*		*35-150*	"	"	"	"	
100836-071C / B-278S 0.0-0.5 (0809118-64) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/10/08 02:12	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**3.3**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*74.9 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-072C / B-278S 1.0-1.5 (0809118-65) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I0945	09/09/08	09/10/08 02:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**4.7**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*77.8 %*		*35-150*	"	"	"	"	
100836-073C / B-278S 2.0-2.5 (0809118-66) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1205	09/12/08	09/16/08 08:49	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*47.5 %*		*35-150*	"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-074C / B-279S 0.0-0.5 (0809118-67) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**21**	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*104 %*	*35-150*		"	"	"	"	
100836-075C / B-279S 1.0-1.5 (0809118-68) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 09:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**73**	16	"	10	"	"	"	"	
Picloram	ND	1.6	"	1	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*87.5 %*	*35-150*		"	"	"	"	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-076C / B-279S 2.0-2.5 (0809118-69) Soil	**Sampled: 09/05/08 00:00**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1504	09/15/08	09/15/08 10:18	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	**54**	16	"	10	"	"	"	"	
Picloram	ND	1.6	"	1	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*138 %*		*35-150*		"	"	"	
100836-077C / B-280S 0.0-0.5 (0809118-70) Soil	**Sampled: 09/05/08 09:50**		**Received: 09/08/08 12:35**						
2,4,5-T	ND	1.6	µg/kg	1	B8I1014	09/10/08	09/10/08 10:58	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*13.4 %*		*35-150*		"	"	"	*S-04*

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
100836-078C / B-280S 1.0-1.5 (0809118-71) Soil Sampled: 09/05/08 09:50 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1205	09/12/08	09/16/08 08:49	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*6.52 %*		*35-150*	"	"	"	"	*S-04*
100836-079C / B-280S 2.0-2.5 (0809118-72) Soil Sampled: 09/05/08 09:50 Received: 09/08/08 12:35									
2,4,5-T	ND	1.6	µg/kg	1	B8I1113	09/11/08	09/12/08 09:20	EPA 8151A	
2,4,5-TP (Silvex)	ND	1.6	"	"	"	"	"	"	
2,4-D	ND	1.6	"	"	"	"	"	"	
2,4-DB	ND	4.0	"	"	"	"	"	"	
3,5-Dichlorobenzoic acid	ND	2.0	"	"	"	"	"	"	
4-Nitrophenol	ND	2.0	"	"	"	"	"	"	
Acifluorfen	ND	1.6	"	"	"	"	"	"	
Bentazon	ND	1.6	"	"	"	"	"	"	
Chloramben	ND	1.6	"	"	"	"	"	"	
Dalapon	ND	20	"	"	"	"	"	"	
DCPA diacid	ND	1.6	"	"	"	"	"	"	
Dicamba	ND	1.6	"	"	"	"	"	"	
Dichlorprop	ND	1.6	"	"	"	"	"	"	
Dinoseb	ND	1.6	"	"	"	"	"	"	
Pentachlorophenol	ND	1.6	"	"	"	"	"	"	
Picloram	ND	1.6	"	"	"	"	"	"	
Surrogate: 2,4-Dichlorophenylacetic Acid		*10.5 %*		*35-150*	"	"	"	"	*S-04*

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I0945 - EPA 8151A Herbicides										
Blank (B8I0945-BLK1)				Prepared & Analyzed: 09/09/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							
Dinoseb	ND	1.6	"							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*94.3*		*"*	*100*		*94.3*	*35-150*			
LCS (B8I0945-BS1)				Prepared & Analyzed: 09/09/08						
2,4,5-T	6.73	1.6	µg/kg	10.0		67.3	20-150			
2,4,5-TP (Silvex)	8.55	1.6	"	10.0		85.5	20-150			
Dichlorprop	5.19	1.6	"	10.0		51.9	20-150			
Dinoseb	2.80	1.6	"	10.0		28.0	20-150			
Duplicate (B8I0945-DUP1)	**Source: 0809118-60**			Prepared: 09/09/08 Analyzed: 09/10/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I0945 - EPA 8151A Herbicides										
Matrix Spike (B8I0945-MS1)	**Source: 0809118-60**			Prepared & Analyzed: 09/09/08						
2,4,5-T	6.42	1.6	µg/kg	10.0	ND	64.2	20-150			
2,4,5-TP (Silvex)	8.77	1.6	"	10.0	ND	87.7	20-150			
Dichlorprop	4.86	1.6	"	10.0	ND	48.6	20-150			
Dinoseb	3.39	1.6	"	10.0	ND	33.9	20-150			
Matrix Spike Dup (B8I0945-MSD1)	**Source: 0809118-60**			Prepared & Analyzed: 09/09/08						
2,4,5-T	6.97	1.6	µg/kg	10.0	ND	69.7	20-150	8.22	30	
2,4,5-TP (Silvex)	9.17	1.6	"	10.0	ND	91.7	20-150	4.46	30	
Dichlorprop	5.84	1.6	"	10.0	ND	58.4	20-150	18.3	30	
Dinoseb	3.18	1.6	"	10.0	ND	31.8	20-150	6.39	30	
Batch B8I1014 - EPA 8151A Herbicides										
Blank (B8I1014-BLK1)				Prepared & Analyzed: 09/10/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							
Dinoseb	ND	1.6	"							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*83.8*		*"*	*100*		*83.8*	*35-150*			

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1014 - EPA 8151A Herbicides										
LCS (B8I1014-BS1)				Prepared & Analyzed: 09/10/08						
2,4,5-T	6.55	1.6	µg/kg	10.0		65.5	20-150			
2,4,5-TP (Silvex)	7.60	1.6	"	10.0		76.0	20-150			
Dichlorprop	4.60	1.6	"	10.0		46.0	20-150			
Dinoseb	2.69	1.6	"	10.0		26.9	20-150			
Duplicate (B8I1014-DUP1)		**Source: 0809118-08**		Prepared & Analyzed: 09/10/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	
Matrix Spike (B8I1014-MS1)		**Source: 0809118-08**		Prepared & Analyzed: 09/10/08						
2,4,5-T	7.48	1.6	µg/kg	10.0	ND	74.8	20-150			
2,4,5-TP (Silvex)	9.01	1.6	"	10.0	ND	90.1	20-150			
Dichlorprop	4.97	1.6	"	10.0	ND	49.7	20-150			
Dinoseb	3.54	1.6	"	10.0	ND	35.4	20-150			
Matrix Spike Dup (B8I1014-MSD1)		**Source: 0809118-08**		Prepared & Analyzed: 09/10/08						
2,4,5-T	8.21	1.6	µg/kg	10.0	ND	82.1	20-150	9.31	30	
2,4,5-TP (Silvex)	11.7	1.6	"	10.0	ND	117	20-150	26.0	30	
Dichlorprop	6.12	1.6	"	10.0	ND	61.2	20-150	20.7	30	
Dinoseb	4.17	1.6	"	10.0	ND	41.7	20-150	16.3	30	
Batch B8I1027 - EPA 8151A Herbicides										
Blank (B8I1027-BLK1)				Prepared & Analyzed: 09/10/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1027 - EPA 8151A Herbicides										
Blank (B8I1027-BLK1)				Prepared & Analyzed: 09/10/08						
Dinoseb	ND	1.6	µg/kg							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*89.8*		*"*	*100*		*89.8*	*35-150*			
LCS (B8I1027-BS1)				Prepared & Analyzed: 09/10/08						
2,4,5-T	7.90	1.6	µg/kg	10.0		79.0	20-150			
2,4,5-TP (Silvex)	7.87	1.6	"	10.0		78.7	20-150			
Dichlorprop	5.34	1.6	"	10.0		53.4	20-150			
Dinoseb	3.85	1.6	"	10.0		38.5	20-150			
Duplicate (B8I1027-DUP1)	**Source: 0809118-58**			Prepared: 09/10/08 Analyzed: 09/11/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	
Matrix Spike (B8I1027-MS1)	**Source: 0809118-58**			Prepared & Analyzed: 09/10/08						
2,4,5-T	12.0	1.6	µg/kg	10.0	ND	120	20-150			
2,4,5-TP (Silvex)	11.3	1.6	"	10.0	ND	113	20-150			
Dichlorprop	6.77	1.6	"	10.0	ND	67.7	20-150			
Dinoseb	2.63	1.6	"	10.0	ND	26.3	20-150			
Matrix Spike Dup (B8I1027-MSD1)	**Source: 0809118-58**			Prepared & Analyzed: 09/10/08						
2,4,5-T	9.12	1.6	µg/kg	10.0	ND	91.2	20-150	27.3	30	
2,4,5-TP (Silvex)	9.18	1.6	"	10.0	ND	91.8	20-150	20.7	30	
Dichlorprop	5.86	1.6	"	10.0	ND	58.6	20-150	14.4	30	
Dinoseb	2.06	1.6	"	10.0	ND	20.6	20-150	24.3	30	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1112 - EPA 8151A Herbicides										
Blank (B8I1112-BLK1)				Prepared: 09/11/08 Analyzed: 09/12/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							
Dinoseb	ND	1.6	"							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*51.1*		*"*	*100*		*51.1*	*35-150*			
LCS (B8I1112-BS1)				Prepared: 09/11/08 Analyzed: 09/12/08						
2,4,5-T	4.78	1.6	µg/kg	10.0		47.8	20-150			
2,4,5-TP (Silvex)	5.98	1.6	"	10.0		59.8	20-150			
Dichlorprop	4.52	1.6	"	10.0		45.2	20-150			
Dinoseb	3.57	1.6	"	10.0		35.7	20-150			
Duplicate (B8I1112-DUP1)	**Source: 0809118-05**			Prepared: 09/11/08 Analyzed: 09/12/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1112 - EPA 8151A Herbicides										
Matrix Spike (B8I1112-MS1)	**Source: 0809118-05**			Prepared: 09/11/08		Analyzed: 09/12/08				
2,4,5-T	7.13	1.6	µg/kg	10.0	ND	71.3	20-150			
2,4,5-TP (Silvex)	8.27	1.6	"	10.0	ND	82.7	20-150			
Dichlorprop	4.57	1.6	"	10.0	ND	45.7	20-150			
Dinoseb	4.22	1.6	"	10.0	ND	42.2	20-150			
Matrix Spike Dup (B8I1112-MSD1)	**Source: 0809118-05**			Prepared: 09/11/08		Analyzed: 09/12/08				
2,4,5-T	8.25	1.6	µg/kg	10.0	ND	82.5	20-150	14.6	30	
2,4,5-TP (Silvex)	8.20	1.6	"	10.0	ND	82.0	20-150	0.850	30	
Dichlorprop	5.28	1.6	"	10.0	ND	52.8	20-150	14.4	30	
Dinoseb	4.48	1.6	"	10.0	ND	44.8	20-150	5.98	30	
Batch B8I1113 - EPA 8151A Herbicides										
Blank (B8I1113-BLK1)				Prepared: 09/11/08		Analyzed: 09/12/08				
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							
Dinoseb	ND	1.6	"							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*95.8*		*"*	*100*		*95.8*	*35-150*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1113 - EPA 8151A Herbicides										
LCS (B8I1113-BS1)				Prepared: 09/11/08 Analyzed: 09/12/08						
2,4,5-T	10.8	1.6	µg/kg	10.0		108	20-150			
2,4,5-TP (Silvex)	11.0	1.6	"	10.0		110	20-150			
Dichlorprop	7.86	1.6	"	10.0		78.6	20-150			
Dinoseb	3.22	1.6	"	10.0		32.2	20-150			
Duplicate (B8I1113-DUP1)		**Source: 0809118-21**		Prepared: 09/11/08 Analyzed: 09/12/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	
Matrix Spike (B8I1113-MS1)		**Source: 0809118-21**		Prepared: 09/11/08 Analyzed: 09/12/08						
2,4,5-T	12.5	1.6	µg/kg	10.0	ND	125	20-150			
2,4,5-TP (Silvex)	12.4	1.6	"	10.0	ND	124	20-150			
Dichlorprop	11.1	1.6	"	10.0	ND	111	20-150			
Dinoseb	3.36	1.6	"	10.0	ND	33.6	20-150			
Matrix Spike Dup (B8I1113-MSD1)		**Source: 0809118-21**		Prepared: 09/11/08 Analyzed: 09/12/08						
2,4,5-T	11.3	1.6	µg/kg	10.0	ND	113	20-150	10.1	30	
2,4,5-TP (Silvex)	10.5	1.6	"	10.0	ND	105	20-150	16.6	30	
Dichlorprop	10.2	1.6	"	10.0	ND	102	20-150	8.45	30	
Dinoseb	4.18	1.6	"	10.0	ND	41.8	20-150	21.8	30	
Batch B8I1204 - EPA 8151A Herbicides										
Blank (B8I1204-BLK1)				Prepared & Analyzed: 09/12/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1204 - EPA 8151A Herbicides										
Blank (B8I1204-BLK1)				Prepared & Analyzed: 09/12/08						
Dinoseb	ND	1.6	µg/kg							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*145*		*"*	*100*		*145*	*35-150*			
LCS (B8I1204-BS1)				Prepared & Analyzed: 09/12/08						
2,4,5-T	9.30	1.6	µg/kg	10.0		93.0	20-150			
2,4,5-TP (Silvex)	12.5	1.6	"	10.0		125	20-150			
Dichlorprop	6.72	1.6	"	10.0		67.2	20-150			
Dinoseb	3.79	1.6	"	10.0		37.9	20-150			
Duplicate (B8I1204-DUP1)	**Source: 0809118-44**			Prepared & Analyzed: 09/12/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	
Matrix Spike (B8I1204-MS1)	**Source: 0809118-44**			Prepared & Analyzed: 09/12/08						
2,4,5-T	8.05	1.6	µg/kg	10.0	ND	80.5	20-150			
2,4,5-TP (Silvex)	12.8	1.6	"	10.0	ND	128	20-150			
Dichlorprop	8.93	1.6	"	10.0	ND	89.3	20-150			
Dinoseb	5.23	1.6	"	10.0	ND	52.3	20-150			
Matrix Spike Dup (B8I1204-MSD1)	**Source: 0809118-44**			Prepared & Analyzed: 09/12/08						
2,4,5-T	9.05	1.6	µg/kg	10.0	ND	90.5	20-150	11.7	30	
2,4,5-TP (Silvex)	12.5	1.6	"	10.0	ND	125	20-150	2.37	30	
Dichlorprop	7.37	1.6	"	10.0	ND	73.7	20-150	19.1	30	
Dinoseb	3.99	1.6	"	10.0	ND	39.9	20-150	26.9	30	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1205 - EPA 8151A Herbicides										
Blank (B8I1205-BLK1)				Prepared: 09/12/08 Analyzed: 09/16/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							
Dinoseb	ND	1.6	"							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*139*		*"*	*100*		*139*	*35-150*			
LCS (B8I1205-BS1)				Prepared: 09/12/08 Analyzed: 09/16/08						
2,4,5-T	12.0	1.6	µg/kg	10.0		120	20-150			
2,4,5-TP (Silvex)	12.5	1.6	"	10.0		125	20-150			
Dichlorprop	7.82	1.6	"	10.0		78.2	20-150			
Dinoseb	4.45	1.6	"	10.0		44.5	20-150			
Duplicate (B8I1205-DUP1)	**Source: 0809118-71**			Prepared: 09/12/08 Analyzed: 09/16/08						**S-04**
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1205 - EPA 8151A Herbicides										
Matrix Spike (B8I1205-MS1)	**Source: 0809118-71**			Prepared: 09/12/08		Analyzed: 09/16/08				
2,4,5-T	13.9	1.6	µg/kg	10.0	ND	139	20-150			
2,4,5-TP (Silvex)	13.3	1.6	"	10.0	ND	133	20-150			
Dichlorprop	9.59	1.6	"	10.0	ND	95.9	20-150			
Dinoseb	3.53	1.6	"	10.0	ND	35.3	20-150			
Matrix Spike Dup (B8I1205-MSD1)	**Source: 0809118-71**			Prepared: 09/12/08		Analyzed: 09/16/08				
2,4,5-T	12.9	1.6	µg/kg	10.0	ND	129	20-150	7.46	30	
2,4,5-TP (Silvex)	13.2	1.6	"	10.0	ND	132	20-150	0.755	30	
Dichlorprop	7.74	1.6	"	10.0	ND	77.4	20-150	21.4	30	
Dinoseb	4.05	1.6	"	10.0	ND	40.5	20-150	13.7	30	
Batch B8I1504 - EPA 8151A Herbicides										
Blank (B8I1504-BLK1)				Prepared & Analyzed: 09/15/08						
2,4,5-T	ND	1.6	µg/kg							
2,4,5-TP (Silvex)	ND	1.6	"							
2,4-D	ND	1.6	"							
2,4-DB	ND	4.0	"							
3,5-Dichlorobenzoic acid	ND	2.0	"							
4-Nitrophenol	ND	2.0	"							
Acifluorfen	ND	1.6	"							
Bentazon	ND	1.6	"							
Chloramben	ND	1.6	"							
Dalapon	ND	20	"							
DCPA diacid	ND	1.6	"							
Dicamba	ND	1.6	"							
Dichlorprop	ND	1.6	"							
Dinoseb	ND	1.6	"							
Pentachlorophenol	ND	1.6	"							
Picloram	ND	1.6	"							
Surrogate: 2,4-Dichlorophenylacetic Acid	*35.6*		*"*	*100*		*35.6*	*35-150*			

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Chlorinated Herbicides by EPA Method 8151A - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8I1504 - EPA 8151A Herbicides										
LCS (B8I1504-BS1)				Prepared & Analyzed: 09/15/08						
2,4,5-T	6.00	1.6	µg/kg	10.0		60.0	20-150			
2,4,5-TP (Silvex)	7.52	1.6	"	10.0		75.2	20-150			
Dichlorprop	5.37	1.6	"	10.0		53.7	20-150			
Dinoseb	2.84	1.6	"	10.0		28.4	20-150			
Duplicate (B8I1504-DUP1)		**Source: 0809118-01**		Prepared & Analyzed: 09/15/08						
2,4,5-T	ND	1.6	µg/kg		ND				30	
2,4,5-TP (Silvex)	ND	1.6	"		ND				30	
Dichlorprop	ND	1.6	"		ND				30	
Dinoseb	ND	1.6	"		ND				30	
Matrix Spike (B8I1504-MS1)		**Source: 0809118-01**		Prepared & Analyzed: 09/15/08						
2,4,5-T	12.4	1.6	µg/kg	10.0	ND	124	20-150			
2,4,5-TP (Silvex)	11.9	1.6	"	10.0	ND	119	20-150			
Dichlorprop	7.73	1.6	"	10.0	ND	77.3	20-150			
Dinoseb	2.96	1.6	"	10.0	ND	29.6	20-150			
Matrix Spike Dup (B8I1504-MSD1)		**Source: 0809118-01**		Prepared & Analyzed: 09/15/08						
2,4,5-T	11.8	1.6	µg/kg	10.0	ND	118	20-150	4.96	30	
2,4,5-TP (Silvex)	11.8	1.6	"	10.0	ND	118	20-150	0.844	30	
Dichlorprop	7.91	1.6	"	10.0	ND	79.1	20-150	2.30	30	
Dinoseb	3.36	1.6	"	10.0	ND	33.6	20-150	12.7	30	

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Advanced Technology Labs	Project: NA	
3275 Walnut Avenue	Project Number: PO#SC03925	**Reported:**
Signal Hill CA, 90755	Project Manager: Hoa Huynh	09/17/08 12:03

Notes and Definitions

S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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26052 MERIT CIRCLE SUITE 105, LAGUNA HILLS, CALIFORNIA 92653
TELEPHONE: (949) 348-9389 FAX: (949) 348-9115
E-MAIL: SIERRALABS @ SIERRALABS.NET

Advanced Technology Laboratories
3275 *Walnut Avenue, Signal Hill, CA* 90755-5225
www.atlglobal.com
TEL: (562) 989-4045 FAX: (562) 989-4040

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:
Sierra Laboratories
26052 Merit Circle Suite 105
Laguna Hills, CA 92653

TEL: (949) 348-9389
FAX: (949) 348-9115
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8151		
100836-001C / B2575 0.0-0.5	Soil	9/4/2008 9:00:00 AM	40ZG	1		
100836-002C / B-257S 1.O-1.5	Soil	9/4/2008 9:00:00 AM	40ZG	1		
100836-003C / B-257S 2.0-2.5	Soil	9/4/2008 9:00:00 AM	40ZG	1		
100836-004C / B-258S 0.0-0.5	Soil	9/4/2008 9:00:00 AM	4OZG	1		
100836-005C / B-258S 1.O-1.5	Soil	9/4/2008 9:00:00 AM	40ZG	1		
100836-006C / B-258S 2.0-2..5	Soil	9/4/2008 9:00:00 AM	40ZG	1		
100836-007C / B-259S 0.0-0.5	Soil	9/4/2008 9:20:00 AM	40ZG	1		
100836-008C / B-259S 1.O-1.5	Soil	9/4/2008 9:20:00 AM	4OZG	1		
100836-009C / B-259S 2.0-2.5	Soil	9/4/2008 9:20:00 AM	40ZG	1		
100836-010C / B-260S 0.0-0.5	Soil	9/4/2008 9:30:00 AM	4OZG	1		
100836-011C / B-260S 1.O-1.5	Soil	9/4/2008 9:30:00 AM	40ZG	▮		
100836-012C / B-260S 2.0-2.5	Soil	9/4/2008 9:30:00 AM	40ZG	1		
100836-013C / B-261S 0.0-0.5	Soil	9/4/2008 9:50:00 AM	4OZG	1		
100836-014C / B-261S 1.0-1.5	Soil	9/4/2008 9:50:00 AM	40ZG	1		
100836-015 6 / B-261S 2.0-2.5	Soil	9/4/2008 9:50:00 AM	4OZG	1		
100836-016C / B-262S 0.0-0.5	Soil	9/4/2008 10:05:00 AM	40ZG	1		
100836-017C / B-262S 1.O-1.5	Soil	9/4/2008 10:05:00 AM	40ZG	1		

General Comments: Please email sample receipt acknowledgement to the PM.

Please use PO#: SC03925 Please fax results by: NORMAL TAT

SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:		9/5/08	Received by:		9/8/08
Relinquished by:	Mark Ferguson	9/8/08 1235	Received by:		9-8-08 1235

Advanced Technology Laboratories
3275 *Walnut Avenue, Signal Hill, CA* 90755-5225
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CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

Sierra Laboratories
26052 Merit Circle Suite 105
Laguna Hills, CA 92653

TEL: (949) 348-9389
FAX: (949) 348-9115
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8151		
100836-018C / B-262S 2.0-2.5	Soil	9/4/2008 10:05:00 AM	4OZG	1		
100836-019C / B-263S 0.0-0.5	Soil	9/4/2008 10:20:00 AM	4OZG	1		
100836-020C / B-263S 1.0-1.5	Soil	9/4/2008 10:20:00 AM	4OZG	1		
100836-021C / B-263S 2.0-2.5	Soil	9/4/2008 10:20:00 AM	4OZG	1		
100836-022C / B-264S 0.0-0.5	Soil	9/4/2008 10:40:00 AM	4OZG	1		
100836-023C / B-264S 1.0-1.5	Soil	9/4/2008 10:40:00 AM	4OZG	1		
100836-024C / B-264S 2.0-2.5	Soil	9/4/2008 10:40:00 AM	4OZG	1		
100836-028C / B-265S 0.0-0.5	Soil	9/4/2008 11:00:00 AM	4OZG	1		
100836-029C / B-265S 1.0-1.5	Soil	9/4/2008 11:00:00 AM	4OZG	1		
100836-030C / B-265S 2.0-2.5	Soil	9/4/2008 11:00:00 AM	4OZG	1		
100836-031C / B-266S 0.0-0.5	Soil	9/4/2008 11:15:00 AM	4OZG	1		
100836-032C / B-266S 1.0-1.5	Soil	9/4/2008 11:15:00 AM	4OZG	1		
100836-033C / B-266S 2.0-2.5	Soil	9/4/2008 11:15:00 AM	4OZG	1		
100836-034C / B-267S 0.0-0.5	Soil	9/4/2008 11:30:00 AM	4OZG	1		
100836-035C / B-267S 1.0-1.5	Soil	9/4/2008 11:30:00 AM	4OZG	1		
100836-036C / B-267S 2.0-2.5	Soil	9/4/2008 11:30:00 AM	4OZG	1		
100836-037C / B-268S 0.0-0.5	Sail	9/4/2008 11:40:00 AM	40ZG	1		

General Comments: Please email sample receipt acknowledgementto the PM.

Please use PO#: SC03925 Please fax results by: NORMAL TAT

SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:*		9/5/08	**Received by:**		9/8/08
Relinquished by:	Meal Ferguson	9/8/08 1235	**Received by:**		9-8-08 0835

Advanced Technology Laboratories
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CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

Sierra Laboratories
26052 Merit Circle Suite 105
Laguna Hills, CA 92653

TEL: (949) 348-9389
FAX: (949) 348-9115
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8151		
100836-038C / B-268S 1.O-1.5	Soil	9/4/2008 11:40:00 AM	40ZG	1		
100836-039C / B-268S 2.0-2.5	Soil	9/4/2008 11:40:00 AM	40ZG	1		
100836-040C / B-269S 0.0-0.5	Soil	9/4/2008 11:55:00 AM	40ZG	1		
100836-041C / B-269S 1.O-1.5	Soil	9/4/2008 11:55:00 AM	40ZG	1		
100836-042C / B-269S 2.0-2.5	Soil	9/4/2008 11:55:00 AM	40ZG	1		
100836-043C / B-270S 0.0-0.5	Soil	9/4/2008 12:05:00 PM	40ZG	1		
100836-0446 / B-270S 1.O-1.5	Soil	9/4/2008 12:05:00 PM	4OZG	1		
100836-045C / B-270S 2.0-2.5	Soil	9/4/2008 12:05:00 PM	40ZG	1		
100836-046C / B-271S 0.0-0.5	Soil	9/4/2008 12:20:00 PM	40ZG	1		
100836-047C / B-271S 1.0-1.5	Soil	9/4/2008 12:20:00 PM	40ZG	1		
100836-048C / B-271S 2.0-2.5	Soil	9/4/2008 12:20:00 PM	40ZG	1		
100836-050C / B-272S 0.0-0.5	Soil	9/5/2008	40ZG	1		
100836-051C / B-272S 1.O-1.5	Soil	9/5/2008	40ZG	1		
100836-052C / B-272S 2.0-2.5	Soil	9/5/2008	40ZG	1		
100836-053C / B-273S 0.0-0.5	Soil	9/5/2008	40ZG	1		
100836-054C / B-273S 1.O-1.5	Soil	9/5/2008	4OZG	1		
100836-055C / B-273S 2.0-2.5	Soil	9/5/2008	40ZG	1		

General Comments: Please email sample receipt acknowledgement to the PM.

Please use PO#: SC03925 Please fax results by: NORMAL TAT

SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:		9/5/08	Received by:		9/8/08
Relinquished by:		9/8/08 1235	Received by:		9-8-08 1235

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755-5225
www atlg/oba/.com
TEL: (562) 989-4045 *FAX: (562)* 989-4040

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

Sierra Laboratories
26052 Merit Circle Suite 105
Laguna Hills, CA 92653

TEL: (949) 348-9389
FAX: (949) 348-9115
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests		
				EPA 8151		
100836-056C / B-274S 0.0-0.5	Soil	9/5/2008	40ZG	1		
100836-057C / B-274S 1.O-1.5	Soil	9/5/2008	40ZG	1		
100836-058C / B-274S 2.0-2.5	Soil	9/5/2008	40ZG	1		
100836-062C / B-275S 0.0-0.5	Soil	9/5/2008	40ZG	1		
100836-063C / B-275S 1.O-1.5	Soul	9/5/2008	40ZG	1		
100836-064C / B-275S 2.0-2.5	Soil	9/5/2008	40ZG	1		
100836-065C / B-276S 0.0-0.5	Soil	9/5/2008	**40ZG**	1		
100836-066C / B-276S 1.O-1.5	Soil	9/5/2008	40ZG	1		
100836-067C / B-276S 2.0-2.5	Soil	9/5/2008	40ZG	1		
100836-068C / B-277S 0.0-0.5	Soil	9/5/2008	40ZG	1		
100836-0696 / B-277S 1.0-1.5	Soil	9/5/2008	40ZG	1		
100836-070C / B-277S 2.0-2.5	Soil	9/5/2008	40ZG	1		
100836-0716 / B-278S 0.0-0.5	Soil	9/5/2008	40ZG	1		
100836-072C / B-278S 1.O-1.5	Soil	9/5/2008	40ZG	1		
100836-073C / B-278S 2.0-2.5	Soil	9/5/2008	40ZG	1		
100836-074C / B-279S 0.0-0.5	Soil	9/5/2008	40ZG	1		
100836-075C / B-279S 1.O-1.5	Soil	9/5/2008	40ZG	1		

General Comments: Please email sample receipt acknowledgement to the PM.

Please use PO#: SC03925 Please fax results by: NORMAL TAT

SEND REPORT TO **HOA HUYNH**

		Date/Time			Date/Time
Relinquished by:		9/5/08	Received by:		9/8/08
Relinquished by:		9/8/08 1235	Received by:		9-8-08 10:35

Advanced Technology Laboratories
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CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

Sierra Laboratories
26052 Merit Circle Suite 105
Laguna Hills, CA 92653

TEL: (949) 348-9389
FAX: (949) 348-9115
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests		
				EPA 8151		
100836-076C / B-279S 2.0-2.5	Soil	9/5/2008	4OZG	1		
100836-077C / B-280S 0.0-0.5	Soil	9/5/2008 9:50:00 AM	4OZG	1		
100836-078C / B-280S 1.0-1.5	Soil	9/5/2008 9:50:00 AM	4OZG	1		
100836-079C / B-280S 2.0-2.5	Soil	9/5/2008 9:50:00 AM	4OZG	1		

General Comments: Please email sample receipt acknowledgement to the PM.

Please use PO#: SC03925 Please fax results by: NORMAL TAT

SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:	[signature]	9/5/08	Received by:	[signature]	9/8/08
Relinquished by:	[signature]	9/8/08 1235	Received by:	[signature]	9-8-08 1035

D-TEK Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Date:	9/4/08 and 9/5/08
Date Sample Received:	9/8/08
Date Extracted:	9/10, 11, 12 and 13/08
Date Analyzed:	September 12, 13, 14, 15, and 16,2008
Analyzed By:	EA
Method:	EPA 8141A
Sample Type:	Soil
Work Order Number:	100836
Sample Log Numhcr:	08-5979 to 08-6050

The sample(s) were analyzed with EPA methodology or equivalent methods as specified on the attached "Analyses Results" report.

The results of these analyses and the quality control data are cncloscd.

Ellen Atienza
Operations Manager

D-TEK Analytical Laboratories, Tnc.
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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA **90807**

Attn: Ms. **Hoa Huynh**

Date of Report:	**9/19/08**
Sampling Dntc:	**9/4/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/10/08**
Date Analyzed:	Septemher **12,2008**
Analyzed By:	EA
Sample **Type:**	**Soil**
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-5979 / 100836-001.B / B257S 0.0-0.5	08-5980 / 100836-002B / B-257S 1.0-1.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa **Huynh**

Date of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Snmple **Received:**	**9/8/08**
Date Extracted:	**9/10/08**
Date **Analyzed:**	September **12,2008**
Analyzed By:	EA
Sample Type:	Soil
Method:	**EPA 8141A**
Unith:	µg/kg

ANALYSES RESULTS

		tog Number:	08-5981	08-5982
		Sample ID:	100836-003B	100836-004B
Analysis	**PQL**		B257S 2.0-2.5	B-258S 0.0-0.5
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Counaphos	**5.0**		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	**5.0**		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	**5.0**		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	5.0		ND	ND
Naled	**5.0**		ND	ND
Phorate	5.0		ND	ND
Ronncl	5.0		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	**5.0**		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, **CA 90807**

Attn: Ms. Hop Huynh

Dntc of Report:	9/19/08
Sampling Dnte:	9/4/08
Date Sample Received:	9/8/08
Dnte Extracted:	9/10108
Dntc Analyzed:	September 12,2008
Analyzed By:	EA
Sample Type:	Snil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

Analysis	PQL	Log Numher: / Sample ID:	08-5983 100836-005B B258S 1.0-1.5	08-5984 100836-006B B-258S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Counaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Bill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Dnte:	9/4/08
Date Sample Received:	9/8/08
Date Extracted:	9/10/08
Dntc Analyzed:	September 12,2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-5985 100836-007B B259S 0.0-0.5	08-5986 100836-008B B-2598 1.0-1.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Moiphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Rotnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hna Huynh

Date of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Sample Received:	**9/8/08**
Dnte Extracted:	**9/10/08**
Date Analyzed:	**September 12, 2008**
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	**µg/kg**

ANALYSES RESULTS

		Log **Number:**	**08-5987**	**08-5988**
		Sample ID:	***100836-009B***	***100836-010B***
Anglysis	**PQL**		**B259S 2.0-2.5**	**B-260S 0.0-0.5**
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gartlona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn! Ms. Hna Huynh

Dole of **Report:**	**9/19/08**
Sampling Dale:	**9/4/08**
Date **Sample** Rcceivcd:	**9/8/08**
Dste Extracted:	**9/10/08**
Date **Analyzed:**	**September 12,2008**
Analyzed By:	EA
Sample Type:	Soil
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log **Number:**	08-5989	08-5990
		Sample ID:	100836-0113	100836-012B
Analysis	**PQL**		B260S 1.0-1.5	B-260S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Pnrnthion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Rorrnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Rill, CA 90807

Attn: Ms. **Hoa** Huynh

Date of Report:	**9/1**9/08
Sampling Date:	9/4/08
Date **Sample** Received:	**9/8/08**
Datc **Extracted:**	**9/10/08**
Date Analyzed:	**September** 12,2008
Analyzed Ry:	EA
Sample Type:	Soil
Method:	**EPA 8141A**
Unit!::	**µg/kg**

ANALYSES RESULTS

		Log Number:	**08-5991**	08-5992
		Sample ID:	100836-013B	3.00836-014B
Analysis	PQL		**B261S 0.0-0.5**	**B-261S 1.0-1.5**
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Courhaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		NIJ	ND

D-TEK Analytical Laboratories, Inc.
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ADVANCED TECHNOLOGY LABORATORIES
3275 **Walnut** Street
Signal Hill, CA 90807

Attn: Ms. Hoa **Huynh**

Date of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/10/08**
Date Analyzed:	September **13,2008**
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA **8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	**08-5993**	**08-5994**
		Sample ID:	**100836-015B**	**100836-016B**
Analysis	**PQL**		**B26IS 2.0-2.5**	**B-262S 0.0-0.5**
Azinphos Methyl	5.0		ND	MD
Bolstar	5.0		ND	ND
Coumaphos	**5.0**		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	**5.0**		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	**5.0**		ND	ND
Naled	5.0		ND	ND
Phorate	**5.0**		ND	ND
Rontnel	**5.0**		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	**5.0**		ND	ND

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ADVANCED TECHNOLOGY **LABORATORIES**
3275 Walnut Street
Signal Hill, CA *90807*

Ann: Ms. Koa Auynh

Date of Report:	9/19/08
Sampling Datc:	9/4/08
Datc Sample Received:	9/8/08
Date Extracted:	9/10/08
Dntc Analyzed:	September 13,2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-5995	08-5996
		Sample ID:	100836-017B	100836-018B
Analysis	PQL		B262S 1.0-1.5	B-262S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Dnte:	**9/4/08**
Date Sample Received:	9/8/08
Dnte Extracted:	**9/10/08**
Dnte Analyzed:	September 13,2008
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-5997 100836-019B B263S 0.0-0.5	08-5998 100836-020B B-263S 1.0-1.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical Laboratories, Inc.
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Tel: (760) 930-2555 Fax: (765) 930-2510

QUALITY CONTROL DATA REPORT

Date:	9/19/08
Attn:	Ms. Hoe Huynh
Rate Extracted:	9/10/08
Date Analyzed:	Septcmbcr 12 and 13, 2008
Analysis Method:	EPA 8141A
Log#:	08-5979 to 08-5998

METHOD RLANK

No target analytes were detected in the method blank.

LABORATORY CONTROL SAMPLE

Compound	% Recovery	QC Limits:*
Diazinon	87	40-130
Methyl Parathion	93	40-130
Dursban (Chlorpyrifos)	92	40-130
Gardona(Stirophos)	104	40-130

Matrix Spike (08-5998)

Compound	Spike % Recovery	Spike Dup. % Recovery	MS/MSD RPD %	RPD Limits
Diazinon	91	109	18	30
Methyl Parathion	96	101	5	30
Dursban (Chlorpyrifos)	118	117	1	30
Gardona (Stirophos)	124	120	3	30

*QC limits applies to LCS, MS and MSD

QUALITY CONTROL TERMINOLOGY

- LCS - LARORATOHV CONTROL SAMPLE. Reported as % recovery of an independent sundnrd carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EPA requirements. Any out-of-control OC data is clearly indicated.
- Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated Reported as % recovery Acceptable range for "Normal Matrix Sample" is based on historical laboratory control data. Any out-of-control QC data is clearly indicated.
- Surrogates- Compounds representative of a group of compounds. Surrogates are spiked into environmental samples and % recovery of concentration spiked is calculated nnd reported. Accepfablc range varies dcpcnding on sample matrix and analysis method. Any out-of-control QC data is clearly indicated.

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2722 **Lokcr Avenue West, Suite B**
Carlsbad, CA 92010
Tcl: *(760) 930-2555* **Fun:** *(765)* 930-2510

SURROGATE RECOVERIES
(Tributylphosphate)

Log #	Percent Recovery:
Method **Blank**	*60*
08-5979	*69*
08-5980	*86*
08-5981	*91*
08-5982	*94*
08-5983	70
08-5984	66
08-5985	*64*
08-5986	*63*
08-5987	81
08-5988	*71*
08-5989	*93*
08-5990	80
08-5991	*75*
08-5992	94
08-5993	*72*
08-5994	*55*
08-5995	*76*
08-5996	*79*
08-5997	*90*
08-5998	*72*
LCS	*127*
98-5998 MS	*63*
08-5998 *MSD*	*94*

Ellen Atienza
Operations Manager

QC Limits: 50 to 170%

QUALITY CONTROL TERMINOLOGY

- **LCS - LABORATORY CONTROL** SAMPLE. Reported as % recovery of an independent standard cnrricd through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EPA requirements. Any out-of-control QC data is clearly indicated
- Spike- environmental sample is matrix spiked with method compounds und % recovery of concentration spiked into sample is calculated. Reported as % recovery. Acceptable range for "Normal Matrix Sample" is based on historical laboratory control data. Any out-of-control OC data is clearly indicated.
- Surrogates- Compounds representative of a group of compounds. *Surrogates are spiked into environmental samples and % recovery* of concentration spiked is calculated and reported. Acceptable range varies depending on sample matrix and analysis method. Any out-of-control QC dntn is clearly indicated.

D-TEK Analytical Laboratories, Xnc.
2722 Loker Avenue **West, Suite** B
Carlsbad, CA 92010
Tcl: (760) **930-2555 Fax: (760) 930-3510**

ADVANCED TECHNOLOGY *LABORATORIES*
3275 Walnut Street
Signal Mill, **CA** 90807

Attn: Ms. **Hon Huynh**

Date of Report:	**9/19/08**
Sampling Dntc:	**9/4/08**
Date Snmplc Reccived:	**9/8/08**
Date Extracted:	**9/11/08**
Date **Analyzed:**	September **13,2008**
Analyzed By:	**EA**
Sample Type:	Soil
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log **Number:**	**08-5999**	**08-6000**
		Sample ID:	**100836-021B**	**100836-022B**
Analysis	**PQL**		**B263S 2.0-2.5**	**B-264S 0.0-0.5**
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	**5.0**		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	**5.0**		ND	ND
Fenkulfothion	**10.0**		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	**5.0**		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	5.0		ND	ND
Naled	**5.0**		ND	ND
Phorate	**5.0**		ND	ND
Rorinel	**5.0**		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	**5.0**		ND	ND

D-TEK Analytical Laboratories, Inc.
2722 Lokcr Avenue West, Suite B
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Tel: (760) 930-2555 Fax: (760) 930-3510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Date:	9/4/08
Date Sample Received:	9/8/08
Date Extracted:	9/11/08
Date Analyzed:	September 13,2008
Analyzed Ry:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

Anglysis	PQL	Log Number: / Sample ID:	08-GOO1 100836-023B B264S 1.0-1.5	OR-GO02 100836-024B B-264S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Durshan (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Rorrnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TER Analytical Laboratories, Inc.
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Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. **Hoa Huynh**

Date of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Sample Received:	**9/8/08**
Date **Extracted:**	**9/11/08**
Dnte Analyzed:	Scptembcr **13,2008**
Analyzed **By:**	**EA**
Sample Type:	Soil
Method:	EPA **8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6003	08-6004
		Sample ID:	100836-028B	100836-029B
Analysis	PQL		B265S 0.0-0.5	B-265S 1.0-1.5
Azinphos Methyl	5.0		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	**5.0**		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	**5.0**		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	**5.0**		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	5.0		ND	ND
Naled	**5.0**		ND	ND
Phorate	5.0		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hon Huynh

Dntc of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/11/08**
Date Analyzed:	**September 13,2008**
Analyzed By:	**EA**
Sample Type:	*Soil*
Method:	**EPA 8141A**
Unite:	µg/kg

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-6005 100836-030B B265S 2.0-2.5	08-6006 100836-031B B-266S 0.0-0.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn! Ms. Hon Huynh

Date of Report:	9/19/08
Sampling Dnte:	9/4/08
Date Sample Received:	9/8/08
Date Extracted:	9111108
Date Analyzed:	Septcmher 13,2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Numher:	08-6007	08-6008
		Sample ID:	100836-032B	100836-033B
Analysis	PQL		B266S 1.0-1.5	B-266S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	N D
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	N D
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		N D	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90867

Attn: Ms. Hoa Huynh

Date of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/11/08**
Date Analyzed:	**September 13, 2008**
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	**µg/kg**

ANALYSES RESULTS

Analysis	PQL	Log Number: / Sample ID:	08-6009 100836-034B B267S 0.0-0.5	08-6010 100836-0358 B-267S 1.0-1.5
Azinphos Methyl	5.0		ND	ND
Bolstar	**5.0**		ND	ND
Countaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	5.0		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	**5.0**		ND	ND
Naled	**5.0**		ND	ND
Phorate	5.0		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical Laboratories, **Inc.**
2722 Loker Avenue West, Suite B
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ADVANCED TECHNOLOGY **LABORATORIES**
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hon **Huynh**

Date nf Report:	9/19/08
Sampling Date:	9/4/08
Date **Sample** Received:	9/8/08
Date Extracted:	**9/11/08**
Date Analyzed:	**September** 13,2008
Analyzed By:	**EA**
Sample Type:	Soil
Method:	EPA **8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	**08-6011**	08-6012
		Sample ID:	**100836-036B**	100836-037B
Analysis	PQL		**B267S** 2.0-2.5	**B-268S** 0.0-0.5
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	**5.0**		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	**5.0**		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	5.0		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	**5.0**		ND	ND
Naled	**5.0**		ND	ND
Phorate	**5.0**		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	**5.0**		ND	ND

D-TFK Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax:(760) 930-2510

ADVANCED TECBNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. **Hoa Huynh**

Date of Report:	**9/19/08**
Sampling **Date:**	**9/4/08**
Dnte Sample **Received:**	**9/8/08**
Date Extracted:	**9/11/08**
Dnte **Analyzed:**	**September 13, 2008**
Analyzed By:	EA
Sample Type:	Soil
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6013	08-6014
		Sample ID:	100836-038B	100836-039B
Analysis	**PQL**		B268S 1.0-1.5	B-268S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Meiphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TER Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/11/08**
Date Analyzed:	**September 14,2008**
Analyzed By:	**EA**
Sample Type:	**Sail**
Method:	**EPA 8141A**
Units:	**µg/kg**

ANALYSES RESULTS

		Log Number:	**08-6015**	**08-6016**
		Sample ID:	***100836-040B***	***100836-041B***
Analysis	**PQL**		**B269S 0.0-0.5**	**B-269S 1.0-1.5**
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	**5.0**		ND	ND
Demeton	5.0		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	**5.0**		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	**5.0**		ND	ND
Naled	5.0		ND	ND
Phorate	**5.0**		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	**5.0**		ND	ND

D-TEK Analytical Laboratories, *Tnc.*
2722 Loker **Avenue** West, Suite B
Carlsbad, CA 92010
Tel: (760) *930-2555* **Fax: (760) 930-2510**

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Bill, CA 90807

Attn: Ms. Hoa Huynh

Dnte nf Report.:	**9/19/08**
Sampling Dnte:	**9/4/08**
Date **Sample** Received:	**9/8/08**
Dnte **Extracted:**	**9/11/08**
Date Annlyzed:	September **14,2008**
Annlyzed By:	E**A**
Samble Type:	Soil
Method:	EPA **8141A**
Unita:	µg/kg

ANALYSES RESULTS

		Log **Number:**	08-6017	08-6018
		Sample ID:	100836-042B	1008360433
Analysis	**PQL**		**B269S** 2.0-2.5	**B-270S** 0.0-0.5
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	**5.0**		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	**5.0**		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	**5.0**		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	**5.0**		ND	ND
Phorate	**5.0**		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	**5.0**		ND	ND

D-TEK Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (765) 930-2510

QUALITY CONTROL DATA REPORT

Date:	9/19/08
Attn:	Ms. Aoa Huynh
Date Extracted:	9/11/08
Date Analyzed:	September 13 and 14,2008
Analysis Method:	EPA 8141A
Log#:	08-5999 to 08-6018

METHOD BLANK

No target analytes were detected in the method blank

LABORATORY CONTROL SAMPLE

Compound	% Rccnvery	QC Limits:*
Diazinon	81	40-130
Methyl Parathion	97	40-130
Dursban (Chlorpyrifos)	80	40-130
Gardona(Stirophos)	130	40-130

Matrix Spike (08-5999)

Compound	Spike % Recovery	Spike Dup. % Recovery	MS/MSD RPD %	RPD Limits
Diazinon	76	102	29	30
Methyl Parathion	101	98	3	30
Dursban (Chlorpyrifos)	104	99	5	30
Gardona (Stirophos)	106	109	3	30

"QC limits applies io LCS, MS and MSD

QUALITY CONTROL TERMINOLOGY

- **LCS - LABORATORY CONTROL SAMPLE.** Reported as % recovery of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EPA requirements. Any out-of-control QC data is clearly indicated.
  Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated Reported as % recovery. Acceptable range for "Normal Matrix Sample" is based on historica. laboratory control data Any out-of-control QC data is clearly indicated.
- Surrogates- Compounds representative of a group of compounds Surrogates are spiked into environmental samples and % recovery o i concentration spiked is calculated and reported. Acceptable range varies depending on sample matrix and analysis method Any out-oi-control QC data is clearly indicated.

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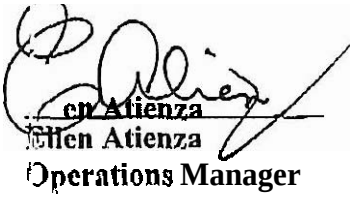
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (765) 930-2510

SURROGATE RECOVERIES
(Tributylphosphate)

Log #	Percent Recovery:
Method Blank	92
08-5999	73
US-6000	70
08-6001	85
08.6002	108
08-6003	70
@8-6004	58
08-6005	67
68-6006	94
08-6007	94
08-6008	86
08-6009	74
08-6010	135
08-6011	83
08-6012	111
08-6013	86
08-6014	112
08-6015	103
08-6016	85
08-6017	91
08-6018	90
LCS	68
08-5999 MS	61
08-5999 MSD	73



Allen Atienza
Operations Manager

QC Limits: 50 *to* 170%

QUALITY CONTROL TERMINOLOGY

LCS - LABORATORY CONTROL **SAMPLE.** Reported as % recovery of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control dnta and EPA requirements. Any out-of-control QC data is clearly indicated.

Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated. Reported as X recovery. Acceptable range for "Normal Matrix Snmple" is based on historical laboratory control data. Any out-of-control QC data is clearly indicated.

Surrogates- Compounds representative of a group of compounds. Surrogates are spiked into environmental samples and % recovery of concentration spiked is calculated and reported. Acceptable range varies depending on sample matrix and analysis method. Any out-of-control QC data is clearly indicated.

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Dnte:	9/4/08
Date Sample Rcccived:	9/8/08
Date Extracted:	9/12/08
Date Analyzed:	September 15,2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6019	08-6020
		Sample ID:	100836-044B	100836-045B
Analysis	PQL		B270S 1.0-1.5	B-270S 2.0-2.5
Azinyhns Methyl	50		ND	ND
Bolstar	5.0		ND	ND
Courhaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	NJJ
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical *Laboratories*, Inc.
2722 Lnker Avenue West, Soitc B
Carlsbnd, CA **92010**
Tcl: (760) 930-2555 **Fax:(760) 930-2510**

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hon **Huynh**

Date of Report:	**9/19/08**
Sampling Date:	**9/4/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/12/08**
Date Analyzed:	**September 15, 2008**
Analyzed Ry:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6021	08-6022
		Sample ID:	100836-046B	100836-047B
Analysis	**PQL**		B271S 0.0-0.5	B-271S 1.U-1.5
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Courhaphos	**5.0**		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	**5.0**		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	**5.0**		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	5.0		ND	ND
Naled	**5.0**		ND	ND
Phorate	**5.0**		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	**5.0**		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Auynh

Date nf Report:	**9/19/08**
Sampling Date:	**9/4/08** and **9/5/08**
Date Sample Rcccivcd:	**9/8/08**
Date Extracted:	**9/12/08**
Date Analyzed:	Septemher **15,2008**
Analyzed By:	**EA**
Sample Type:	Soil
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6023	08-6024
		Sample ID:	100836-048B	100836-050B
Analysis	PQL		B271S 2.0-2.5	B-272S 0.0-0.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		NU	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	NU
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Dnte:	9/5/08
Date Sample Rcccivcd:	9/8/08
Date Extracted:	9/12/08
Date Analyzed:	September 15,2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Unite:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6025	08-6026
		Sample ID:	100836-0513	100836-052B
Analysis	PQL		B272S 1.0-1.5	B-272S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fentlion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	**9/19/08**
Sampling Date:	**9/5/08**
Dstc **Sample Received:**	**9/8/08**
Date Extracted:	**9/12/08**
Dstc **Analyzed:**	**September 15, 2008**
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	EPA **8141A**
Units:	**µg/kg**

ANALYSES RESULTS

		Log **Number:**	**08-6027**	**08-6028**
		Sample **ID:**	**100836-053B**	**100836-0548**
Analysis	**PQL**		***B273S 0.0-0.5***	***B-273S 1.0-1.5***
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	5.0		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	**5.0**		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	**5.0**		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Rorrnel	**5.0**		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	**5.0**		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hna Huynh

Date of Report:	9/19/08
Sampling Date:	9/5/08
Date Sample Received:	9/8/08
Date Extracted:	9/12/08
Date Analyzed:	September 16, 2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6029	08-6030
		Sample ID:	100836-055B	100836-056B
Analysis	**PQL**		B273S 2.0-2.5	B-274S 0.0-0.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: MS. Hoa Huynh

Dute of Report:	9/19/08
Sampling Date:	9/5/08
Date Sample Received:	9/8/08
Dale Extracted:	9112108
Date Analyzed:	September 16,2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6031	08-6032
		Sample ID:	100836-057B	100836-058B
Analysis	PQL		B274S 1.0-1.5	B-274S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fentllion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Dale of Report:	**9/19/08**
***Sampling* Date:**	**9/5/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/12/08**
Date Analyzed:	**September 18, 2008**
Analyzed By:	EA
Sample Type:	Soil
Method:	**EPA 8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6033	08-6034
		Sample ID:	100836-062B	100836-063B
Analysis	**PQL**		B275S 0.0-0.5	B-275S 1.0-1.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	**5.0**		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	**5.0**		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Rill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/11/08
Sampling Date:	9/5/08
Date Sample Received:	9/8/08
Date Extracted:	9/12/08
Date Analyzed:	September 16,2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6035	08-6036
		Sample ID:	100836-064B	100836-065B
Analysis	PQL		B275S 2.0-2.5	B-276S 0.0-0.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Vicllorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		NU	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Rotnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Date:	9/5/08
Date Sample Received:	9/8/08
Date Extracted:	9/12/08
Date Analyzed:	September 16, 2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6037	08-6038
		Sample ID:	100836-066B	100836-067B
Analysis	PQL		B-276S 1.0-1.5	B-276S 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		NO	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical Laboratories, Inc.
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QUALITY CONTROL DATA REPORT

Date:	9/19/08
Attn:	Ms. Hoa Huynh
Date Extracted:	9/12/08
Date Analyzed:	September 15 nnd 16, 2008
Analysis Method:	EPA 8141A
Log#:	08-6019 to 08-6038

METHOD BLANK

No target analytes were detected in the method blank.

LABORATORY CONTROL SAMPLE

Compound	% Recovery	QC Limits:*
Diazinon	90	40-130
Methyl Parathion	96	40-130
Dursban (Chlorpyrifos)	122	40-130
Gardona(Stirophos)	115	40-130

Matrix Spike (08-6019)

Compound	Spike % Recovery	Spike Dup. % Recovery	MS/MSD RPD %	RPD Limits
Diazinon	107	121	12	30
Methyl Parathion	108	108	0	30
Dursban (Chlorpyrifos)	127	127	0	30
Gardona (Stirophos)	119	115	3	30

*QC limits applies to LCS, MS and MSD

QUALITY CONTROL TERMINOLOGY

- LCS - LABORATORY CONTROL SAMPLE. Reported as % recovery of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EYA requirements. Any out-of-control QC data is clearly indicated.
- Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated. Reported as % recovery. Acceptable range for "Normal Matrix Sample" is based on historical laboratory control data. Any out-of-control QC data is clearly indicated.

Surrogates- Compounds representative of a group of compounds. Surrogates are spiked into environmental samples and % recovery of concentration spiked is calculated and reported. Acceptable range varies depending on sample matrix and analysis method. Any out-of-control QC data is clearly indicated.

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SURROGATE RECOVERIES
(Tributylphosphate)

Log #	Percent Recovery:
Method Blank	114
08-6019	110
08-6020	106
08-6021	95
06-6022	124
08-6023	69
08-6024	101
08-6025	86
08-6026	85
08-6027	55
08-6028	93
OR-6029	96
08-6030	84
08-6031	83
08-6032	90
08-6033	112
08-6034	75
08-6035	90
08-6036	86
08-6037	103
08-6038	78
LCS	85
08-6019 MS	97
08-6019 MSD	101

Ellen Atienza
Operations Manager

QC Limits: 50 to 170%

QUALITY CONTROL TERMINOLOGY

- LCS - LABORATORY CONTROL SAMPLE. Reported as % recovery of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EPA requirements. Any out-of-control QC data is clearly indicated.
- Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated. Reported as % recovery. Acceptable range for "Normal Matrix Sample" is based on historical laboratory control data, Any out-of-control QC data is clearly indicated.
- Surrogates- Compounds representative of a group of compounds. Surrogates are spiked into environmental samples and % recovery of concentration spiked is calculated and reported Acceptable range varies depending on sample matrix and analysis method. Any out-of-control QC data is clearly indicated

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hos Huynh

Date of Report:	9/19/08
Sampling Date:	9/5/08
Date Sample Received:	9/8/08
Date Extracted:	9/13/08
Date Analyzed:	September 16, 2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6039	08-6040
		Sample ID:	100836-068B	100836-069B
Analysis	PQL		B-277S 0.0-0.5	B-277S 1.0-1.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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AD'VANCED TECHNOLOGY LABORATORIES
3275 Wnlnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa **Huynh**

Date of Report:	**9/19/08**
Sampling Dnte:	**9/5/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/13/08**
Date Analyzed:	**September 16, 2008**
Analyzed **By:**	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141.4**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6041	08-6042
		Sample ID:	100836-0708	100836-071B
Analysis	**PQL**		B-277S 2.0-2.5	B-278S 0.0-0.5
Azinphos Methyl	**5.0**		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	**5.0**		ND	ND
Demeton	5.0		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	**5.0**		ND	ND
Disulfoton	**5.0**		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	*5.0*		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	**5.0**		ND	ND
Malathion	**5.0**		ND	ND
Merphos	**5.0**		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	**5.0**		ND	ND
Naled	**5.0**		ND	ND
Phorate	**5.0**		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	**5.0**		ND	ND

D-TEK Analytical Laboratories, Inc.
2722 Loker Avenue West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fax: (760) 930-2510

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Rill, CA 90807

Attn: Ms. Hoa Huynh

Date of Report:	9/19/08
Sampling Date:	9/5/08
Date Sample Received:	9/8/08
Date Extracted:	9/13/08
Date Analyzed:	September 16, 2008
Analyzed By:	EA
Sample Type:	Soil
Method:	EPA 8141A
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	08-6043	08-6044
		Sample ID:	100836-072B	100836-073B
Analysis	PQL		B-27SS 1.0-1.5	B-27SS 2.0-2.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumnphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Ms. Hoa Huynh

Dnte of Report:	**9/19/08**
Sampling Date:	**9/5/08**
Date Sample Received:	**9/8/08**
Dnte Extracted:	**9/13/08**
Date Analyzed:	**September 16, 2008**
Analyzed By:	**EA**
Sample Type:	**Soil**
Method:	**EPA 8141A**
Units:	**µg/kg**

ANALYSES RESULTS

		Log Number:	08-6045	08-6046
		Sample ID:	100836-074B	100836-075B
Analysis	**PQL**		**B-279S 0.0-0.5**	**B-279S 1.0-1.5**
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gerdona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

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ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90307

Attn: Ms. Hoa Nuynh

Date of Report:	**9/19/08**
Sampling Date:	**9/5/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/13/08**
Date Analyzed:	September **16,2008**
Analyzed By:	**EA**
Sample Type:	Soil
Method:	**EPA 8141A**
Units:	**µg/kg**

ANALYSES RESULTS

		Lα Number:	08-6047	08-6048
		Sample ID:	100836-076B	100836-077B
Analysis	PQL		B-279S 2.62.5	B-280S 0.0-0.5
Azinphos Methyl	5.0		ND	ND
Bolstar	5.0		ND	ND
Coumaphos	5.0		ND	ND
Demeton	5.0		ND	ND
Diazinon	5.0		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	5.0		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	10.0		ND	ND
Fenthion	5.0		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	5.0		ND	ND
Merphos	5.0		ND	ND
Methyl Parathion	5.0		ND	ND
Mevinphos	5.0		ND	ND
Naled	5.0		ND	ND
Phorate	5.0		ND	ND
Ronnel	5.0		ND	ND
Tokuthion	5.0		ND	ND
Trichloronate	5.0		ND	ND

D-TEK Analytical Laboratories, *Inc.*
2722 **Loker Avenue West, Suite B**
Carlsbad, CA **92010**
Tel: (760) 930-2555 Fax: **(760) 930-2510**

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Street
Signal Hill, CA 90807

Attn: Mr. **Hoa** Huynh

Date of Report:	**9/19/08**
Sampling Date:	**9/5/08**
Date Sample Received:	**9/8/08**
Date Extracted:	**9/13/08**
Date Analyzed:	**September 16,2008**
Analyzed By:	EA
Sample Type:	**Soil**
Method:	EPA **8141A**
Units:	µg/kg

ANALYSES RESULTS

		Log Number:	**08-6049**	**08-6050**
		Sample ID!	**100836-078B**	**100836-079B**
Analysis	**PQL**		**B-280S 1.0-1.5**	**B-280S 2.0-2.5**
Azinphos Methyl	5.0		ND	ND
Bolstar	**5.0**		ND	ND
Coumaphos	5.0		ND	ND
Demeton	**5.0**		ND	ND
Diazinon	**5.0**		ND	ND
Dichlorvos	5.0		ND	ND
Disulfoton	5.0		ND	ND
Dursban (Chlorpyrifos)	**5.0**		ND	ND
Ethoprop	5.0		ND	ND
Fensulfothion	**10.0**		ND	ND
Fenthion	**5.0**		ND	ND
Gardona (Stirophos)	5.0		ND	ND
Malathion	**5.0**		ND	ND
Mefphos	**5.0**		ND	ND
Methyl Parathion	**5.0**		ND	ND
Mevinphos	5.0		ND	ND
Naled	**5.0**		ND	ND
Phorate	**5.0**		ND	ND
Ronnel	**5.0**		ND	ND
Tokuthion	**5.0**		ND	ND
Trichloronate	**5.0**		ND	ND

D-TEK Analytical Laboratories, Tnc.
2722 Lnlcer Avcnuc West, Suite B
Carlsbad, CA 92010
Tel: (760) 930-2555 Fnn: (765) 930-2510

QUALITY CONTROL DATA REPORT

Date:	9/19108
Attn:	Ms. Hoa Huynh
Date Extracted:	9/13/08
Date Analyzed:	Scptcmber 16,2008
Analysis Method:	EPA 8141A
Log#:	08-6039 to 08-6050

METHOD BLANK

No target analytes were detected in the method blank.

LABORATORY CONTROL SAMPLE

Compound	% Recovery	QC Limits:*
Diazinon	90	40-130
Methyl Parathion	96	40-130
Dursban (Chlorpyrifos)	122	40-130
Gardona(Stirophos)	115	40-130

Matrix Spike (08-6043)

Compound	Spike % Recovery	Spike Dup. % Recovery	MS/MSD RPD %	RPD Limits
Diazinon	75	76	1	30
Methyl Parathion	113	114	1	30
Dursban (Chlorpyrifos)	123	122	1	30
Gardona (Stirophos)	104	116	11	30

*QC limits applies to LCS, MS and MSD

QUALITY CONTROL TERMINOLOGY

- LCS - LABORATORY CONTROL SAMPLE. Reported as % recovery of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EPA requirements. Any out-of-control QC data is clearly indicated.
- Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated. Reported as % recovery. Acceptable range for "Normal Matrix Sample" is based on historical laboratory control data. Any out-of-control QC data is clearly indicated.

  Surrogates- Compounds representative of n group of compounds Surrogates nrc spiked into environmental samples and Oh recovery of concentration spiked is calculated and reported Acceptable range varies depending on sample matrix and analysis method. Any out-of-control QC data is clearly indicated.

D-TEK Analytical Laboratories, Inc.
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Tel: (760) 930-2555 Fax: (765) 930-2510

SURROGATE RECOVERIES
(Tributylphosphate)

Log #	Percent Recovery:
Method Blank	96
08-6039	127
08-6040	74
08-6041	84
08-6042	84
08-6043	92
08-6044	105
08-6045	106
08-6046	91
08-6047	106
08-6048	122
08-6049	62
08-6050	71
LCS	91
08-6043 MS	95
08-6043 MSD	104

QC Limits: 50 to 170%

Ellen Atienza
Operations Manager

QUALITY CONTROL TERMINOLOGY

LCS - LABORATORY CONTROL SAMPLE. Reported as % recovery of an independent standard carried through all sample preparation procedures to verify method performance. Acceptable range is based on historical laboratory control data and EPA requirements. Any out-of-control QC data is clearly indicated.

Spike- environmental sample is matrix spiked with method compounds and % recovery of concentration spiked into sample is calculated. Reported as % recovery. Acceptable range for "Normal Matrix Sample" is based on historical laboratory control data. Any out-of-control QC data is clearly indicated.

Surrogates- Compounds representative of a group of compounds. Surrogates are spiked into environmental samples and % recovery of concentration spiked is calculated and reported. Acceptable range varies depending on sample matrix and analysis method. Any out-of-control QC data is clearly indicated.

Advanced Technology Laboratories
3275 **Walnut Avenue, Signal** *Hill,* **CA** *90755-5225*
www.atlglobal.com
TEL: ***(562) 989-4045*** **FAX:** ***(562) 989-4040***

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

D-Tek
2722 Loker Ave. West, Suite B
Carlsbad, CA 92010

TEL: (760) 930-2555
FAX: (760) 930-2510
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8141A	
100836-001B / B2575 0.0-0.5	Soil	9/4/2008 9:00:00 AM	4OZG	1	08-5979
100836-002B / B-257S 1.0-1.5	Soil	9/4/2008 9:00:00 AM	4OZG	1	08-5980
100836-003B / B-257S 2.0-2.5	Soil	9/4/2008 9:00:00 AM	4OZG	1	08-5981
100836-004B / B-258S 0.0-0.5	Soil	9/4/2008 9:00:00 AM	4OZG	1	08-5982
100836-005B / B-258S 1.0-1.5	Soil	9/4/2008 9:00:00 AM	4OZG	1	08-5983
100836-006B / B-258S 2.0-2..5	Soil	9/4/2008 9:00:00 AM	4OZG	1	08-5984
100836-007B / B-259S 0.0-0.5	Soil	9/4/2008 9:20:00 AM	4OZG	1	08-5985
100836-008B / B-259S 1.0-1.5	Soil	9/4/2008 9:20:00 AM	4OZG	1	08-5986
100836-009B / B-259S 2.0-2.5	Soil	9/4/2008 9:20:00 AM	4OZG	1	08-5987
100836-010B / B-260S 0.0-0.5	Soil	9/4/2008 9:30:00 AM	4OZG	1	08-5988
100836-011B / B-260S 1.0-1.5	Soil	9/4/2008 9:30:00 AM	4OZG	1	08-5989
100836-012B / B-260S 2.0-2.5	Soil	9/4/2008 9:30:00 AM	4OZG	1	08-5990
100836-013B / B-261S 0.0-0.5	Soil	9/4/2008 9:50:00 AM	4OZG	1	08-5991
100836-014B / B-261S 1.0-1.5	Soil	9/4/2008 9:50:00 AM	4OZG	1	08-5992
100836-015B / B-261S 2.0-2.5	Soil	9/4/2008 9:50:00 AM	4OZG	1	08-5993
100836-016B / B-262S 0.0-0.5	Soil	9/4/2008 10:05:00 AM	4OZG	1	08-5994
100836-017B / B-262S 1.0-1.5	Soil	9/4/2008 10:05:00 AM	4OZG	1	08-5995

General Comments: **Please email sample receipt acknowledgement to the PM.**

Please use PO#: SC03924 **Please fax results by: NORMALTAT**

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		Date/Time			Date/Time
Relinquished by:	[signature]	9/5/08	Received by:	[signature]	9/8/08
Relinquished by:	[signature]	9/8/08 1325	Received by:	[signature]	9/8/08 1350

Advanced Technology Laboratories
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w.atlglobat.com
TEL: (562) 989-4045 *FAX:* (562) *989-4040*

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

D-Tek
2722 Loker Ave. West, Suite B
Carlsbad, CA 92010

TEL: (760) 930-2555
FAX: (760) 930-2510
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8141A	
100836-018B / B-262S 2.0-2.5	Soil	9/4/2008 10:05:00 AM	4OZG	1	08-5996
100836-019B / B-263S 0.0-0.5	Soil	9/4/2008 10:20:00 AM	4OZG	1	08-5997
100836-020B / B-263S 1.0-1.5	Soil	9/4/2008 10:20:00 AM	4OZG	1	08-5998
100836-021B / B-263S 2.0-2.5	Soil	9/4/2008 10:20:00 AM	4OZG	1	08-5999
100836-022B / B-264S 0.0-0.5	Soil	9/4/2008 10:40:00 AM	4OZG	1	08-6000
100836-023B / B-264S 1.0-1.5	Soil	9/4/2008 10:40:00 AM	4OZG	1	08-6001
100836-024B / B-264S 2.0-2.5	Soil	9/4/2008 10:40:00 AM	4OZG	1	08-6002
100836-028B / B-265S 0.0-0.5	Soil	9/4/2008 11:00:00 AM	4OZG	1	08-6003
100836-029B / B-265S 1.0-1.5	Soil	9/4/2008 11:00:00 AM	4OZG	1	08-6004
100836-030B / B-265S 2.0-2.5	Soil	9/4/2008 11:00:00 AM	4OZG	1	08-6005
100836-031B / B-266S 0.0-0.5	Soil	9/4/2008 11:15:00 AM	4OZG	1	08-6006
100836-032B / B-266S 1.0-1.5	Soil	9/4/2008 11:15:00 AM	4OZG	1	08-6007
100836-033B / B-266S 2.0-2.5	Soil	9/4/2008 11:15:00 AM	4OZG	1	08-6008
100836-034B / B-267S 0.0-0.5	Soil	9/4/2008 11:30:00 AM	4OZG	1	08-6009
100836-035B / B-267S 1.0-1.5	Soil	9/4/2008 11:30:00 AM	4OZG	1	08-6010
100836-036B / B-267S 2.0-2.5	Soil	9/4/2008 11:30:00 AM	4OZG	1	08-6011
100836-037B / B-268S 0.0-0.5	Soil	9/4/2008 11:40:00 AM	4OZG	1	08-6012

General Comments: **Please email sample receipt acknowledgement to the PM.**

Please use PO#: SC03924 **Please fax results by: NORMAL TAT**

SEND REPORT TO HOA HUYNH

	Date/Time		Date/Time
Relinquished by:	9/5/08	**Received by:**	9/8/08
Relinquished by: Mark Ferguson	9/8/08 1325	**Received by:**	9/8/08 1350

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3275 Walnut Avenue, Signal Hill, CA 90755-5225
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TEL: (562) 989-4045 FAX: (562) 989-4040

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

D-Tek
2722 Loker Ave. West, Suite B
Carlsbad. CA 92010

TEL: (760) 930-2555
FAX: (760) 930-2510
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8141A		
100836-038B / B-268S 1.0-1.5	Soil	9/4/2008 11:40:00 AM	4OZG	1	08- 6013	
100836-039B / B-268S 2.0-2.5	Soil	9/4/2008 11:40:00 AM	4OZG	1	08 - 6014	
100836-040B / B-269S 0.0-0.5	Soil	9/4/2008 11:55:00 AM	4OZG	1	08- 6015	
100836-041B / B-269S 1.0-1.5	Soil	9/4/2008 11:55:00 AM	4OZG	1	08 - 6016	
100836-042B / B-269S 2.0-2.5	Soil	9/4/2008 11:55:00 AM	4OZG	1	08 - 6017	
100836-043B / B-270S 0.0-0.5	Soil	9/4/2008 12:05:00 PM	4OZG	1	08- 6018	
100836-044B / B-270S 1.0-1.5	Soil	9/4/2008 12:05:00 PM	4OZG	1	08 - 6019	
100836-045B / B-270S 2.0-2.5	Soil	9/4/2008 12:05:00 PM	4OZG	1	08 - 6020	
100836-046B / B-271S 0.0-0.5	Soil	9/4/2008 12:20:00 PM	4OZG	1	08- 6021	
100836-047B / B-271S 1.0-1.5	Soil	9/4/2008 12:20:00 PM	4OZG	1	08- 6022	
100836-048B / B-271S 2.0-2.5	Soil	9/4/2008 12:20:00 PM	4OZG	1	08- 6023	
100836-050B / B-272S 0.0-0.5	Soil	9/5/2008	4OZG	1	08- 6024	
100836-051B / B-272S 1.0-1.5	Soil	9/5/2008	4OZG	1	08- 6025	
100836-052B / B-272S 2.0-2.5	Soil	9/5/2008	4OZG	1	08 - 6026	
100836-053B / B-273S 0.0-0.5	Soil	9/5/2008	4OZG	1	08- 6027	
100836-054B / B-273S 1.0-1.5	Soil	9/5/2008	4OZG	1	08- 6028	
100836-055B / B-273S 2.0-2.5	Soil	9/5/2008	4OZG	1	08- 6029	

General Comments: Please email sample receipt acknowledgement to the PM.

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SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:		9/5/08	Received by:		9/8/08
Relinquished by:		9/8/08 1325	Received by:		9/8/08 1330

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755-5225
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CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

D-Tek
2722 Loker Ave. West, Suite B
Carlsbad, CA 92010

TEL: (760) 930-2555
FAX: (760) 930-2510
Acct #:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8141A		
100836-056B / B-274S 0.0-0.5	Soil	9/5/2008	4OZG	1	08-6030	
100836-057B / B-274S 1.0-1.5	Soil	9/5/2008	4OZG	1	08-6031	
100836-058B / B-274S 2.0-2.5	Soil	9/5/2008	4OZG	1	08-6032	
100836-062B / B-275S 0.0-0.5	Soil	9/5/2008	4OZG	1	08-6033	
100836-063B / B-275S 1.0-1.5	Soil	9/5/2008	4OZG	1	08-6034	
100836-064B / B-275S 2.0-2.5	Soil	9/5/2008	4OZG	1	08-6035	
100836-065B / B-276S 0.0-0.5	Soil	9/5/2008	4OZG	1	08-6036	
100836-066B / B-276S 1.0-1.5	Soil	9/5/2008	4OZG	1	08-6037	
100836-067B / B-276S 2.0-2.5	Soil	9/5/2008	4OZG	1	08-6038	
100836-068B / B-277S 0.0-0.5	Soil	9/5/2008	4OZG	1	08-6039	
100836-069B / B-277S 1.0-1.5	Soil	9/5/2008	4OZG	1	08-6040	
100836-070B / B-277S 2.0-2.5	Soil	9/5/2008	4OZG	1	08-6041	
100836-071B / B-278S 0.0-0.5	Soil	9/5/2008	4OZG	1	08-6042	
100836-072B / B-278S 1.0-1.5	Soil	9/5/2008	4OZG	1	08-6043	
100836-073B / B-278S 2.0-2.5	Soil	9/5/2008	4OZG	1	08-6044	
100836-074B / B-279S 0.0-0.5	Soil	9/5/2008	4OZG	1	08-6045	
100836-075B / B-279S 1.0-1.5	Soil	9/5/2008	4OZG	1	08-6046	

General Comments: Please email sample receipt acknowledgement to the PM.

Please use PO#: SC03924 Please fax results by: NORMAL TAT

SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:		9/5/08	Received by:		9/8/08
Relinquished by:		9/8/08 1325	Received by:		9/8/08 1350

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3275 Walnut Avenue, Signal Hill, CA 90755-5225
www.atlglobal.com
TEL: (562) 989-4045 FAX: (562) 989-4040

CHAIN-OF-CUSTODY RECORD

QC Level: CT

Subcontractor:

D-Tek
2722 Loker Ave. West, Suite B
Carlsbad, CA 92010

TEL: (760) 930-2555
FAX: (760) 930-2510
Acct#:

05-Sep-08

Sample ID	Matrix	Date Collected	Bottle Type	Requested Tests: EPA 8141A	Requested Tests:	
100836-0768 / B-279S 2.0-2.5	Soil	9/5/2008	4OZG	1	- 47	
100836-077B / B-280S 0.0-0.5	Soil	9/5/2008 9:50:00 AM	4OZG	1	08-6048	
100836-0788 / B-280S 1.0-1.5	Soil	9/5/2008 9:50:00 AM	40ZG	1	08-6049	
100836-079B / B-280S 2.0-2.5	Soil	9/5/2008 9:50:00 AM	40ZG	1	08-6050	

General Comments: Please email sample receipt acknowledgementto the PM.

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SEND REPORT TO HOA HUYNH

		Date/Time			Date/Time
Relinquished by:		9/5/08	Received by:	Mai Nguyen	9/8/08
Relinquished by:	Mai Nguyen	9/8/08 1325	Received by:		9/8/08 1325

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

PO# _____ Logged By: _____ Date: 9/5/08

Method of Transport: Client ☑ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 3.4 4.4 Y☑ N☐ 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ NO 6. PRESERVED Y O N ☐

Client: TRC	Address: 21 Technology		TEL: (949) 727-9336
Attn: David Lennon	City Irvine	State CA Zip Code 92618	FAX: ( )
Project Name: Caltrans West County Connectors	Project #: 151396	Sampler: (Printed Name) DAVID YORK / WARREN HOWE (Signature) Warren Howe	

Relinquished by: (Signature and Printed Name) Warren Howe	Date: 9/5/08	Time: 1205	Received by: (Signature and Printed Name) Kal	Date: 9/5/08	Time: 1205
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
_____ Print Name _____ Date
_____ Signature

Send Report To: Attn: Dav dLennon Co: _____ Address _____ City _____ State _____ Zip _____

Bill To: Ann: Same Co: _____ Address _____ City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead, Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8141 - Herbicides 8141 - Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100830-01	B-257S 0.0-0.5	9/4/08	<9:00				X					X	X					E	2	Jar	
	-02	B-257S 1.0-1.5						X					X	X								
	-03	B-257S 2.0-2.5						X					X	X								
	-04	B-258S 0.0-0.5						X					X	X								
	-05	B-258S 1.0-1.5						X					X	X								
	-06	B-258S 2.0-2.5						X					X	X								
	-07	B-259S 0.0-0.5		0920				X					X	X								
	-08	B-259S 1.0-1.5		0920				X					X	X								
	-09	B-259S 2.0-2.5		0920				X					X	X								
	-10	B-260S 0.0-0.5	9/4/08	0930				X					X	X								

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport
Client ☐
ATL ☐
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ NO 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N ☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y O N ☐

Client: TRC
Attn: David Lennon
Address:
City State Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) David York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date: 9/5/08 Time: 12:05
Received by: (Signature and Printed Name) Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
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Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead, Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) 8151 Herbicides 8141 Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100836-11	B-2605 1.0-1.5	9/4/08	0930				X					X X	X				E	2	G	
	-12	B-2605 2.0-2.5		0930				X					X X	X					2		
	-13	B-2615 0.0-0.5		0950				X					X X	X					2		
	-14	B-2615 1.0-1.5		0950				X					X X	X					2		
	-15	B-2615 2.0-2.5		0952				X					X X	X					2		
	-16	B-2625 0.0-0.5		1005				X					X X	X					2		
	-17	B-2625 1.0-1.5		1005				X					X X	X					2		
	-18	B-2625 2.0-2.5		1005				X					X X	X					2		
	-19	B-2635 0.0-0.5		1020				X					X X	X					2		
	-20	B-2635 1.0-1.5		1020				X					X X	X					2		

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Dave York/Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date 9/5/08 Time: 12:05
Received by: (Signature and Printed Name) Kit Date: 9/5/08 Time: 1205
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DaveLennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 Herbicides 8141 Pesticides	SPECIFY APPROPRIATE MATRIX: SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s): #	Type	PRESERVATION	QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____	REMARKS
	100936 - 21	B-2635 2.0-2.5	9/4/08	1020				X					X	X	X				E	2	G			
	- 22	B-2645 0.0-0.5		1040				X					X	X	X					2				
	- 23	B-2645 1.0-1.5		1040				X					X	X	X					2				
	- 24	B-2645 2.0-2.5		1040				X					X	X	X					2				
	- 25	B-2645 @ 0.0-0.5		1040				X					X	X WT	X					1				Duplicate
	- 26	B-2645 @ 1.0-1.5		1040				X					X	X WT	X					1				Duplicate
	- 27	B-2645 @ 2.0-2.5		1040				X					X	X WT	X					1				Duplicate
	- 28	B-2655 0.0-0.5		1100				X					X	X	X					2				
	- 29	B-2655 1.0-1.5		1100				X					X	X	X					2				
	- 30	B-2655 2.0-2.5		1100				X					X	X	X					2				

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TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OFSPLS MATCH COC Y☐ N☐ 3. CONTAINER IMACT Y☐ N☐ 6. PRESERVED Y O N O

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe	Date 9/5/08	Time: 12:05	Received by: (Signature and Printed Name)		Date: 9/5/08	Time: 1205
Relinquished by: (Signature and Printed Name)	Date :	Time:	Received by: (Signature and Printed Name)		Date:	Time:
Relinquished by: (Signature and Printed Name)	Date :	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

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- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) Lead Absent, 8015B (GRO) / 8020 (BTEX), 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000), 8151 Herbicides, 8141 Pesticides

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	100836-31	B-2665 0.0-0.5	9/4/08	1115	E	2	G	
	-32	B-2665 1.0-1.5		1115		2		
	-33	B-2665 2.0-2.5		1115		2		
	-34	B-2675 0.0-0.5		1130		2		
	-35	B-2675 1.0-1.5		1130		2		
	-36	B-2675 2.0-2.5		1130		2		
	-37	B-2685 0.0-0.5		1140		2		
	-38	B-2685 1.0-1.5		1140		2		
	-39	B-2685 2.0-2.5		1140		2		
	-40	B-2695 0.0-0.5		1155		2		

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Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDW ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ O 4. SEALED Y O N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y O N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe	Date: 9/5/08	Time: 1205	Received by: (Signature and Printed Name)	Date: 9/5/08	Time: 1705
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Name)	Date:	Time:

I hereby authorize A n lo perform the work indicated below:
Project Mgr /Submitter:
_____ Date
Print Name
Signature

Send Report To:
Attn: David Lennon
Co:
Address _____
City _____ State ____ Zip ____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State ____ Zip ____

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Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) 8151 Herbicides 8141 Pesticides	LEAD	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	100836 - 41	B-269S 1.0-1.5	9/4/08	1155				X	X				X X		X				E	2	G		
	- 42	B-269S 2.0-2.5		1155				X	X				X X		X					2			
	- 43	B-270S 0.0-0.5		1205				X	X				X X		X					2			
	- 44	B-270S 1.0-1.5		1205				X	X				X X		X					2			
	- 45	B-270S 2.0-2.5		1205				X	X				X X		X					2			
	- 46	B-271S 0.0-0.5		1220				X	X				X X		X					2			
	- 47	B-271S 1.0-1.5		1220				X	X				X X		X					2			
	- 48	B-271S 2.0-2.5		1220				X	X				X X		X					2			
	- 49	ER-8		1230										X		X				1	P		

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Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ NO 4. SEALED Y O N O
2. HEADSPACE (VOA) Y☑ N☐ 5. UOFSPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☑ N☑ 6. PRESERVED Y O N O

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State Ca Zip Code 92618
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) David York / Warren Howe (Signature) Warren T Howe

Relinquished by: (Signature and Printed Name) Warren T Howe Date: 9/5/08 Time: 12:05
Received by: (Signature and Printed Name) Kd Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated blow:
Project Mgr /Submitter:
Print Name Dale
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

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Circle or Add Analysis(es) Requested

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) 8151 Herbicides 8141 Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	100836-50	B-2725 0.0-0.5	9/5					X					X X	X				E	2	Jar		
	-51	1.0-1.5						X					X X	X								
	-52	2.0-2.5						X					X X	X								
	-53	B-2735 0.0-0.5						X					X X	X								
	-54	1.0-1.5						X					X X	X								
	-55	2.0-2.5						X					X X	X								
	-56	B-2745 0.0-0.5						X					X X	X								
	-57	1.0-1.5						X					X X	X								
	-57	2.0-2.5						X					X X	X								

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport
Client ☑ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y O N O 4. SEALED Y O N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )
Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe	Date: 9/5/08	Time: 12:05	Received by: (Signature and Printed Name) Kel	Date: 9/5/08	Time: 1205
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) 3151 Herbicides 8141 Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	100Y3C - 59	B-272SDUP 0.5	9/5					X										E	1	Jar		
	- 60	B-272SDUP 1.0-1.5						X											1			
	- 61	B-272SDUP 2.0-2.5						X											1			
	- 62	B-275S 0.0-0.5						X					X X						2			
	- 63	B-275S 1.0-1.5						X					X X						1			
	- 64	B-275S 2.0-2.5						X					X X									
	- 65	B-276S 0.0-0.5						X					X X									
	- 66	1.0-1.5						X					X X									
	- 67	2.0-2.5						X					X X									

QA/QC
RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. Yellow to folder. Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West Coast Connectors Project #: 151396
Sampler: (Printed Name) David York/Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date: 9/5/08 Time: 12:05 Received by: (Signature and Printed Name) [illegible] Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal); 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); 8151 Herbicides; 8141 Pesticides; Lead Arsenic

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	100836-68	B-277S 0.0-0.5	9/5		E	2	Jar	
	-69	1.0-1.5						
	-70	2.0-2.5						
	-71	B-278S 0.0-0.5						
	-72	1.0-1.5						
	-73	2.0-2.5						
	-74	B-279S 0.0-0.5						
	-75	1.0-1.5						
	-76	2.0-2.5						

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical 2 Workdays; D= Urgent 3 Workdays; E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDW ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. #OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y O N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West Connectors Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe	Date 9/5 0	Time: 12:05	Received by: (Signature and Printed Name)	Date: 9/5/08	Time: 1205
Relinquished by: (Signature and Printed Name)	Date :	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by. (Signature and Printed Name)	Date :	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time
	100836 - 77	B-280S 0.0-0.5	9/5	950
	- 78	1.0-1.5		
	- 79	2.0-2.5		
	- 80	B-280S-DUP 0.0-0.5		
	- 81	1.0-1.5		
	- 82	2.0-2.5		
	- 83	ER-9		10:00

Circle or Add Analysis(es) Requested

8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 Herbicides	8141 Pesticides	LEAD	SPECIFY APPROPRIATE MATRIX: SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
			X					X	X			X				6	2	Jar		
			X					X	X			X					2			
			X					X	X			X					2			
			X									X					1			
			X									X					1			
			X									X					1			
										X			X				1	P		

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report. **Yellow** to folder, Pink to submitter.

September 25,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

E L M No.: 1838
N E L M No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100836

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on September 05,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is **an** integral part of this analytical report. This Laboratory Report cannot be reproduced in **part** or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 9/25/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-001A	B-257S 0.0-0.5	0.34	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-004A	B-258S 0.0-0.5	0.78	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-005A	B-258S 1.0-1.5	ND	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-007A	B-259S 0.0-0.5	ND	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-008A	B-259S 1.0-1.5	ND	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-010A	B-260S 0.0-0.5	ND	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-013A	B-261S 0.0-0.5	0.44	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-014A	B-261S 1.0-1.5	ND	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-016A	B-262S 0.0-0.5	4.2	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-019A	B-263S 0.0-0.5	2.7	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-022A	B-264S 0.0-0.5	2.1	mg/L	R99932	0.086	0.25		1	9/4/2008	9/25/2008
100836-053A	B-273S 0.0-0.5	2.7	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008
100836-056A	B-274S 0.0-0.5	3.2	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008
100836-062A	B-275S 0.0-0.5	2.5	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008
100836-077A	B-280S 0.0-0.5	4.4	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008
100836-078A	B-280S 1.0-1.5	5.3	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008
100836-080A	B-280S-DUP 0.0-0.5	4.5	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

Advanced Technology Laboratories

Date: 9/25/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	TRC	**Lab Order:**	100836
Project:	Caltrans West County Connectors, 151396	**Date Received**	9/5/2008 12:05:00 PM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100836-081A	B-280S-DUP 1.0-1.5	2.6	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008
100836-082A	B-280S-DUP 2.0-2.5	1.6	mg/L	R99932	0.086	0.25		1	9/5/2008	9/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-257S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/4/2008 9:00:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-001A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
4,4´-DDE	13	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
4,4´-DDT	16	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/18/2008 09:18 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:18 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:18 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 09:18 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 09:18 PM
Surr: Decachlorobiphenyl	60.4	0	20-142		%REC	1	9/18/2008 09:18 PM
Surr: Tetrachloro-m-xylene	55.1	0	25-115		%REC	1	9/18/2008 09:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-004A

Client Sample ID: B-258S 0.0-0.5
Collection Date: 9/4/2008 9:00:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	2.6	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
4,4´-DDE	28	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
4,4´-DDT	25	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/18/2008 09:37 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:37 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:37 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 09:37 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 09:37 PM
Surr: Decachlorobiphenyl	60.7	0	20-142		%REC	1	9/18/2008 09:37 PM
Surr: Tetrachloro-m-xylene	51.3	0	25-115		%REC	1	9/18/2008 09:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-007A

Client Sample ID: B-259S 0.0-0.5
Collection Date: 9/4/2008 9:20:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	3.7	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
4,4´-DDE	7.2	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
4,4´-DDT	14	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
Chlordane	12	5.0	8.5		µg/Kg	1	9/18/2008 09:57 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 09:57 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
gamma-Chlordane	1.3	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 09:57 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 09:57 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 09:57 PM
Surr: Decachlorobiphenyl	87.2	0	20-142		%REC	1	9/18/2008 09:57 PM
Surr: Tetrachloro-m-xylene	48.1	0	25-115		%REC	1	9/18/2008 09:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-010A

Client Sample ID: B-260S 0.0-0.5
Collection Date: 9/4/2008 9:30:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	2.0	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
4,4´-DDE	7.6	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
4,4´-DDT	4.2	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/18/2008 10:36 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:36 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:36 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 10:36 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 10:36 PM
Surr: Decachlorobiphenyl	70.1	0	20-142		%REC	1	9/18/2008 10:36 PM
Surr: Tetrachloro-m-xylene	47.2	0	25-115		%REC	1	9/18/2008 10:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-013A

Client Sample ID: B-261S 0.0-0.5
Collection Date: 9/4/2008 9:50:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	9.5	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
4,4´-DDE	34	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
4,4´-DDT	22	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
alpha-Chlordane	1.3	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
Chlordane	15	5.0	8.5		µg/Kg	1	9/18/2008 10:55 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 10:55 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
gamma-Chlordane	1.6	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 10:55 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 10:55 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 10:55 PM
Surr: Decachlorobiphenyl	63.4	0	20-142		%REC	1	9/18/2008 10:55 PM
Surr: Tetrachloro-m-xylene	48.5	0	25-115		%REC	1	9/18/2008 10:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-262S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/4/2008 10:05:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-016A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	47	0.50	2.0		µg/Kg	1	9/18/2008 11:15 PM
4,4´-DDE	270	2.5	10		µg/Kg	5	9/22/2008 06:40 PM
4,4´-DDT	180	2.5	10		µg/Kg	5	9/22/2008 06:40 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/18/2008 11:15 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:15 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:15 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:15 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:15 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:15 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:15 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:15 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 11:15 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 11:15 PM
Surr: Decachlorobiphenyl	50.8	0	20-142		%REC	1	9/18/2008 11:15 PM
Surr: Decachlorobiphenyl	66.0	0	20-142		%REC	5	9/22/2008 06:40 PM
Surr: Tetrachloro-m-xylene	51.3	0	25-115		%REC	5	9/22/2008 06:40 PM
Surr: Tetrachloro-m-xylene	38.5	0	25-115		%REC	1	9/18/2008 11:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-019A

Client Sample ID: B-263S 0.0-0.5
Collection Date: 9/4/2008 10:20:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	18	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
4,4´-DDE	130	2.5	10		µg/Kg	5	9/24/2008 04:07 PM
4,4´-DDT	28	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/18/2008 11:34 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:34 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:34 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 11:34 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 11:34 PM
Surr: Decachlorobiphenyl	69.0	0	20-142		%REC	1	9/18/2008 11:34 PM
Surr: Decachlorobiphenyl	116	0	20-142		%REC	5	9/24/2008 04:07 PM
Surr: Tetrachloro-m-xylene	78.1	0	25-115		%REC	5	9/24/2008 04:07 PM
Surr: Tetrachloro-m-xylene	47.7	0	25-115		%REC	1	9/18/2008 11:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT:	TRC	**Client Sample ID:**	B-264S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/4/2008 10:40:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-022A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	8.6	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
4,4´-DDE	88	1.2	5.0		µg/Kg	2.5	9/22/2008 07:00 PM
4,4´-DDT	10	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/18/2008 11:53 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/18/2008 11:53 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/18/2008 11:53 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/18/2008 11:53 PM
Toxaphene	ND	50	50		µg/Kg	1	9/18/2008 11:53 PM
Surr: Decachlorobiphenyl	55.2	0	20-142		%REC	1	9/18/2008 11:53 PM
Surr: Decachlorobiphenyl	69.1	0	20-142		%REC	2.5	9/22/2008 07:00 PM
Surr: Tetrachloro-m-xylene	50.9	0	25-115		%REC	2.5	9/22/2008 07:00 PM
Surr: Tetrachloro-m-xylene	41.4	0	25-115		%REC	1	9/18/2008 11:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-028A

Client Sample ID: B-265S 0.0-0.5
Collection Date: 9/4/2008 11:00:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	30	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
4,4´-DDE	150	2.5	10		µg/Kg	5	9/24/2008 04:27 PM
4,4´-DDT	32	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 12:13 AM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 12:13 AM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 12:13 AM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 12:13 AM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 12:13 AM
Surr: Decachlorobiphenyl	60.6	0	20-142		%REC	1	9/19/2008 12:13 AM
Surr: Decachlorobiphenyl	110	0	20-142		%REC	5	9/24/2008 04:27 PM
Surr: Tetrachloro-m-xylene	78.0	0	25-115		%REC	5	9/24/2008 04:27 PM
Surr: Tetrachloro-m-xylene	49.7	0	25-115		%REC	1	9/19/2008 12:13 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-031A

Client Sample ID: B-266S 0.0-0.5
Collection Date: 9/4/2008 11:15:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918A** QC Batch: **48947** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	ND	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
4,4´-DDE	200	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
4,4´-DDT	86	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
Aldrin	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
alpha-BHC	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
alpha-Chlordane	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
beta-BHC	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
Chlordane	ND	50	85		µg/Kg	10	9/22/2008 07:19 PM
delta-BHC	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
Dieldrin	ND	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
Endosulfan I	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
Endosulfan II	ND	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
Endosulfan sulfate	ND	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
Endrin	ND	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
Endrin aldehyde	ND	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
Endrin ketone	ND	5.0	20		µg/Kg	10	9/22/2008 07:19 PM
gamma-BHC	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
gamma-Chlordane	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
Heptachlor	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
Heptachlor epoxide	ND	5.0	10		µg/Kg	10	9/22/2008 07:19 PM
Methoxychlor	ND	5.0	50		µg/Kg	10	9/22/2008 07:19 PM
Toxaphene	ND	500	500		µg/Kg	10	9/22/2008 07:19 PM
Surr: Decachlorobiphenyl	95.1	0	20-142		%REC	10	9/22/2008 07:19 PM
Surr: Tetrachloro-m-xylene	70.7	0	25-115		%REC	10	9/22/2008 07:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-034A

Client Sample ID: B-267S 0.0-0.5
Collection Date: 9/4/2008 11:30:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	6.9	0.50	2.0		µg/Kg	1	9/19/2008 01:19 PM
4,4´-DDE	180	2.5	10		µg/Kg	5	9/22/2008 07:39 PM
4,4´-DDT	110	2.5	10		µg/Kg	5	9/22/2008 07:39 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 01:19 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:19 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:19 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:19 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:19 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:19 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:19 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:19 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 01:19 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 01:19 PM
Surr: Decachlorobiphenyl	42.7	0	20-142		%REC	1	9/19/2008 01:19 PM
Surr: Decachlorobiphenyl	58.2	0	20-142		%REC	5	9/22/2008 07:39 PM
Surr: Tetrachloro-m-xylene	58.4	0	25-115		%REC	5	9/22/2008 07:39 PM
Surr: Tetrachloro-m-xylene	41.7	0	25-115		%REC	1	9/19/2008 01:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT:	TRC	**Client Sample ID:**	B-268S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/4/2008 11:40:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-037A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	2.3	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
4,4´-DDE	16	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
4,4´-DDT	13	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 01:58 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 01:58 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 01:58 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 01:58 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 01:58 PM
Surr: Decachlorobiphenyl	62.9	0	20-142		%REC	1	9/19/2008 01:58 PM
Surr: Tetrachloro-m-xylene	39.9	0	25-115		%REC	1	9/19/2008 01:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-040A

Client Sample ID: B-269S 0.0-0.5
Collection Date: 9/4/2008 11:55:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	4.6	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
4,4´-DDE	43	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
4,4´-DDT	34	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 02:17 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:17 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:17 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 02:17 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 02:17 PM
Surr: Decachlorobiphenyl	59.1	0	20-142		%REC	1	9/19/2008 02:17 PM
Surr: Tetrachloro-m-xylene	42.0	0	25-115		%REC	1	9/19/2008 02:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-043A

Client Sample ID: B-270S 0.0-0.5
Collection Date: 9/4/2008 12:05:00 PM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	9.1	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
4,4´-DDE	28	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
4,4´-DDT	61	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 02:37 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:37 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:37 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 02:37 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 02:37 PM
Surr: Decachlorobiphenyl	62.8	0	20-142		%REC	1	9/19/2008 02:37 PM
Surr: Tetrachloro-m-xylene	39.7	0	25-115		%REC	1	9/19/2008 02:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-046A

Client Sample ID: B-271S 0.0-0.5
Collection Date: 9/4/2008 12:20:00 PM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	9.4	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
4,4´-DDE	110	1.2	5.0		µg/Kg	2.5	9/22/2008 08:18 PM
4,4´-DDT	60	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 02:56 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 02:56 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 02:56 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 02:56 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 02:56 PM
Surr: Decachlorobiphenyl	60.5	0	20-142		%REC	1	9/19/2008 02:56 PM
Surr: Decachlorobiphenyl	55.5	0	20-142		%REC	2.5	9/22/2008 08:18 PM
Surr: Tetrachloro-m-xylene	53.9	0	25-115		%REC	2.5	9/22/2008 08:18 PM
Surr: Tetrachloro-m-xylene	39.1	0	25-115		%REC	1	9/19/2008 02:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT:	TRC	**Client Sample ID:**	B-272S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/5/2008
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-050A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	3.6	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
4,4´-DDE	20	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
4,4´-DDT	11	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 03:16 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:16 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:16 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 03:16 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 03:16 PM
Surr: Decachlorobiphenyl	59.9	0	20-142		%REC	1	9/19/2008 03:16 PM
Surr: Tetrachloro-m-xylene	35.7	0	25-115		%REC	1	9/19/2008 03:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: TRC
Client Sample ID: B-273S 0.0-0.5
Lab Order: 100836
Collection Date: 9/5/2008
Project: Caltrans West County Connectors, 151396
Matrix: SOIL
Lab ID: 100836-053A

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	12	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
4,4´-DDE	64	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
4,4´-DDT	47	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 03:35 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:35 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:35 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 03:35 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 03:35 PM
Surr: Decachlorobiphenyl	51.3	0	20-142		%REC	1	9/19/2008 03:35 PM
Surr: Tetrachloro-m-xylene	35.8	0	25-115		%REC	1	9/19/2008 03:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-274S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/5/2008
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-056A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	31	0.50	2.0		µg/Kg	1	9/19/2008 03:55 PM
4,4´-DDE	130	2.5	10		µg/Kg	5	9/22/2008 08:37 PM
4,4´-DDT	170	2.5	10		µg/Kg	5	9/22/2008 08:37 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 03:55 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:55 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:55 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:55 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:55 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:55 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 03:55 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 03:55 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 03:55 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 03:55 PM
Surr: Decachlorobiphenyl	51.3	0	20-142		%REC	1	9/19/2008 03:55 PM
Surr: Decachlorobiphenyl	65.7	0	20-142		%REC	5	9/22/2008 08:37 PM
Surr: Tetrachloro-m-xylene	55.8	0	25-115		%REC	5	9/22/2008 08:37 PM
Surr: Tetrachloro-m-xylene	39.6	0	25-115		%REC	1	9/19/2008 03:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-275S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/5/2008
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-062A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	12	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
4,4´-DDE	97	5.0	20		µg/Kg	10	9/22/2008 08:57 PM
4,4´-DDT	35	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 04:14 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:14 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:14 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 04:14 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 04:14 PM
Surr: Decachlorobiphenyl	55.8	0	20-142		%REC	1	9/19/2008 04:14 PM
Surr: Decachlorobiphenyl	76.9	0	20-142		%REC	10	9/22/2008 08:57 PM
Surr: Tetrachloro-m-xylene	63.2	0	25-115		%REC	10	9/22/2008 08:57 PM
Surr: Tetrachloro-m-xylene	42.8	0	25-115		%REC	1	9/19/2008 04:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-276S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/5/2008
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-065A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080918B** QC Batch: **48948** PrepDate: **9/18/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	4.2	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
4,4´-DDE	30	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
4,4´-DDT	12	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
alpha-Chlordane	15	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
Chlordane	93	5.0	8.5		µg/Kg	1	9/19/2008 04:34 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:34 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
gamma-Chlordane	17	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
Heptachlor epoxide	1.7	0.50	1.0		µg/Kg	1	9/19/2008 04:34 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 04:34 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 04:34 PM
Surr: Decachlorobiphenyl	50.1	0	20-142		%REC	1	9/19/2008 04:34 PM
Surr: Tetrachloro-m-xylene	44.6	0	25-115		%REC	1	9/19/2008 04:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-277S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/5/2008
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-068A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080919A** QC Batch: **48965** PrepDate: **9/19/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	22	0.50	2.0		µg/Kg	1	9/19/2008 04:54 PM
4,4´-DDE	150	2.5	10		µg/Kg	5	9/22/2008 09:16 PM
4,4´-DDT	77	2.5	10		µg/Kg	5	9/22/2008 09:16 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 04:54 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:54 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:54 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:54 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:54 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:54 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 04:54 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 04:54 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 04:54 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 04:54 PM
Surr: Decachlorobiphenyl	91.6	0	20-142		%REC	1	9/19/2008 04:54 PM
Surr: Decachlorobiphenyl	98.1	0	20-142		%REC	5	9/22/2008 09:16 PM
Surr: Tetrachloro-m-xylene	80.4	0	25-115		%REC	5	9/22/2008 09:16 PM
Surr: Tetrachloro-m-xylene	73.4	0	25-115		%REC	1	9/19/2008 04:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-278S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/5/2008
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-071A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080919A** QC Batch: **48965** PrepDate: **9/19/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	18	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
4,4´-DDE	140	2.5	10		µg/Kg	5	9/22/2008 09:36 PM
4,4´-DDT	38	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 06:12 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:12 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:12 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 06:12 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 06:12 PM
Surr: Decachlorobiphenyl	71.4	0	20-142		%REC	1	9/19/2008 06:12 PM
Surr: Decachlorobiphenyl	84.0	0	20-142		%REC	5	9/22/2008 09:36 PM
Surr: Tetrachloro-m-xylene	80.3	0	25-115		%REC	5	9/22/2008 09:36 PM
Surr: Tetrachloro-m-xylene	73.7	0	25-115		%REC	1	9/19/2008 06:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	B-279S 0.0-0.5
Lab Order:	100836	**Collection Date:**	9/5/2008
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-074A		

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080919A** QC Batch: **48965** PrepDate: **9/19/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	30	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
4,4´-DDE	95	1.2	5.0		µg/Kg	2.5	9/22/2008 09:55 PM
4,4´-DDT	59	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
Chlordane	ND	5.0	8.5		µg/Kg	1	9/19/2008 05:52 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
Dieldrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 05:52 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
gamma-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 05:52 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 05:52 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 05:52 PM
Surr: Decachlorobiphenyl	98.3	0	20-142		%REC	1	9/19/2008 05:52 PM
Surr: Decachlorobiphenyl	102	0	20-142		%REC	2.5	9/22/2008 09:55 PM
Surr: Tetrachloro-m-xylene	79.1	0	25-115		%REC	2.5	9/22/2008 09:55 PM
Surr: Tetrachloro-m-xylene	75.2	0	25-115		%REC	1	9/19/2008 05:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100836
Project: Caltrans West County Connectors, 151396
Lab ID: 100836-077A

Client Sample ID: B-280S 0.0-0.5
Collection Date: 9/5/2008 9:50:00 AM
Matrix: SOIL

ORGANOCHLORINE PESTICIDES BY GC/ECD

EPA 3550B **EPA 8081A**

RunID: **GC9_080919A** QC Batch: **48965** PrepDate: **9/19/2008** Analyst: **VLT**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
4,4´-DDD	10	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
4,4´-DDE	12	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
4,4´-DDT	16	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
Aldrin	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
alpha-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
alpha-Chlordane	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
beta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
Chlordane	16	5.0	8.5		µg/Kg	1	9/19/2008 06:51 PM
delta-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
Dieldrin	3.7	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
Endosulfan I	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
Endosulfan II	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
Endosulfan sulfate	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
Endrin	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
Endrin aldehyde	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
Endrin ketone	ND	0.50	2.0		µg/Kg	1	9/19/2008 06:51 PM
gamma-BHC	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
gamma-Chlordane	1.7	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
Heptachlor	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
Heptachlor epoxide	ND	0.50	1.0		µg/Kg	1	9/19/2008 06:51 PM
Methoxychlor	ND	0.50	5.0		µg/Kg	1	9/19/2008 06:51 PM
Toxaphene	ND	50	50		µg/Kg	1	9/19/2008 06:51 PM
Surr: Decachlorobiphenyl	54.9	0	20-142		%REC	1	9/19/2008 06:51 PM
Surr: Tetrachloro-m-xylene	51.1	0	25-115		%REC	1	9/19/2008 06:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-49010A**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99932**
Client ID: **PBS**	Batch ID: **R99932**	TestNo: **WET/ EPA 74**		Analysis Date: **9/25/2008**	SeqNo: **1548592**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49010**	SampType: **LCS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99932**
Client ID: **LCSS**	Batch ID: **R99932**	TestNo: **WET/ EPA 74**		Analysis Date: **9/25/2008**	SeqNo: **1548593**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.173	0.25	5.000	0	103	80	120				

Sample ID: **100836-019A-DUP**	SampType: **DUP**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99932**
Client ID: **B-263S 0.0-0.5**	Batch ID: **R99932**	TestNo: **WET/ EPA 74**		Analysis Date: **9/25/2008**	SeqNo: **1548604**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.719	0.25						2.655	2.39	20	

Sample ID: **100836-019A-MS**	SampType: **MS**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99932**
Client ID: **B-263S 0.0-0.5**	Batch ID: **R99932**	TestNo: **WET/ EPA 74**		Analysis Date: **9/25/2008**	SeqNo: **1548605**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.285	0.25	5.000	2.655	92.6	80	120				

Sample ID: **MB-49010B**	SampType: **MBLK**	TestCode: **7420_ST**	Units: **mg/L**	Prep Date:	RunNo: **99932**
Client ID: **PBS**	Batch ID: **R99932**	TestNo: **WET/ EPA 74**		Analysis Date: **9/25/2008**	SeqNo: **1548606**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **100836-082A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **99932**
Client ID: **B-280S-DUP 2.0-2.** Batch ID: **R99932** TestNo: **WET/ EPA 74** Analysis Date: **9/25/2008** SeqNo: **1548616**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.850	0.25						1.622	13.1	20	

Sample ID: **100836-082A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **99932**
Client ID: **B-280S-DUP 2.0-2.** Batch ID: **R99932** TestNo: **WET/ EPA 74** Analysis Date: **9/25/2008** SeqNo: **1548617**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.117	0.25	5.000	1.622	89.9	80	120				

Sample ID: **100836-082A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **99932**
Client ID: **B-280S-DUP 2.0-2.** Batch ID: **R99932** TestNo: **WET/ EPA 74** Analysis Date: **9/25/2008** SeqNo: **1548618**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.112	0.25	5.000	1.622	89.8	80	120	6.117	0.0759	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **MB-48947** SampType: **MBLK** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99863**
Client ID: **PBS** Batch ID: **48947** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547502**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDD	ND	2.0									
4,4´-DDE	ND	2.0									
4,4´-DDT	ND	2.0									
Aldrin	ND	1.0									
alpha-BHC	ND	1.0									
alpha-Chlordane	ND	1.0									
beta-BHC	ND	1.0									
Chlordane	ND	8.5									
delta-BHC	ND	1.0									
Dieldrin	ND	2.0									
Endosulfan I	ND	1.0									
Endosulfan II	ND	2.0									
Endosulfan sulfate	ND	2.0									
Endrin	ND	2.0									
Endrin aldehyde	ND	2.0									
Endrin ketone	ND	2.0									
gamma-BHC	ND	1.0									
gamma-Chlordane	ND	1.0									
Heptachlor	ND	1.0									
Heptachlor epoxide	ND	1.0									
Methoxychlor	ND	5.0									
Toxaphene	ND	50									
Surr: Tetrachloro-m-xylene	9.980		16.67		59.9	25	115				
Surr: Decachlorobiphenyl	10.254		16.67		61.5	20	142				

Sample ID: **LCS-48947** SampType: **LCS** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99863**
Client ID: **LCSS** Batch ID: **48947** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547503**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldrin	15.222	1.0	16.67	0	91.3	59	113				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **LCS-48947**	SampType: **LCS**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/18/2008**	RunNo: **99863**
Client ID: **LCSS**	Batch ID: **48947**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/18/2008**	SeqNo: **1547503**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dieldrin	15.349	2.0	16.67	0	92.1	59	108				
Endrin	16.316	2.0	16.67	0	97.9	41	132				
gamma-BHC	15.434	1.0	16.67	0	92.6	60	111				
Heptachlor	14.794	1.0	16.67	0	88.7	62	108				
Surr: Tetrachloro-m-xylene	13.772		16.67		82.6	25	115				
Surr: Decachlorobiphenyl	13.857		16.67		83.1	20	142				

Sample ID: **MB-48947MS**	SampType: **MS**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/18/2008**	RunNo: **99863**
Client ID: **ZZZZZZ**	Batch ID: **48947**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/18/2008**	SeqNo: **1547504**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDT	9.970	2.0	16.67	0	59.8	29	143				
Aldrin	10.343	1.0	16.67	0	62.0	44	131				
Dieldrin	10.449	2.0	16.67	0	62.7	40	136				
Endrin	11.799	2.0	16.67	0	70.8	41	146				
gamma-BHC	10.425	1.0	16.67	0	62.5	45	129				
Heptachlor	10.143	1.0	16.67	0	60.8	48	126				
Surr: Tetrachloro-m-xylene	9.476		16.67		56.8	25	115				
Surr: Decachlorobiphenyl	9.988		16.67		59.9	20	142				

Sample ID: **MB-48947MSD**	SampType: **MSD**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/18/2008**	RunNo: **99863**
Client ID: **ZZZZZZ**	Batch ID: **48947**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/18/2008**	SeqNo: **1547505**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDT	10.054	2.0	16.67	0	60.3	29	143	9.970	0.834	20	
Aldrin	10.345	1.0	16.67	0	62.1	44	131	10.34	0.0113	20	
Dieldrin	10.465	2.0	16.67	0	62.8	40	136	10.45	0.151	20	
Endrin	11.622	2.0	16.67	0	69.7	41	146	11.80	1.51	20	
gamma-BHC	10.439	1.0	16.67	0	62.6	45	129	10.42	0.139	20	
Heptachlor	10.156	1.0	16.67	0	60.9	48	126	10.14	0.122	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **MB-48947MSD** SampType: **MSD** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99863**
Client ID: **ZZZZZZ** Batch ID: **48947** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547505**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Tetrachloro-m-xylene	9.549		16.67		57.3	25	115		0	0	
Surr: Decachlorobiphenyl	9.928		16.67		59.6	20	142		0	0	

Sample ID: **100836-007ADUP** SampType: **DUP** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99863**
Client ID: **B-259S 0.0-0.5** Batch ID: **48947** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547509**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2,4´-DDD	ND	4.0						0	0	20	
2,4´-DDE	ND	4.0						0	0	20	
2,4´-DDT	ND	4.0						0	0	20	
4,4´-DDD	4.235	2.0						3.723	12.9	20	
4,4´-DDE	7.052	2.0						7.205	2.15	20	
4,4´-DDT	13.036	2.0						14.47	10.5	20	
Aldrin	ND	1.0						0	0	20	
alpha-BHC	ND	1.0						0	0	20	
alpha-Chlordane	0.767	1.0						0.7958	0	20	
beta-BHC	ND	1.0						0	0	20	
Chlordane	12.773	8.5						11.62	9.45	20	
Chlorothalonil	ND	2.0						0	0	20	
delta-BHC	ND	1.0						0	0	20	
Dieldrin	ND	2.0						0	0	20	
Endosulfan I	ND	1.0						0	0	20	
Endosulfan II	ND	2.0						0	0	20	
Endosulfan sulfate	ND	2.0						0	0	20	
Endrin	ND	2.0						0	0	20	
Endrin aldehyde	ND	2.0						0	0	20	
Endrin ketone	ND	2.0						0	0	20	
gamma-BHC	ND	1.0						0	0	20	
gamma-Chlordane	1.567	1.0						1.312	17.7	20	
Heptachlor	ND	1.0						0	0	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **100836-007ADUP** SampType: **DUP** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99863**
Client ID: **B-259S 0.0-0.5** Batch ID: **48947** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547509**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Heptachlor epoxide	ND	1.0						0	0	20	
Methoxychlor	ND	5.0						0	0	20	
Toxaphene	ND	50						0	0	20	
Surr: Tetrachloro-m-xylene	7.812		16.67		46.9	25	115		0	0	
Surr: Decachlorobiphenyl	16.276		16.67		97.6	20	142		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **MB-48948** SampType: **MBLK** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99865**
Client ID: **PBS** Batch ID: **48948** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547620**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDD	ND	2.0									
4,4´-DDE	ND	2.0									
4,4´-DDT	ND	2.0									
Aldrin	ND	1.0									
alpha-BHC	ND	1.0									
alpha-Chlordane	ND	1.0									
beta-BHC	ND	1.0									
Chlordane	ND	8.5									
delta-BHC	ND	1.0									
Dieldrin	ND	2.0									
Endosulfan I	ND	1.0									
Endosulfan II	ND	2.0									
Endosulfan sulfate	ND	2.0									
Endrin	ND	2.0									
Endrin aldehyde	ND	2.0									
Endrin ketone	ND	2.0									
gamma-BHC	ND	1.0									
gamma-Chlordane	ND	1.0									
Heptachlor	ND	1.0									
Heptachlor epoxide	ND	1.0									
Methoxychlor	ND	5.0									
Toxaphene	ND	50									
Surr: Tetrachloro-m-xylene	9.942		16.67		59.6	25	115				
Surr: Decachlorobiphenyl	10.312		16.67		61.9	20	142				

Sample ID: **LCS-48948** SampType: **LCS** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99865**
Client ID: **LCSS** Batch ID: **48948** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldrin	15.203	1.0	16.67	0	91.2	59	113				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **LCS-48948** SampType: **LCS** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99865**
Client ID: **LCSS** Batch ID: **48948** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dieldrin	15.209	2.0	16.67	0	91.2	59	108				
Endrin	15.559	2.0	16.67	0	93.3	41	132				
gamma-BHC	15.411	1.0	16.67	0	92.4	60	111				
Heptachlor	14.807	1.0	16.67	0	88.8	62	108				
Surr: Tetrachloro-m-xylene	13.797		16.67		82.8	25	115				
Surr: Decachlorobiphenyl	13.574		16.67		81.4	20	142				

Sample ID: **MB-48948MS** SampType: **MS** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99865**
Client ID: **ZZZZZZ** Batch ID: **48948** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547622**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDT	10.114	2.0	16.67	0	60.7	29	143				
Aldrin	10.427	1.0	16.67	0	62.5	44	131				
Dieldrin	10.493	2.0	16.67	0	62.9	40	136				
Endrin	11.309	2.0	16.67	0	67.8	41	146				
gamma-BHC	10.548	1.0	16.67	0	63.3	45	129				
Heptachlor	10.196	1.0	16.67	0	61.2	48	126				
Surr: Tetrachloro-m-xylene	9.609		16.67		57.6	25	115				
Surr: Decachlorobiphenyl	9.884		16.67		59.3	20	142				

Sample ID: **MB-48948MSD** SampType: **MSD** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99865**
Client ID: **ZZZZZZ** Batch ID: **48948** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/18/2008** SeqNo: **1547623**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDT	10.253	2.0	16.67	0	61.5	29	143	10.11	1.37	20	
Aldrin	10.498	1.0	16.67	0	63.0	44	131	10.43	0.679	20	
Dieldrin	10.568	2.0	16.67	0	63.4	40	136	10.49	0.707	20	
Endrin	10.942	2.0	16.67	0	65.6	41	146	11.31	3.30	20	
gamma-BHC	10.605	1.0	16.67	0	63.6	45	129	10.55	0.537	20	
Heptachlor	10.284	1.0	16.67	0	61.7	48	126	10.20	0.861	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **MB-48948MSD**	SampType: **MSD**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/18/2008**	RunNo: **99865**
Client ID: **ZZZZZZ**	Batch ID: **48948**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/18/2008**	SeqNo: **1547623**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Tetrachloro-m-xylene	9.652		16.67		57.9	25	115		0	0	
Surr: Decachlorobiphenyl	10.131		16.67		60.8	20	142		0	0	

Sample ID: **100836-034ADUP**	SampType: **DUP**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/18/2008**	RunNo: **99865**
Client ID: **B-267S 0.0-0.5**	Batch ID: **48948**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/19/2008**	SeqNo: **1547628**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2,4´-DDD	ND	4.0						0	0	20	
2,4´-DDE	ND	4.0						0	0	20	
2,4´-DDT	ND	4.0						0	0	20	
4,4´-DDD	8.207	2.0						6.904	17.2	20	
Aldrin	ND	1.0						0	0	20	
alpha-BHC	ND	1.0						0	0	20	
alpha-Chlordane	ND	1.0						0	0	20	
beta-BHC	ND	1.0						0	0	20	
Chlordane	ND	8.5						0	0	20	
Chlorothalonil	ND	2.0						0	0	20	
delta-BHC	ND	1.0						0	0	20	
Dieldrin	ND	2.0						0	0	20	
Endosulfan I	ND	1.0						0	0	20	
Endosulfan II	ND	2.0						0	0	20	
Endosulfan sulfate	ND	2.0						0	0	20	
Endrin	ND	2.0						0	0	20	
Endrin aldehyde	ND	2.0						0	0	20	
Endrin ketone	ND	2.0						0	0	20	
gamma-BHC	ND	1.0						0	0	20	
gamma-Chlordane	ND	1.0						0	0	20	
Heptachlor	ND	1.0						0	0	20	
Heptachlor epoxide	ND	1.0						0	0	20	
Methoxychlor	ND	5.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **100836-034ADUP** SampType: **DUP** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99865**
Client ID: **B-267S 0.0-0.5** Batch ID: **48948** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/19/2008** SeqNo: **1547628**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toxaphene	ND	50						0	0	20	
Surr: Tetrachloro-m-xylene	6.727		16.67		40.4	25	115		0	0	
Surr: Decachlorobiphenyl	6.876		16.67		41.2	20	142		0	0	

Sample ID: **100836-034ADUP** SampType: **DUP** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/18/2008** RunNo: **99865**
Client ID: **B-267S 0.0-0.5** Batch ID: **48948** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/22/2008** SeqNo: **1547639**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDE	179.617	10						180.9	0.732	20	
4,4´-DDT	110.289	10						108.3	1.81	20	
Surr: Tetrachloro-m-xylene	9.943		16.67		59.6	25	115		0	0	
Surr: Decachlorobiphenyl	9.288		16.67		55.7	20	142		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **MB-48965** SampType: **MBLK** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/19/2008** RunNo: **99866**
Client ID: **PBS** Batch ID: **48965** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/19/2008** SeqNo: **1547558**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDD	ND	2.0									
4,4´-DDE	ND	2.0									
4,4´-DDT	ND	2.0									
Aldrin	ND	1.0									
alpha-BHC	ND	1.0									
alpha-Chlordane	ND	1.0									
beta-BHC	ND	1.0									
Chlordane	ND	8.5									
delta-BHC	ND	1.0									
Dieldrin	ND	2.0									
Endosulfan I	ND	1.0									
Endosulfan II	ND	2.0									
Endosulfan sulfate	ND	2.0									
Endrin	ND	2.0									
Endrin aldehyde	ND	2.0									
Endrin ketone	ND	2.0									
gamma-BHC	ND	1.0									
gamma-Chlordane	ND	1.0									
Heptachlor	ND	1.0									
Heptachlor epoxide	ND	1.0									
Methoxychlor	ND	5.0									
Toxaphene	ND	50									
Surr: Tetrachloro-m-xylene	9.888		16.67		59.3	25	115				
Surr: Decachlorobiphenyl	7.686		16.67		46.1	20	142				

Sample ID: **LCS-48965** SampType: **LCS** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/19/2008** RunNo: **99866**
Client ID: **LCSS** Batch ID: **48965** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/19/2008** SeqNo: **1547559**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldrin	14.989	1.0	16.67	0	89.9	59	113				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **LCS-48965**	SampType: **LCS**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/19/2008**	RunNo: **99866**
Client ID: **LCSS**	Batch ID: **48965**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/19/2008**	SeqNo: **1547559**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dieldrin	14.388	2.0	16.67	0	86.3	59	108				
Endrin	18.112	2.0	16.67	0	109	41	132				
gamma-BHC	15.534	1.0	16.67	0	93.2	60	111				
Heptachlor	15.085	1.0	16.67	0	90.5	62	108				
Surr: Tetrachloro-m-xylene	13.725		16.67		82.3	25	115				
Surr: Decachlorobiphenyl	10.569		16.67		63.4	20	142				

Sample ID: **MB-48965MS**	SampType: **MS**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/19/2008**	RunNo: **99866**
Client ID: **ZZZZZZ**	Batch ID: **48965**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/19/2008**	SeqNo: **1547560**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDT	9.282	2.0	16.67	0	55.7	29	143				
Aldrin	10.211	1.0	16.67	0	61.3	44	131				
Dieldrin	9.694	2.0	16.67	0	58.2	40	136				
Endrin	12.690	2.0	16.67	0	76.1	41	146				
gamma-BHC	10.534	1.0	16.67	0	63.2	45	129				
Heptachlor	10.334	1.0	16.67	0	62.0	48	126				
Surr: Tetrachloro-m-xylene	9.513		16.67		57.1	25	115				
Surr: Decachlorobiphenyl	7.647		16.67		45.9	20	142				

Sample ID: **MB-48965MSD**	SampType: **MSD**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/19/2008**	RunNo: **99866**
Client ID: **ZZZZZZ**	Batch ID: **48965**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/19/2008**	SeqNo: **1547561**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDT	9.670	2.0	16.67	0	58.0	29	143	9.282	4.09	20	
Aldrin	10.375	1.0	16.67	0	62.2	44	131	10.21	1.60	20	
Dieldrin	9.931	2.0	16.67	0	59.6	40	136	9.694	2.42	20	
Endrin	12.516	2.0	16.67	0	75.1	41	146	12.69	1.38	20	
gamma-BHC	10.707	1.0	16.67	0	64.2	45	129	10.53	1.63	20	
Heptachlor	10.513	1.0	16.67	0	63.1	48	126	10.33	1.72	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **MB-48965MSD**	SampType: **MSD**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/19/2008**	RunNo: **99866**
Client ID: **ZZZZZZ**	Batch ID: **48965**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/19/2008**	SeqNo: **1547561**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Tetrachloro-m-xylene	9.650		16.67		57.9	25	115		0	0	
Surr: Decachlorobiphenyl	7.758		16.67		46.5	20	142		0	0	

Sample ID: **100836-074ADUP**	SampType: **DUP**	TestCode: **8081_S**	Units: **µg/Kg**	Prep Date: **9/19/2008**	RunNo: **99866**
Client ID: **B-279S 0.0-0.5**	Batch ID: **48965**	TestNo: **EPA 8081A**	**EPA 3550B**	Analysis Date: **9/19/2008**	SeqNo: **1547565**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2,4´-DDD	ND	4.0						0	0	20	
2,4´-DDE	ND	4.0						0	0	20	
2,4´-DDT	ND	4.0						0	0	20	
4,4´-DDD	31.194	2.0						30.16	3.38	20	
4,4´-DDT	59.902	2.0						59.48	0.704	20	
Aldrin	ND	1.0						0	0	20	
alpha-BHC	ND	1.0						0	0	20	
alpha-Chlordane	ND	1.0						0	0	20	
beta-BHC	ND	1.0						0	0	20	
Chlordane	ND	8.5						0	0	20	
Chlorothalonil	ND	2.0						0	0	20	
delta-BHC	ND	1.0						0	0	20	
Dieldrin	1.120	2.0						1.126	0	20	
Endosulfan I	ND	1.0						0	0	20	
Endosulfan II	ND	2.0						0	0	20	
Endosulfan sulfate	ND	2.0						0	0	20	
Endrin	ND	2.0						0	0	20	
Endrin aldehyde	ND	2.0						0	0	20	
Endrin ketone	ND	2.0						0	0	20	
gamma-BHC	ND	1.0						0	0	20	
gamma-Chlordane	ND	1.0						0	0	20	
Heptachlor	ND	1.0						0	0	20	
Heptachlor epoxide	ND	1.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 8081_S

Sample ID: **100836-074ADUP** SampType: **DUP** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/19/2008** RunNo: **99866**
Client ID: **B-279S 0.0-0.5** Batch ID: **48965** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/19/2008** SeqNo: **1547565**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methoxychlor	ND	5.0						0	0	20	
Toxaphene	ND	50						0	0	20	
Surr: Tetrachloro-m-xylene	12.432		16.67		74.6	25	115		0	0	
Surr: Decachlorobiphenyl	16.803		16.67		101	20	142		0	0	

Sample ID: **100836-074ADUP** SampType: **DUP** TestCode: **8081_S** Units: **µg/Kg** Prep Date: **9/19/2008** RunNo: **99866**
Client ID: **B-279S 0.0-0.5** Batch ID: **48965** TestNo: **EPA 8081A** **EPA 3550B** Analysis Date: **9/22/2008** SeqNo: **1547570**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4´-DDE	97.464	5.0						95.09	2.47	20	
Surr: Tetrachloro-m-xylene	13.148		16.67		78.9	25	115		0	0	
Surr: Decachlorobiphenyl	17.214		16.67		103	20	142		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Hoa Huynh

From: Bing Roura
Sent: Thursday, September 18, 2008 9:59 AM
To: Hoa Huynh
Subject: FW: Caitrans 1-405

Please do not log samples per email below.

Thanks,
Bing'
-----Original Message-----
From: Surrency, Ross (Irvine,CA-US) [mailto:RSurrency@trcsolutions.com]
Sent: Thursday, September 18,2008 10:01 AM
To: Bing Roura
Subject: RE: Caltrans I-405

Bing,

We decided not to analyze the samples collected on 8125108. Please proceed with the other samples

Ross

> -----Original Message-----
> From: Bing Roura [mailto:bing@atlglobal.com]
> Sent: Thursday, September 18,2008 9:32 AM
> To: Surrency, Ross (Irvine,CA-US)
> Cc: Lennon, David (Irvine,CA-US); Hoa Huynh
> **Subject:** RE: Caltrans I-405
>
> For samples collected on 08/25/08, the holding time for EPA 8081A analysis already expired (since 9/8/08). We will proceed with analysis per your email request however results will be flagged with "H" qualifier (denoting samples analyzed past holding time).
>
> Regards,
> Bing Roura
> Advanced Technology Laboratories
> www.atlglobal.com
> Phone: 562.989.4045 ext 246
> Fax: 562.989.6348
> e-mail: Bing@ATLGlobal.com
> This message is intended for the use of the individual or entity to which it is addressed. This may contain information that is privileged, confidential, and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, disiribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone and delete the original message. Thank you.
>
> > -----Original Message-----
> > From: Surrency, Ross (Irvine,CA-US) [mailto:RSurrency@trcsolutions.com]
> > Sent: Thursday, September 18, 2008 9:24 AM
> > To: Bing Roura
> > Cc: Lennon, David (Irvine,CA-US)
> > Subject: Caltrans I405

Bing,

Per our discussion, please analyze the following samples for organochlorine pesticides (8081):

B-257 0-0.5' through B-280 0-0.5' (24 samples). These were collected on 9/4 and 9/5/08.
B-175 0-0.5' through B-179 0-0.5' (5 samples). These were collected on 8/25/08. Work order 100642.

Thank you

Ross Surrency, PG

TRC

21 Technology Drive
Irvine, CA 92618

949-727-7324 phone
949-753-0111 fax
949-283-9257 cell
rsurrency@trcsolutions.com

CHAIN OF CUSTODY RECORD

Pg 1 of 9

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill. CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: 9/5/08

Method of Transport: Client ☑ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED 3.4 4.4 Y☑ N☐ 4. SEALED Y O N☐
2. HEADSPACE (VOA) Y O NO 5. # OF SPLS MATCH COC Y O N☐
3. CONTAINER INTACT Y☐ NO 6. PRESERVED Y O N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code 92618
TEL: (949) 727-9336
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) David York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date: 9/5/08 Time: 1205
Received by: (Signature and Printed Name) Kal Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead, Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 - Herbicides 8141 - Pesticides	TAT	Container(s) #	Container(s) Type	REMARKS
	100830 - 01	B-257S 0.0-0.5	9/4/08	<9:00				X					X	X	E	2	Jar	
	- 2	B-257S 1.0-1.5						X					X	X				
	- 3	B-257S 2.0-2.5						X					X	X				
	- 4	B-258S 0.0-0.5						X					X	X				
	- 5	B-258S 1.0-1.5						X					X	X				
	- 6	B-258S 2.0-2.5						X					X	X				
	- 7	B-259S 0.0-0.5		0920				X					X	X				
	- 8	B-259S 1.0-1.5		0920				X					X	X				
	- 9	B-259S 2.0-2.5		0920				X					X	X				
	- 10	B-260S 0.0-0.5	9/4/08	0930				X					X	X				

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=Hcl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 ▪ Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y O N O 4. SEALED Y O N C ☐ 2 HEADSPACE(VOA) Y q N ☐ 5. # OF SPLS MATCH COC Y q N ☐ 3. CONTAINER INTACT Y ☐ N O 6. PRESERVED Y O N C ☐

Client: TRC
Attn: David Lennon
Address:
City State Zip w e
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) David York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe	Date: 9/5/08	Time: 12:05	Received by: (Signature and Printed Name)	Date:	Time: 1205
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) Lead, Arsenic | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | 8151 Herbicides | 8141 Pesticides

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	100836 - 11	B-2605 1.0-1.5	9/4/08	0930	E	2	G	
	- 12	B-2605 2.0-2.5		0930		2		
	- 13	B-2615 0.0-0.5		0950		2		
	- 14	B-2615 1.0-1.5		0950		2		
	- 15	B-2615 2.0-2.5		0952		2		
	- 16	B-2625 0.0-0.5		1005		2		
	- 17	B-2625 1.0-1.5		1005		2		
	- 18	B-2625 2.0-2.5		1005		2		
	- 19	B-2635 0.0-0.5		1020		2		
	- 20	B-2635 1.0-1.5		1020		2		

▪ TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396 Sampler: (Printed Name) Dave York/Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date: 9/5/08 Time: 12:05 Received by: (Signature and Printed Name) Kal Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: DaveLennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (VOAs/ies) | 8270C (BNA) | 8010B (Total Metal) Lead, Arsenic | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | 8151 Herbicides | 8141 Pesticides

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s): #	Type	REMARKS
	100836-21	B-2635 2.0-2.5	9/4/08	1020	E	2	G	
	-22	B-2645 0.0-0.5		1040		2		
	-23	B-2645 1.0-1.5		1040		2		
	-24	B-2645 2.0-2.5		1040		2		
	-25	B-2645 Dup 0.0-0.5		1040		1		Duplicate
	-26	B-2645 Dup 1.0-1.5		1040		1		Duplicate
	-27	B-2645 Dup 2.0-2.5		1040		1		Duplicate
	-28	B-2655 0.0-0.5		1100		2		
	-29	B-2655 1.0-1.5		1100		2		
	-30	B-2655 2.0-2.5		1100		2		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☑ ATL ☐ CA Overn ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y ○ N ☐ 4. SEALED Y ○ N ○ 2. HEADSPACE (VOA) Y ○ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐ 3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date 9/5/08 Time: 12:05
Received by: (Signature and Printed Name) Kal Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize A n lo perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 Herbicides 8141 Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100836-31	B-2665 0.0-0.5	9/4/08	1115				X					X	X	X				E	2	G	
	-32	B-2665 1.0-1.5		1115				X					X	X	X					2		
	-33	B-2665 2.0-2.5		1115				X					X	X	X					2		
	-34	B-2675 0.0-0.5		1130				X					X	X	X					2		
	-35	B-2675 1.0-1.5		1130				X					X	X	X					2		
	-36	B-2675 2.0-2.5		1130				X					X	X	X					2		
	-37	B-2685 0.0-0.5		1140				X					X	X	X					2		
	-38	B-2685 1.0-1.5		1140				X					X	X	X					2		
	-39	B-2685 2.0-2.5		1140				X					X	X	X					2		
	-40	B-2695 0.0-0.5		1155				X					X	X	X				E	2	G	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors
Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe	Date: 9/5/08	Time: 1205	Received by: (Signature and Printed Name) Kal	Date: 9/5/08	Time: 1205
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Acid	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 Herbicides	8141 Pesticides	LEAD	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	100830 - 41	B-2695 1.0-1.5	9/4/08	1155				X					X	X			X					E	2	G		
	-42	B-2695 2.0-2.5		1155				X					X	X			X						2			
	-43	B-2705 0.0-0.5		1205				X					X	X			X						2			
	-44	B-2705 1.0-1.5		1205				X					X	X			X						2			
	-45	B-2705 2.0-2.5		1205				X					X	X			X						2			
	-46	B-2715 0.0-0.5		1220				X					X	X			X						2			
	-47	B-2715 1.0-1.5		1220				X					X	X			X						2			
	-48	B-2715 2.0-2.5		1220				X					X	X			X						2			
	-49	ER-8		1230											X			X					1	P		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced *Technology* *Laboratories*
3275 Walnut Avenue
Signal Hill. CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.# _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ NU 4 SEALED Y O N O
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y O N O

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine Ca State Zip Code 92618
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) David York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date: 9/5/08 Time: 12:05
Received by: (Signature and Printed Name) Kal Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co:
Address
City State Zip

Bill To:
Attn: Same
Co:
Address
City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metals) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015 (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 Herbicides	8141 Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	10w 83C - 50	B-272S 0.0-0.5	9/5					X					X	X		X				E	2	Jar	
	-51	1.0-1.5						X					X	X		X							
	-52	2.0-2.5						X					X	X		X							
	-53	B-273S 0.0-0.5						X					X	X		X							
	-54	1.0-1.5						X					X	X		X							
	-55	2.0-2.5						X					X	X		X							
	-56	B-274S 0.0-0.5						X					X	X		X							
	-57	1.0-1.5						X					X	X		X							
	-58	2.0-2.5						X					X	X		X							

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O#: _____
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ NO 4. SEALED Y O NO
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name)	Warren Howe	Date: 9/5/08	Time: 12:05	Received by: (Signature and Printed Name)	Kd	Date: 9/5/08	Time: 1205
Relinquished by: (Signature and Printed Name)		Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:
Relinquished by: (Signature and Printed Name)		Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
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- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) Lead, Arsenic | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000) | 8151 Herbicides 8141 Pesticides

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
	100936 - 59	B-272SDUP 0.0-0.5	9/5		E	1	Jar	
	-60	B-272SDUP 1.0-1.5				1		
	-61	B-272SDUP 2.0-2.5				1		
	-62	B-275S 0.0-0.5				2		
	-63	B-275S 1.0-1.5				1		
	-64	B-275S 2.0-2.5						
	-65	B-276S 0.0-0.5						
	-66	1.0-1.5						
	-67	2.0-2.5						

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: While with report. Yellow to folder. Pink to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA *90755*
(562) 989-4045 ▪ Fax *(562)* 9894040

FOR LABORATORY USE ONLY:

P.O #: _____
Logged By: _____ Date: _____

Method of Transport
Client ☐
ATL ☐
CA OverN ☐
FEDEX ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y☐ NO 4. SEALED Y O N ☐
2 HEADSPACE (VOA) Y☐ NO 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y O N ☐

Client: TRC
Attn: David
Address: 21 Technology
City Irvine State Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West Coast Connectors Project #: 151396
Sampler: (Printed Name) David York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe	Date: 9	Time: 12:05	Received by: (Signature and Printed Name)		Date: 9/5/08	Time: 1205
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name _____ Date _____
Signature _____

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Assay	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 Herbicides 8141 Pesticides	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	160936-68	B-277S 0.0-0.5	9/5				X						X	X					E	2	Jar	
	-69	1.0-1.5					X						X	X								
	-70	2.0-2.5					X						X	X								
	-71	B-278S 0.0-0.5					X						X	X								
	-72	1.0-1.5					X						X	X								
	-73	2.0-2.5					X						X	X								
	-74	B-279S 0.0-0.5					X						X	X								
	-75	1.0-1.5					X						X	X								
	-76	2.0-2.5					X						X	X								

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED YO NO 4 SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ NC 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West Connectors Project #: 151396
Sampler: (Printed Name) Dave York / Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date 9/5/08 Time: 1205
Received by: (Signature and Printed Name) [illegible] Date: 9/5/08 Time: 1205

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:

Print Name Date

Signature

Send Report To: Attn: David Lennon
AM — ..
City _____ State _____ Zip _____

Bill To: Attn: Same
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
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- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐
Logcode ____
OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) Lead Arsenic	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	8151 Herbicides	8141 Pesticides	LEAD	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	151936 - 77	B-2805 0.0-0.5	9/5	950				X					X	X			X				E	2	Jar	
	- 78	1.0-1.5						X					X	X			X					2		
	- 79	2.0-2.5						X					X	X			X					2		
	- 80	B-2805-DUP 0.0-0.5						X									X					1		
	- 81	1.0-1.5						X									X					1		
	- 82	2.0-2.5						X									X					1		
	- 83	EB-9		10:00											X			X				1	P	

- TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=Zn(AC)$_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

October 03,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAF' No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100836

RE: Caltrans West County Connectors, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on September 05, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT:	TRC	**Client Sample ID:**	B-280S 1.0-1.5
Lab Order:	100836	**Collection Date:**	9/5/2008 9:50:00 AM
Project:	Caltrans West County Connectors, 151396	**Matrix:**	SOIL
Lab ID:	100836-078		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (TCLP)							
EPA3010A					**EPA 1311/ 7420**		
RunID: **AA2_081002D**	QC Batch: **49178**				PrepDate:	**9/30/2008**	Analyst: **AMT**
Lead	0.33	0.086	0.25		mg/L	1	10/2/2008 02:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49178

Sample ID: **MB-49178A**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **PBS**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553289**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49144A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **PBS**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553290**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.134	0.25									

Sample ID: **LCS-49178**	SampType: **LCS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **LCSS**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553291**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.885	0.25	1.000	0	88.5	80	120				

Sample ID: **100824-073A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **ZZZZZZ**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.514	0.25						0.6781	27.4	20	R

Sample ID: **100824-073A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **ZZZZZZ**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.827	0.25	2.500	0.6781	85.9	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100836
Project: Caltrans West County Connectors, 151396

ANALYTICAL QC SUMMARY REPORT

BatchID: 49178

Sample ID: **MB-49178B**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **PBS**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.129	0.25									

Sample ID: **MB-49144A TCLP**	SampType: **MBLK**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **PBS**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553305**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.095	0.25									

Sample ID: **100848-013A-DUP**	SampType: **DUP**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **ZZZZZZ**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553316**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.885	0.25						4.126	6.02	20	

Sample ID: **100848-013A-MS**	SampType: **MS**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **ZZZZZZ**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553317**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.512	0.25	2.500	4.126	95.4	70	130				

Sample ID: **100848-013A-MSD**	SampType: **MSD**	TestCode: **7420_TC**	Units: **mg/L**	Prep Date: **9/30/2008**	RunNo: **100180**
Client ID: **ZZZZZZ**	Batch ID: **49178**	TestNo: **EPA 1311/ 74**	**EPA3010A**	Analysis Date: **10/2/2008**	SeqNo: **1553318**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.210	0.25	2.500	4.126	83.4	70	130	6.512	4.74	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

September 12,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: A20689
CSDLAC No.: 10196
Workorder No.: 100846

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on September 05, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-001

Client Sample ID: #30-Seal Beach-East-Westbound-Medi
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	14	0.018	1.0		mg/L	20	9/11/2008 10:59 PM
Lead	13	0.042	1.0		mg/L	20	9/11/2008 10:59 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 09:57 AM
Lead	0.74	0.023	0.25		mg/L	1	9/11/2008 09:57 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-002

Client Sample ID: #31-Seal Beach-East-Westbound-Lane
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	ND	0.042	1.0		mg/L	20	9/11/2008 11:02 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:01 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#32-Seal Beach-East-Westbound-Bike
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
WET					**WET/ EPA 6010B**		
RunID: **ICP8_080911K** QC Batch: **48678**					PrepDate: **9/9/2008**	Analyst: **LKN**	
Lead	ND	0.042	1.0		mg/L	20	9/11/2008 11:05 PM
ICP METALS BY TCLP EXTRACTION							
EPA3010A					**EPA 1311/ 6010B**		
RunID: **ICP6_080911A** QC Batch: **48655**					PrepDate: **9/9/2008**	Analyst: **LKN**	
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:05 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-004

Client Sample ID: #33-Seal Beach-East-Eastbound-Medi
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	130	0.18	10		mg/L	20	9/11/2008 11:09 PM
Lead	82	0.42	10		mg/L	20	9/11/2008 11:09 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	0.75	0.0034	0.25		mg/L	1	9/11/2008 10:09 AM
Lead	3.5	0.023	0.25		mg/L	1	9/11/2008 10:09 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-005

Client Sample ID: #34-Seal Beach-East-Eastbound-Lane-
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	ND	0.042	1.0		mg/L	20	9/11/2008 11:12 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:12 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-006

Client Sample ID: #35-Valley View-East-Westbound-Me
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	6.4	0.018	1.0		mg/L	20	9/11/2008 11:15 PM
Lead	5.0	0.042	1.0		mg/L	20	9/11/2008 11:15 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 10:16 AM
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:16 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#36-Valley View-East-Eastbound-Med
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	110	0.042	1.0		mg/L	20	9/11/2008 11:19 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:20 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-008

Client Sample ID: #37-Valley View-East-Eastbound-Med
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	16	0.018	1.0		mg/L	20	9/12/2008 02:25 PM
Lead	16	0.042	1.0		mg/L	20	9/12/2008 02:25 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 10:31 AM
Lead	0.32	0.023	0.25		mg/L	1	9/11/2008 10:31 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-009

Client Sample ID: #38-605S to 405 South-Entry-YEL
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	ND	0.018	1.0		mg/L	20	9/12/2008 02:29 PM
Lead	ND	0.042	1.0		mg/L	20	9/12/2008 02:29 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 10:35 AM
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 100846
Project: WEST COUNTY CONNECTORS, 151396
Lab ID: 100846-010

Client Sample ID: #39-405N to 605 North-Exit-YEL
Collection Date: 9/4/2008
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	17	0.018	1.0		mg/L	20	9/12/2008 03:00 PM
Lead	7.6	0.042	1.0		mg/L	20	9/12/2008 03:00 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 10:43 AM
Lead	2.8	0.023	0.25		mg/L	1	9/11/2008 10:43 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100846
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-48678A**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **PBS**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/11/2008**	SeqNo: **1539592**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: **LCS-48678**	SampType: **LCS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **LCSS**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/11/2008**	SeqNo: **1539593**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.005	0.050	1.000	0	100	85	115				
Lead	1.133	0.050	1.000	0	113	85	115				

Sample ID: **100827-002A-DUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **ZZZZZZ**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/12/2008**	SeqNo: **1540298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.845	1.0						1.789	3.04	20	
Lead	5.053	1.0						4.925	2.57	20	

Sample ID: **100827-002A-MS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **ZZZZZZ**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/12/2008**	SeqNo: **1540299**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	3.879	1.0	2.500	1.789	83.6	75	120				
Lead	7.045	1.0	2.500	4.925	84.8	71	118				

Sample ID: **MB-48678B**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **PBS**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/12/2008**	SeqNo: **1540300**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits

Calculations are based on raw values

- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100846
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-48678B**	SampType: **MBLK**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **PBS**	Batch ID: **48678**	TestNo: **WET/ EPA 60**	**WET**	Analysis Date: **9/12/2008**	SeqNo: **1540300**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: **100827-015A-DUP**	SampType: **DUP**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **ZZZZZZ**	Batch ID: **48678**	TestNo: **WET/ EPA 60**	**WET**	Analysis Date: **9/12/2008**	SeqNo: **1540303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.239	1.0						0.2383	0	20	
Lead	0.283	1.0						0.2969	0	20	

Sample ID: **100827-015A-MS**	SampType: **MS**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **ZZZZZZ**	Batch ID: **48678**	TestNo: **WET/ EPA 60**	**WET**	Analysis Date: **9/12/2008**	SeqNo: **1540304**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.343	1.0	2.500	0.2383	84.2	75	120				
Lead	2.492	1.0	2.500	0.2969	87.8	71	118				

Sample ID: **100827-015A-MSD**	SampType: **MSD**	TestCode: **6010_ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **ZZZZZZ**	Batch ID: **48678**	TestNo: **WET/ EPA 60**	**WET**	Analysis Date: **9/12/2008**	SeqNo: **1540305**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.303	1.0	2.500	0.2383	82.6	75	120	2.343	1.73	20	
Lead	2.439	1.0	2.500	0.2969	85.7	71	118	2.492	2.12	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100846
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: **MB-48655A**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99387**
Client ID: **PBS**	Batch ID: **48655**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538772**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	0.013	0.050									

Sample ID: **MB-48631A TCLP**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99387**
Client ID: **PBS**	Batch ID: **48655**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538773**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.002	0.050									
Lead	ND	0.050									

Sample ID: **LCS-48655**	SampType: **LCS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99387**
Client ID: **LCSS**	Batch ID: **48655**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538774**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.049	0.050	1.000	0	105	85	115				
Lead	1.044	0.050	1.000	0.01331	103	85	115				

Sample ID: **100846-009ADUP**	SampType: **DUP**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99387**
Client ID: **#38-605S to 405 Sou**	Batch ID: **48655**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538784**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.043	0.25						0.02243	0	20	
Lead	0.140	0.25						0.08202	0	20	

Sample ID: **100846-010AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99387**
Client ID: **#39-405N to 605 Nor**	Batch ID: **48655**	TestNo: **EPA 1311/ 60**	**EPA3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538786**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.587	0.25	12.50	0.1167	99.8	75	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100846
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: **100846-010AMS** SampType: **MS** TestCode: **6010_TC** Units: **mg/L** Prep Date: **9/9/2008** RunNo: **99387**
Client ID: **#39-405N to 605 Nor** Batch ID: **48655** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **9/11/2008** SeqNo: **1538786**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.191	0.25	12.50	2.787	99.2	71	118				

Sample ID: **100846-010AMSD** SampType: **MSD** TestCode: **6010_TC** Units: **mg/L** Prep Date: **9/9/2008** RunNo: **99387**
Client ID: **#39-405N to 605 Nor** Batch ID: **48655** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **9/11/2008** SeqNo: **1538787**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.894	0.25	12.50	0.1167	102	75	120	12.59	2.41	20	
Lead	15.397	0.25	12.50	2.787	101	71	118	15.19	1.35	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

FOR LABORATORY USE ONLY

P.O. #: 151396
Logged By: _____ Date: 9/5/08

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FedEx ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y ☑ N ☐ 4. SEALED Y ☐ N ☑
2. HEADSPACE (VOA) Y ☐ N ☐ (N/A) 5. # OF SPLS MATCH COC Y ☑ N ☐
3. CONTAINER INTACT Y ☑ N ☐ 6. PRESERVED Y ☐ N ☑ 6

Client: TRC
Attention: DAVID LENNON
Address: 21 TECHNOLOGY
City: IRVINE State: CA Zip Code: 92618
Tel: 949-727-7458
Fax: 949-727-9336

Project Name: WEST COUNTY CONNECTORS
Project #: 151396
Sampler: (Printed Name) ERIK PAQUETTE (Signature) 5:09pm

Relinquished by: (Signature and Printed Name)	Date	Time	Received by: (Signature and Printed Name)	Date	Time
Dottie Spisak	9/5/08	1347		9/5/08	1347
	9/5/08	1445		9/5/08	1445

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ERIK PAQUETTE (Print Name) 9/4/08 (Date) (Signature)

Send Report To:
Attn: DAVID LENNON
Co:
Addr: 21 TECHNOLOGY
City: IRVINE State: CA Zip: 92618

Bill To:
Attn:
Co: Same
Addr:
City: State: Zip:

Special Instructions/Comments:
* Anticipate STLC/TCLP

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides); 8082 (PCB); 8260B (Volatiles); 8270C (BNA); 6010B (Total Metal); 8015B (GRO) / 8020 (BTEX); 8015B (DRO); 8021 (BTEX); TITLE 22 / CAM 17 (6010 / 7000); STLC LEAD; TCLP LEAD; STLC CHROMIUM; TCLP CHROMIUM

SPECIFY APPROPRIATE MATRIX: SOIL; WATER; GROUND WATER; WASTEWATER

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode_____ OTHER _____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	TAT	Container(s) #	Container(s) Type	REMARKS
1	100846-001	#30 - Seal Beach - East - Westbound - Median YEL	9/4/08		E	P		
2		#31 - Seal Beach - East - Westbound - Lane - WHT						
3		#32 - Seal Beach - East - Westbound - Bike Lane						
4		#33 - Seal Beach - East - Eastbound - Median YEL						
5		#34 - Seal Beach - East - Eastbound - Lane - WHT						
6		#35 - Valley View - East - Westbound - Median YEL						
7		#36 - Valley View - East - Eastbound - Median - BLK						
8		#37 - Valley View - East - Eastbound - Median - YEL						
9		#38 - 605 S to 405 South - Entry - YEL						
10		#39 - 405 N to 605 North - Exit - YEL						

■ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl $N=HNO_3$ $S=H_2SO_4$ C=4°C $Z=Zn(AC)_2$ O=NaOH $T=Na_2S_2O_3$

September 12, 2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100863

RE: Caltrans West County Connectors

Attention: David Lennon

Enclosed are the results for sample(s) received on September 08, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

Date: 9/12/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100863
Project:	Caltrans West County Connectors	**Date Received**	9/8/2008 1:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100863-001A	B-230-S @ 0.0-0.5	28	mg/Kg	48763	0.11	5.0		1	9/8/2008	9/11/2008
100863-002A	B-231-S @ 0.0-0.5	9.4	mg/Kg	48763	0.11	5.0		1	9/8/2008	9/11/2008
100863-003A	B-232-S @ 0.0-0.5	24	mg/Kg	48763	0.11	5.0		1	9/8/2008	9/11/2008
100863-004A	B-233-S @ 0.0-0.5	8.7	mg/Kg	48763	0.11	5.0		1	9/8/2008	9/11/2008
100863-005A	B-226-S @ 0.0-0.5	35	mg/Kg	48763	0.11	5.0		1	9/8/2008	9/11/2008
100863-006A	B-226-S @ 1.0-1.5	39	mg/Kg	48763	0.11	5.0		1	9/8/2008	9/11/2008
100863-007A	B-226-S @ 2.0-2.5	ND	mg/Kg	48763	0.11	5.0		1	9/8/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 9/12/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	TRC	**Lab Order:**	100863
Project:	Caltrans West County Connectors	**Date Received**	9/8/2008 1:00:00 AM
Project No:		**Matrix:**	Water
Analyte:	Lead	**Analyst:**	LKN

Laboratory ID	Client Sample ID	Results	Units	QC Batch	MDL	PQL	Qual	DF	Date Collected	Date Analyzed
100863-008A	ER-10	ND	mg/L	48682	0.0046	0.25		1	9/8/2008	9/11/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100863
Project: Caltrans West County Connectors

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-48763A**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99428**
Client ID: **PBS**	Batch ID: **48763**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/11/2008**	SeqNo: **1539515**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-48763**	SampType: **LCS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99428**
Client ID: **LCSS**	Batch ID: **48763**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/11/2008**	SeqNo: **1539516**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	271.236	5.0	250.0	0	108	80	120				

Sample ID: **100827-045A-DUP**	SampType: **DUP**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99428**
Client ID: **ZZZZZZ**	Batch ID: **48763**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/11/2008**	SeqNo: **1539527**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.341	5.0						2.997	0	20	

Sample ID: **100827-045A-MS**	SampType: **MS**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99428**
Client ID: **ZZZZZZ**	Batch ID: **48763**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/11/2008**	SeqNo: **1539528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	175.626	5.0	250.0	2.997	69.1	45	110				

Sample ID: **MB-48763B**	SampType: **MBLK**	TestCode: **6010_SPB**	Units: **mg/Kg**	Prep Date: **9/11/2008**	RunNo: **99428**
Client ID: **PBS**	Batch ID: **48763**	TestNo: **EPA 6010B**	**EPA 3050M**	Analysis Date: **9/11/2008**	SeqNo: **1539529**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.909	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100863
Project: Caltrans West County Connectors

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **100863-007A-DUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **9/11/2008** RunNo: **99428**
Client ID: **B-226-S @ 2.0-2.5** Batch ID: **48763** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **9/11/2008** SeqNo: **1539538**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.520	5.0						3.688	0	20	

Sample ID: **100863-007A-MS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **9/11/2008** RunNo: **99428**
Client ID: **B-226-S @ 2.0-2.5** Batch ID: **48763** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **9/11/2008** SeqNo: **1539539**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	162.504	5.0	250.0	3.688	63.5	45	110				

Sample ID: **100863-007A-MSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **9/11/2008** RunNo: **99428**
Client ID: **B-226-S @ 2.0-2.5** Batch ID: **48763** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **9/11/2008** SeqNo: **1539540**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	168.781	5.0	250.0	3.688	66.0	45	110	162.5	3.79	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: TRC
Work Order: 100863
Project: Caltrans West County Connectors

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WPB

Sample ID: **MB-48682**	SampType: **MBLK**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **PBW**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538402**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-48682**	SampType: **LCS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **LCSW**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538403**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.029	0.25	1.000	0	103	85	115				

Sample ID: **100863-008A-DUP**	SampType: **DUP**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **ER-10**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538407**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **100863-008A-MS**	SampType: **MS**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **ER-10**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538408**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.495	0.25	2.500	0	99.8	71	118				

Sample ID: **100863-008A-MSD**	SampType: **MSD**	TestCode: **6010_WPB**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99367**
Client ID: **ER-10**	Batch ID: **48682**	TestNo: **EPA 6010B**	**EPA 3010A**	Analysis Date: **9/11/2008**	SeqNo: **1538409**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.502	0.25	2.500	0	100	71	118	2.495	0.278	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Pg 1 of 1

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 9/8/08

Method of Transport: Client ☑ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 2.2

1. CHILLED Y☐ N☐ | 2. HEADSPACE (VOA) Y☐ N☐ NA | 3. CONTAINER INTACT Y☐ N☐ | 4. SEALED Y☐ N☑ | 5. # OF SPLS MATCH COC Y☑ N☐ | 6. PRESERVED Y☑ N☐

Client: TRC
Attn: David Lennon
Address: 21 Technology Dr.
City Irvine State CA Zip Code
TEL: ( )
FAX: ( )

Project Name: Caltrans West County Connectors
Project #:
Sampler: (Printed Name) Warren Howe (Signature) Warren Howe

Relinquished by: (Signature and Printed Name) Warren Howe Date: 9/8/08 Time: 13:00 Received by: (Signature and Printed Name) Marg Date: 9/8/08 Time: 13:00

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn: David Lennon
Co: _____
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: Same
Co: _____
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) Lead | 8015B (GRO) / 8020 (BTEX) | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

PRESERVATION

Q A / Q C: RTNE ☐ CT ☐ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch # / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8270C	6010B (Total Metal) Lead	SOIL	WATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	100863-001	B-230-5@0.0-0.5	9/8	9:20	X	X		E	1	Jar	N	
	2	B-231-5@0.0-0.5		9:45	X	X						
	3	B-232-5@0.0-0.5		10:25	X	X						
	4	B-233-5@0.0-0.5		10:40	X	X						
	5	B-226-8@0.0-0.5		11:30	X	X						
	6	1.0-1.5		11:30	X	X						
	7	2.0-2.5		11:30	X	X						
	8	ER-10		12:05	X		X			Poly	Y	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr | B= Emergency Next workday | C= Critical 2 Workdays | D= Urgent 3 Workdays | E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CLIENT CORRESPONDENCE LOG

Client Name: TRC-IRVINE

ATL Workorder No.: 100863

DATE: 9/9/2008 3:09:22 PM

DATE	CONTACT	CALL IN/OUT	ISSUE / PROBLEM	COMMENTS/CORRECTIVE ACTION	INITIAL
9/8/2008 1:59:45 P	David Lennon	OUT	coc marked as B-226-8 @ 0.5, 1.5, 2.5. Sample labelled as B-226-S @ 0.5, 1.5, 2.5	left voice message.	MARGOP
9/9/2008 3:05:43 P	Warren Howe	OUT	the above issue	Follow the label on the sample jars. B-226-S @ 0.5, 1.5, 2.5.	hoah

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

APPENDIX E

PHOTOGRAPHS

Caltrans ADL Study
West County Connectors Project

Photo 1: Sampling with direct-push rig along southbound I-405 shoulder.

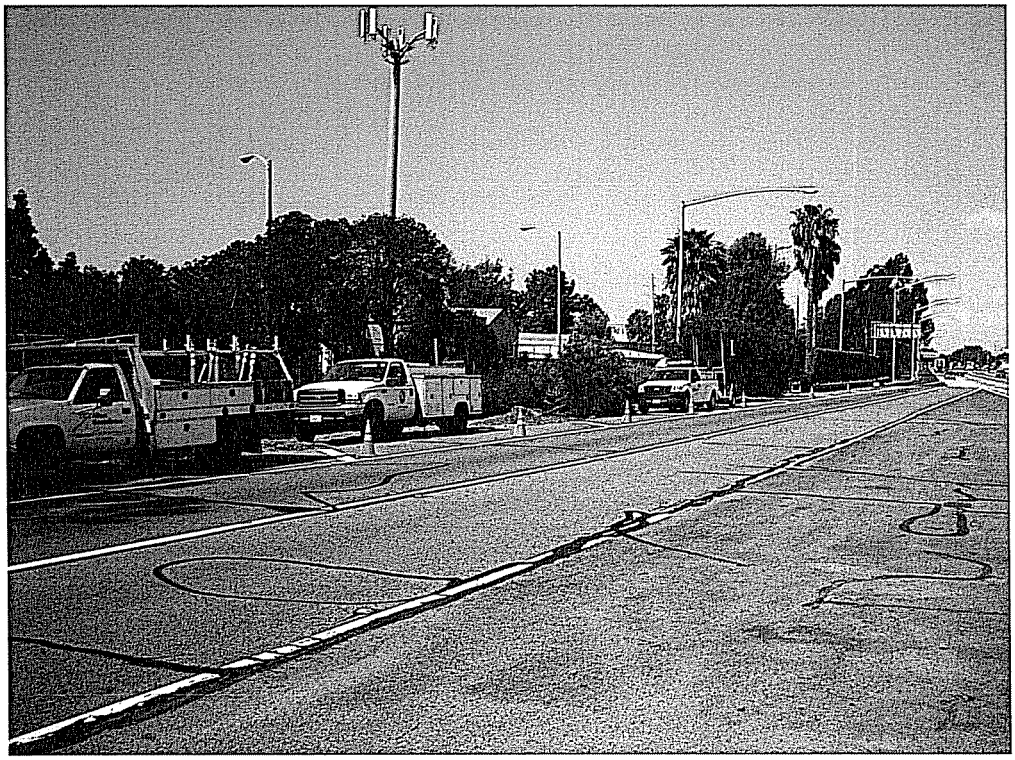


Photo 2: Traffic control setup along Valley View St. exit ramp.

Caltrans ADL Study
West County Connectors Project

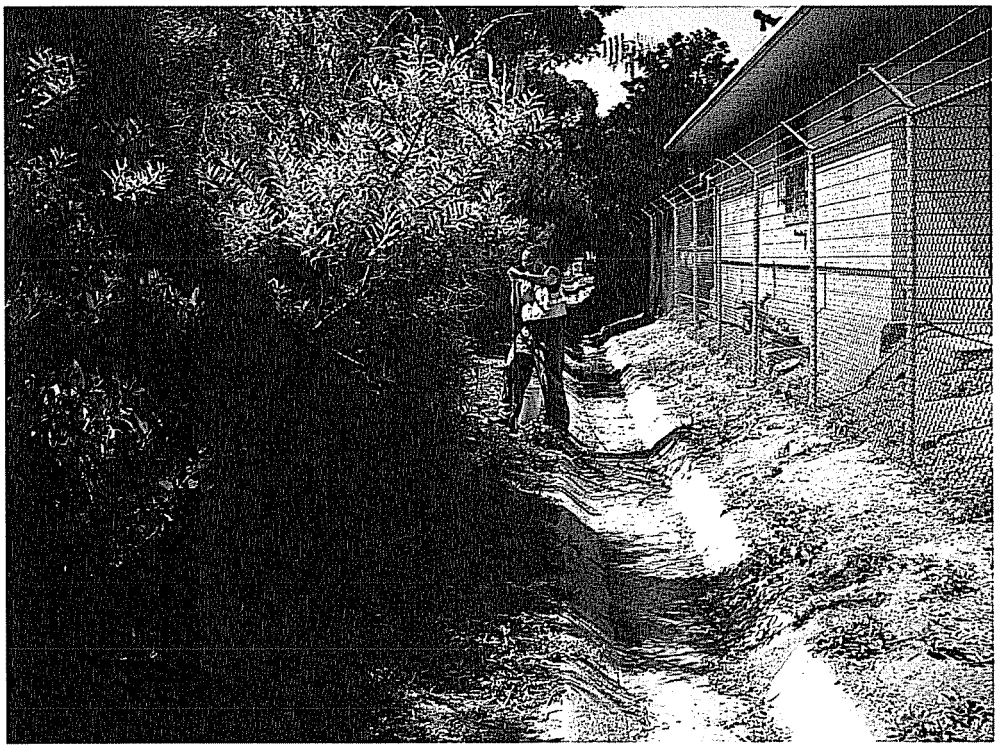


Photo 3: Sampling with hand auger at location B-110S.

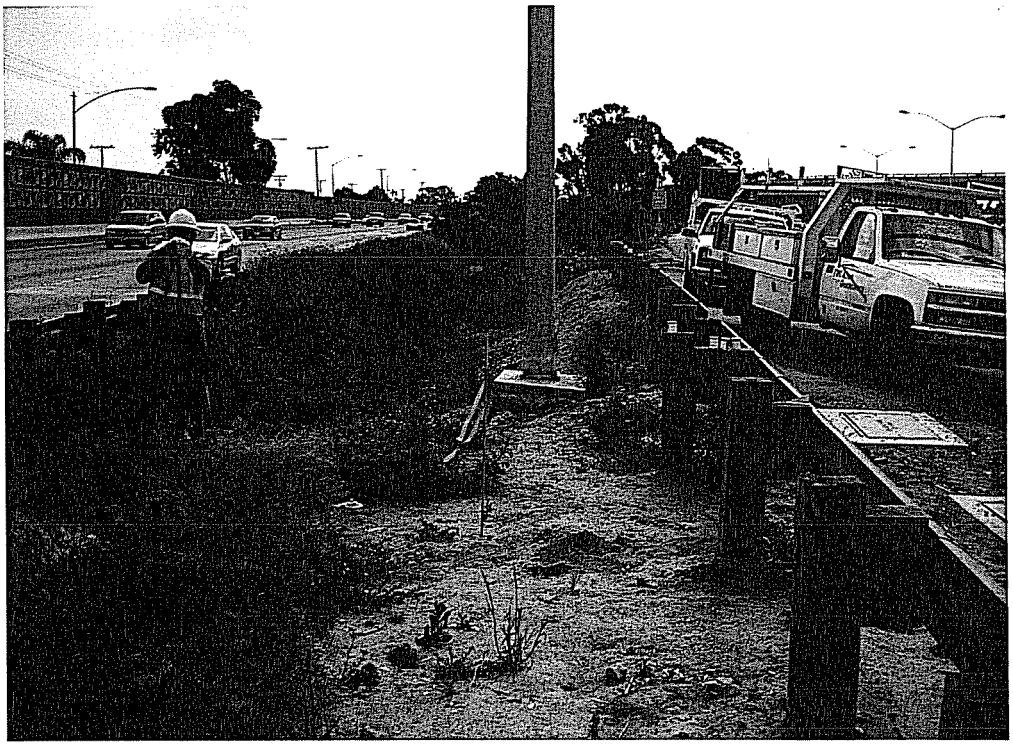


Photo 4: Sampling with hand auger at location B-163N (I-405 Northbound shoulder).

Caltrans ADL Study
West County Connectors Project

Photo 5: Sampling with direct-push rig along southbound I-405.

Photo 6: View of northbound I-405 shoulder.

APPENDIX F

NON HAZARDOUS WASTE MANIFEST

NON HAZARDOUS WASTE MANIFEST	1. Generator ID Number: Not Required	2. Page 1 of: 22	3. Emergency Response Phone: (562) 786-6200	4. Waste Tracking Number: 40330

5. Generator's Name and Mailing Address: Caltrans - Dept. of Trans. Dist. 7, 100 S. Main Street, Suite 1200, Los Angeles Ca. 90012

Generator's Site Address (if different than mailing address): Project Location, 405 Freeway, Orange County, California

Generator's Phone:

6. Transporter 1 Company Name: KM Industrial, Inc.

U.S. EPA ID Number: CAL000274783

7. Transporter 2 Company Name:

U.S. EPA ID Number:

8. Designated Facility Name and Site Address: Crosby & Overton, 1630 W. 16th St. Long Beach CA 90813, 562-432-6445

U.S. EPA ID Number: CAD026409019

Facility's Phone:

9. Waste Shipping Name and Description	10. Containers: No.	Type	11. Total Quantity	12. Unit Wt./Vol.	
1. Non Hazardous Waste Liquids	1	TT	50	G	
2.					
3.					
4.					

13. Special Handling Instructions and Additional Information: Wear protective equipment while handling. Weights or volumes are approximate. 24 hour emergency telephone number (562) 786-6200

95(1) Profile #: 60044 - Groundwater
Appointment Time: 1100 Hours

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Gordon Clemmer — Agent for Caltrans — Signature: [signature] — Month: 05 Day: 16 Year: 08

15. International Shipments: ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: Date leaving U.S.:

Transporter Signature (for exports only):

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Ray Rivera — Signature: [signature] #20552 — Month: 05 Day: 16 Year: 08

Transporter 2 Printed/Typed Name: — Signature: — Month: Day: Year:

17. Discrepancy

17a. Discrepancy Indication Space: ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator): U.S. EPA ID Number:

Facility's Phone:

17c. Signature of Alternate Facility (or Generator): Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: [illegible] Smith — Signature: [signature] — Month: 5 Day: 16 Year: 08

GENERATOR | TRANSPORTER | DESIGNATED FACILITY

169-BLC-O 6 10498 (Rev. 8/06)

TRANSPORTER #1

LEAD BASED PAINT INSPECTION REPORT
FREEWAY STRIPING

West County Connectors Project
Orange County, California

Submitted to

California Department of Transportation
District 12
3337 Michelson Drive, Suite 380
Irvine, California 92612

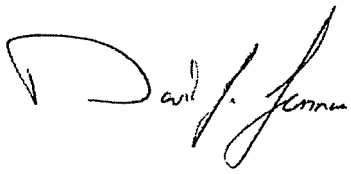
TRC Project No. 151396

March 30,2009

Prepared by

TRC
21 Technology Drive
Irvine, California 92618
Telephone 949-727-9336
Facsimile 949-727-7399

Sam Seneviratne
California Dept. of Public Health
Lead Related Construction
Inspector/Assessor (No. 9658)



David Lennon
Senior Project Manager

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D Bulk Paint Chip Laboratory Analytical Results
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EXECUTIVE SUMMARY

On behalf of the Orange County Transportation Authority (OCTA), TRC conducted testing for lead based paint (LBP) on freeway and bridge striping along an approximately 4-mile section of State Route 22 (SR-22), Interstate 405 (I-405), and Interstate 605 (1-605) as part of the West County Connectors Project in Orange County, California. The project will link high occupancy vehicle (HOV) lanes/carpool lanes on the San Diego Freeway (1-405) with those on the Garden Grove Freeway (SR-22) and San Gabriel Freeway (1-605) to create a seamless HOV connection amongst the three freeways. A site vicinity map is presented in Figure 1 and the project limits are presented in Figure 2.

TRC performed testing, assessment, and quantification for LBP on freeway striping on June 5, 2008. Additional testing was conducted on striping on overpass bridges and freeway lanes on August 18, September 4 and 25, 2008, and March 19, 2009. The test locations were selected on freeway and bridge striping at approximately 1,000-foot intervals on the right shoulder, carpool lane and center median striping. Random testing of other markings that may be impacted by the proposed HOV lane construction was also conducted.

The LBP testing was conducted by Sam Seneviratne, a State of California Department of Public Health, Lead Related Construction Inspector/Risk Assessor and Project Monitor (# 9658) and Erik Paquette a State of California Department of Public Health, Lead Related Construction Inspector/Risk Assessor (# 14356) on June 5, August 18, September 4 and 25, 2008, and March 19, 2009. The lead testing was performed using portable X-ray Fluorescence (XRF) Lead Analyzers, Niton Model XLp 300A, XLt 898AD and RMD LPA–1B and by collection of paint chip bulk samples that were analyzed at an offsite laboratory. The XRF analyzers were checked for calibration prior to and after the conclusion of testing. The LBP assessment activities were performed in general conformance with the United States Department of Housing and Urban Development's (HUD's) guidance document, "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing," 1997 Revision.

Bulk paint chip sampling and laboratory analysis was conducted to confirm the presence of LBP on selected freeway striping and markings. The laboratory analysis provided additional data for LBP locations and for waste disposal classification of the removed paint. The bulk paint chip sampling and laboratory analysis was performed through paint chip sampling in accordance with HUD's guidance document, "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing," 1997 Revision. This testing was conducted to determine waste disposal

options that would comply with the California Department of Toxic Substances Control (DTSC) disposal requirements for hazardous waste analysis and disposal.

Federal EPA and California DHS regulations define LBP as any surface coating that contains lead at or above 1.0 milligrams per square centimeter (mg/cm^2) or 0.5% by weight. Therefore, paint and coatings that tested at or above 1.0 mg/cm^2 or 0.5% for lead and/or paint chip analysis data that exceeded the hazardous waste classification threshold concentrations for lead or chromium have been identified as lead and/or chromium-containing materials in this report.

During the August 18, September 4, September 25,2008, and March 19,2009 sampling events, TRC obtained bulk paint samples in order to further identify lead and chromium containing paint markings and to classify the paint for waste disposal. Sixty-one (61) bulk samples were analyzed using method EPA 3050B for Total Threshold Limit Concentration (TTLC) for lead and forty-eight (48) samples were analyzed for chromium. Fifty-three (53) samples were analyzed using method EPA 6010B and EPA 1311/6010B for both Soluble Threshold Limit Concentration (STLC) and Toxicity Characteristic Leaching Procedure (TCLP) for lead and forty-six (46) were analyzed for chromium. The analyses provided data on the location of LBP for removal and information for classification of the waste paint according to DTSC hazardous waste disposal guidelines.

FINDINGS OF LEAD BASED PAINT CONTAINING STRIPING

LBP was detected on striping and markings on the freeway and overpass bridges. The LBP striping and locations are presented in the table below. Lead was detected in the following locations at concentrations exceeding the Federal and State of California lead in paint concentration limits of 1.0 mg/cm^2 by area and/or paint chip analysis data that exceeded the hazardous waste classification threshold concentrations for lead or chromium. The locations where XRF test results indicated the paint contains regulated concentrations of lead were also tested by obtaining paint chip samples that were submitted to a laboratory to be analyzed for STLC and TCLP analysis. The analytical testing indicates that the waste paint should be classified as a Non-RCRA hazardous waste (California Regulated).

TABLE 1
SUMMARY OF LEAD BASED PAINT STRIPE AND MARKING LOCATIONS

XRF #/ Lab Analysis Sample #	Test Location(s)	Color	XRF Lead (mg/cm^2)	TTLC Lead/ Chromium (mg/Kg)	STLC Lead/ Chromium (mg/L)	TCLP Lead/ Chromium (mg/L)	Approx. Quantity (feet)
50,511 100846-0101 100537-001	Inner (left side) Stripe-1-405 Northbound Connector to I-605 Northbound	Yellow	4.3, 4.8	Lead 4,200 Chromium 1,300	Lead 7.6 Chromium 17	Lead 2.8 Chromium ND	2,490
64, 65, 66,67, 154, 1561 101314-0041 100537-003	Inner (left side) Stripe-1-605 Southbound Connector to I-405 southbound	Yellow	7.2, 6.6, 3.2, 2.6, 12.2, 3.0	Lead 280 Chromium 65	Lead 8.3 Chromium 11.0	Lead 0.94 Chromium ND	4,600
81, 118/ 100846-001/ 100537-005	Median Stripe-Seal Beach Blvd Westbound	Yellow	1.5, 1.6	Lead 13,000 Chromium 3,100	Lead 13 Chromium 14	Lead 0.74 Chromium ND	
92, 121/ 100846-004/ 100537-008	Median Stripe-Seal Beach Blvd Eastbound	Yellow	2.8, 1.7	Lead 120,000 Chromium 28,000	Lead 82.0 Chromium 130	Lead 3.5 Chromium 0.75	600
126/ 100846-006/ 100537-016	Median Stripe-Valley View Street Westbound	Yellow	0.4	Lead 2,800 Chromium 730	Lead 5.0 Chromium 6.4	Lead ND Chromium ND	1,160
127/ 100846-008/ 100537-019	Median Stripe-Valley View Street Eastbound	Yellow	1.0	Lead 3,600 Chromium 940	Lead 16.0 Chromium 16.0	Lead 0.32 Chromium ND	1,080
128/ 100846-007/ 100537-020	Median Stripe-Valley View Street Eastbound	Black	0.2	Lead 51	Lead 110	Lead ND	1,080
1451 101314-003	Shoulder Stripe-Willow Onramp Eastbound to I-605 Northbound	Yellow	5.6	Lead 28,000 (XRF)	Lead 8.0 Chromium 12.0	Lead 1.2 Chromium ND	2,400
167/ 101314-008	Shoulder Stripe-Willow Onramp Eastbound to I-605 South	Yellow	2.4	Lead 12,000 (XRF)	Lead ND Chromium ND	Lead ND Chromium ND	2,100
83, 119/ 100537-007/ 100846-003	Bike Lane stripe Seal Beach East Side Westbound	White	0	Lead 3,900 Chromium ND	Lead ND	Lead ND	

1.0 INTRODUCTION

PROJECT DESCRIPTION

On behalf of the Orange County Transportation Authority (OCTA), TRC conducted testing for lead based paint (LBP) on freeway and bridge striping along an approximately 4-mile section of State Route 22 (SR-22), Interstate 405 (I-405), and Interstate 605 (1-605) as part of the West County Connectors Project in Orange County, California. The project will link high occupancy vehicle (HOV) lanes/carpool lanes on the San Diego Freeway (1-405) with those on the Garden Grove Freeway (SR-22) and San Gabriel Freeway (1-605) to create a seamless HOV connection amongst the three freeways.

TRC performed testing, assessment, and quantification for LBP in freeway and overpass bridge striping on June 5, August 18, September 4, September 25,2008, and March 19, 2009. The test locations were selected on freeway and bridge striping at approximately 1,000-foot intervals on the right shoulder, carpool lane and center median striping. Random testing of other markings that may be impacted by the proposed HOV lane construction was also conducted. The LBP testing was conducted by Sam Seneviratne, a State of California Department of Public Health Certified Lead-Related Construction Inspector/Assessor/Project Monitor and Erik Paquette, a State of California Department of Public Health Certified Lead-Related Construction Inspector/Assessor. Copies of relevant training certificates and state licenses (where applicable) are presented in the appendices section of the report.

BACKGROUND

The LBP testing was conducted to investigate potential LBP used in lane striping on the freeway and bridges as well as other roadway markings that may be disturbed during the addition of the proposed high occupancy vehicle (HOV) lane in each direction between SR 22, I-405 and the I-605 freeways. The LBP testing was performed in accordance with industry standards for paint testing and as per the work plan submitted to the California Department of Transportation (Caltrans), District 12, dated March 12,2008.

The subject area spans the I-405,I-605, and SR-22 for approximately 4 miles. The limits of the subject area are as follows:

- I-405
    - Postmile – 20.50 to 24.0
    - SR-22 to I-405
- I-605
    - Postmile – 3.0 (ORA) to 1.0 (LA)
    - I-405 to Katella Avenue Interchange (IC)
- SR-22
    - Postmile – 0.4t02.0
    - Valley View Street IC to I-405

Sampling was conducted on lane striping and markings on the right shoulder and center median of the roadway sections of the freeways, including exit and entry ramps to the freeways in the area of the interchange that may be impacted by the construction activities. Random testing of other markings that may be impacted by the proposed HOV lane construction was also conducted

SCOPE OF WORK

The scope of work included the testing of representative samples and physical assessment of paint and coatings used for the freeway lane striping and other markings. The LBP testing was performed using Niton XLp 300A, XLt 898AD, & RMD LPA–1B X-ray fluorescence (XRF) Spectrum Analyzer Lead Detectors and by collection of paint chip bulk samples that were analyzed at an offsite laboratory. The XRF determined the lead concentrations in the paint using a non-destructive process and displayed the results in milligrams per square centimeter (mg/cm^2). The XRF analyzers used for this sampling do not have an inconclusive range and therefore did not require a paint chip sample be collected for laboratory analysis to verify the results.

During the August 18, September 4, September 25,2008, and March 19, 2009 sampling events, TRC obtained bulk paint samples in order to further identify lead and chromium containing paint markings and to classify the paint for waste disposal. Sixty-one (61) bulk samples were analyzed using method EPA 3050B for Total Threshold Limit Concentration (TTLC) for lead and forty-eight (48) samples were analyzed for chromium. Fifty-three (53) samples were analyzed using method EPA 6010B and EPA 1311/6010B for both Soluble Threshold Limit Concentration (STLC) and Toxicity Characteristic Leaching Procedure (TCLP) for lead and forty-six (46)

samples were analyzed for chromium. The analyses provided data on the location of LBP for removal and information for classification of the waste paint according to DTSC hazardous waste disposal guidelines. The test locations were selected according to distinguishable colors of the striping and applications (i.e., stripe, cross stripe, symbol, etc.) and at approximately 1,000-foot intervals.

2.0 PRE-FIELD ACTIVITIES

PRE-FIELD WORK ACTIVITIES

TRC obtained encroachment permit numbers 1207-NSV-0957 and 1207-NDP-0971 from the Caltrans Permit Unit prior to starting field activities as described in the scope of work on the West County Connectors Project. The Aerially Deposited Lead and Lead Based Paint Striping Assessment Work Plan dated March 12, 2008 for the West County Connectors Project was provided to Caltrans District 12, Design Oversight Team for approval.

Prior to each of the sampling events, TRC conducted a pre-sampling tailgate safety meeting with the TRC personnel conducting the lead based paint (LBP) testing activities, the personnel providing the traffic control activities, and four officers from the California Highway Patrol (CHP), Westminster Station. Hazards associated with vehicle traffic and health hazards from LBP were reviewed at the safety meeting. A site-specific health and safety plan was prepared for the Aerially Deposited Lead (ADL) and LBP assessment activities and was used at the site to review the health and safety hazards of the sampling activity.

TRAFFIC CONTROL

During the LBP testing activities, traffic control was provided by United Traffic Control service as well as CHP officers. The traffic control vehicles and the CHP ensured the safety of the sampling team and alerted freeway traffic of the sampling work. Two traffic control trucks with flashing lights and warning signs were positioned behind the TRC crew during the testing activities while four CHP patrol cars were utilized during the LBP testing. LBP testing was conducted from 10:30 PM to approximately 2:30 AM on June 5-6, September 25-26, 2008, and March 19-20,2009. The August 18 and September 4,2008 sampling events on overpass bridges occurred during daytime hours. Caltrans limited the moving lane closure activities to the HOV lane and right shoulder lane. Testing of the center lane lines was not allowed, because the activities would have been unsafe with a moving lane closure and would have significantly disrupted traffic.

3.0 FIELD ACTIVITIES

LEAD BASED PAINT SAMPLING

In the West County Connectors Project limits, TRC sampled striping and lane markings approximately every 1,000 feet. Based on the study area limits, including field calibration of the testing instruments, two hundred and fourteen (214) LBP test locations were analyzed using the Niton or RMD, XRF Spectrum Analyzer Lead Detectors and/or bulk paint chip samples were collected for laboratory analysis (Figures 3 to 32). Representative locations of suspect LBP striping locations were randomly tested within the project limits. The striping along the right shoulder, carpool lane and the center median were tested.

SAMPLING PROCEDURES

Representative locations/surfaces of lane striping were selected for XRF testing or bulk paint chip sample collection. Homogenous material determinations were assessed based on the following criteria:

- Similar physical characteristics (same color and texture, etc.); and
- Material function (shoulder striping, HOV lane striping, etc.).

X-Ray Fluorescence Analyzer Testing

LBP testing was performed by a California Department of Health Services (DHS) Certified Lead Inspector using a modified protocol based on HUD guidelines and State of California regulations. The XRF instrument was placed against the suspected striping paint and activated for approximately 3 to 60 seconds. Photographs of the sampling procedure are included in Appendix E. This XRF instrument displayed the LBP results on the instrument screen as mg/cm^2. While the XRF testing was conducted, selected testing positions were surveyed with a hand-held global positioning system (GPS) (Table 2) and all testing locations were identified by freeway landmarks.

The following data was recorded on the LBP XRF Testing Data Sheet (Appendix A):

- Unique sample number
- Substrate
- Component tested
- Color
- Description of sample location/GPS coordinates
- Paint condition
- XRF reading
- Positive or negative for LBP
- Approximate quantity of LBP

Paint Chip Sampling

A bulk paint chip sample is taken by using a sharp knife, chisel, or equivalent to cut a section of paint at least one-inch square, and remove it from the substrate with as little substrate material as possible. The paint chip is then placed into a sample container and labeled as to location. The sample(s) are then shipped under the chain-of-custody protocol to a laboratory where it is analyzed by an approved analytical method.

The laboratory analysis of the paint chip samples were performed by Advanced Technology Laboratories in Signal Hill, California. Advanced Technology Laboratories have the following laboratory accreditations: ELAP No.:1838, NELAP No.: 02107CA and CSDLAC No.:10196.

While the bulk paint chip sampling was conducted, selected testing positions were surveyed with a hand-held global positioning system (GPS) (Table 2) and all testing locations were identified by freeway landmarks.

The following data was recorded on the Lead Paint Bulk Sampling Data Sheet (Appendix A):

- Unique sample number
- Substrate
- Component tested
- Color
- Description of sample location/GPS coordinates
- Paint condition

4.0 FIELD ANALYSIS

XRF ANALYSIS FOR LEAD BASED PAINT

The XLp 300 XRF uses a 40 milicurie Cadmium 109 sealed radioactive source which has a half life of 18 months. The RMD LpA-1 XRF uses a 12 rnilicurie Cobalt 57 sealed radioactive source. The XRF measures the L & K electron shell energy released by the excited atoms of the test material such as the painted and/or coated surface to calculate the concentrations of elemental lead (Pb) on the surface coating down to the substrate. The Niton XLp 300 and the RMD LpA-1 XRF machines do not have an inconclusive range such as the older generation XRF machines. Analysis of the paint coating is accomplished by placing the instrument detector against the painted surface and activating the XRF by pulling the instrument trigger. The instrument will cycle for approximately 3-60 seconds and then display the lead reading on the instrument display screen.

XRF INSTRUMENT CALIBRATION CHECK

The XRF instrument is checked for calibration each work day prior to and at the conclusion of testing. A paint standard with a known concentration of lead is tested by the instrument for three consecutive tests. The instrument results are reviewed to ensure that the results are correct for the standard tested. The calibration results are recorded on the LBP XRF Testing Data Sheet prior to the start and upon completion of the sampling.

INTERPRETATION OF XRF RESULTS

The XRF lead analyzer has a detection range of 0.01 to 50.0 mg/cm^2 of lead. LBP testing utilizing a XRF instrument can quantify lead concentrations of painted or coated surfaces and building components. Federal and California DPH regulations define LBP as any surface coating that contains lead at or above 1.0 milligrams per square centimeter (mg/ cm^2). This LBP in striping assessment identifies any paint that tested at or above 1.0 mg/cm^2 as positive for LBP and components in this report. A result of 1.0 mg/cm^2 is approximately equivalent to 5,000 ppm or 0.5% by weight.

LEAD WASTE CHARACTERIZATION AND DISPOSAL

In order to determine whether the LBP wastes should be classified as non-hazardous solid or hazardous waste the waste generator must meet State of California requirements according to California Code of Regulations, Section 66261 and conduct both STLC and TCLP analysis of the paint for waste characterization prior to the disposal of LBP waste. If any of these samples contain lead or chromium at or above the TTLC, STLC, and/or the TCLP limits, the waste would be disposed of as hazardous waste.

The paint waste analysis was compared to the following hazardous waste limits found in the California Code of Regulations:

	TTLC (mg/Kg)	STLC (mg/L)	TCLP (mg/L)
Lead	1,000	5.0	5.0
Chromium and/or Chromium (III) Compounds	2,500	5.0	5.0

Paint striping with a TTLC and/or a STLC for lead and/or chromium exceeding the regulatory limit would be classified as a non-RCRA hazardous waste (a positive XRF reading corresponds to a lead concentration of approximately 5,000 ppm). Paint striping with a lead and/or chromium TCLP concentration of 5.0 mg/L or greater would be classified as a RCRA D008 (lead) or D007 (chromium) toxicity characteristic hazardous waste. The waste generator must consider the proper waste classification when selecting potential disposal options for the waste. In addition, the proper segregation of waste materials and representative characterization sample analysis of the actual waste generated during the the striping removal should be utilized when determining the final disposal options for the waste paint.

5.0 FINDINGS

Federal and California DHS regulations define LBP as any surface coating that contains lead at or above 1.0 milligrams per square centimeter (mglcm^2). Therefore, freeway or bridge striping paint that tested at or above 1.0 mg/cm^2 for lead when tested utilizing the XRF and/or paint chip analysis data that exceeded the hazardous waste classification threshold concentrations for lead or chromium has been identified as lead and/or chromiurn-containing materials in this report. The results of the TTLC, STLC, and TCLP analysis of the bulk samples indicate that the waste paint should be classified as a non-RCRA Hazardous waste, since none of the TCLP results were equal to or exceeded 5.0 mg/L.

The XRF test results that were found to be positive are presented in Table 2. All XRF testing conducted for the West County Connectors Project is tabulated in the appendices of this report. The bulk paint chip sampling and laboratory results are presented in Table 3 with the laboratory analytical results from Advanced Technology Laboratories provided in Appendix D. Visual assessment of the condition of the LBP striping was observed to be in fair condition.

6.0 CONCLUSIONS

Lead and/or chromium containing paint in concentrations above the Federal and State regulated concentrations was found in the painted striping that is scheduled for removal during construction. LBP was found in conditions ranging from intact (good) to fair. LBP must be abated by a licensed lead abatement contractor using California-certified workers and supervisors, and must be done according to State of California lead abatement regulations. The improper removal of the lead containing paint will expose workers to airborne lead dust as well as contaminate the surrounding environment.

The lead containing paint must be removed prior to construction activities that would disturb the lead containing paint by lead trained personnel in accordance with all applicable federal, state, and local regulations. These requirements include, but are not limited to, the following: Exposure Assessments; Methods of Compliance including work practices, administrative, and engineering controls; Respiratory Protection; Protective Clothing and Equipment; Housekeeping; Hygiene Facilities; Medical Surveillance; and Employee Information and Training. The waste materials generated must be segregated accordingly and should be subjected to waste characterization testing and disposed of according to California Code of Regulations, Title 8 Section 1532.1.

The content presented in this report is based on data collected during the site assessment and XRF testing, review of pertinent regulations, requirements, guidelines and commonly followed industry standards, and information provided by Caltrans, District 12, their clients, agents, and representatives.

The work has been conducted in an objective and unbiased manner and in accordance with generally accepted professional practice for this type of work. TRC believes the test data to be accurate and relevant, but cannot accept responsibility for the accuracy or completeness of available documentation or possible withholding of information of other parties.

This LBP assessment report is designed to aid the owner, architect, construction manager, general contractor, and LBP abatement contractor in identifying and/or locating LBP identified in this report. This report is not intended for, and may not be utilized as a bidding document or as an abatement specification document.

7.0 RECOMMENDATIONS

LBP must be abated by a licensed lead abatement contractor using California-certified workers and supervisors, and must be done according to State of California lead abatement regulations prior to any construction activities. The improper removal of the lead containing paint will expose workers to airborne lead dust as well as contaminate the surrounding environment.

Unacceptable lead removal methods include but not limited to:

1) Open flame burning or torching (includes propane-fueled heat grids);
2) Machine sanding or grinding without a local HEPA vacuum exhaust attachment;
3) Uncontained hydro blasting or high pressure washing;
4) Abrasive blasting or sandblasting without a local HEPA vacuum exhaust tool;
5) Dry-scraping unless:
    a) Performed in conjunction with heat gun or around electrical outlets
    b) LBP area is less than or equal to 2 square feet on interior surfaces
    c) LBP area is less than or equal to 20 square feet on exterior surfaces
6) Heat guns operating above 1100°F; and
7) Methylene chloride chemical paint removers.

The California Occupational Safety and Health Administration (Cal/OSHA) Lead in Construction Standard states that "negative" readings i.e., those below the HUD/EPA definition of what constitutes LBP (1.0 mg/cm^2), "DO NOT" relieve contractors from performing exposure assessments (personal exposure monitoring) on their employees per the OSHA Lead Standard, and should not be interpreted as lead is not present. Although a reading may indicate "negative" result or lead concentration, concentrations of airborne lead may still exceed the Cal/OSHA Action Level or the Cal/OSHA Permissible Exposure Limit (PEL) depending on the work activity.

Lead and chromium containing waste must be disposed of in accordance with all applicable federal, state, county, local government regulations and guidelines. It is the sole responsibility of the Contractor performing the work to assure compliance with all laws and regulations relating to the disposal. A LBP waste management plan is provided in Appendix F.

The requirements of the Resource Conservation and Recovery Act as'well as the California Code of Regulations requirements should be followed by the contractor. Waste materials should be

segregated into separate waste streams (i.e., paint chips, personal protective equipment, plastic, etc.) and placed into labeled leak-tight containers. Wastewater from the washing facilities should be captured, filtered, and prior to disposal into the sanitary sewer system, sampled for lead content.

Random samples of each waste stream should be collected and analyzed for TTLC, STLC, and TCLP analysis at a State of California certified laboratory to determine the final disposition of the waste materials, in accordance with the LBP waste management plan provided in Appendix F. All wastes should be disposed of in accordance with applicable federal, state, and local regulations.

8.0 REFERENCES

California Code of Regulations Title 8 Section 1532.1 (Cal/OSHA Construction Safety Orders, Lead)

State of California, *Code of Regulations, Title 17, Division 1, Chapter 8 (Accreditation, Certification and Work Practices in Lead-Related Construction)*

United States Department of Housing and Urban Development (HUD) guidance document, *"Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing,"* (1997 Revision) 24 CFR part 35 – U.S. Department of Housing and Urban Development (HUD)

United States Environmental Protection Agency (EPA), *40 Code of Federal Regulations Part 745 Subpart L*

United States Environmental Protection Agency (EPA), *40 Code of Federal Regulations Part 745.227*

TABLES

TABLE 2

SUMMARY OF LEAD BASED PAINT UTLIZING XRF TESTING

XRF #	Test Location(s)	Color	XRF Lead (mg/cm^2)	Approx. Quantity
50, 51	Inner (left side) Stripe-1-405 Northbound Connector to I-605 Northbound	Yellow	4.3, 4.8	2,490 feet
64, 65, 66,67, 154, 156	Inner (left side) Stripe-1-605 Southbound Connector to I-405 Southbound	Yellow	7.2, 6.6, 3.2, 2.6, 12.2, 3.0	4,600 feet
81,118	Median Stripe-Seal Beach Blvd Westbound	Yellow	1.5, 1.6	1,250 feet
92, 121	Median Stripe-Seal Beach Blvd Eastbound	Yellow	2.8, 1.7	600 feet
126	Median Stripe-Valley View Street Westbound	Yellow	0.4	1,160 feet
127	Median Stripe-Valley View Street Eastbound	Yellow	1.0	1,080 feet
128	Median Stripe-Valley View Street Eastbound	Black	0.2	1,080 feet
145	Shoulder Stripe-Willow Onramp Eastbound to I-605 Northbound	Yellow	5.6	2,400 feet
167	Shoulder Stripe-Willow Onramp Eastbound to I-605 South	Yellow	2.4	2,100 feet
83,119	Bike Lane stripe Seal Beach East Side Westbound	White	0[(1)]	1,250 feet

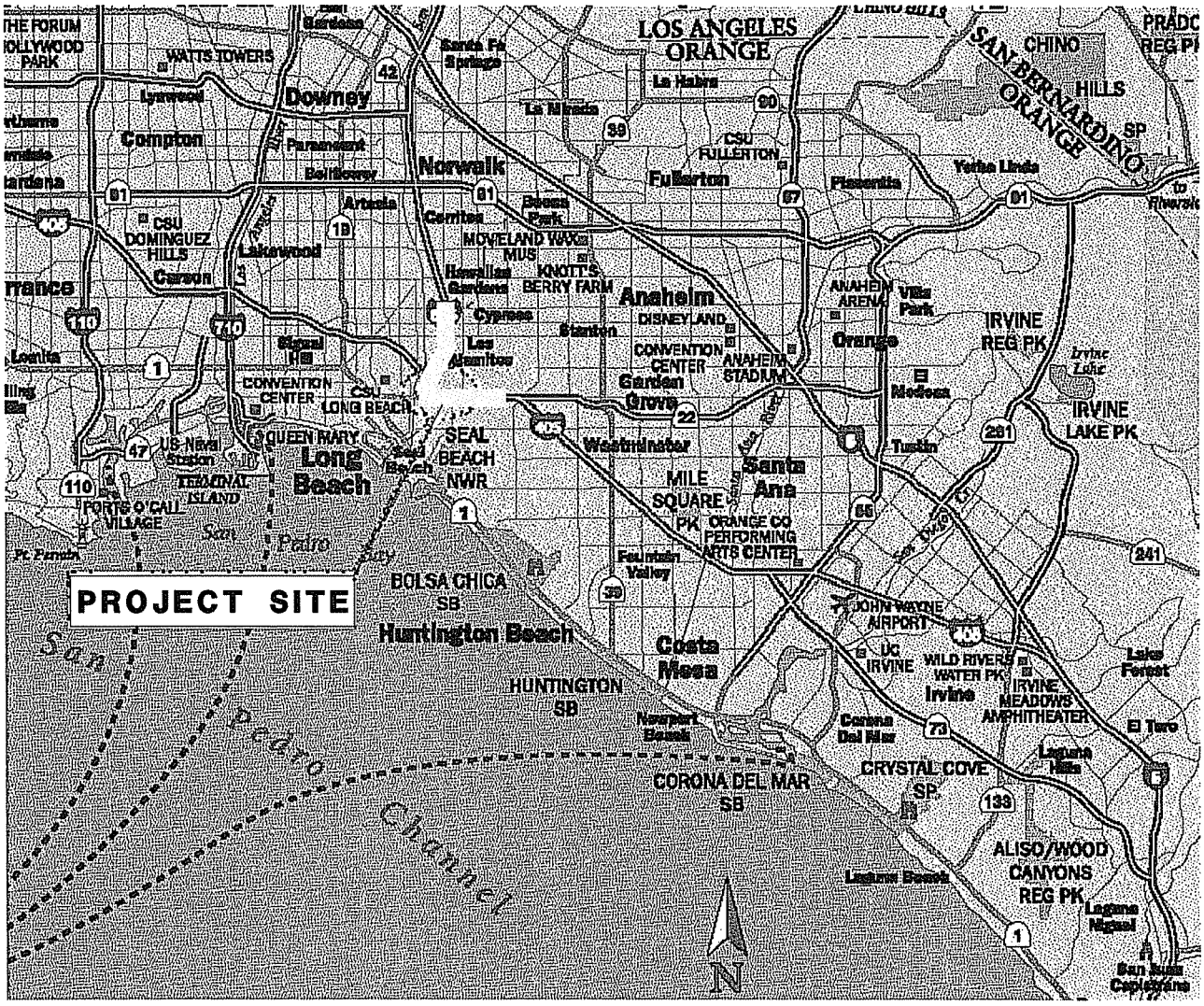
[(1)] The TTLC result for this test location was 3,900 mg/kg.

TABLE 3

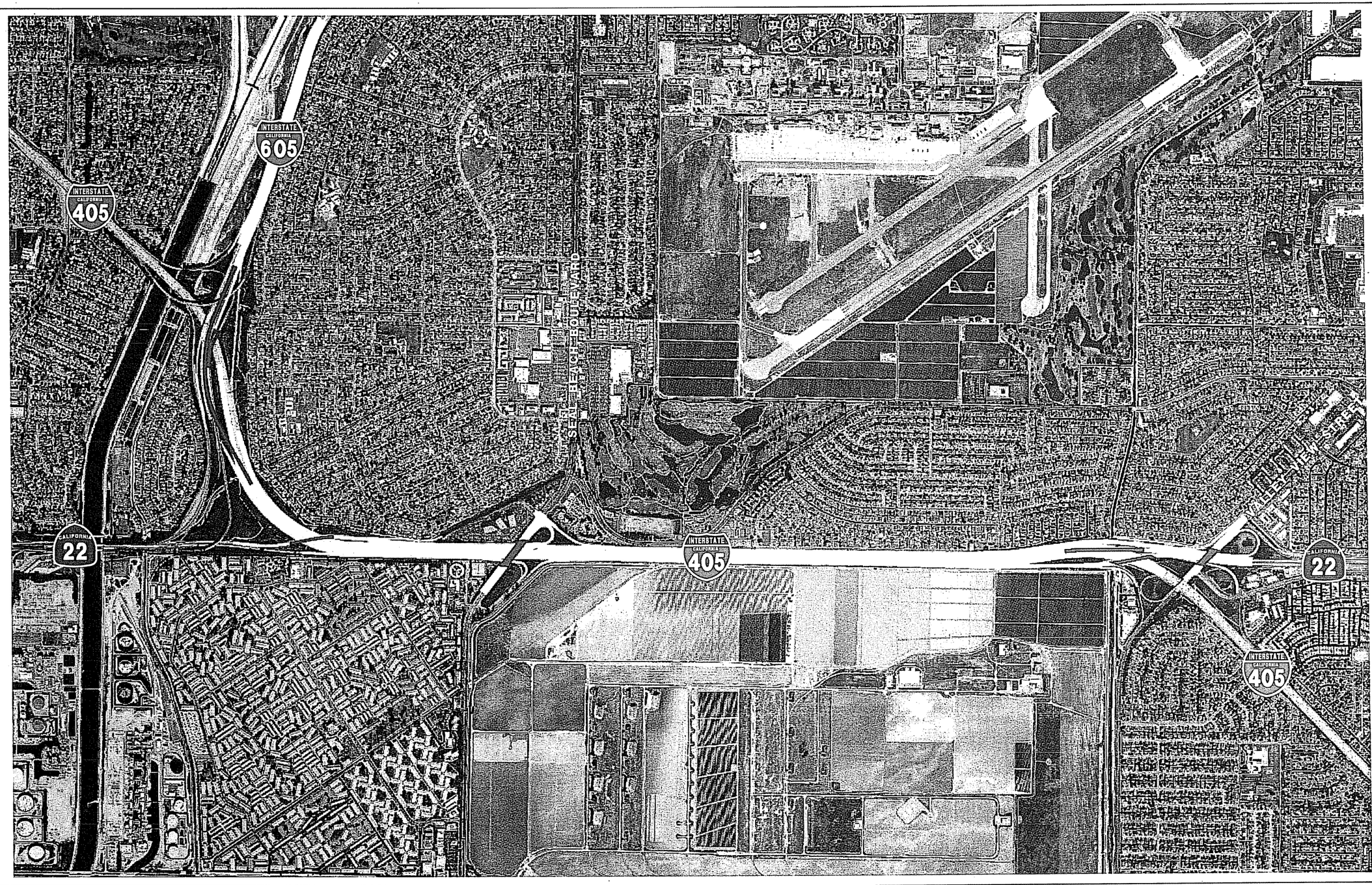
SUMMARY OF LEAD BASED PAINT UTLIZING PAINT CHIP SAMPLE LABORATORY ANALYSIS

XRF #/ Lab Analysis Sample #	Test Location(s)	Color	TTLC Lead/ Chromium (mg/Kg)	STLC Lead/ Chromium (mg/L)	TCLP Lead/ Chromium (mg/L)	Approx. Quantity (feet)
50,511 100846-010/ 100537-001	Inner (left side) Stripe-1-405 Northbound Connector to I-605 Northbound	Yellow	Lead 4,200 Chromium 1,300	Lead 7.6 Chromium 17	Lead 2.8 Chromium ND	2,490
64, 65, 66,67, 154, 1561 101314-0041 100537-003	Inner (left side) Stripe-1-605 Southbound Connector to I-405 Southbound	Yellow	Lead 280 Chromium 65	Lead 8.3 Chromium 11.0	Lead 0.94 Chromium ND	4,600
81, 1181 100846-001/ 100537-005	Median Stripe-Seal Beach Blvd Westbound	Yellow	Lead 13,000 Chromium 3,100	Lead 13 Chromium 14	Lead 0.74 Chromium ND	1,250
92, 1211 100846-0041 100537-008	Median Stripe-Seal Beach Blvd Eastbound	Yellow	Lead 120,000 Chromium 28,000	Lead 82.0 Chromium 130	Lead 3.5 Chromium 0.75	600
1261 100846-0061 100537-016	Median Stripe-Valley View Street Westbound	Yellow	Lead 2,800 Chromium 730	Lead 5.0 Chromium 6.4	Lead ND Chromium ND	1,160
1271 100846-0081 100537-019	Median Stripe-Valley View Street Eastbound	Yellow	Lead 3,600 Chromium 940	Lead 16.0 Chromium 16.0	Lead 0.32 Chromium ND	1,080
1281 100846-0071 100537-020	Median Stripe-Valley View Street Eastbound	Black	Lead 51	Lead 110	Lead ND	1,080
1451 101314-003	Shoulder Stripe-Willow Onramp Eastbound to I-605 Northbound	Yellow	Lead 28,000 (XRF)	Lead 8.0 Chromium 12.0	Lead 1.2 Chromium ND	2,400
1671 101314-008	Shoulder Stripe-Willow Onramp Eastbound to I-605 South	Yellow	Lead 12,000 (XRF)	Lead ND Chromium ND	Lead ND Chromium ND	2,100
83, 1191 100537-0071 100846-003	Bike Lane stripe Seal Beach East Side Westbound	White	Lead 3,900 Chromium ND	Lead ND	Lead ND	1,250

FIGURES



TRC	PROJECT: 151396	VICINITY MAP
	FACILITY: WEST COUNTY CONNECTORS PROJECT SEAL BEACH, CALIFORNIA	FIGURE 1

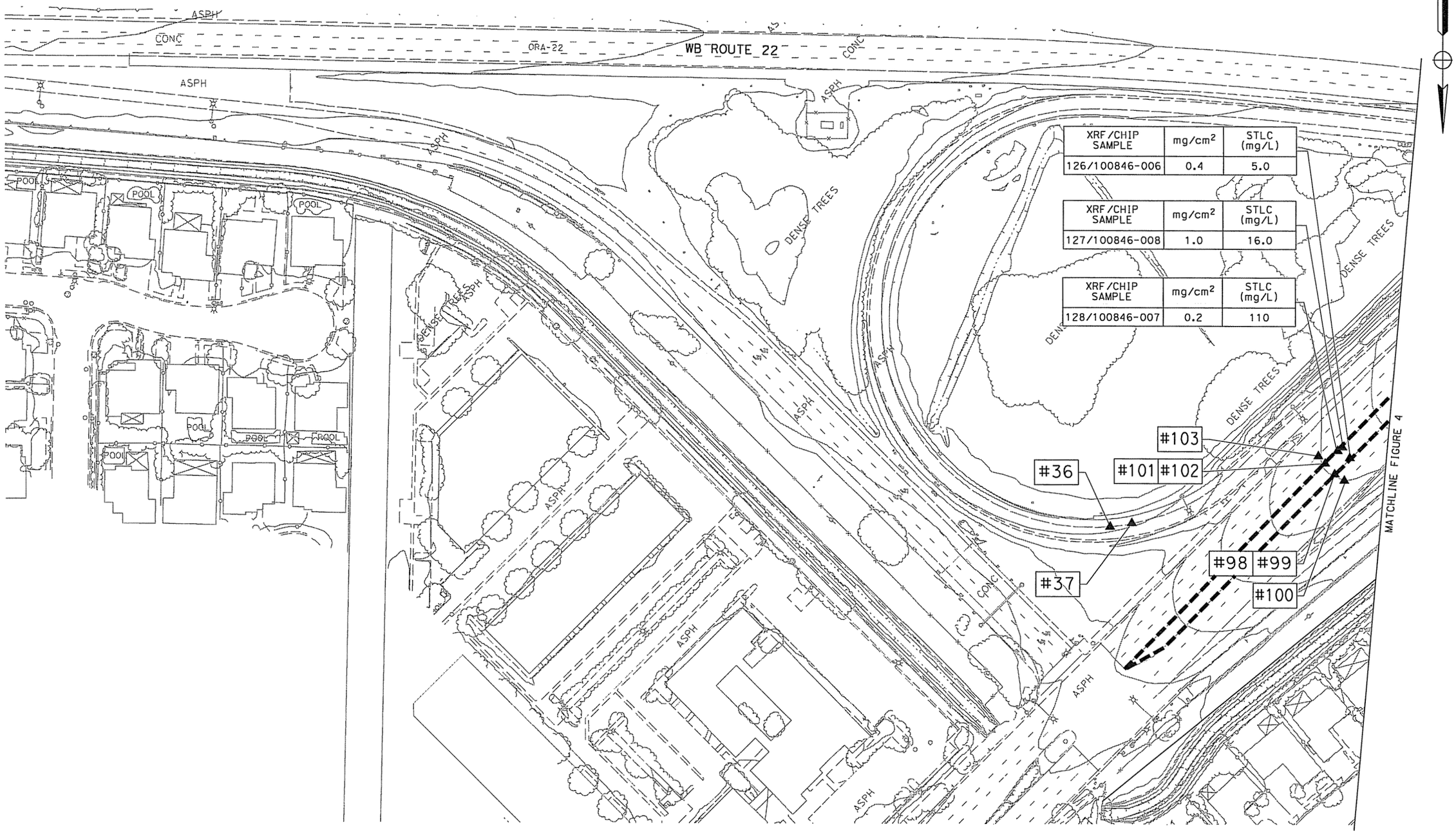


TRC

FIGURE *2*

WEST COUNTY CONNECTORS
PROJECT LIMITS

WEST COUNTY CONNECTORS
22
405
605
Get Connected



XRF/CHIP SAMPLE	mg/cm²	STLC (mg/L)
126/100846-006	0.4	5.0

XRF/CHIP SAMPLE	mg/cm²	STLC (mg/L)
127/100846-008	1.0	16.0

XRF/CHIP SAMPLE	mg/cm²	STLC (mg/L)
128/100846-007	0.2	110

LEGEND:

- mg/cm^2 = Milligrams per square centirneter
- STLC = Soluble Threshold Limit Concentrotion
- #XX = XRF Sample Number
- ▬ ▬ ▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-003.dgn

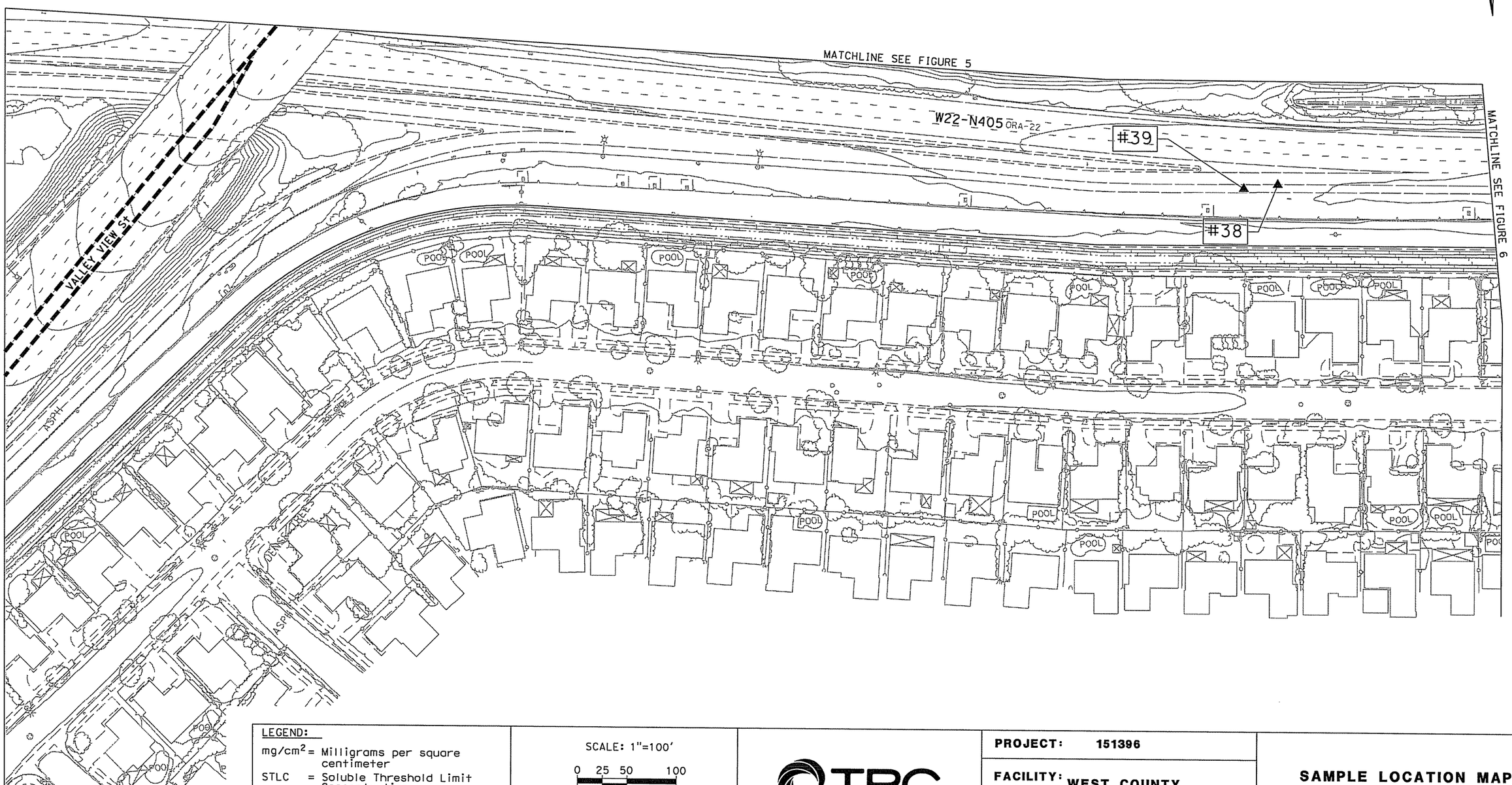
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 3



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

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DGN FILE => ...\stripe-ADL\STRP-ADL-004.dgn

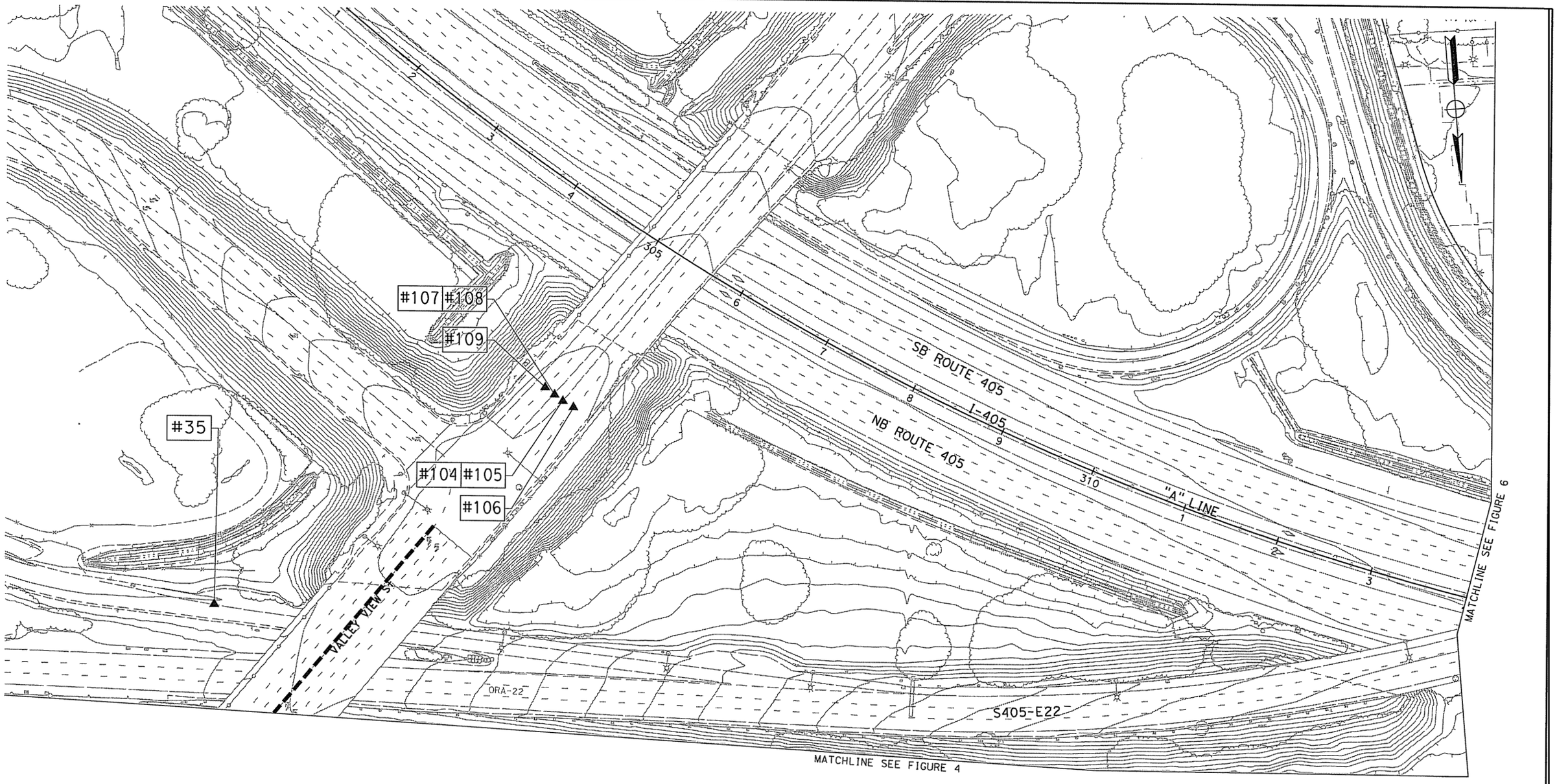
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 4



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

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DGN FILE => ...\stripe-ADL\STRP-ADL-005.dgn

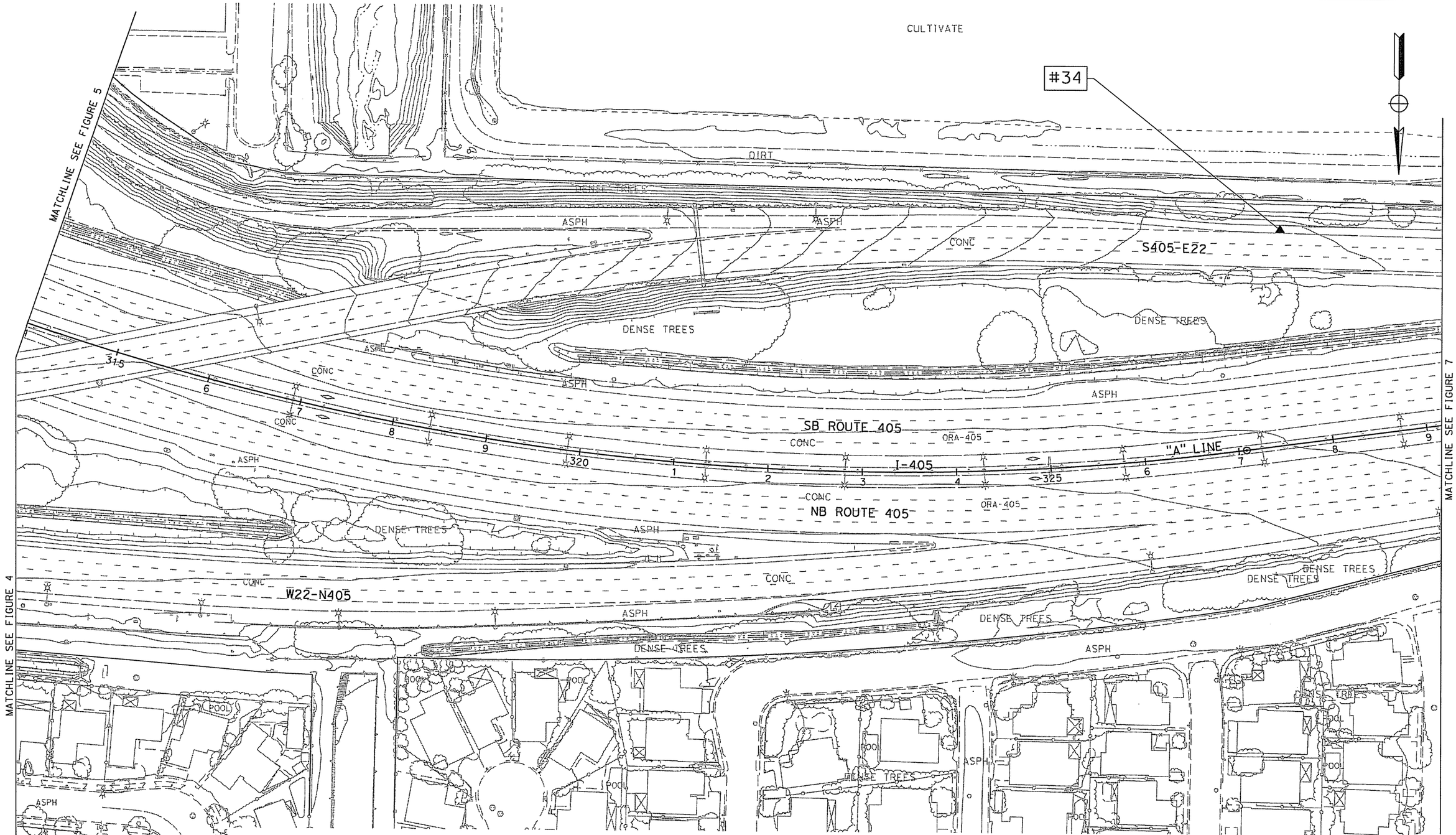
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 5



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

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USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-006.dgn

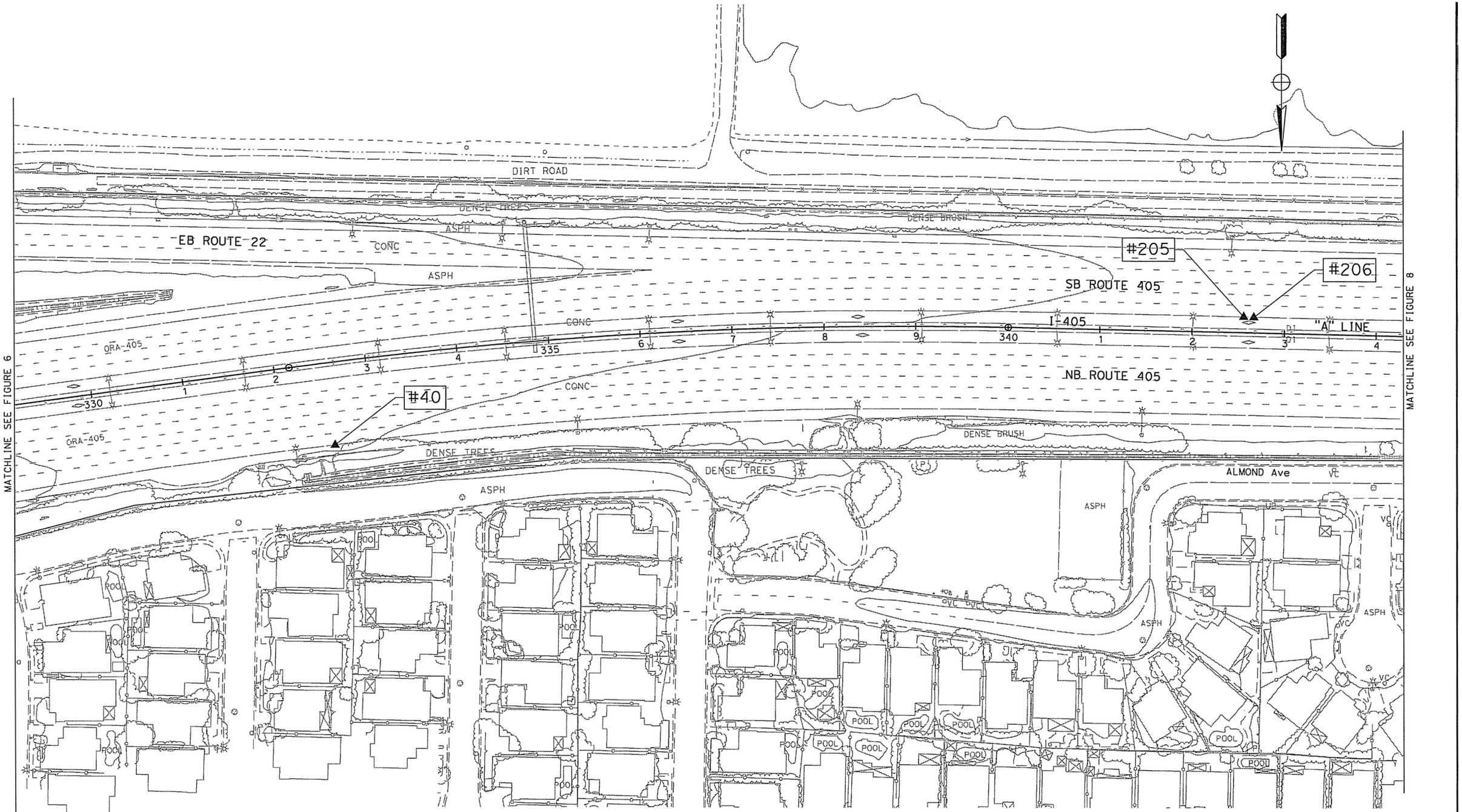
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 6



LEGEND:

mg/cm² = Milligrams per square centimeter

STLC = Soluble Threshold Limit Concentration

#XX = XRF Sample Number

▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-007.dgn

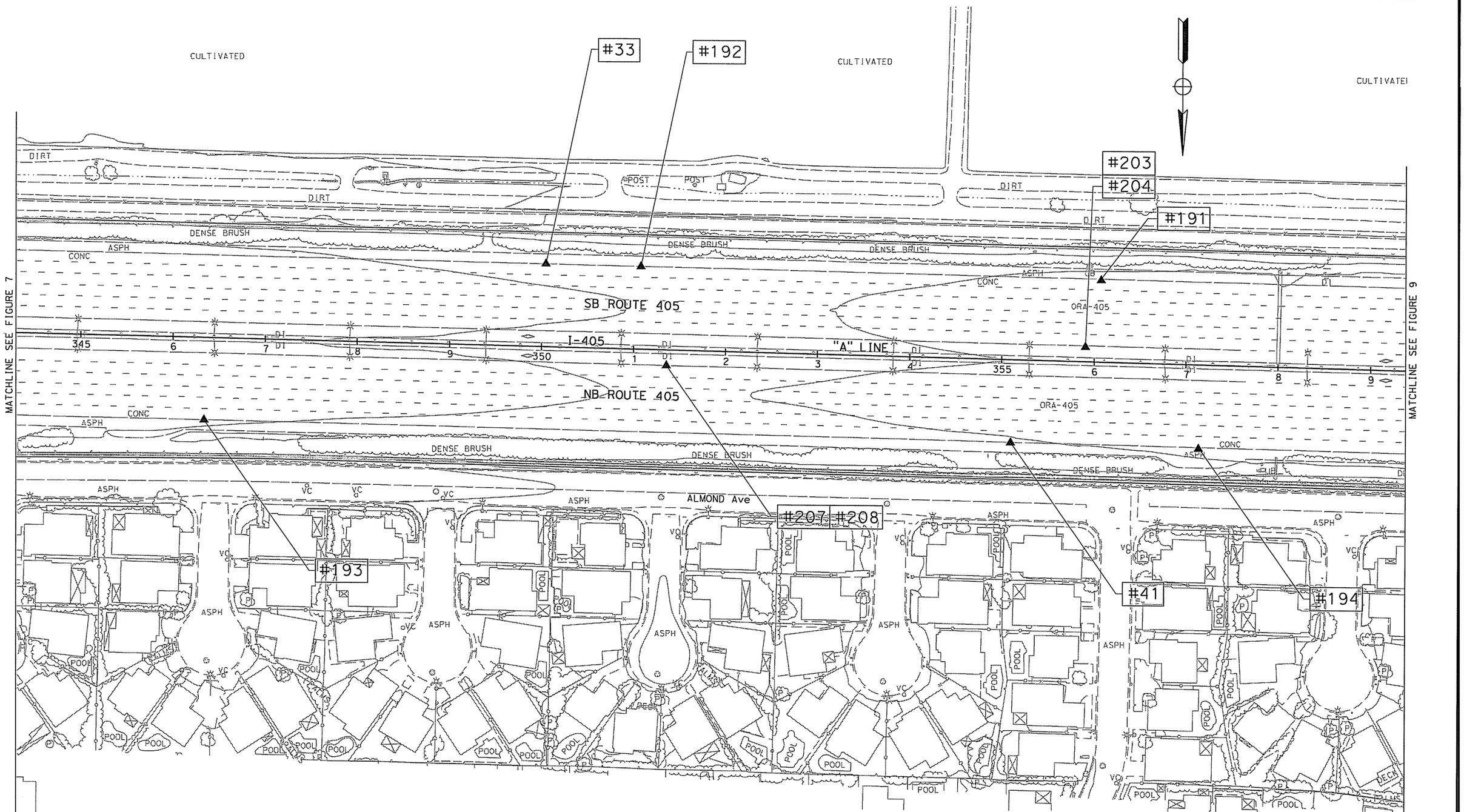
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 7



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-008.dgn

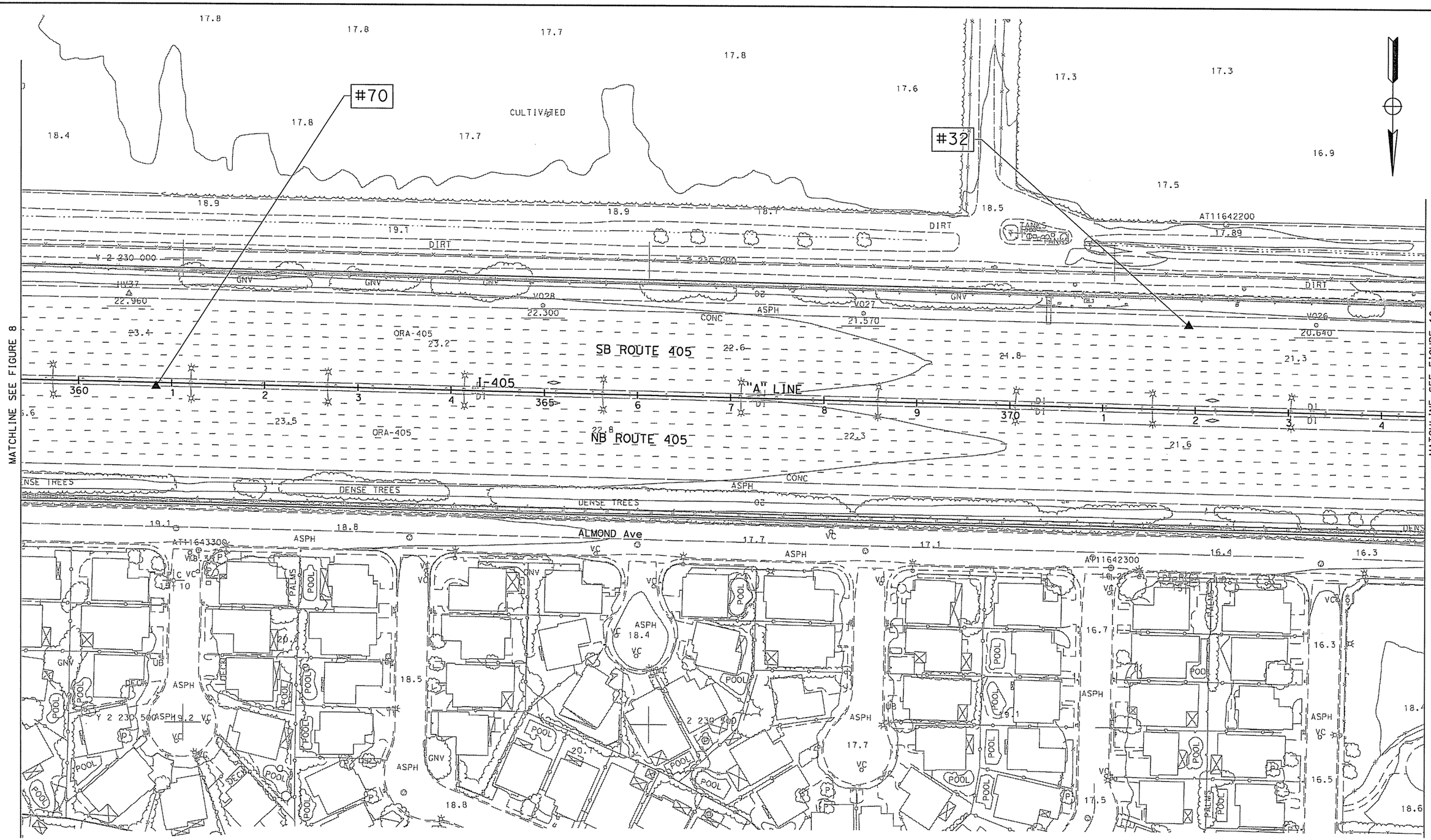
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 8



LEGEND:

- mg/cm² = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-009.dgn

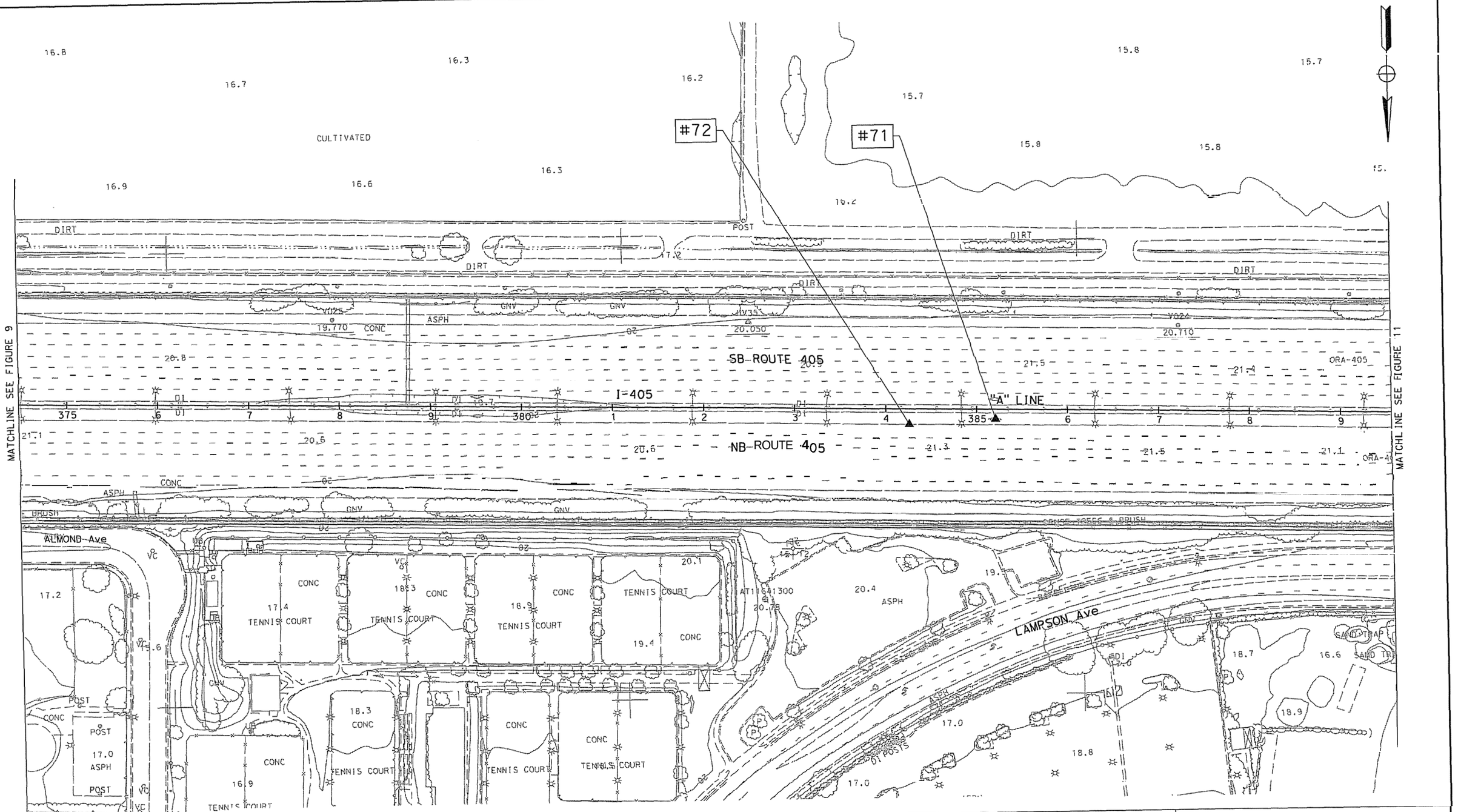
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 9



LEGEND:

mg/cm² = Milligrams per square centimeter

STLC = Soluble Threshold Limit Concentration

#XX = XRF Sample Number

▬ ▪ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-010.dgn

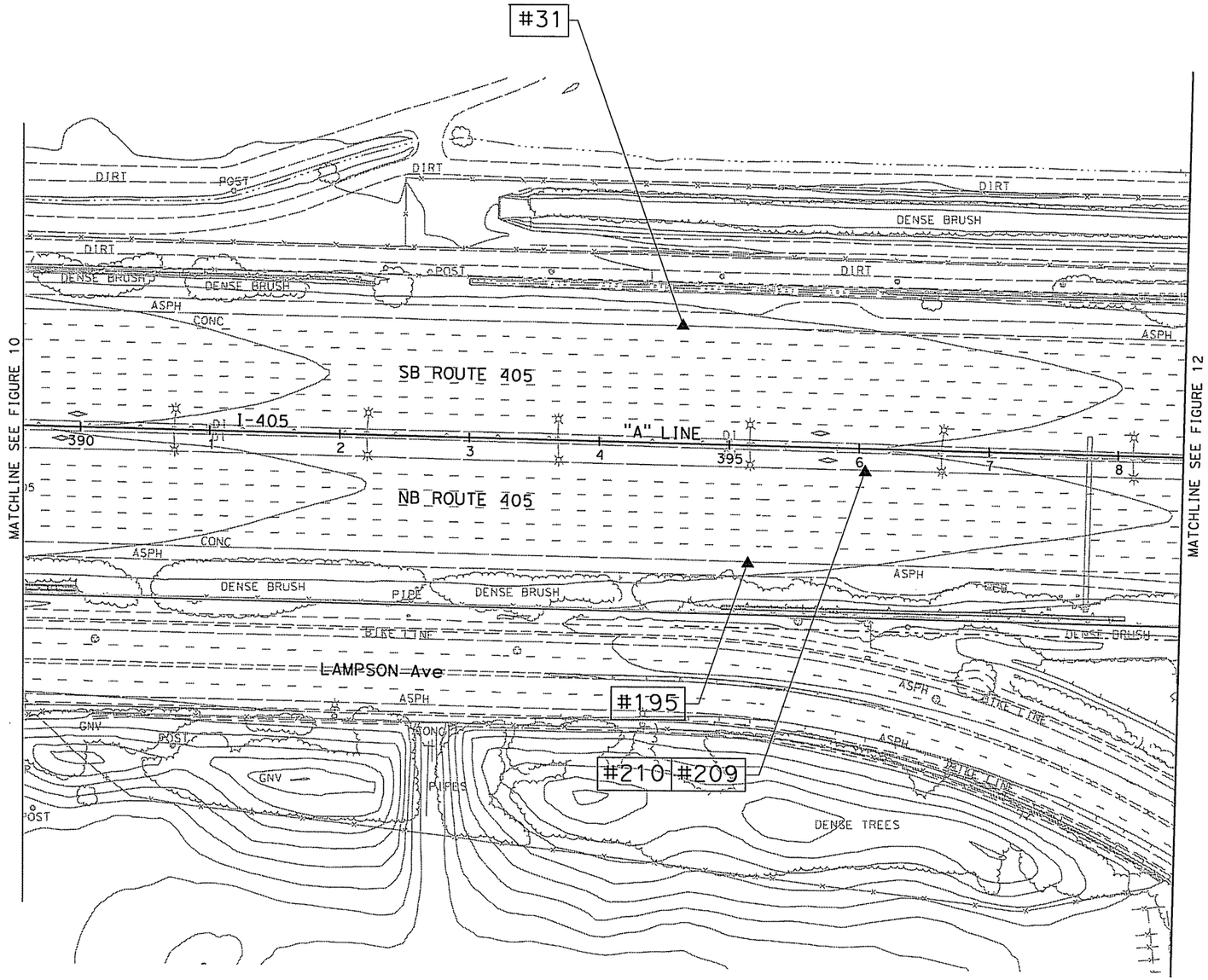
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 10



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME =>smonivong
DGN FILE =>...\stripe-ADL\STRP-ADL-011.dgn

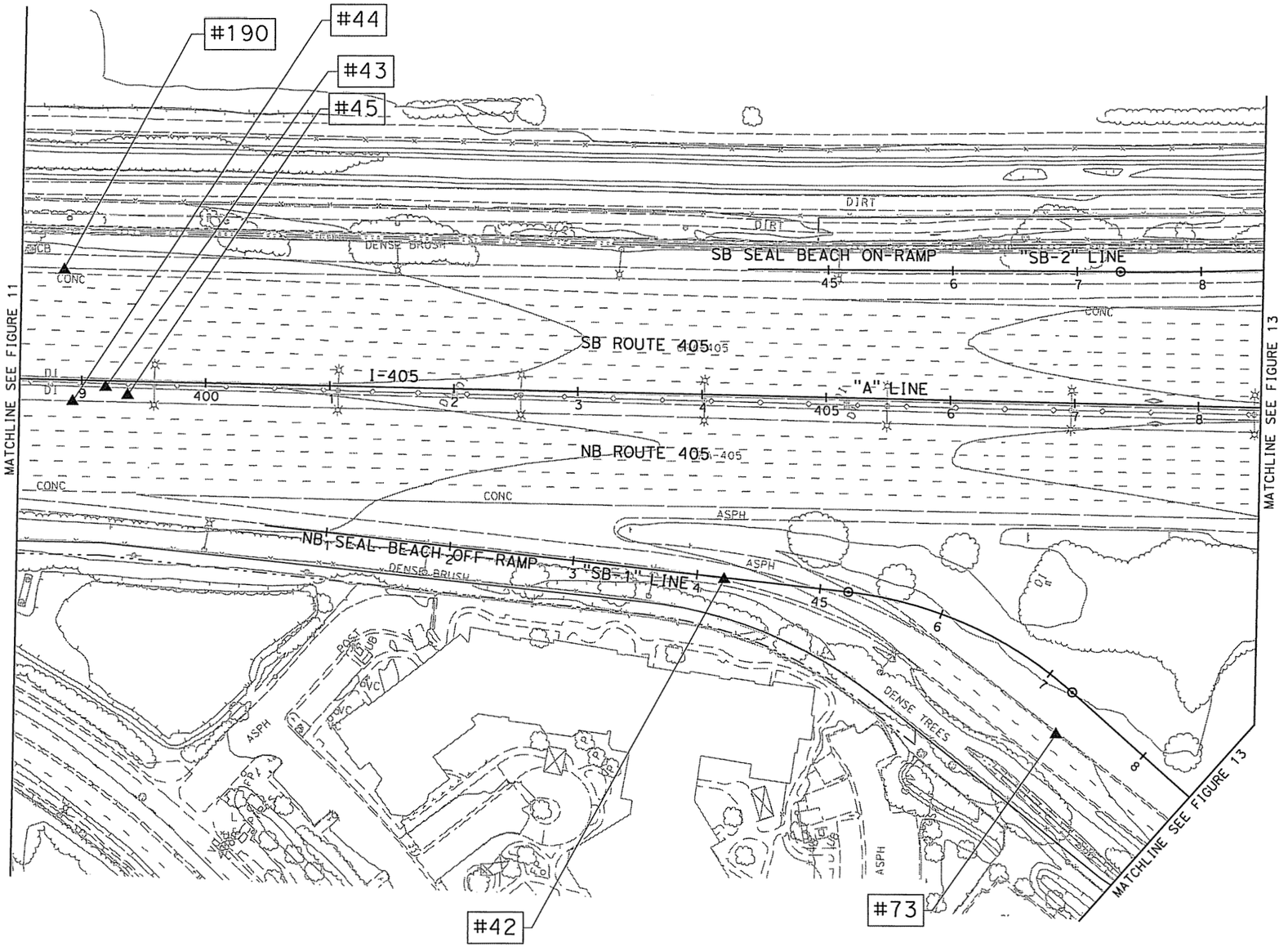
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 11



LEGEND:

- mg/cm^2 = Milligrams per squore centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Bosed Point Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-012.dgn

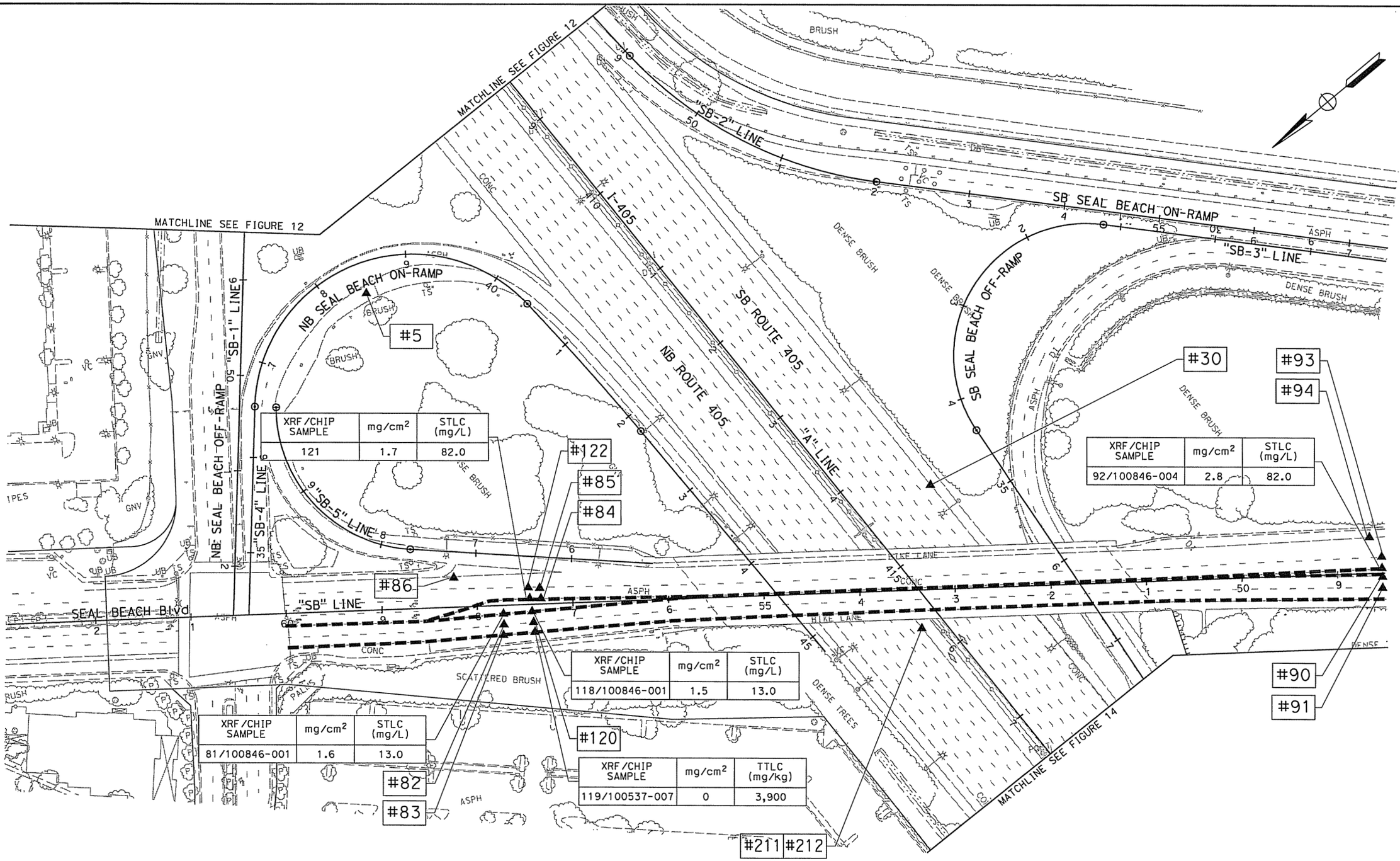
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 12



LEGEND:

mg/cm² = Milligrams per square centimeter
STLC = Soluble Threshold Limit Concentration
#XX = XRF Sample Number
■■■■ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-013.dgn

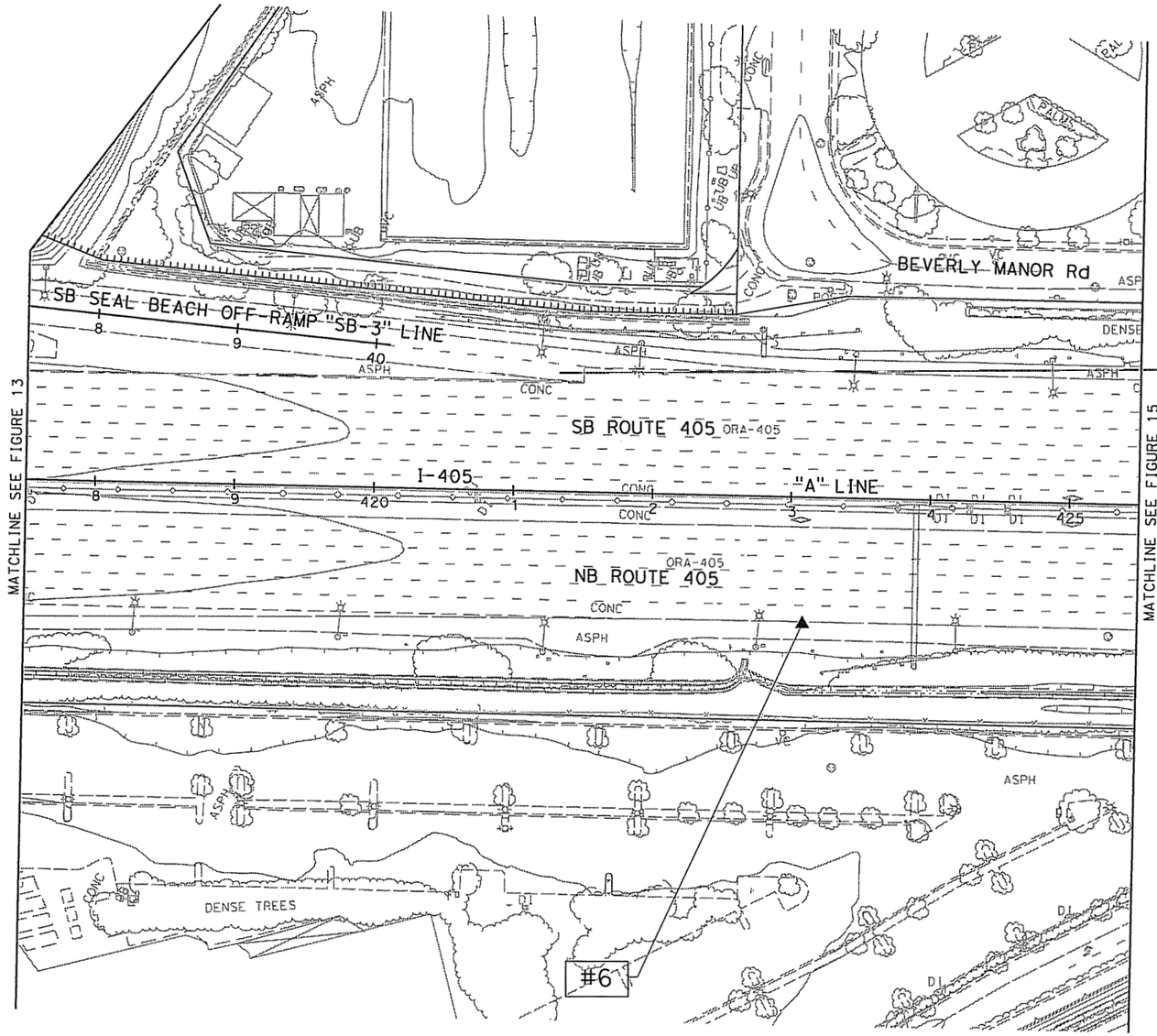
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 13



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-014.dgn

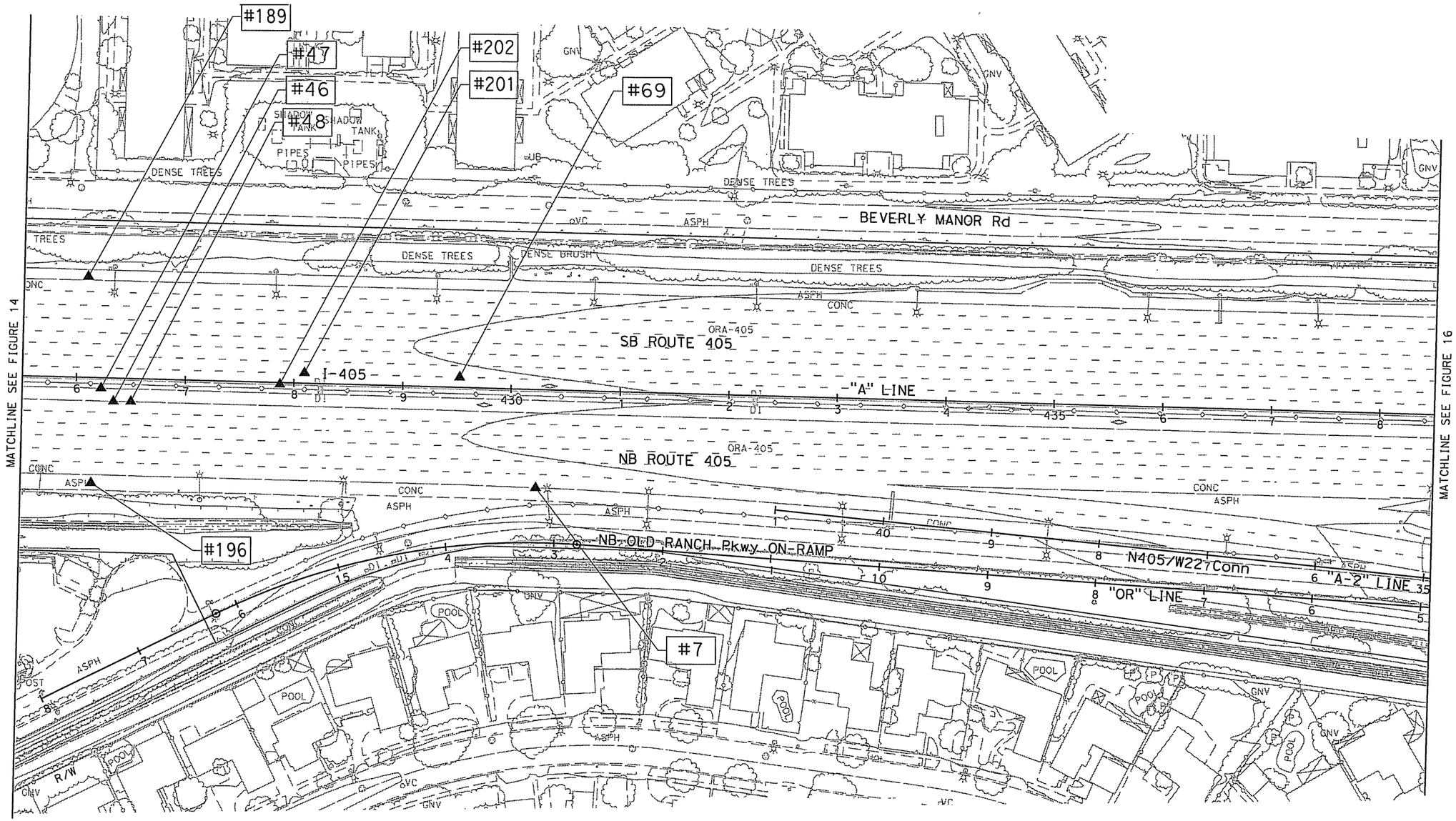
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 14



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Point Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-015.dgn

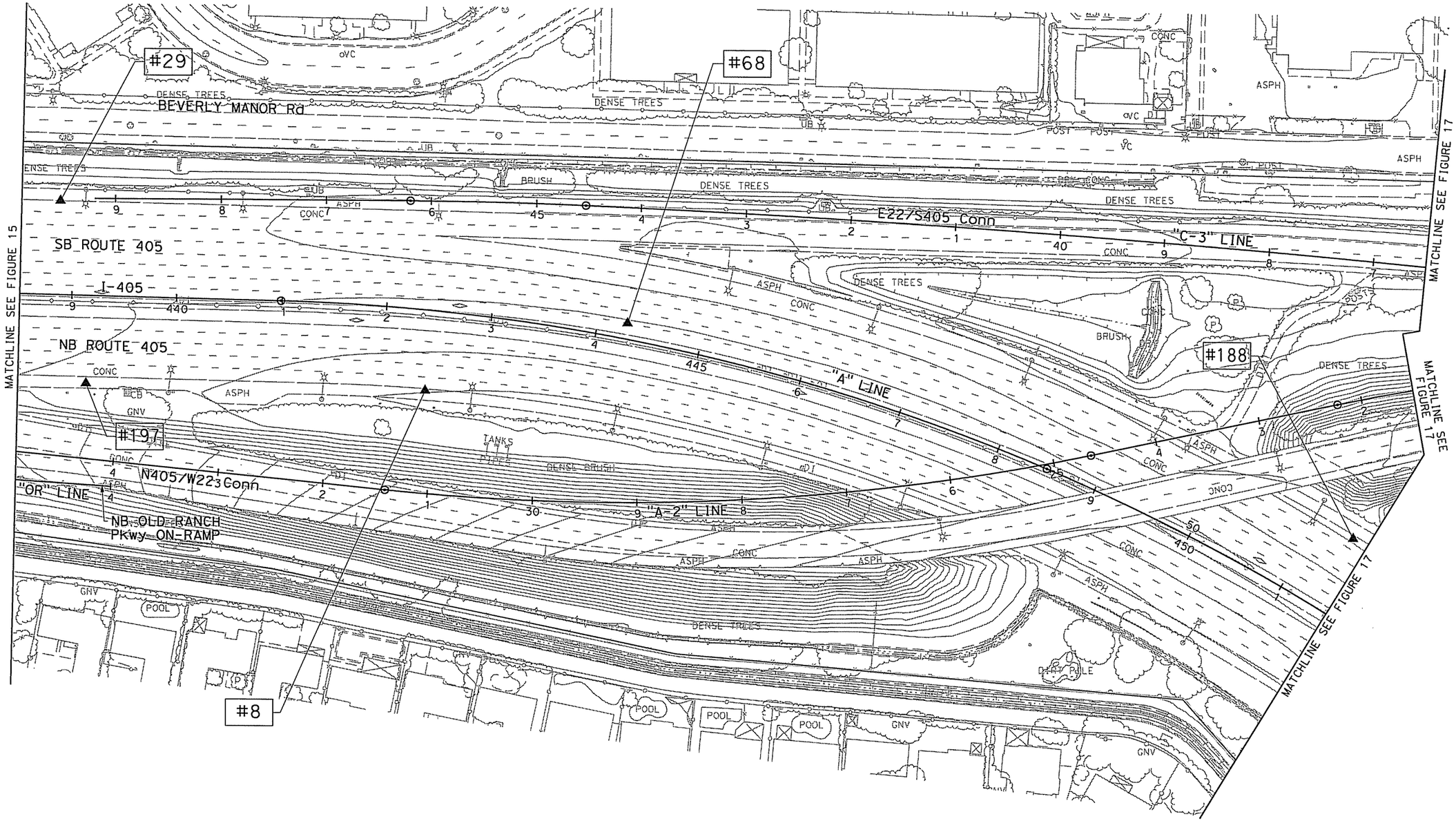
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 15



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-016.dgn

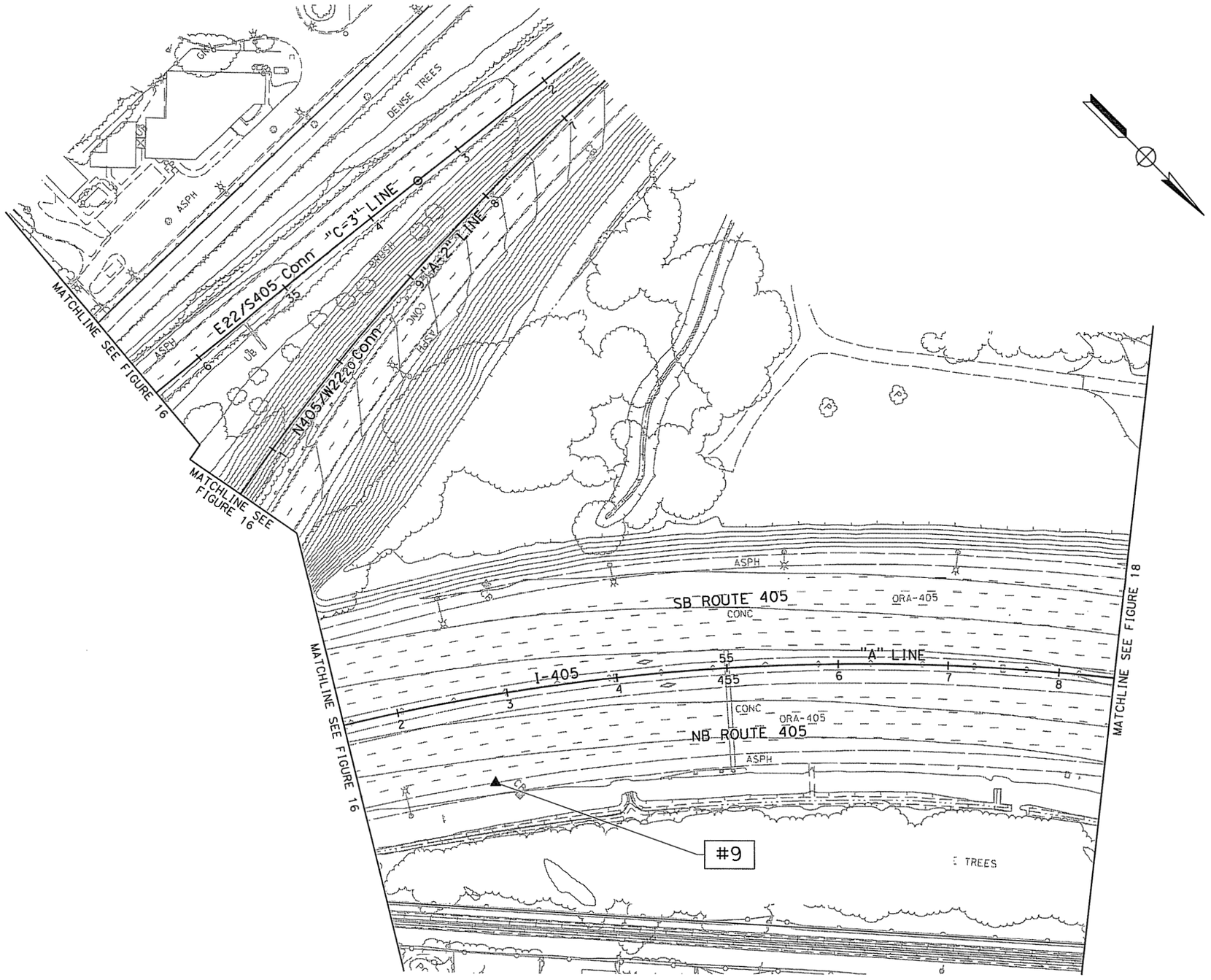
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 16



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Point Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-017.dgn

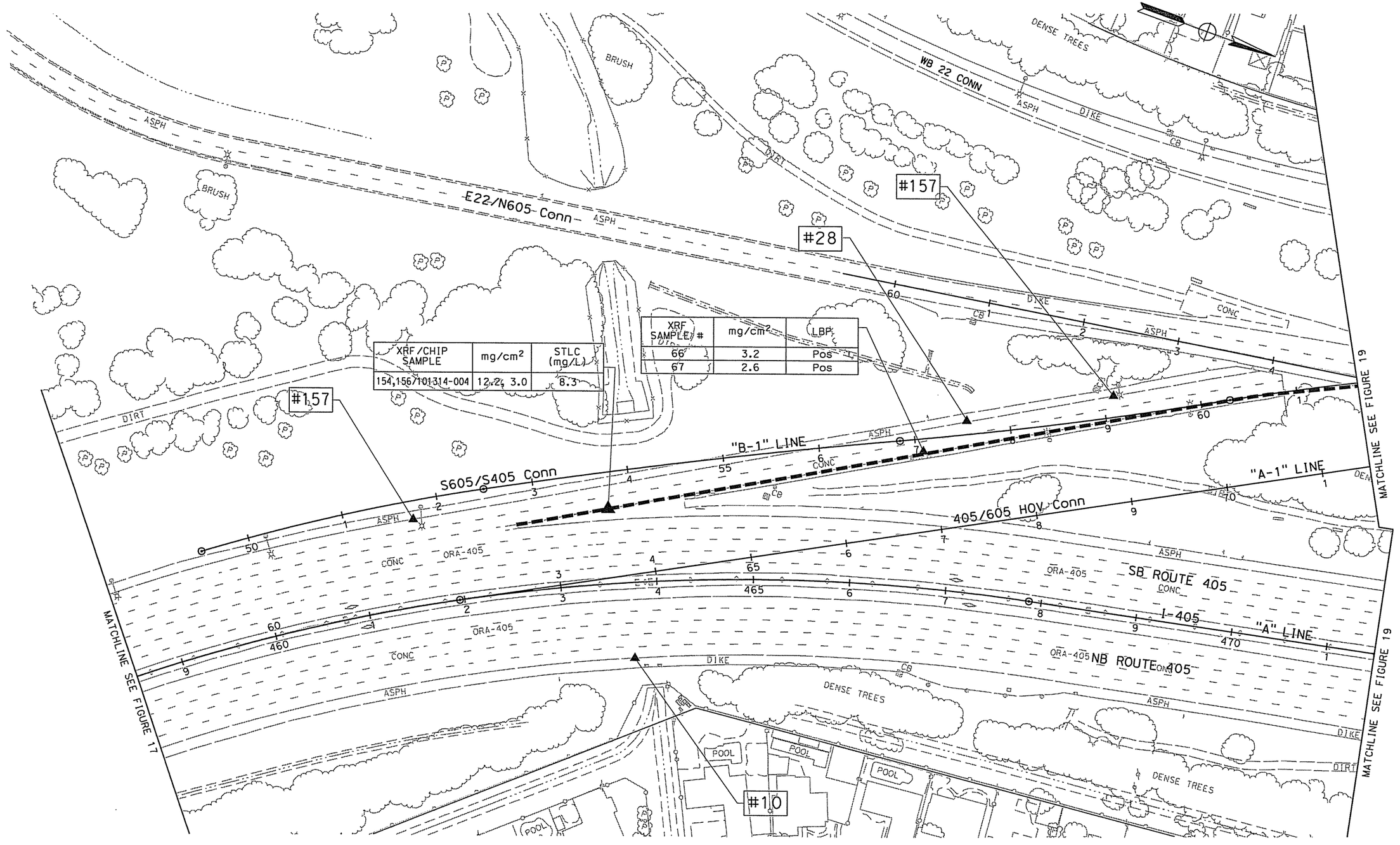
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 17



XRF/CHIP SAMPLE	mg/cm²	STLC (mg/L)
154,156/101314-004	12.2, 3.0	8.3

XRF SAMPLE/#	mg/cm²	LBP
66	3.2	Pos
67	2.6	Pos

LEGEND:

- mg/cm² = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-018.dgn

TRC

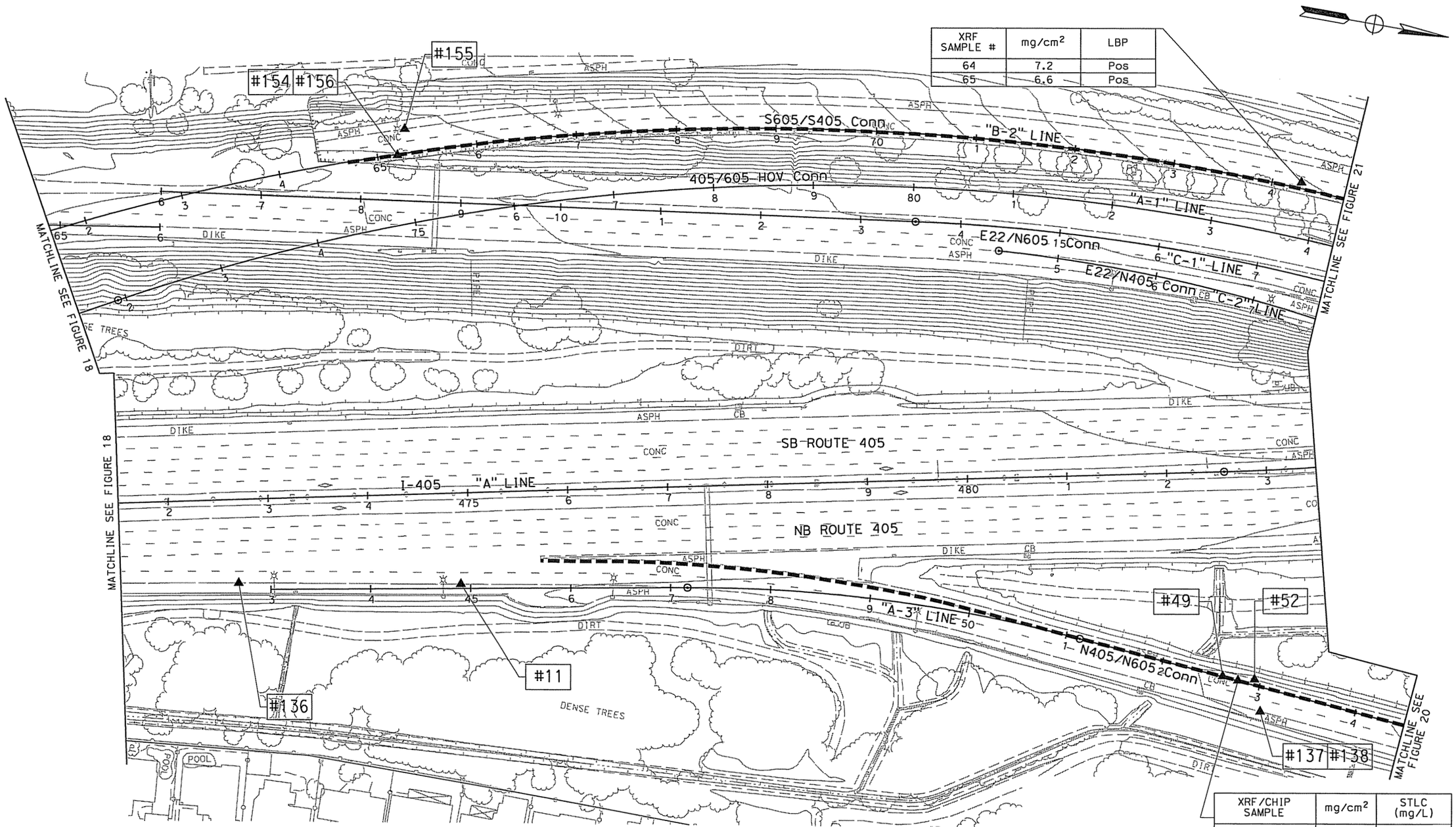
PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 18

XRF SAMPLE #	mg/cm²	LBP
64	7.2	Pos
65	6.6	Pos



XRF/CHIP SAMPLE	mg/cm²	STLC (mg/L)
50,51/100846-010	4.3, 4.8	7.6

LEGEND:

mg/cm² = Milligrams per square centimeter
STLC = Soluble Threshold Limit Concentration
#XX = XRF Sample Number
■ ■ ■ ■ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-019.dgn

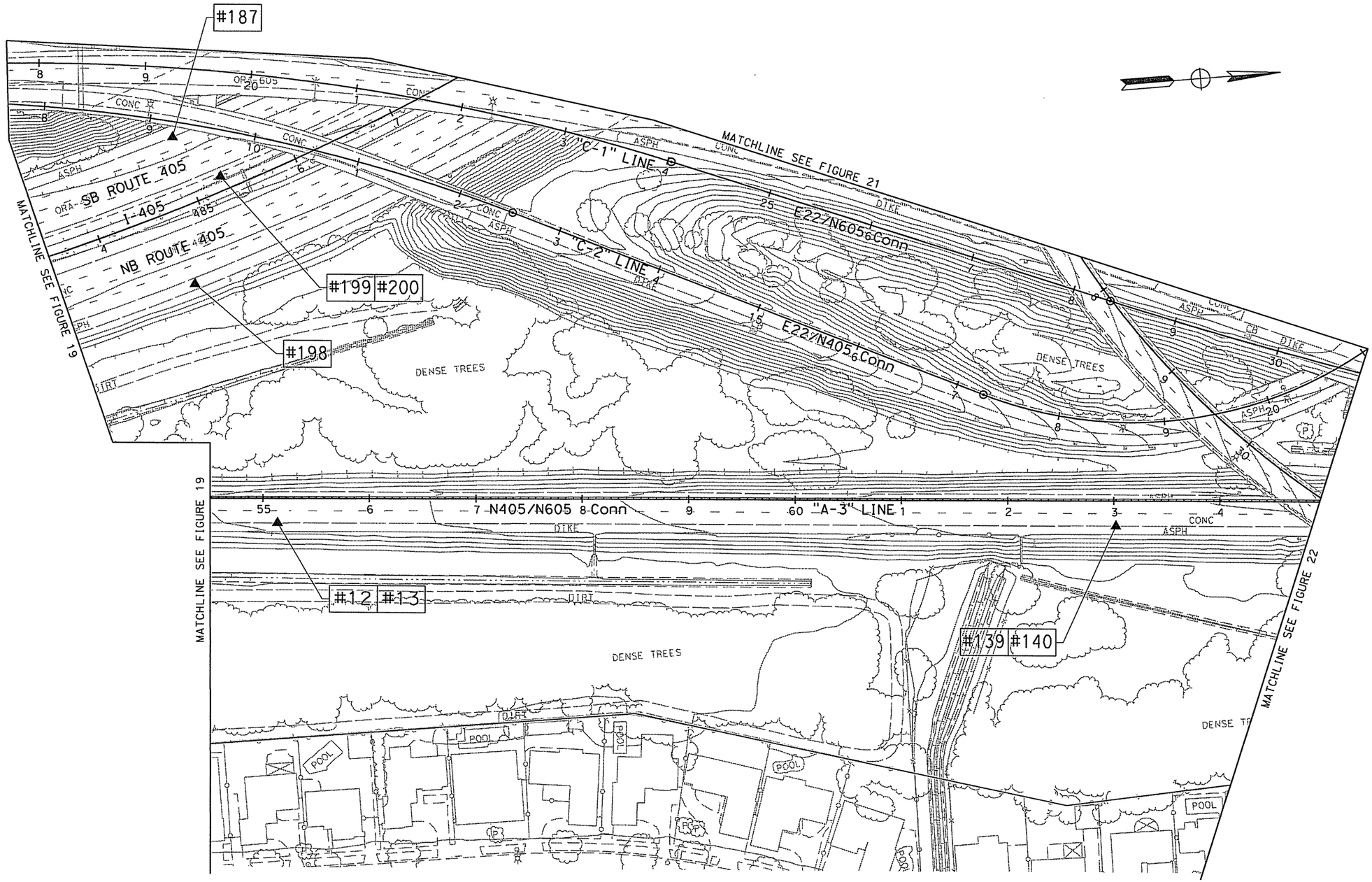
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 19



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-020.dgn

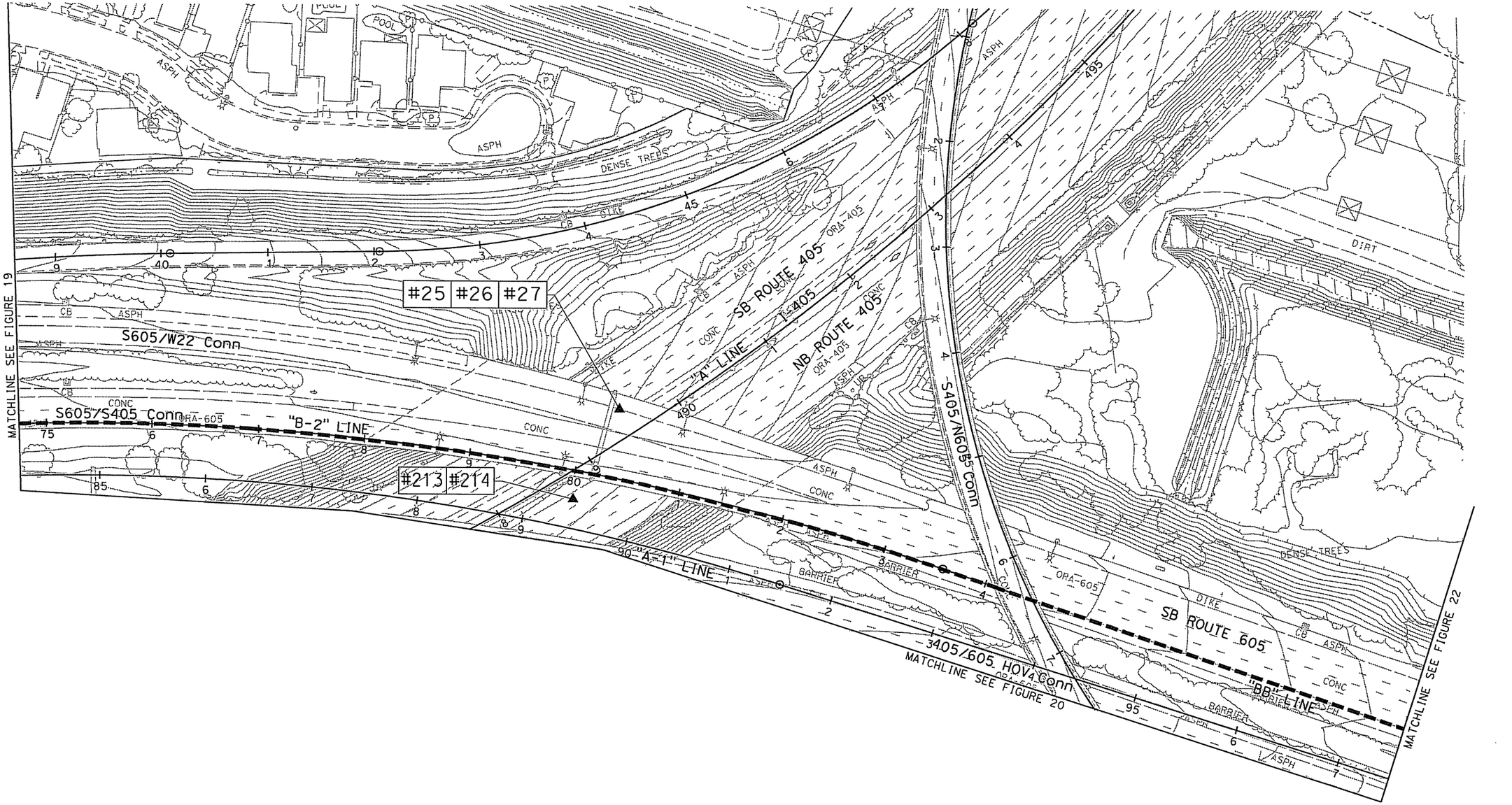
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 20



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-021.dgn

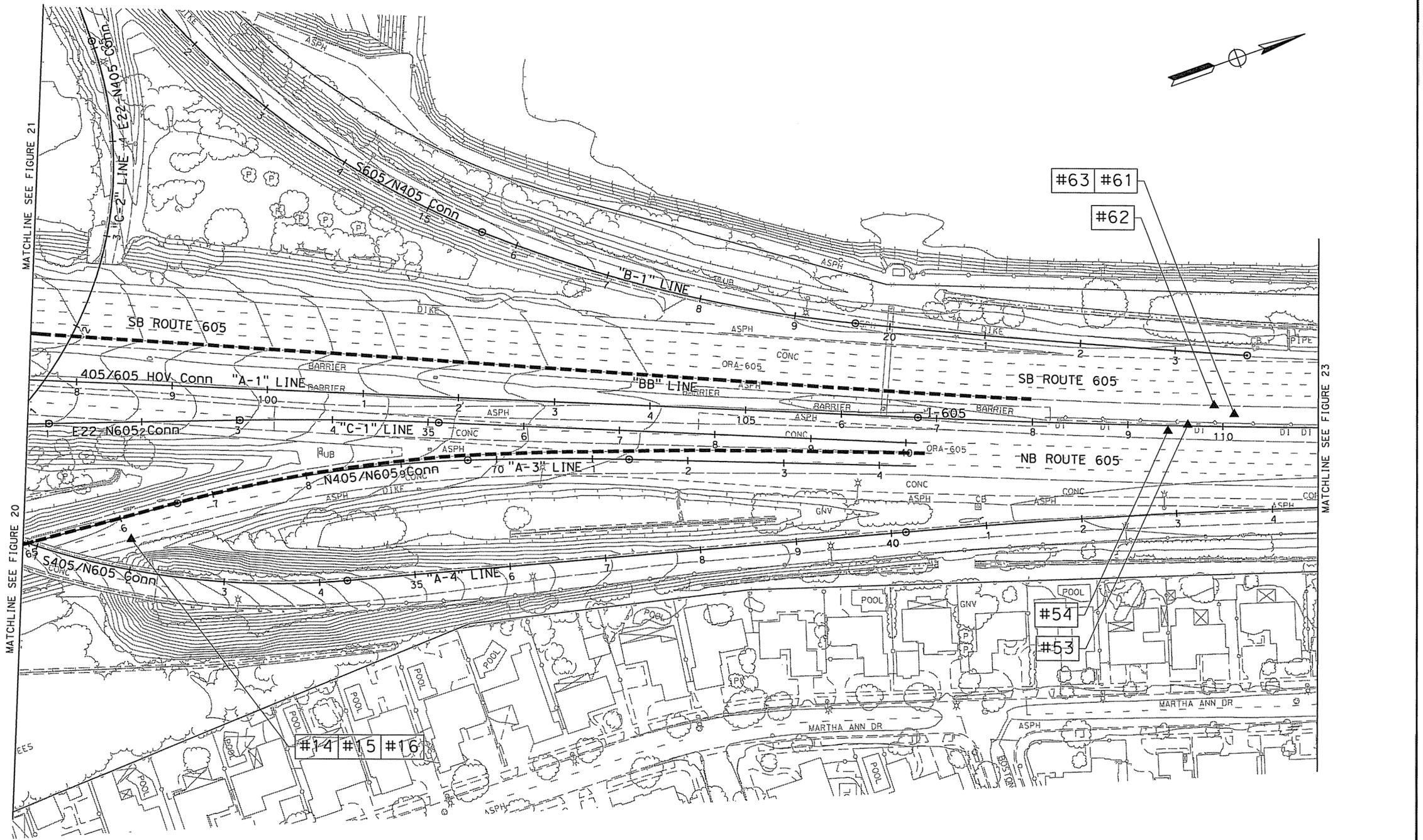
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 21



LEGEND:

- mg/cm^2 = Milligrams per squore centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬ ▬ ▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-022.dgn

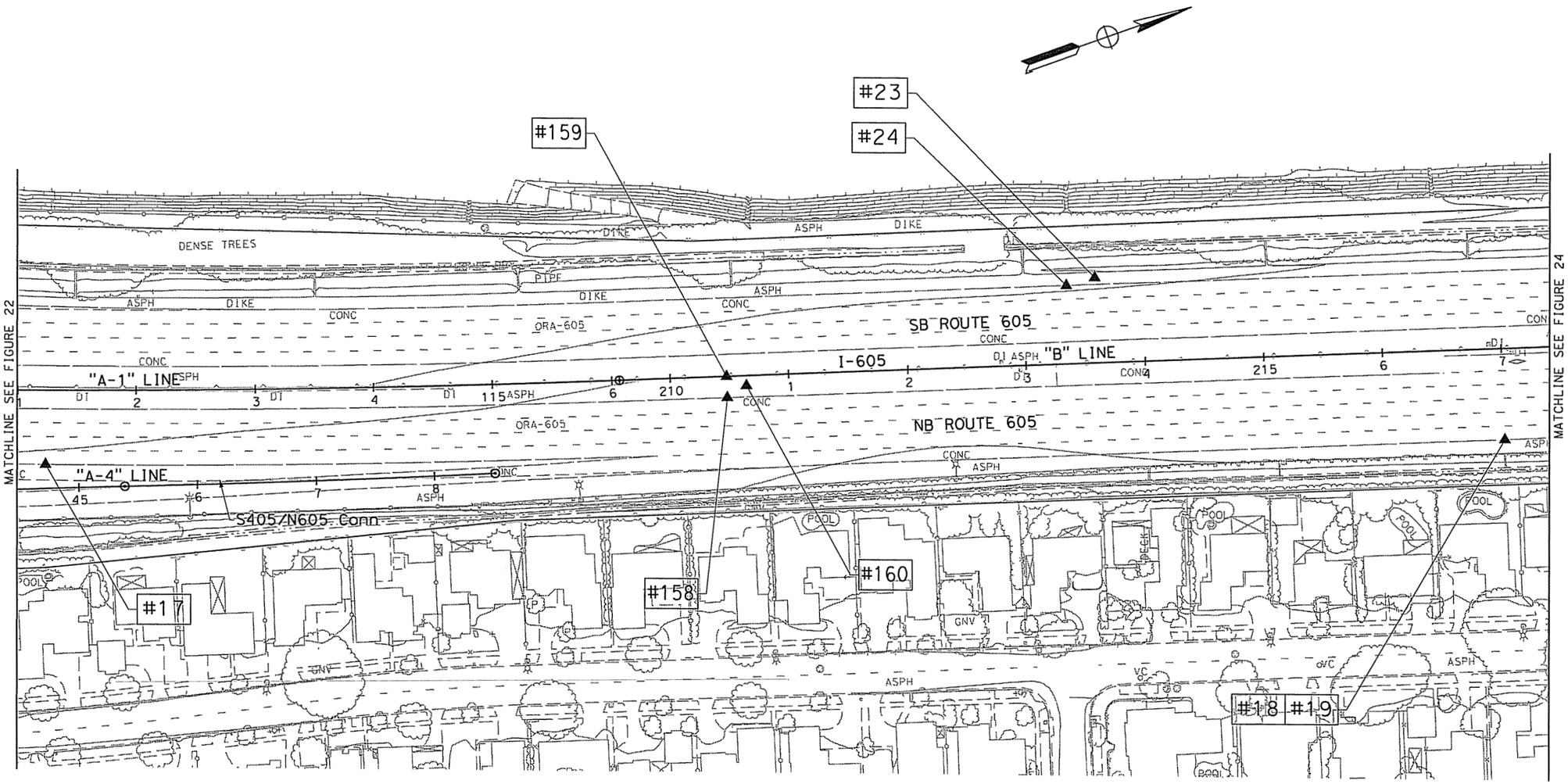
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 22



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-023.dgn

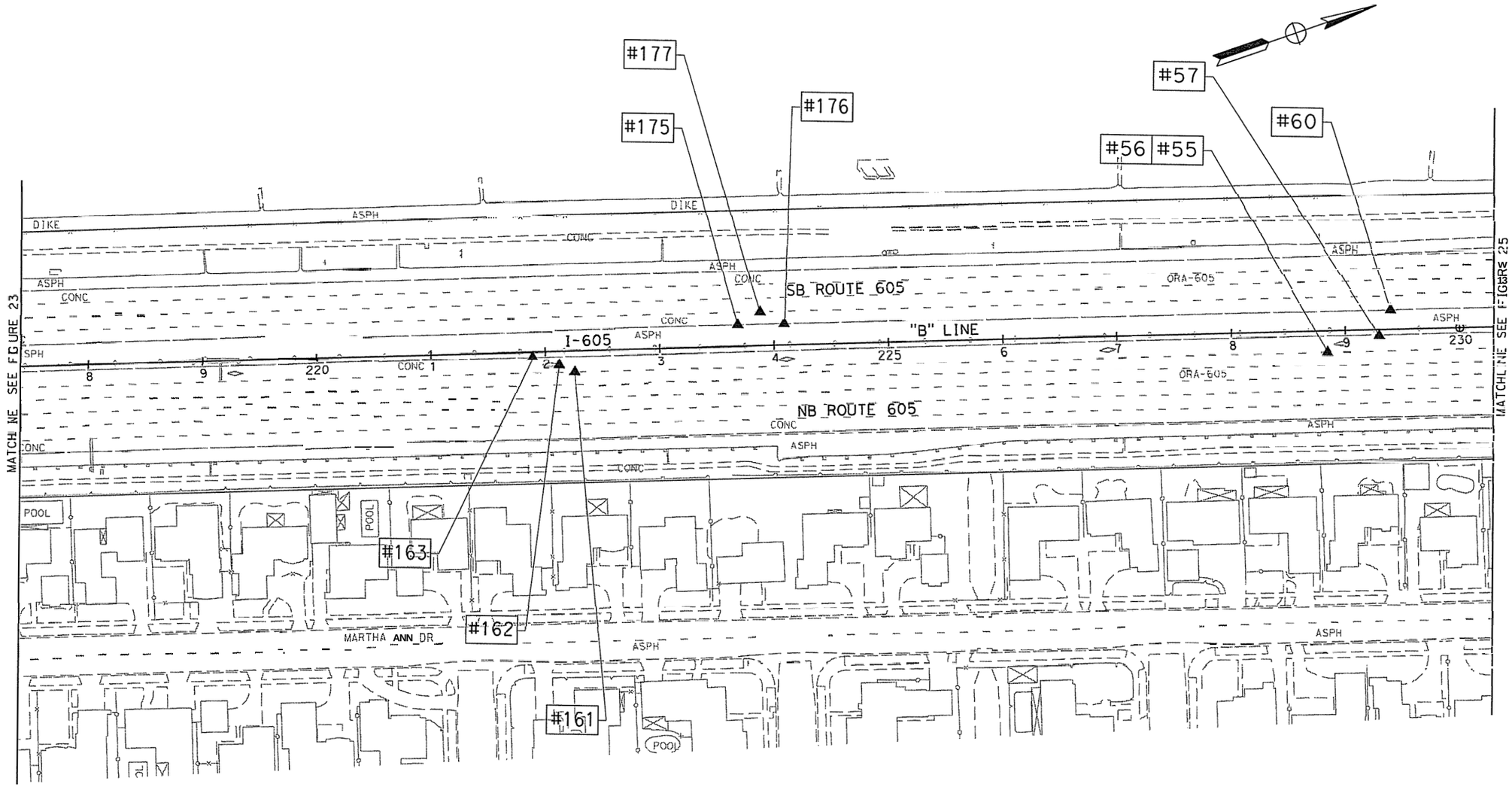
TRC

PROJECT: 151398

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 23



LEGEND:

mg/cm² = Milligrams per square centimeter
STLC = Soluble Threshold Limit Concentration
#XX = XRF Sample Number
■■■■ = Lead Based Point Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-024.dgn

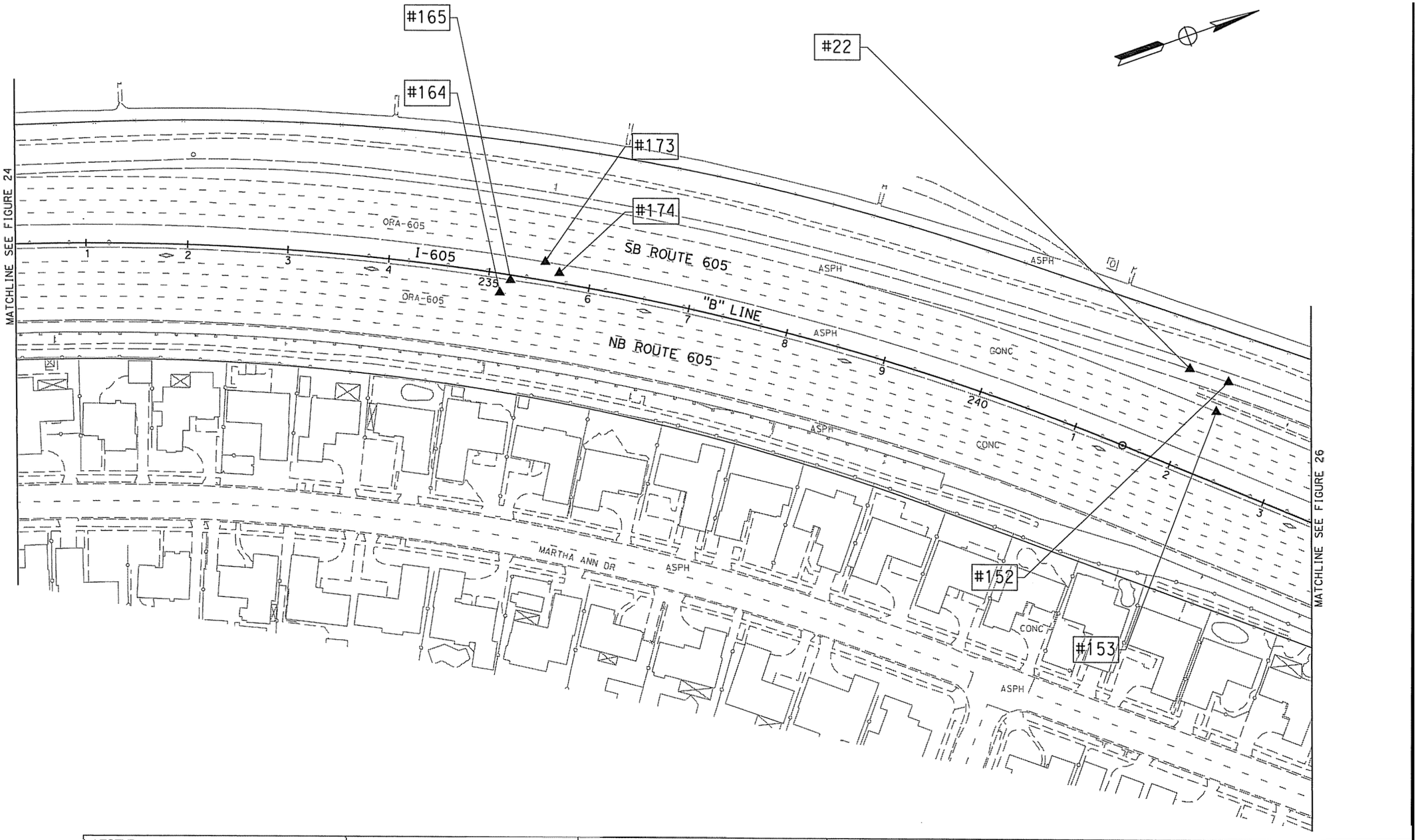
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT
ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 24



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬ ▬ ▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-025.dgn

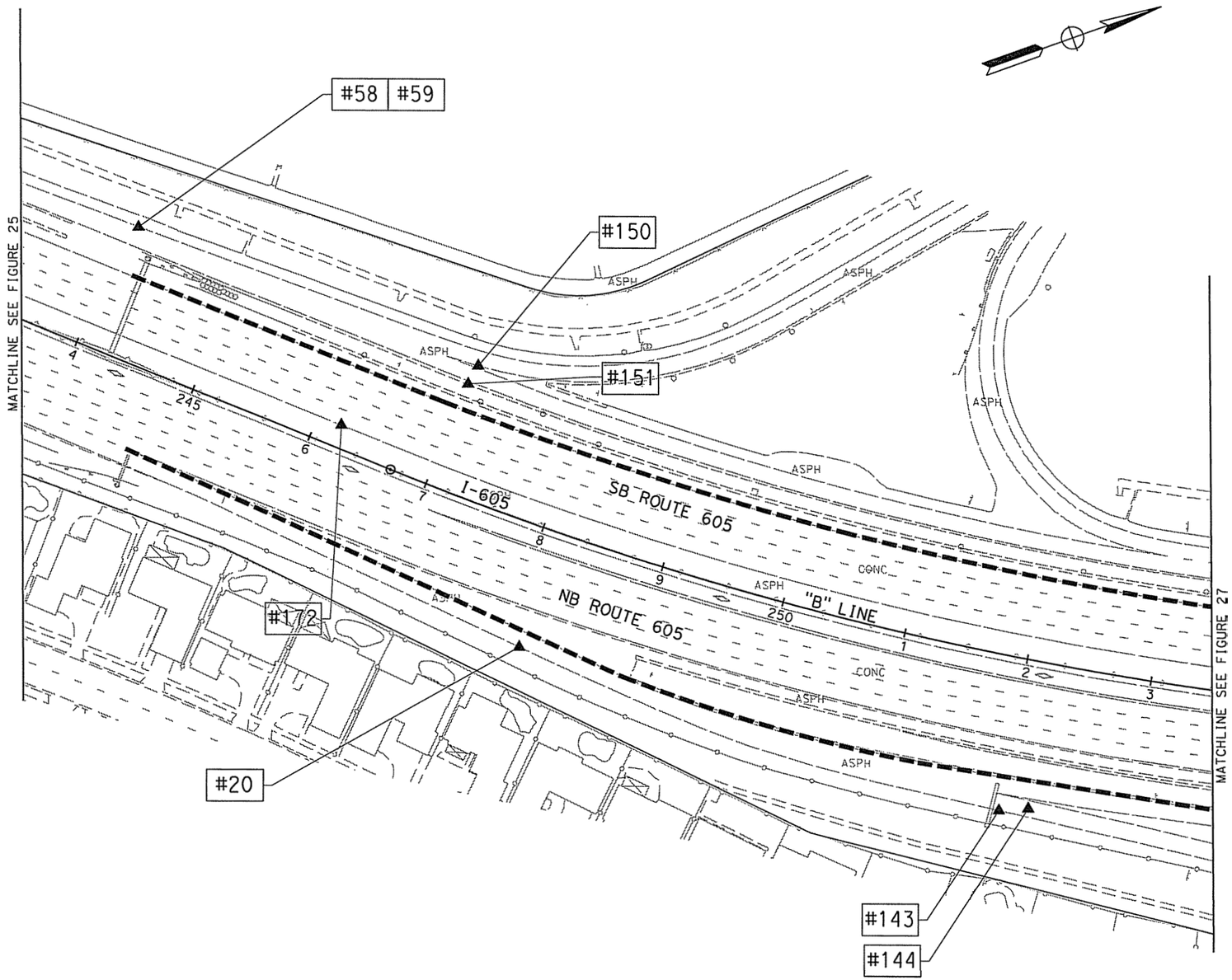
TRC

PROJECT: 151396

WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 25



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-026.dgn

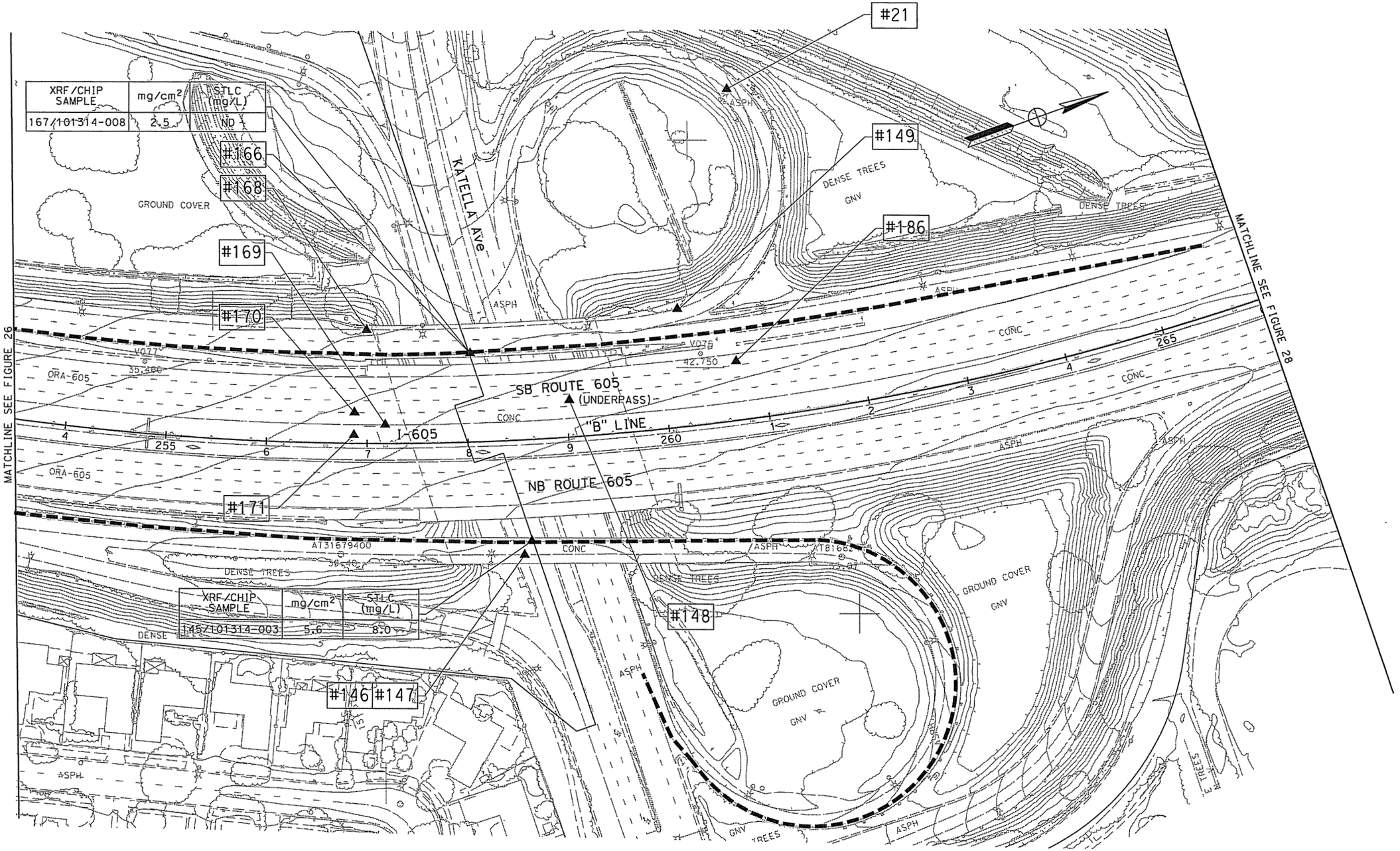
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 26



LEGEND:

mg/cm^2 = Milligrams per square centimeter

STLC = Soluble Threshold Limit Concentration

#XX = XRF Sample Number

▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-027.dgn

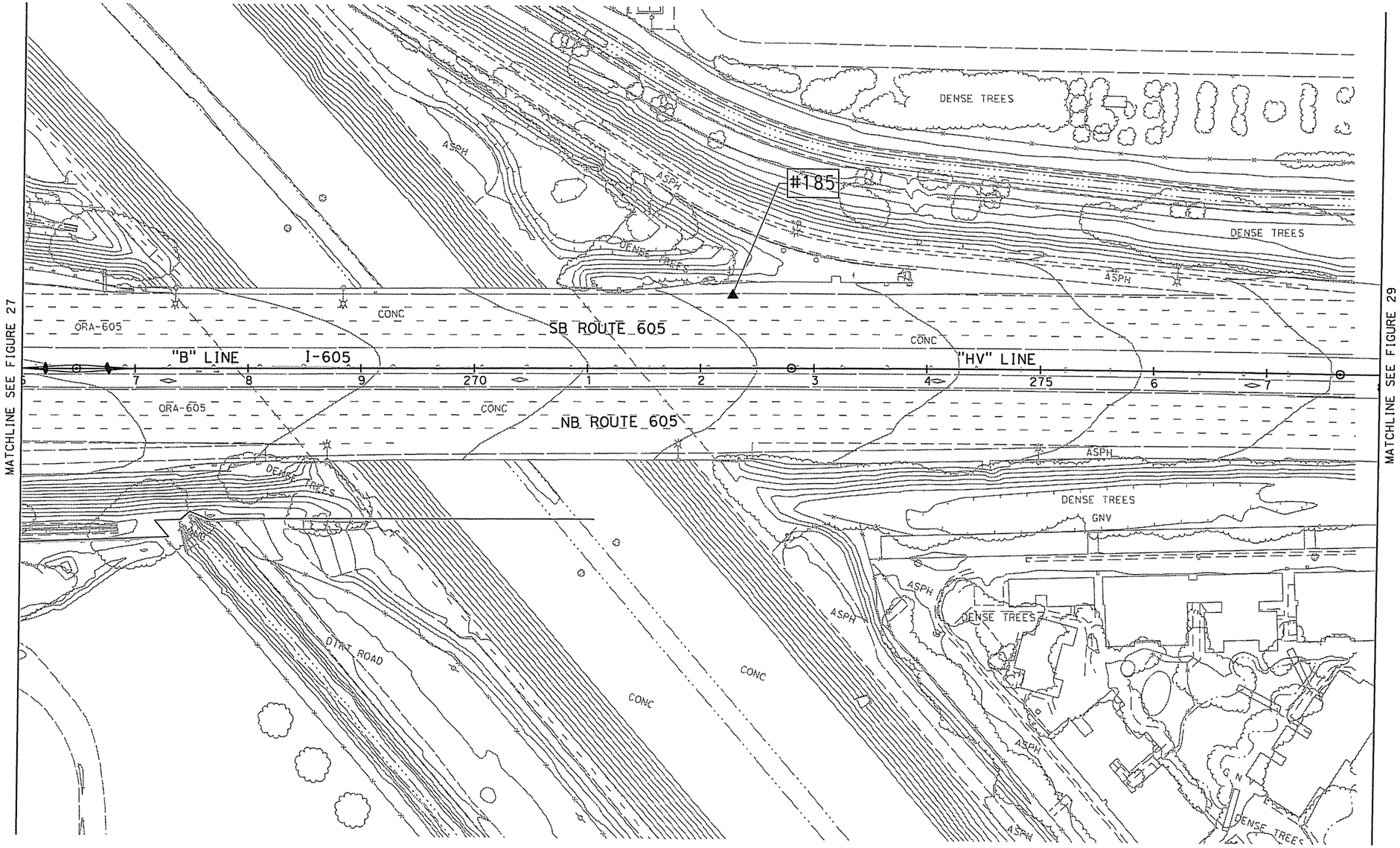
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 27



LEGEND:

mg/cm^2 = Milligrams per square centimeter

STLC = Soluble Threshold Limit Concentration

#XX = XRF Sample Number

■ ■■ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-028.dgn

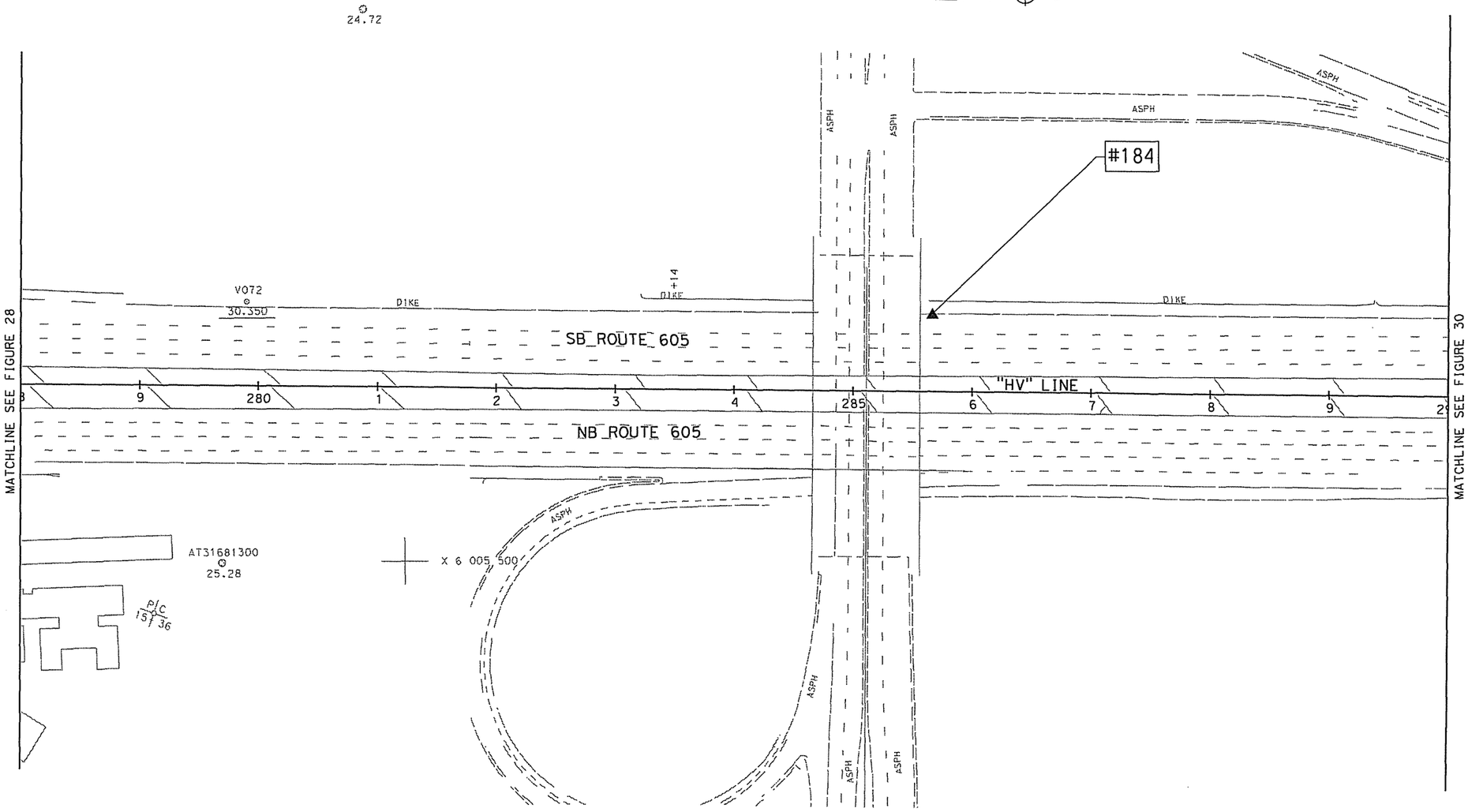
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 28



LEGEND:

- mg/cm^2 = Milligrams per square centimeter
- STLC = Soluble Threshold Limit Concentration
- #XX = XRF Sample Number
- ▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-029.dgn

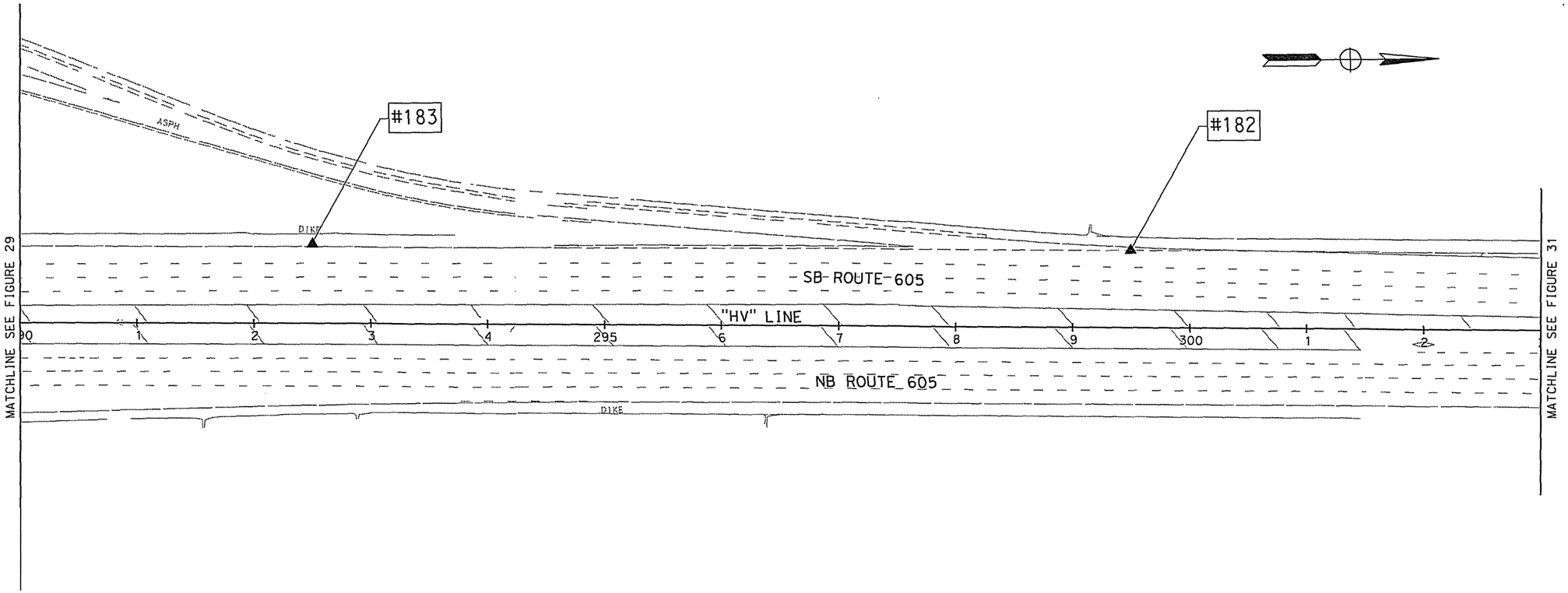
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 29



LEGEND:

mg/cm^2 = Milligrams per square centimeter

STLC = Soluble Threshold Limit Concentration

#XX = XRF Sample Number

▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-030.dgn

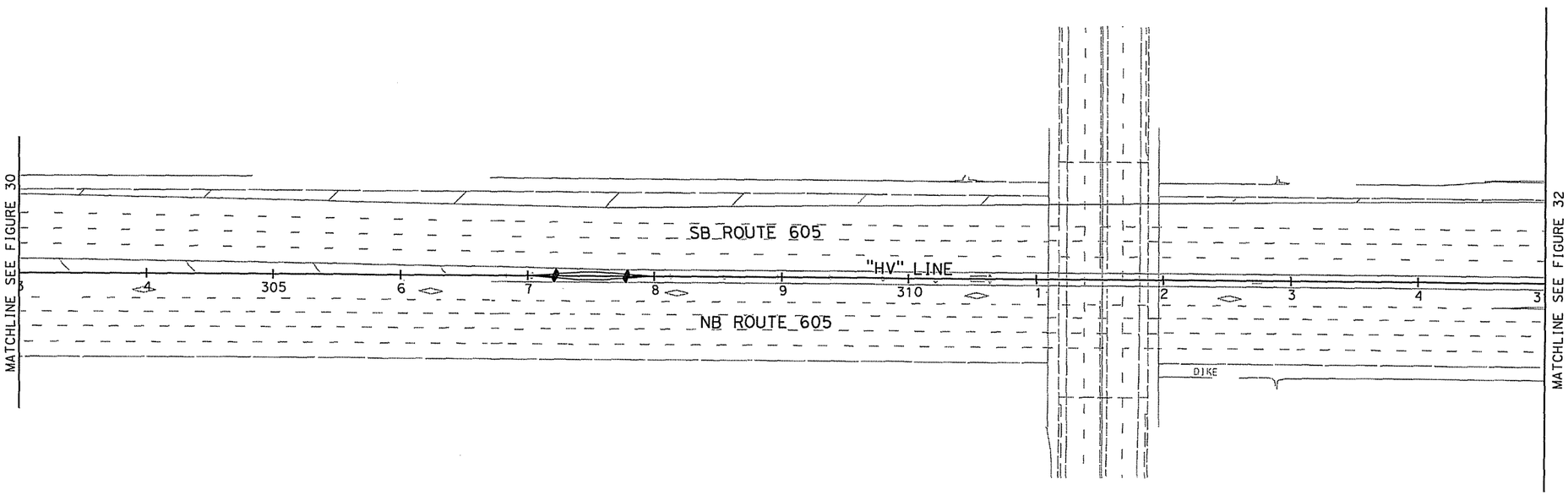
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 30



LEGEND:

mg/cm^2 = Milligroms per square centimeter

STLC = Soluble Threshold Limit Concentration

#XX = XRF Sample Number

▬ ▬ ▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smonivong
DGN FILE => ...\stripe-ADL\STRP-ADL-031.dgn

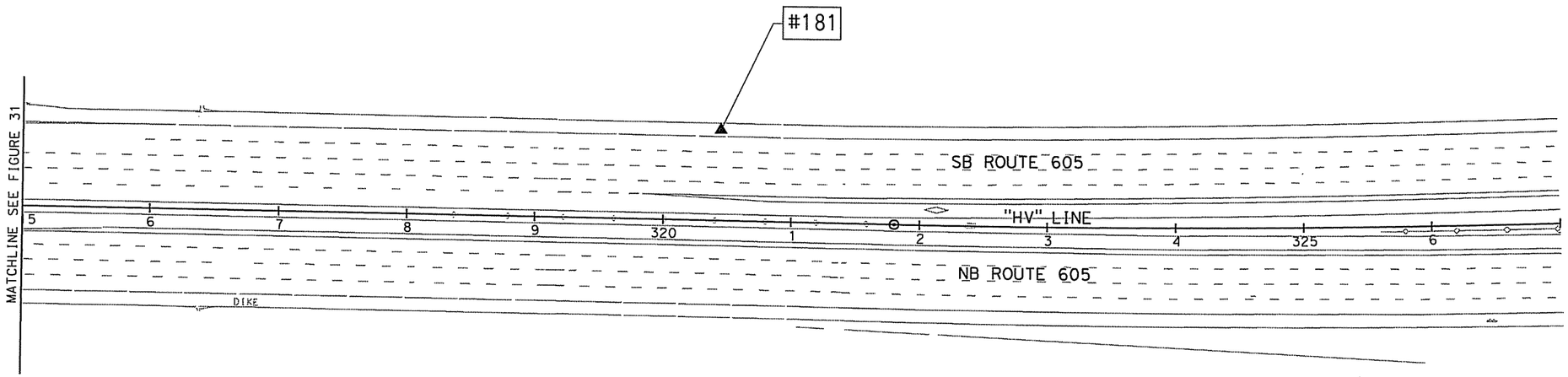
TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 31



LEGEND:

mg/cm^2 = Milligrams per square centimeter

STLC = Soluble Threshold Limit Concentration

#XX = XRF Sample Number

▬▬▬ = Lead Based Paint Striping

SCALE: 1"=100'

0 25 50 100

USERNAME => smanivong
DGN FILE => ...\stripe-ADL\STRP-ADL-032.dgn

TRC

PROJECT: 151396

FACILITY: WEST COUNTY CONNECTORS PROJECT ORANGE COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

FIGURE 32

APPENDIX A

LEAD BASED PAINT XRF TEST DATA SHEETS, LEAD CHIP BULK SAMPLING DATA SHEETS

Lead-Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne, License # DHS #9658
Inspection Date: June 5,2008
Niton XRF Model XLp300A, Serial Number: 8423

Sample #	Substrate	Component	Color	Sample Location/GPS #	Paint Condition	XRF Reading (mg/cm²)	Pos = LBP Neg = Not LBP	Approximate Quantity
1	NA	NA	NA	Self Calibrate at Start-up	NA	NA	NA	
2	Standard	Standard	Red	Calibration Standard	Intact	0.9	Okay	
3	Standard	Standard	Red	Calibration Standard	Intact	0.9	Okay	
4	Standard	Standard	Red	Calibration Standard	Intact	0.9	Okay	
5	Asphalt	Cross stripe	White	Seal Beach Blvd Ramp to I 405 N-GPS # 1	Fair	0.0	Neg	
6	Asphalt	Shoulder stripe	White	I 405N/ SR 22 W Freeway-GPS # 2	Fair	0.0	Neg	
7	Asphalt	Shoulder stripe	White	I 405 NB Freeway-GPS # 3	Fair	0.0	Neg	
8	Asphalt	Shoulder stripe	White	I 405 NB - GPS # 4	Fair	0.0	Neg	
9	Asphalt	Shoulder stripe	White	I 405 NB - GPS # 5	Fair	0.0	Neg	
10	Asphalt	Shoulder stripe	White	I 405 NB -GPS # 6	Fair	0.0	Neg	
11	Asphalt	Shoulder stripe	White	I 4051605 NB connector - GPS # 7	Fair	0.0	Neg	
12	Asphalt	Shoulder stripe	White	I 605 Freeway-GPS # 8	Fair	0.0	Neg	
13	Asphalt	Shoulder stripe	White	I 605 Freeway- double stripe GPS # 8	Fair	0.0	Neg	
14	Asphalt	Shoulder stripe	White	I 605 Freeway-outer stripe GPS # 9	Fair	0.0	Neg	
15	Asphalt	Shoulder stripe	White	I 605 Freeway- inside stripe GPS # 9	Fair	0.0	Neg	

TRC

Lead-Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne, License # DHS #9658
Inspection Date: June 5,2008
Niton XRF Model XLp300A, Serial Number: 8423

Sample #	Substrate	Component	Color	Sample Location/GPS #	Paint Condition	XRF Reading (mg/cm^2)	Pos = LBP Neg = Not LBP	Approximate Quantity
16	Asphalt	Shoulder stripe	White	I 605 Freeway- cross stripe GPS # 9	Fair	0.01	Neg	
17	Asphalt	Shoulder stripe	White	I 605 SB Katella Ave exit ramp GPS # 10	Fair	0.0	Neg	
18	Asphalt	Shoulder stripe	White	Katella Ave. ramp shoulder GPS # 11	Fair	0.0	Neg	
19	Asphalt	Shoulder stripe	White	Katella Ave ramp Cross stripe GPS # 11	Fair	0.0	Neg	
20	Asphalt	Cross stripe	White	Katella Ave ramp to I 605 GPS # 12	Fair	0.0	Neg	
21	Asphalt	Cross stripe	White	Katella Ave ramp to I 605 GPS # 13	Fair	0.0	Neg	
22	Asphalt	Shoulder stripe	White	I 605 Freeway Shoulder-GPS # 14	Fair	0.0	Neg	
23	Asphalt	Cross stripe	White	I 605 South Freeway Shoulder -GPS # 15	Fair	0.0	Neg	
24	Asphalt	Shoulder stripe	White	I 605 Freeway Shoulder -GPS # 15	Fair	0.0	Neg.	
25	Asphalt	Shoulder stripe	White	I 405S/ SR 22E Freeway-GPS # 16	Fair	0.0	Neg	
26	Asphalt	Shoulder stripe	White	I 405 SB inner stripe- GPS # 16	Fair	0.0	Neg	
27	Asphalt	Shoulder stripe	White	I 405 SB - GPS # 16	Fair	0.01	Neg	
28	Asphalt	Shoulder stripe	White	I 405 SB - GPS # 17	Fair	0.0	Neg	
29	Asphalt	Shoulder stripe	White	I 405 SB - GPS # 18	Fair	0.0	Neg	
30	Asphalt	Shoulder stripe	White	I 405 SB - GPS # 19	Fair	0.0	Neg	

Lead-Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County California
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne, License # DHS #9658
Inspection Date: June 5,2008
Niton XRF Model XLp300A, Serial Number: 8423

Sample #	Substrate	Component	Color	Description of Sample Location	Paint Condition	XRF Reading (mg/cm^2)	Pos = LBP Neg = Not LBP	Approximate Quantity
31	Asphalt	Shoulder stripe	White	I 405 SB - GPS # 20	Fair	0.0	Neg	
32	Asphalt	Shoulder stripe	White	I 405 SB - GPS # 21	Fair	0.0	Neg	
33	Asphalt	Shoulder stripe	White	I 405 SB/Valley View St Ramp GPS # 22	Fair	0.01	Neg	
34	Asphalt	Shoulder double stripe	White	I 405 SB/Valley View St Ramp GPS # 23	Fair	0.0	Neg	
35	Asphalt	Shoulder cross stripe	White	I 405 SB/Valley View St. Ramp GPS # 24	Fair	0.01	Neg	
36	Asphalt	Shoulder stripe	White	Valley View St. to SR 22 West Ramp GPS # 25	Fair	0.0	Neg	
37	Asphalt	Shoulder stripe	White	Valley View St. to SR 22 West Ramp GPS # 25	Fair	0.0	Neg	
38	Asphalt	Shoulder stripe	White	I 405/SR 22 Shoulder GPS # 26	Fair	0.0	Neg	
39	Asphalt	Shoulder cross stripe	White	I 405/SR 22 Shoulder GPS # 26	Fair	0.0	Neg	
40	Asphalt	Shoulder stripe	White	I405 NB Shoulder GPS # 27	Fair	0.0	Neg	
41	Asphalt	Shoulder stripe	White	I 405 NB Shoulder GPS # 28	Fair	0.0	Neg	
42	Asphalt	Shoulder stripe	White	I 405 NB at Seal Beach exit - GPS # 29	Fair	0.0	Neg	
43	Asphalt	Carpool stripe	Yellow	I405 NB - GPS # 30	Fair	0.0	Neg	
44	Asphalt	Carpool stripe	White	I 405 NB - GPS # 30	Fair	0.0	Neg	
45	Asphalt	Carpool Letter	White	I405 NB - GPS # 30	Fair	0.0	Neg	

Lead-Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County California
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne, License # DHS **#9658**
Inspection Date: June 5,2008
Niton XRF Model **XLp300A,** Serial Number: 8423

Sample #	Substrate	Component	Color	Description of Sample Location	Paint Condition	XRF Reading (mg/cm^2)	Pos = LBP Neg = Not LBP	Approximate Quantity
46	Asphalt	Carpool stripe	White	I 405 Freeway N - GPS # 31	Fair	0.0	Neg	
47	Asphalt	Carpool inner stripe	Yellow	I 405 Freeway N - GPS # 31	Fair	0.0	Neg	
48	Asphalt	Carpool outer stripe	Yellow	I 405 Freeway N - GPS # 31	Fair	0.0	Neg	
49	Asphalt	Carpool outer stripe	White	I 405 Freeway N -GPS # 32	Fair	0.0	Neg	
50	Asphalt	Inner stripe	**Yellow**	I 405 NB to I 605 NB Ramp **-GPS** # 32	Fair	4.3	Pos	2,490 feet
Retest51	Asphalt	Inner stripe	Yellow	I 405 NB to I605 NB Ramp GPS # 32	Fair	4.8	Pos	
52	Asphalt	Inner Shoulder stripe	White	Ramp to I 605 N - GPS # 32	Fair	0.03	Neg	
53	Asphalt	Inner Shoulder stripe	Yellow	I 405 N HOV lane - GPS # 33	Fair	0.03	Neg	
54	Asphalt	Shoulder cross stripe	Yellow	I 605 N HOV lane -GPS # 33	Fair	0.0	Neg	
55	Asphalt	Carpool lane stripe	Yellow	I 605 N Carpool lane - GPS #34	Fair	0.0	Neg	
56	Asphalt	Carpool cross stripe	White	I605 Carpool lane - GPS #34	Fair	0.0	Neg	
57	Asphalt	Shoulder stripe	White	I 605 Carpool lane Diamond - GPS #34	Fair	0.0	Neg	
58	Asphalt	Carpool stripe (new)	Yellow	Katella Ave to I 605 S Ramp left inside - GPS # 35	Fair	0.03	Neg	
59	Asphalt	Shoulder stripe (old)	Yellow	Katella Ave to I 605 S Ramp left inside -GPS # 35	Fair	0.4	Neg	
60	Asphalt	Shoulder stripe	Yellow	1 605 Freeway S left stripe - GPS # 36	Fair	0.0	Neg	

Lead-Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County California
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne, License # DHS **#9658**
Inspection Date: June 5,2008
Niton XRF Model **XLp300A,** Serial Number: 8423

Sample #	Substrate	Component	Color	Description of Sample Location	Condition	Reading (mg/cm²)	Pos = LBP Neg = Not LBP	Approximate Quantity
61	Asphalt	Cross stripe	Yellow	I 605 Freeway S GPS # 37	Fair	0.08	Neg	
62	Asphalt	Shoulder stripe	Yellow	I605 Freeway S GPS # 37	Fair	0.0	Neg	
63	Asphalt	Cross stripe	Yellow	I 605 Freeway S GPS # 37	Fair	0.0	Neg	
64	Asphalt	Shoulder stripe	Yellow	I 605 S to I 405 S ramp GPS # 38	Fair	7.2	Pos	4,600 feet
Retest 65	Asphalt	Shoulder stripe	Yellow	I 605 S to I 405 S ramp GPS # 38	Fair	6.6	Pos	"
66	Asphalt	Shoulder stripe	Yellow	I 605 S to I 405 S ramp GPS # 39	Fair	3.2'	Pos	""
67	Asphalt	Shoulder stripe	Yellow	I 605 S to I405 S ramp GPS # 39	Fair	2.6	Pos	
68	Asphalt	Carpool lane stripe	Yellow	I 405 S/SR 22 E Left shoulder GPS # 40	Fair	0.03	Neg	
69	Asphalt	Carpool lane stripe	White	I 405 SB Left shoulder GPS # 41	Fair	0.0	Neg	
70	Asphalt	Carpool lane stripe	Yellow	I 405 NB Carpool lane GPS # 42	Fair	0.0	Neg	
71	Asphalt	Carpool Diamond	White	I 405 NB Carpool lane GPS # 43	Fair	0.0	Neg	
72	Asphalt	Carpool lane stripe	White	I 405 NB Carpool lane Diamond GPS # 43	Fair	0.0	Neg	
73	Asphalt	Shoulder stripe	Yellow	I 405 NB /Seal Beach Ramp left lane GPS # 44	Fair	0.0	Neg	
74	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
75	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
76	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	

TRC

Lead Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Erik Paquette **License CDPH# 14356**
Inspection Date: August 18,2008
Niton XRF Model XLt 898AD, Serial Number: 17361

Sample #	Substrate	Component	Color	Sample Location/GPS #	Paint Condition	XRF Reading (mg/cm^2)	Pos = LBP Neg = Not LBP	Approximate Quantity
77	NA	NA	NA	Self Calibrate at Start-up	NA	NA	NA	
78	Standard	Standard	Red	Calibration Standard	Intact	0.8	Okay	
79	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
80	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
81	**Asphalt**	**Median stripe**	**Yellow**	**Seal Beach Blvd – East Side - Westbound**	**Intact**	**1.6**	**Pos**	
82	Asphalt	Lane stripe	White	Seal Beach Blvd – East Side - Westbound	Intact	0.0	Neg	
83	Asphalt	Bike Lane stripe	White	Seal Beach Blvd – East Side - Westbound	Intact	0.0	Neg	
84	Asphalt	Median stripe	Yellow	Seal Beach Blvd – East Side - Eastbound	Intact	0.0	Neg	
85	Asphalt	Lane	White	Seal Beach Blvd – East Side - Eastbound	Intact	0.0	Neg	
86	Asphalt	Lane	White	Seal Beach Blvd – East Side - Eastbound	Intact	0.0	Neg	
87	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
88	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
89	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
90	Asphalt	Median stripe	Yellow	Seal Beach Blvd – West Side - Westbound	Intact	0.6	Neg	
91	Asphalt	Lane stripe	White	Seal Beach Blvd – West Side - Westbound	Intact	0.0	Neg	
92	**Asphalt**	**Median stripe**	**Yellow**	**Seal Beach Blvd – West Side - Eastbound**	**Intact**	**2.8**	**Pos**	
93	Asphalt	Lane Stripe	White	Seal Beach Blvd – West Side - Eastbound	Intact	0.0	Neg	

TRC

Lead Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Erik Paquette, License CDPH#14356
Inspection Date: August 18,2008
Niton XRF Model XLt 898AD, Serial Number: 17361

Sample #	Substrate	Component	Color	Sample Location/GPS #	Paint Condition	XRF Reading (mg/cm^2)	Pos = LBP Neg = Not LBP	Approximate Quantity
94	Asphalt	Bike Lane stripe	White	Seal Beach Blvd – West Side - Eastbound	Intact	0.0	Neg	
95	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
96	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
97	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
98	Asphalt	Median stripe	Yellow	Valley View St – East side - Westbound	Intact	0.3	Neg	
99	Asphalt	Median stripe	Black	Valley View St – East side - Westbound	Intact	0.0	Neg	
100	Asphalt	Lane stripe	White	Valley View St – East side - Westbound	Intact	0.0	Neg	
101	Asphalt	Median stripe	Yellow	Valley View St – East side - Eastbound	Intact	0.3	Neg	
102	Asphalt	Median stripe	Black	Valley View St – East side - Eastbound	Intact	0.0	Neg	
103	Asphalt	Lane stripe	White	Valley View St – East side - Eastbound	Intact	0.0	Neg	
104	Asphalt	Median stripe	Black	Bolsa Chica – Westside - Westbound	Intact	0.0	Neg	
105	Asphalt	Median stripe	Yellow	Bolsa Chica – Westside - Westbound	Intact	0.0	Neg	
106	Asphalt	Lane stripe	White	Bolsa Chica – Westside - Westbound	Intact	0.0	Neg	
107	Asphalt	Median stripe	Black	Bolsa Chica – Westside - Eastbound	Intact	0.0	Neg	
108	Asphalt	Median stripe	Yellow	Bolsa Chica – Westside - Eastbound	Intact	0.0	Neg	
109	Asphalt	Lane Marking	White	Bolsa Chica – Westside - Eastbound	Intact	0.0	Neg	
110	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
111	Standard	Standard	Red	Calibration Standard	Intact	1.0	Okay	
112	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	

TRC

Lead Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Erik Paquette License CDPH **#14356**
Inspection Date: September 4,2008
RMD XRF Model **LPA-1B,** Serial Number: 1038

Sample #	Substrate	Component	Color	Sample **Location/GPS** #	**Paint** Condition	**XRF** Reading **(m–/cm²)**	**Pos = LBP** Neg = Not LBP	Approximate Quantity
113	NA	NA	NA	Self Calibrate at Start-up	NA	NA	NA	
114	Standard	Standard	Yellow	Calibration Standard	Intact	1.5	Okay	
115	Standard	Standard	Yellow	Calibration Standard	Intact	1.7	Okay	
116	Standard	Standard	Yellow	Calibration Standard	Intact	2.0	Okay	
117	Standard	Standard	Yellow	Calibration Standard	Intact	1.7	Okay	
118	Asphalt	**Median Stripe**	Yellow	Seal Beach Blvd – East Side – Westbound - Median	Fair	1.5	Pos	
119	Asphalt	Bike Lane	White	Seal Beach Blvd – East Side – Westbound – Bike Lane	Fair	-0.1	Neg	
120	Asphalt	Lane Stripe	White	Seal Beach Blvd – East Side – Westbound	Fair	0.5	Neg	
121	Asphalt	**Median Stripe**	Yellow	Seal Beach Blvd – East Side – Eastbound - Median	Fair	1.7	Pos	
122	Asphalt	Lane Stripe	White	Seal Beach Blvd – East Side – Eastbound – Lane Stripe	Fair	-0.1	Neg	
123	Standard	Standard	Yellow	Calibration Standard	Intact	1.4	Okay	
124	Standard	Standard	Yellow	Calibration Standard	Intact	1.7	Okay	
125	Standard	standard	Yellow	Calibration Standard	Intact	1.7	Okay	
126	Asphalt	Median Stripe	Yellow	Valley View Street – East Side – Westbound - Median	Fair	0.4	Neg	
127	Asphalt	**Median Stripe**	**Yellow**	Valley View Street – East Side – Eastbound - Median	**Intact**	1.0	Pos	
128	Asphalt	Median Stripe	Black	Valley View Street – East Side – Eastbound - Median	Fair	0.2	Neg	
129	Standard	Standard	Yellow	Calibration Standard	Intact	2.0	Okay	

TRC

Lead Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Erik Paquette, License: CDPH #14356
Inspection Date: September 4,2008
RMD XRF Model LPA–1A, Serial Number: 1038

Sample #	Substrate	Component	Color	Sample Location/GPS #	Paint Condition	XRF Reading (mg/cm^2)	Pos = LBP Neg = Not LBP	Approximate Quantity
130	Standard	Standard	Yellow	Calibration Standard	Intact	1.5	Okay	
131	Standard	Standard	Yellow	Calibration Standard	Intact	1.5	Okay	

Lead Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne License # DHS #9658
Inspection Date: September 25,2008
Niton XRF Model **XLp300A,** Serial Number: 8423

Sample #	Substrate	Component	Color	Sample **Location/GPS** #	**Paint** Condition	**XRF** Reading (mg/cm²)	**Pos** = LBP Neg = Not LBP	Approximate Quantity
132	NA	NA	NA	Self Calibrate at Start-up	NA	NA	NA	
133	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
134	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
135	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
136	Concrete	Shoulder stripe	White	I 405 NB to 605 NB connector	Intact	0.0	Neg	
137	Concrete	Shoulder stripe	White	1405 SB to I 605 NB Ramp	Intact	0.0	Neg	
138	Asphalt	Cross stripe	White	I 405 SB to I 605 NB Ramp	Intact	0.0	Neg	
139	Concrete	Shoulder stripe	White	I 605 Freeway NB	Intact	0.0	Neg	
140	Asphalt	Cross stripe	White	I 605 Freeway NB	Intact	0.0	Neg	
141	Concrete	Shoulder stripe	White	I 605 Freeway NB	Intact	0.0	Neg	
142	Asphalt	Cross stripe	White	I 605 Freeway NB	Intact	0.01	Neg	
143	Asphalt	Shoulder stripe	White	I 605 Freeway NB to Katella Ave exit ramp	Intact	0.0	Neg	
144	Asphalt	Cross stripe	White	I 605 Freeway NB to Katella Ave exit ramp	Intact	0.0	Neg	
145	Concrete	**Shoulder stripe**	Yellow	Willow **onramp** to 1605 Freeway NB	Intact	**5.6**	**Pos**	
146	Concrete	Shoulder stripe	Black	Willow onramp to I 605 Freeway NB	Intact	0.01	Neg	
147	Concrete	Shoulder stripe	White	Willow onramp to I 605 Freeway NB	Intact	0.0	Neg	
148	Asphalt	Shoulder stripe	White	Willow underpass at 605 Freeway	Intact	0.0	Neg	

TRC

Lead Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne, License # DHS **#9658**
Inspection Date: September 25,2008
Niton XRF Model **XLp300A,** Serial Number: 8423

Sample #	Substrate	Component	Color	Sample **Location/GPS** #	**Paint** Condition	**XRF** Reading (mg/cm^2)	Pos = LBP Neg = Not LBP	Approximate Quantity
149	Asphalt	Shoulder stripe	White	Willow onramp to I 605 SB	Intact	0.0	Neg	
150	Asphalt	Shoulder stripe	White	Willow onramp to I 605 SB – center line	Intact	0.0	Neg	
151	Asphalt	Shoulder stripe	White	Willow onramp to I 605 SB –median	Intact	0.0	Neg	
152	Asphalt	Lane marker	White	Willow onramp to I 605 SB – lane marker	Intact	0.01	Neg	
153	Concrete	Double Shoulder stripe	White	Willow onramp to I 605 SB – lane marker	Intact	0.0	Neg	
154	**Concrete**	**Shoulder stripe**	**Yellow**	1 605 SB to I 405 SB at Tunnel **entry**	Intact	12.2	Pos	
155	Asphalt	Shoulder stripe	White	I 605 SB to I 405 SB at Tunnel entry	Intact	0.0	Neg	
156	**Asphalt**	**Shoulder stripe**	**Yellow**	**I** 605 **SB to** I 405 SB at Tunnel entry – Inside shoulder	Intact	3.0	Pos	
157	Concrete	Shoulder stripe	White	1605 SB to I405 SB at Tunnel exit	Intact	0.0	Neg	
158	Concrete	Median stripe	Yellow	I 605 NB - Median	Intact	0.04	Neg	
159	Asphalt	Median stripe	Yellow	I 605 NB – Median – Lane marker	Intact	0.0	Neg	
160	Asphalt	Median cross stripe	Yellow	I 605 NB – Median	Intact	0.0	Neg	
161	Concrete	Carpool stripe	White	I 605 NB –beginning of carpool lane	Intact	0.0	Neg	
162	Concrete	Carpool Label	White	I 605 NB –beginning of carpool lane	Intact	0.01	Neg	
163	Concrete	Carpool Shoulder stripe	Yellow	1 605 NB –beginning of carpool lane	Intact	0.0	Neg	
164	Concrete	Carpool stripe	White	I 605 NB –beginning of carpool lane	Intact	0.0	Neg	
165	Concrete	Carpool Shoulder stripe	Yellow	I 605 NB – 2/10 mile from beginning of carpool lane	Intact	0.0	Neg	
166	Concrete	Carpool	Black	I 605 NB – 2/10 mile from beginning of carpool lane	Intact	0.0	Neg	

TRC

Lead Based Paint (LBP) XRF Testing Data Sheet

Project Name: California Dept of Transportation - District 12
Site ID: West County Connectors Project, Orange County CA
TRC Job Number: 151396

Inspector's Name: Sam Seneviratne, License # DHS **#9658**
Inspection Date: September 25,2008
Niton XRF Model **XLp300A,** Serial Number: 8423

Sample #	Substrate	Component	Color	Sample **Location/GPS** #	Paint Condition	**XRF** Reading **(m-/cm²)**	Pos = LBP Neg = Not LBP	Approximate Quantity
		Shoulder stripe						
167	Concrete	**Shoulder stripe**	Yellow	Willow **onramp** eastbound to 605 S	Intact	2.4	Pos	
168	Asphalt	Shoulder stripe	White	Willow onramp eastbound to 605 S	Intact	0.0	Neg	
169	Asphalt	Center median stripe	Yellow	Willow onramp eastbound to 605 S – Center median	Intact	0.01	Neg	
170	Concrete	Shoulder stripe	White	Willow onramp eastbound to 605 S – Lane marker	Intact	0.0	Neg	
171	Asphalt	Cross stripe	White	Willow onramp eastbound to 605 S	Intact	0.0	Neg	
172	Concrete	Shoulder stripe	White	Willow onramp eastbound to 605 S	Intact	0.01	Neg	
173	Concrete	Center median stripe	Yellow	I 605 SB Center median	Intact	0.0	Neg	
174	Asphalt	Center median cross stripe	Yellow	I 605 SB Center median	Intact	0.0	Neg	
175	Concrete	Center median stripe	Yellow	I 605 SB Center median	Intact	0.0	Neg	
176	Concrete	Center median stripe	Yellow	I 605 SB Center median	Intact	0.0	Neg	
177	Concrete	Center median stripe	White	I 605 SB Center median lane divider	Intact	0.0	Neg	
178	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
179	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	
180	Standard	Standard	Red	Calibration Standard	Intact	1.1	Okay	

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA

Sample Date: August 19,2008

Laboratory Sample #	Sample **Date**	Substrate	**Component/Location**	Color	Total Chromium **(mg/Kg)**	Total Lead **(mg/Kg)**	**Pos/** Neg
100537-001	**8.19.08**	Concrete	Lane Stripe **I 405N** to I 605 N Entry [Inner (left side) Stripe-I-405 Northbound Connector to **I-605** Northbound]	Yellow	1,300	4,200	**Neg**
100537-002	**8.19.08**	Concrete	Lane Stripe **I 405N** to I 605 N Exit [Inner (left side) Stripe-1-405 Northbound Connector to **I-605** Northbound]	Yellow	520	2,200	**Neg**
100537-003	8.19.08	Concrete	Lane Stripe I 605 S to 1 405 S Entry	Yellow	65	280	Neg
100537-004	8.19.08	Concrete	Lane Stripe I 605 S to I 405 S Exit	Yellow	11	40	Neg
100537-005	8.19.08	Asphalt	Median stripe Seal **Beach** East Side Westbound	Yellow	3,100	13,000	Pos
100537-006	8.19.08	Asphalt	Lane Stripe Seal Beach East Side Westbound	White	NA	420	Neg
100537-007	8.19.08	Asphalt	**Bike** Lane stripe Seal Beach East Side Westbound	**White**	0.0	3,900	**Neg**
100537-008	**8.19.08**	Asphalt	Median stripe Seal Beach East Side Eastbound	Yellow	28,000	120,000	Pos
100537-009	8.19.08	Asphalt	Lane stripe Seal Beach East Side Eastbound	White	NA	79	Neg
100537-010	8.19.08	Asphalt	Lane stripe Seal Beach East Side Eastbound	White	0.0	47	Neg
100537-011	8.19.08	Asphalt	Median stripe Seal Beach West Side Westbound	Yellow	1,300	5,400	Pos
100537-012	8.19.08	Asphalt	Lane stripe Seal Beach West Side Westbound	White		110	Neg
100537-013	8.19.08	Asphalt	Median stripe Seal Beach West Side Eastbound	Yellow	4,100	17,000	Pos
100537-014	8.19.08	Asphalt	Lane Stripe Seal Beach West Side Eastbound	White	NA	68	Neg

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA

Sample Date: August 19,2008

Laboratory Sample #	Sample Date	Substrate	Component/Location	Color	Total Chromium (mg/Kg)	Total Lead (mg/Kg)	Posl Neg
100537-015	8.19.08	Asphalt	Bike Lane stripe Seal Beach West Side Eastbound	White	NA	30	Neg
100537-016	8.19.08	**Asphalt**	**Lane stripe Valley View St. East Side Westbound**	**Yellow**	730	2,800	**Neg**
100537-017	8.19.08	Asphalt	Median stripe Valley View St. East Side Westbound	Black	NA	33	Neg
100537-018	8.19.08	Asphalt	Lane stripe Valley View St. East Side Westbound	White	NA	11	Neg
100537-019	8.19.08	**Asphalt**	**Median stripe Valley View St. East Side Eastbound**	**Yellow**	940	3,600	**Neg**
100537-020	8.19.08	Asphalt	Median stripe Valley View St. East Side Eastbound	Black	NA	51	Neg
100537-021	8.19.08	Asphalt	Lane stripe Valley View St. East Side Eastbound	White	NA	ND	Neg
100537-022	8.19.08	Asphalt	Median stripe Bolsa Chica West Side Westbound	Black	NA	ND	Neg
100537-023	8.19.08	Asphalt	Median stripe Bolsa Chica West Side Westbound	Yellow	ND	ND	Neg
100537-024	8.19.08	Asphalt	Median stripe Bolsa Chica West Side Westbound	White	NA	6.1	Neg
100537-025	8.19.08	Asphalt	Median stripe Bolsa Chica West Side Eastbound	Black	NA	ND	Neg
100537-026	8.19.08	Asphalt	Median stripe Bolsa Chica West Side Eastbound	Yellow	ND	ND	Neg
100537-027	8.19.08	Asphalt	Lane Marking Bolsa Chica West Side Eastbound	White	NA	24	Neg

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

Total Lead analysis by method EPA 3050B/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District **12**
Site ID: West County Connectors Project, Orange County CA

Sample Date: September **4,2008**

Laboratory Sample #	Sample Date	Substrate	**Component/Location**	Color	STLC Chromium **(mg/L)**	STLC Lead **(mg/L)**	TCLP Chromium **(mg/L)**	TCLP Lead **(mg/L)**
100846-001	**9.4.08**	Asphalt	Median stripe Seal Beach Blvd. East Side Westbound	**Yellow**	**14**	**13**	ND	**0.74**
100846-002	9.4.08	Asphalt	Lane stripe Seal Beach Blvd. East Side Westbound	White	NA	ND	NA	ND
100846-003	9.4.08	Asphalt	Bike Lane Seal Beach Blvd. East Side Westbound	White	NA	**ND**	NA	ND
100846-004	**9.4.08**	Asphalt	Median stripe Seal Beach Blvd. **East Side Eastbound**	Yellow	**130**	**82**	**0.75**	**3.5**
100846-005	9.4.08	Asphalt	Lane stripe Seal Beach Blvd. East Side Eastbound	White	NA	**ND**	NA	ND
100846-006	**9.4.08**	Asphalt	Median stripe Valley View St. **East Side Westbound**	**Yellow**	**6.4**	**5.0**	ND	**ND**
100846-007	**9.4.08**	Asphalt	Median stripe Valley View St. **East Side Eastbound**	**Black**	NA	**110**	NA	**ND**
100846-008	**9.4.08**	Asphalt	Median stripe Valley View St. **East Side Eastbound**	Yellow	**16**	**16**	ND	**0.32**
100846-009	9.4.08	Concrete	Lane stripe Southbound I 605 to I 405 Connector	Yellow	**ND**	ND	ND	ND
100846-010	**9.4.08**	Concrete	Lane stripe Northbound **I405** to **I 605** Connector	**Yellow**	**17**	**7.6**	ND	**2.8**

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

STLC - Soluble Threshold Limit Concentration analysis by method Wet/EPA 6010B

TCLP – Toxicity Characteristic Leaching Procedure analysis by method EPA 1311/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12 **Sample Date: September 25,2008**
Site ID: West County Connectors Project, Orange County CA

Laboratory Sample #	Sample Date	Substrate	Component/Location	Color	STLC Chromium (mg/L)	STLC Lead (mg/L)	TCLP Chromium	TCLP Lead (mg/L)
101314-001	9.25.08	Concrete	Shoulder stripe Northbound I 405 to 1 605 Connector	White	NA	ND	NA	ND
101314-002	9.25.08	Asphalt	Cross stripe Southbound I 405 to I 605 Northbound Ram	White	NA	**ND**	NA	ND
101314-003	**9.25.08**	**Concrete**	**Shoulder stripe Willow onramp to Northbound I 605**	**Yellow**	**12**	**8.0**	ND	**1.2**
101314-004	**9.25.08**	**Concrete**	**Shoulder stripe Willow onramp to Northbound I605**	**Yellow**	**11.0**	**8.3**	**ND**	**0.94**
101314-005	9.25.08	Concrete	Median stripe Northbound I 605 Center Median	Yellow	ND	ND	**ND**	**ND**
101314-006	9.25.08	Concrete	Carpool Stripe Beginning of Carpool Lane Northbound I 605	White	NA	**ND**	NA	**ND**
101314-007	9.25.08	Concrete	Carpool Shoulder Stripe 2/10 mile from Beginning of Carpool Lane Northbound I 605	Yellow	**ND**	ND	ND	ND
101314-008	9.25.08	Concrete	Shoulder stripe Willow onramp to Southbound 1 605	Yellow	**ND**	ND	ND	ND
101314-009	9.25.08	Concrete	Center Median stripe Southbound I 605	Yellow	**ND**	ND	ND	ND

NA – Not Applicable, ND –None Detected
Bold Face Indicates Values in Excess of Regulated Concentrations
STLC - Soluble Threshold Limit Concentration analysis by method Wet/EPA 6010B
TCLP –Toxicity Characteristic Leaching Procedure analysis by method EPA 1311/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12 **Sample Date: March 19-20,2009**

Site ID: West County Connectors Project, Orange County CA

Sample Number #	Laboratory Sample #	Sample Date	Substrate	Component/Location	Color	Total Chromium (mg/Kg)	Total Lead (mg/Kg)	Pos/ Neg
181	104687-001	3.20.09	Concrete	Right Shoulder Stripe I 605 S, 1000' North of Wardlow	White	ND	ND	Neg
182	104687-002	3.20.09	Concrete	Right Shoulder Stripe I 605 S, North of Spring St. exit	White	ND	**11**	Neg
183	104687-003	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Spring St. exit	White	ND	**9.2**	Neg
184	104687-004	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Spring St. bridge	White	ND	ND	Neg
185	104687-005	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Willow St.	White	ND	ND	Neg
186	104687-006	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Katella Ave. exit	White	ND	ND	Neg
187	104687-007	3.20.09	Concrete	Right Shoulder Stripe I 405 S, South of I 605 overpass	White	ND	ND	Neg
188	104687-008	3.20.09	Concrete	Right Shoulder Stripe I 405 S, North of 7th St. overpass	White	**8.0**	**9.8**	Neg
189	104687-009	3.20.09	Concrete	Right Shoulder Stripe I 405 S, North of Seal Beach Blvd. exit	White	**5.2**	ND	Neg
190	104687-010	3.20.09	Concrete	Right Shoulder Stripe I 405 S, South of Seal Beach Blvd. overpass	White	ND	ND	Neg
191	104687-011	3.20.09	Asphalt	Right Shoulder Stripe I 405 S, at Call Box 224	White	ND	ND	Neg
192	104687-012	3.20.09	Concrete	Right Shoulder Stripe I 405 S, North of Valley View St. exit	White	ND	ND	Neg
193	104687-013	3.20.09	Concrete	Right Shoulder Stripe I 405 N, North of Valley View St.	White	ND	ND	Neg
194	104687-014	3.20.09	Concrete	Right Shoulder Stripe I 405 N, at Call Box 217	White	ND	ND	Neg

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

Total Lead analysis by method EPA 3050B/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12 **Sample Date: March 19-20,2009**
Site ID: West County Connectors Project, Orange County CA

Sample Number #	Laboratory Sample #	Sample Date	Substrate	Component/Location	Color	Total Chromium (mg/Kg)	Total Lead (mg/Kg)	Pos/ Neg
195	104687-015	3.20.09	Asphalt	Right Shoulder Stripe I 405 N, South of Seal Beach Blvd. exit	White	**ND**	**9.2**	Neg
196	104687-016	3.20.09	Asphalt	Right Shoulder Stripe I 405 N, South of 7th Street/22 fwy exit	White	**5.5**	ND	Neg
197	104687-017	3.20.09	Concrete	Right Shoulder Stripe 1405 N, at 7'' Street/22 fwy exit	White	**ND**	**ND**	Neg
198	104687-018	3.20.09	Concrete	Right Shoulder Stripe I 405 N, North of I 605 exit	White	ND	ND	Neg
199	104687-019	3.20.09	Concrete	Carpool Lane Stripe I 405 S, South of I 605 overpass	White	ND	ND	Neg
200	104687-020	3.20.09	Concrete	Carpool Lane Stripe 1405 S, South of I 605 overpass	Yellow	**4.0**	**5.7**	Neg
201	104687-021	3.20.09	Concrete	Carpool Lane Stripe I 405 S, North of Seal Beach Blvd. exit	White	**4.1**	ND	Neg
202	104687-022	3.20.09	Concrete	Carpool Lane Stripe 1405 S, North of Seal Beach Blvd. exit	Yellow	**6.7**	**7.8**	Neg
203	104687-023	3.20.09	Concrete	Carpool Lane Stripe I 405 S, at Call Box	White	**ND**	ND	Neg
204	104687-024	3.20.09	Concrete	Carpool Lane Stripe I 405 S, at Call Box	Yellow	**ND**	**6.4**	Neg
205	104687-025	3.20.09	Concrete	Carpool Lane Stripe 1405 S, ¼ mile North of Valley View St. exit	White	**4.3**	**ND**	Neg
206	104687-026	3.20.09	Concrete	Carpool Lane Stripe 1405 S, ¼ mile North of Valley View St. exit	Yellow	**ND**	ND	Neg
207	104687-027	3.20.09	Concrete	Carpool Lane Stripe I 405 N, North of Valley View St. exit	White	ND	ND	Neg
208	104687-028	3.20.09	Concrete	Carpool Lane Stripe I 405 N, North of Valley View St. exit	Yellow	ND	ND	Neg

NA – Not Applicable, ND – None Detected
Bold Face Indicates Values in Excess of Regulated Concentrations
Total Lead analysis by method EPA 3050B/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12
site-ID: West County Connectors Project, Orange County CA

Sample Date: March 19-20, 2009

Sample Number #	Laboratory Sample #	Sample Date	Substrate	*Component/Location*	Color	Total Chromium (mg/Kg)	Total Lead (mg/Kg)	Pos/ Neg
209	104687-029	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. exit	White	ND	**ND**	Neg
210	104687-030	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. exit	Yellow	ND	**ND**	Neg
211	104687-031	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. ovemass	White	ND	ND	Neg
212	104687-032	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. overpass	Yellow	ND	**ND**	Neg
213	104687-033	3.20.09	Concrete	Carpool Lane Stripe I 405 N, South of I 605 overpass	White	ND	**ND**	Neg
214	104687-034	3.20.09	Concrete	Carpool Lane Stripe 1 405 S, South of 1 605 overpass	Yellow	**6.2**	**21**	Neg

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

Total Lead analysis by method EPA 3050B/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA

Sample Date: March 19-20,2009

Sample Number #	Laboratory Sample #	Sample Date	Substrate	Component/Location	Color	STLC Chromium (mg/L)	STLC Lead (mg/L)	TCLP Chromium (mg/L)	TCLP Lead (mg/L)
181	10487-001	3.20.09	Concrete	Right Shoulder Stripe I 605 S, 1000' North of Wardlow	White	ND	ND	ND	ND
182	104687-002	3.20.09	Concrete	Right Shoulder Stripe I 605 S, North of Spring St. exit	White	ND	ND	ND	ND
183	104687-003	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Spring St. exit	White	ND	ND	ND	ND
184	104687-004	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Spring St. bridge	White	ND	ND	ND	ND
185	104687-005	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Willow St.	White	ND	ND	ND	ND
186	104687-006	3.20.09	Concrete	Right Shoulder Stripe I 605 S, South of Katella Ave. exit	White	ND	ND	ND	ND
187	104687-007	3.20.09	Concrete	Right Shoulder Stripe I 405 S, South of I 605 overpass	White	ND	ND	ND	ND
188	104687-008	3.20.09	Concrete	Right Shoulder Stripe I 405 S, North of 7th St. overpass	White	ND	ND	ND	ND
189	104687-009	3.20.09	Concrete	Right Shoulder Stripe I 405 S, North of Seal Beach exit	White	ND	ND	ND	ND
190	104687-010	3.20.09	Concrete	Right Shoulder Stripe I 405 S, South of Seal Beach overpass	White	ND	ND	ND	ND
191	104687-011	3.20.09	Asphalt	Right Shoulder Stripe I 405 S, at Call Box 224	White	ND	ND	ND	ND
192	104687-012	3.20.09	Concrete	Right Shoulder Stripe I 405 S, North of Valley View St. exit	White	ND	ND	ND	ND
193	104687-013	3.20.09	Concrete	Right Shoulder Stripe I405 N, North of Valley View St.	White	ND	ND	ND	**ND**
194	104687-014	3.20.09	Concrete	Right Shoulder Stripe I405 N, at Call Box 217	White	ND	ND	ND	**ND**

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

STLC - Soluble Threshold Limit Concentration analysis by method Wet/EPA 6010B

TCLP – Toxicity Characteristic Leaching Procedure analysis by method EPA 1311/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District 12
Site ID: West County Connectors Project, Orange County CA

Sample Date: March 19-20,2009

Sample Number #	Laboratory Sample #	Sample Date	Substrate	Component/Location	Color	STLC Chromium (mg/L)	STLC Lead (mg/L)	TCLP Chromium (mg/L)	TCLP Lead (mg/L)
195	104687-015	3.20.09	Asphalt	Right Shoulder Stripe I 405 N, South of Seal Beach Blvd. exit	White	ND	ND	ND	ND
196	104687-016	3.20.09	Asphalt	Right Shoulder Stripe I 405 N, South of 7th fwy exit	White	ND	ND	ND	ND
197	104687-017	3.20.09	Concrete	Right Shoulder Stripe I 405 N, at 7" Street/22 fwy exit	White	ND	ND	ND	ND
198	104687-018	3.20.09	Concrete	Right Shoulder Stripe I 405 N, North of I 605 exit	White	ND	ND	ND	ND
199	104687-019	3.20.09	Concrete	Carpool Lane Stripe I 405 S, South of I 605 overpass	White	ND	ND	ND	ND
200	104687-020	3.20.09	Concrete	Carpool Lane Stripe I 405 S, South of I-605 ove ass	Yellow	ND	ND	ND	ND
201	104687-021	3.20.09	Concrete	Carpool Lane Stripe 1405 S, North of Seal Beach Blvd. exit	White	ND	ND	ND	ND
202	104687-022	3.20.09	Concrete	Carpool Lane Stripe I 405 S, North of Seal Beach Blvd. exit	Yellow	ND	ND	ND	ND
203	104687-023	3.20.09	Concrete	Carpool Lane Stripe 1 405 S, at Call Box	White	ND	ND	ND	ND
204	104687-024	3.20.09	Concrete	Carpool Lane Stripe I 405 S, at Call Box	Yellow	ND	ND	ND	ND
205	104687-025	3.20.09	Concrete	Carpool Lane Stripe I 405 S, ¼ mile North of Valley View St. exit	White	ND	ND	ND	ND
206	104687-026	3.20.09	Concrete	Carpool Lane Stripe I 405 S, ¼ mile North of Valley View St. exit	Yellow	ND	**ND**	ND	**ND**
207	104687-027	3.20.09	Concrete	Carpool Lane Stripe I 405 N, North of Valley View St. exit	White	ND	ND	**ND**	**ND**
208	104687-028	3.20.09	Concrete	Carpool Lane Stripe I 405 N, North of Valley View St. exit	Yellow	**ND**	**ND**	**ND**	**ND**

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

STLC - Soluble Threshold Limit Concentration analysis by method Wet/EPA 6010B

TCLP – Toxicity CharacteristicLeaching Procedure analysis by method EPA 1311/6010B

TRC

Lead Paint Chip Bulk Sampling Data Sheets

Project Name: California Dept of Transportation-District12
Site ID: West County Connectors Project, Orange County CA

Sample Date: March 19-20,2009

Sample Number #	Laboratory Sample #	Sample Date	Substrate	Component/Location	Color	STLC Chromium (mg/L)	STLC Lead (mg/L)	TCLP Chromium (mg/L)	TCLP Lead (mg/L)
209	104687-029	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. exit	White	ND	ND	ND	ND
210	104687-030	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. exit	Yellow	ND	ND	ND	ND
211	104687-031	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. overpass	White	ND	ND	ND	ND
212	104687-032	3.20.09	Concrete	Carpool Lane Stripe I 405 N, at Seal Beach Blvd. overpass	Yellow	ND	ND	ND	ND
213	104687-033	3.20.09	Concrete	Carpool Lane Stripe I 405 N, South of I 605 overpass	White	ND	ND	ND	ND
214	104687-034	3.20.09	Concrete	Carpool Lane Stripe I 405 N, South of I 605 overpass	Yellow	ND	ND	ND	ND

NA – Not Applicable, ND – None Detected

Bold Face Indicates Values in Excess of Regulated Concentrations

STLC - Soluble Threshold Limit Concentration analysis by method Wet/EPA 6010B

TCLP – Toxicity Characteristic Leaching Procedure analysis by method EPA 1311/6010B

APPENDIX B

NITON XLp 300, XLt 898AD & RMD LPA–1B XRF PERFORMANCE CHARACTERISTIC SHEETS

Performance Characteristic Sheet

EFFECTIVE DATE: **September 24,2004** **EDITION NO.: I**

MANUFACTURER AND MODEL:

Make: *Niton* **LLC**
Tested Model: *XLp 300*
Source: ^{109}Cd
Note: This PCS is also applicable to the equivalent model variations indicated below, for the Lead-in-Paint K+L variable reading time mode, in the XLi and XLp series:

XLi 300A, XLi 301A, XLi 302A and XLi 303A.
XLp 300A, XLp 301A, XLp 302A and XLp 303A.
XLi 700A, XLi 701A, XLi 702A and XLi 703A.
XLp 700A, XLp 701A, XLp 702A, and XLp 703A.

Note: The XLi and XLp versions refer to the shape of the handle part of the instrument. The differences .in the model numbers reflect other modes available, in addition to Lead-in-Paint modes. The manufacturer states that specifications for these instruments are identical for the source, detector, and detector electronics relative to the Lead-in-Paint mode.

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Lead-in-Paint K+L variable reading time mode,

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm^2 (inclusive)

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm^2 in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm^2 film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION:

For XRF results using Lead-in-Paint K+L variable reading time mode, substrate correction is not needed for:

Brick, Concrete, Drywall, Metal, Plaster, and Wood

INCONCLUSIVE RANGE OR THRESHOLD:

K+L MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm^2)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for fhe Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted in August 2004 on 133 testing combinations. The instruments that were used to perform the testing had new sources; one instrument's was installed in November 2003 with 40 mCi initial strength, and the other's was installed June 2004 with 40 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Substrate correction is not needed for brick, concrete, drywall, metal, plaster or wood when using Lead-in-Paint K+L variable reading time mode, the normal operating mode for these instruments. If substrate correction is desired, refer to Chapter 7 of the HUD Guidelines for guidance on correcting XRF results for substrate bias.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use the K+L variable time mode readings.

Conduct XRF retesting at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family housing a result is defined as the average of three readings. In multifamily housing, a result is a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit

Compute the average of all ten original XRF results.

Compute the average of all ten re-test XRF results.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

For the Lead-in-Paint K+L variable reading time mode, the instrument continues to read until it is moved away from the testing surface, terminated by the user, or the instrument software indicates the reading is complete. The following table provides testing time information for this testing mode. The times have been adjusted for source decay, normalized to the initial source strengths as noted above. Source strength and type of substrate will affect actual testing times. At the time of testing, the instruments had source strengths of 26.6 and 36.6 mCi.

Testing Times Using K+L Reading Mode (Seconds)

	All Data			Median for laboratory-measured lead levels (mg/cm^2)		
Substrate	25th Percentile	Median	75th Percentile	Pb < 0.25	0.25 ≤ Pb<1.0	1.0 ≤ Pb
Wood Drywall	4	11	19	11	15	11
Metal	4	12	18	9	12	14
Brick Concrete Plaster	8	16	22	15	18	16

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than or equal to the threshold, and negative if they are less than the threshold.

DOCUMENTATION:

A document titled *Methodology for* XRF *Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD.

This XRF Performance Characteristic Sheet was developed by the Midwest Research Institute (MRI) and QuanTech, Inc., under a contract between MRI and the XRF manufacturer. HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing.*

APPENDIX C

NITON XLp 300 SERIAL NO. 8423
XLt 898AD SERIAL NO. 17361
RMD LPA–1B SERIAL NO. 1038
LEAK: TESTING

VSSA

Valley Safety Services Associates, Inc.

330 Old Enfield Road, Belchertown, MA 01007
http://www.vssa-inc.com
(413)323-9571

Leak Test Data/Certificate

Complete the data requested on the top part of this form and return it with your leak test to the address in the above heading. Following our analysis of your leak test specimen we will return this form to you for your record of the test and results.

Source/Device Description

Device: NITON **Model:** XLP **Serial #:** 8423 **Manufacturer:** _____

Radioisotope Cd 109 **Activity (mCi)** 40

Source model: _____ Source #: NR7039 **Manufacturer:** _____

The leak testing of this source/device was performed as indicated in manufacturer recommendations or LT-952 kit instructions using kit # 803963

By: ANDREW J. OLCOTT Date: 2/1/08

Company: TRC Telephone: 602-266-8288

Address: 7600 N. 16th St. Ste 110 Fax: 602-266-9355
PHOENIX, AZ 85020

Do Not Write Below This Line

Leak Test Analysis Result

Analysis of the above test on 29 FEBRUARY 2008 yielded the following;

☒ Statistical analysis of the radioactive count data of this leak test specimen indicated any sctiviry present is less than 0.005 μCi. The source maybe used as authorized.

☐ Statistical analysis of the radioactive count data of this leak test specimen indicated there is greater than 0.005 microcuries of activity present. This source should be considered leaking. Consult your device operations manual; place this unit in storage and make the required notification to your regulatory agency.

YOUR NEXT REQUIRED LEAK TEST FOR THIS DEVICE/SOURCE IS DUE ON OR BEFORE

29 AUGUST 2008

ANOTHER TEST KIT WILL BE SENT TO YOU 2 WEEKS BEFORE THIS DATE POR YOUR USE AND RETURN FOR ANALYSIS.

THIS CERTIFICATE IS AN ESSENTIAL RECORD AND SHOULD BE MAINTAINED FOR INSPECTION BY THE REGULATORY AGENCY.

CERTIFICATE #: 803963 **BY:** Jim Tosi **DATE:** 29 Feb 08

ThermoFisher
SCIENTIFIC

Radiation Profile Certification

FRM064 Rev B

This NITON Portable XRF Analyzer, Serial Number 8423 was surveyed for radiation dose rate prior to initial delivery. The survey is performed with the shutter closed (i.e., sources in the shielded position).

The results of the survey indicate that the dose rate does not exceed 0.05 millirem per hour at any point 5 cm from the surface of the device.

This survey was conducted by James Collins on 4-1-08. If you have any further questions, please contact Thermo Fisher Scientific's NITON Analyzers at (800) 875-1578.

(NOTE: THIS IS NOT A LEAK TEST – For **leak** testing instructions **please** refer to the Radiation Safety section of your User's Guide)

APPENDIX D

BULK PAINT CHIP
LABORATORY ANALYTICAL RESULTS

August 27,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100537

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on August 20,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	#1-405 **N to** 605 N-Entry-YEL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-001		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: LKN
Chromium	1300	4.0		mg/Kg	1	8/26/2008 01:08 PM
Lead	4200	4.0		mg/Kg	1	8/26/2008 01:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Client Sample ID: **#2-405 N to 605** N-Exit-YEL
Lab Order: **100537**
Collection Date: **8/19/2008**
Project: WEST COUNTY CONNECTORS, **151396**
Matrix: PAINT CHIP
Lab ID: **100537-002**

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	520	4.0		mg/Kg	1	8/26/2008 01:14 PM
Lead	2200	4.0		mg/Kg	1	8/26/2008 01:14 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT:	TRC	**Client Sample ID:**	#3-605 S **to** 405 S-Entry-YEL
Lab Order:	100537	**Collection Date:**	8/1912008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-003		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	**65**	4.0		mg/Kg	1	8/26/2008 01:20 PM
Lead	280	4.0		mg/Kg	1	8/26/2008 01:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#4-605 S **to** 405 S-Exit-YEL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-004		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	11	4.0		mg/Kg	1	8/26/2008 01:26 PM
Lead	40	4.0		mg/Kg	1	8/26/2008 01:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#5-Seal Beach-E-West Bound-YEL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-005		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: LKN
Chromium	3100	5.0		mg/Kg	1	8/26/2008 01:32 PM
Lead	13000	10		mg/Kg	2	8/26/2008 04:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#6-Seal Beach-E-West Bound-WHT
Lab Order:	100537	**Collection Date:**	8/1912008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-006		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: LKN
Lead	420	120		mg/Kg	1	8/26/2008 01:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#7-Seal Beach-E-West Bound-WHT
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-007		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	3900	5.6		mg/Kg	1	8/26/2008 01:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#8-Seal Beach-E-East Bound-YEL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-008		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: LKN
Chromium	28000	120		mg/Kg	1	8/26/2008 02:11 PM
Lead	120000	120		mg/Kg	1	8/26/2008 02:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 9989.4045 Fax: 562.989.4040

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#9-Seal Beach-E-EastBound-WHT
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-009		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	**79**	6.1		mg/Kg	1	8/26/2008 02:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#10-Seal Beach-E-East Bound-WHT
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-010		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826C	QC Batch: 48324			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	47	8.0		mg/Kg	1	8/26/2008 02:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#11-Seal Beach-W-West Bound-YEL
Lab Order:	100537	**Collection Date:**	811912008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-011		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 30506			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	1300	17		mg/Kg	1	8/26/2008 03:40 PM
Lead	5400	17		mg/Kg	1	8/26/2008 03:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#12-Seal Beach-W-West Bound-WH
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-012		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS	**EPA 3050B**			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	110	**17**		mg/Kg	1	8/26/2008 03:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#13-Seal Beach-W-East Bound-YEL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-013		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	4100	4.4		mg/Kg	1	8/26/2008 04:13 PM
Lead	17000	8.9		mg/Kg	2	8/26/2008 04:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#14-Seal Beach-W-East Bound-WHT
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-014		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 30506			**EPA 6010 6**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	68	40		mg/Kg	1	8/26/2008 03:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#15-Seal Beach-W-East Bound-Bike
Lab Order:	100537	**Collection Date:**	811912008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-015		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	30	10		mg/Kg	1	8/26/2008 04:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	#16-Valley View-E-West Bound-YE
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-016		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	730	20		mg/Kg	1	8/26/2008 04:22 PM
Lead	2800	20		mg/Kg	1	8/26/2008 04:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#17-Valley View-E-West Bound-BL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-017		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	33	20		mg/Kg	1	8/26/2008 04:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
	Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	#18-Valley View-E-West Bound-WH
Lab Order:	100537	**Collection Date:**	811912008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-018		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: LKN
Lead	11	8.7		mg/Kg	1	8/26/2008 04:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	**TRC**	**Client Sample ID:**	#19-Valley **View-E-East** Bound-YEL
Lab Order:	**100537**	**Collection Date:**	**8/19/2008**
Project:	**WEST COUNTY CONNECTORS, 151396**	**Matrix:**	**PAINT CHIP**
Lab ID:	**100537-019**		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 601OB**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	940	25		mg/Kg	1	8/26/2008 04:36 PM
Lead	3600	25		mg/Kg	1	8/26/2008 04:36 PM

Qualifiers:

B	Analyte **detected in the associated Method Blank**	**E**	**Value above quantitation range**
H	**Holding times for preparation or analysis exceeded**	**ND**	**Not Detected at the Reporting Limit**
S	Spike/Surrogate **outside of limits due to matrix interference**		**Results are wet unless otherwise specified**
DO	Surrogate **Diluted Out**		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#20-Valley View-E-East Bound-BLK
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-020		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826E	QC Batch: 48325			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	51	9.5		mg/Kg	1	8/26/2008 04:40 PM

Qualifiers:

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	#21-Valley View-E-East Bound-WH
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-021		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826A	QC Batch: 48326			PrepDate:	8/25/2008	**Analyst: LKN**
Lead	**ND**	290		mg/Kg	1	8/26/200811:21 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#22-Bolsa Chica-W-West Bound-BL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-022		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826A	QC Batch: 48326			PrepDate:	8/25/2008	Analyst: LKN
Lead	ND	330		mg/Kg	1	8/26/2008 11:26 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#23-Bolsa Chica-W-West Bound-YE
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-023		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826A	QC Batch: 48326			PrepDate:	8/25/2008	Analyst: LKN
Chromium	ND	20		mg/Kg	1	8/26/2008 11:30 AM
Lead	ND	20		mg/Kg	1	8/26/2008 11:30 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#24-Bolsa Chica-W-West Bound-WH
Lab Order:	100537	**Collection Date:**	8/1912008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-024		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826A	QC Batch: 48326			PrepDate:	8/25/2008	Analyst: LKN
Lead	6.1	4.9		mg/Kg	1	8/26/2008 11:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#25-Bolsa Chica-W-East Bound-BLK
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-025		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826A	**QC** Batch: **48326**			PrepDate:		**8/25/2008 Analyst: LKN**
Lead	ND	15		mg/Kg	1	**8/26/2008** 1:41 **AM**

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *27-Aug-08*

CLIENT:	TRC	**Client Sample ID:**	#26-Bolsa Chica-W-East Bound-YEL
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-026		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826A	QC Batch: 48326			PrepDate:	8/25/2008	Analyst: **LKN**
Chromium	ND	18		mg/Kg	1	8/26/2008 11:45 AM
Lead	ND	18		mg/Kg	1	8/26/2008 11:45 AM

Qualifiers:

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	#27-Bolsa Chica-W-East Bound-WH
Lab Order:	100537	**Collection Date:**	8/19/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	PAINT CHIP
Lab ID:	100537-027		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_080826A	QC Batch: 48326			PrepDate:	8/25/2008	Analyst: **LKN**
Lead	24	5.4		mg/Kg	1	8/26/2008 11:50 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 100537
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-48324A**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **8/25/2008**	RunNo: **98797**
Client ID: **PBS**	Batch ID: **48324**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **8/26/2008**	SeqNo: **1528995**

Anaiyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.089	1.0									
Lead	0.31 8	1.0									

Sample ID: **LCS-48324**	SampType: **LCS**	TestCode: **6010–S**	Units: **mg/Kg**	Prep Date: **8/25/2008**	RunNo: **98797**
Client ID: **LCSS**	Batch ID: **48324**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **8/26/2008**	SeqNo: **1528996**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	50.408	1.0	50.00	0.08906	101	80	120				
Lead	50.905	1.0	50.00	0.3179	101	80	120				

Sample ID: **MB-48324-MS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **8/25/2008**	RunNo: **98797**
Client ID: **ZZZZZZ**	Batch ID: **48324**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **8/26/2008**	SeqNo: **1528998**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	115.274	1.0	125.0	0	92.2	50	114				
Lead	116.614	1.0	125.0	0	93.3	45	110				

Sample ID: **MB-48324-MSD**	SampType: **MSD**	TestCode: **6010–S**	Units: **mg/Kg**	Prep Date: **8/25/2008**	RunNo: **98797**
Client ID: *777722*	Batch ID: **48324**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **8/26/2008**	SeqNo: **1528999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	117.252	1.0	125.0	0	93.8	50	114	115.3	1.70	20	
Lead	117.725	1.0	125.0	0	94.2	45	110	116.6	0.949	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100537
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–S

Sample ID: MB-48326	SampType: MBLK	TestCode: 6010_S	Units: mg/Kg	Prep Date: 8/25/2008	RunNo: 98763
Client ID: PBS	Batch ID: 48326	TestNo: EPA 60108	EPA 30508	Analysis Date: 8/26/2008	SeqNo: 1528506

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.102	1.0									
Lead	0.280	1.0									

Sample ID: 100607-005A-DUP	SampType: DUP	TestCode: 6010_S	Units: mg/Kg	Prep Date: 8/25/2008	RunNo: 98763
Client ID: ZZZZZZ	Batch ID: 48326	TestNo: EPA 60108	EPA 30508	Analysis Date: 8/26/2008	SeqNo: 1528508

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	31.058	1.0						30.53	1.71	20	
Lead	51.825	1.0						48.60	6.42	20	

Sample ID: 100607-005A-MS	SampType: MS	TestCode: 6010–S	Units: mg/Kg	Prep Date: 8/25/2008	RunNo: 98763
Client ID: ZZZZZZ	Batch ID: 48326	TestNo: EPA 60108	EPA 30508	Analysis Date: 8/26/2008	SeqNo: 1528509

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Quai
Chromium	125.334	1.0	125.0	30.53	75.8	50	114				
Lead	146.949	1.0	125.0	48.60	78.7	45	110				

Sample ID: 100607-005A-MSD	SampType: MSD	TestCode: 6010_S	Units: mg/Kg	Prep Date: 8/25/2008	RunNo: 98763
Client ID: ZZZZZZ	Batch ID: 48326	TestNo: EPA 60108	EPA 30508	Analysis Date: 8/26/2008	SeqNo: 1528510

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	109.500	1.0	125.0	30.53	63.2	50	114	125.3	13.5	20	
Lead	182.090	1.0	125.0	48.60	107	45	110	146.9	21.4	20	R

Sample ID: LCS-48326	SampType: LCS	TestCode: 6010_S	Units: mg/Kg	Prep Date: 8/25/2008	RunNo: 98763
Client ID: LCSS	Batch ID: 48326	TestNo: EPA 60108	EPA 30508	Analysis Date: 8/26/2008	SeqNo: 1528511

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	47.760	1.0	50.00	0.1015	**95.3**	80	120				

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100537
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–S

Sample ID: **LCS-48326**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **8/25/2008**	RunNo: **98763**
Client ID: **LCSS**	Batch ID: **48326**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **8/26/2008**	SeqNo: **1528511**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	**48.866**	1.0	**50.00**	**0.2799**	**97.2**	**80**	**120**				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	**H**	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	**S**	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

FOR LABORATORY USE ONLY

P.O. #: 15396
Logged By: _____ Date: 8/21/08

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FedEx ☐ Other: ____

Sample Condition Upon Receipt
1. CHILLED 5-0 Y ☒ N ☐ 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attention: DAVID LENNON
Address: 21 TECHNOLOGY
City: IRVINE State: CA Zip Code: 92618
Tel: 949-727-7458
Fax: 949-727-9336

Project Name: WEST COUNTY CONNECTORS
Project #: 15396
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
ERIK PAQUETTE	8/20/08	1114		8/20/08	1114
	8/20/08	1835		8/20/08	1835
	Date:	Time:		Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ERIK PAQUETTE 8/20/08 (Print Name / Date)
Signature

Send Report To:
Attn: DAVID LENNON
Co: _____
Addr: 21 TECHNOLOGY
City: IRVINE State: CA Zip: 92618

Bill To:
Attn: _____
Co: SAME.
Addr: _____
City: _____ State: _____ Zip: _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	TOTAL LEAD	STLC	TCLP	CHROMIUM	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	160537-1	#1 - 405 N to 605 N - Entry - YEL	8/19/08										X	X	X	X							E		
	2	#2 - 405 N to 605 N - Exit - YEL														X									
	3	#3 - 605 S to 405 S - Entry - YEL														X									
	4	#4 - 605 S to 405 S - Exit - YEL														X									
	5	#5 - Seal Beach - E - West Bound - YEL														X									
	6	#6 - Seal Beach - E - West Bound - WHT																							
	7	#7 - Seal Beach - E - West Bound - WHT																							
	8	#8 - Seal Beach - E - East Bound - YEL														X									
	9	#9 - Seal Beach - E - East Bound - WHT																							
	10	#10 - Seal Beach - E - East Bound - WHT																							

▪ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl $N=HNO_3$ $S=H_2SO_4$ C=4°C $Z=Zn(AC)_2$ O=NaOH $T=Na_2S_2O_3$

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel:(562) 989-4045 • Fax:(562) 989-4040

FOR LABORATORY USE ONLY

P.O. #: 15/396
Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☒ CA OverN ☐ FedEx ☐ Other: _____

Sample Condition Upon Receipt: CHILLED Y ☐ N ☐ | 2. HEADSPACE (VOA) Y ☐ N ☐ | 3. CONTAINER INTACT Y ☐ N ☐ | 4. SEALED Y ☐ N ☐ | 5. # OF SPLS MATCH COC Y ☐ N ☐ | 6. PRESERVED Y ☐ N ☐

Client: TRC
Attention: DAVID LENNON
Address: 21 TECHNOLOGY
City: IRVINE State: CA Zip Code: 92618
Tel: 949-727-7458
Fax: 949-727-9336

Project Name: WEST COUNTY CONNECTORS
Project #: 15/396
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
ERIK PAQUETTE	8/20/08	11:14am		8/20/08	
	8/20/08	1835		8/20/08	1835
	Da :	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ERIK PAQUETTE 8/20/08 (Print Name / Date)
(Signature)

Send Report To:
Attn: DAVID LENNON
Co:
Addr: 21 TECHNOLOGY
City: IRVINE State: CA Zip: 92618

Bill To:
Attn:
Co: Same
Addr:
City: State: Zip:

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA / QC
RTNE ☐
CT ☐
SWRCB ☐ Logcode_____
OTHER _____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	TOTAL LEAD	STLC	TCLP	CHROMIUM	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100537-11	#11 - Seal Beach - W - West Bound - YEL	8/19/08																			E			
	12	#12 - Seal Beach - W - West Bound - WHT																							
	13	#13 - Seal Beach - W - East Bound - YEL															X								
	14	#14 - Seal Beach - W - East Bound - WHT																							
	15	#15 - Seal Beach - W - East Bound - Bike Lane - WHT																							
		~~#16 Seal Beach W East Bound YEL~~																							
		~~#17 Seal Beach W East Bound BLK~~																							
	16	#16 - Valley View - E - West Bound - YEL																							
	17	#17 - Valley View - E - West Bound - BLK																							
	18	#18 - Valley View - E - West Bound - WHT																							

■ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=HCl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

PO # 151396
Logged By _____ Date _____

FOR LABORATORY USE ONLY

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FedEx ☐ Other:.

Sample Condition Upon Receipt:
1 CHILLED Y ☐ N ☐ | 4 SEALED Y ☐ N ☐
2 HEADSPACE(VOA) Y ☐ N ☐ | 5 # OF SPLS MATCH COC Y ☐ N q
3. CONTAINER INTACT Y ☐ N ☐ | 6. PRESERVED Y ☐ N ☐

Client: TRC
Attention: DAVID LENNON
Address: 21 TECHNOLOGY
City: IRVINE State: CA Zip Code: 92618
Tel: 949-727-7458
Fax: 949-770-9336

Project Name: WEST COUNTY CONNECTORS
Project #: 1513
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
ERIK PAQUETTE	8/20/08	11:14 am		8/20/08	1114
	8/20/08	1835		8/20/08	1835

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ERIK PAQUETTE 8/20/08
Print Name Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: _____
Addr: 21 TECHNOLOGY
City: IRVINE State: CA Zip: 92618

Bill To:
Attn: _____
Co: Same
Addr: _____
City: _____ State: _____ Zip: _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode_____ OTHER _____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	TOTAL LEAD	STLC	TCLP	CHROMIUM	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	100537-19	#19-Valley View-E-East Bound-YEL	8/19/08										X	X	X	X							E		
	20	#20-Valley View-E-East Bound-BLK																							
	21	#21-Valley View-E-East Bound-WHT																							
	22	#22-Bolsa Chica-W-West Bound-BLK																							
	23	#23-Bolsa Chica-W-West Bound-YEL															X								
	24	#24-Bolsa Chica-W-West Bound-WHT																							
	25	#25-Bolsa Chica-W-East Bound-BLK																							
	26	#26-Bolsa Chica-W-East Bound-YEL															X								
	27	#27-Bolsa Chica-W-East Bound-WHT																							

■ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl $N=HNO_3$ $S=H_2SO_4$ C=4°C $Z=Zn(AC)_2$ O=NaOH $T=Na_2S_2O_3$

September 12,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 100846

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on September 05,2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample** ID:	#30-Seal Beach-East-Westbound-Medi
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLD
Lab ID:	100846-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: 48678				PrepDate: **9/9/2008**	Analyst: **LKN**	
Chromium	14	0.018	1.0		mg/L	20	911112008 10:59 PM
Lead	13	0.042	1.0		mg/L	20	9/1112008 10:59 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate: **9/9/2008**	Analyst: **LKN**	
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 09:57 AM
Lead	0.74	0.023	0.25		mg/L	1	9/11/2008 09:57 AM

Qualifiers:
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO 'surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	#31-Seal Beach-East-Westbound-Lane
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	**WEST** COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	**QC** Batch: 48678				PrepDate:	9/9/2008	Analyst: **LKN**
Lead	ND	0.042	1.0		mg/L	20	9/1112008 11:02 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 13111 6010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate:	9/9/2008	Analyst: **LKN**
Lead	ND	0.023	0.25		mg/L	1	911112008 10:01 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#32-Seal Beach-East-Westbound-Bike
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
WET					**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: 48678				PrepDate: **9/9/2008**	Analyst: **LKN**	
Lead	ND	0.042	1.0		mg/L	20	9111/2008 11:05 PM
ICP METALS BY TCLP EXTRACTION							
EPA3010A					**EPA 131116010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate: 9/9/2008	Analyst: **LKN**	
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:05 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#33-Seal Beach-East-Eastbound-Medi
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: 48678				PrepDate:	**9/9/2008**	Analyst: **LKN**
Chromium	130	0.18	10		mg/L	20	9111/2008 11:09 PM
Lead	82	0.42	10		mg/L	20	911112008 11:09 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate:	91912008	Analyst: **LKN**
Chromium	0.75	0.0034	0.25		mg/L	1	911112008 10:09 AM
Lead	3.5	0.023	0.25		mg/L	1	911112008 10:09 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#34-Seal Beach-East-Eastbound-Lane-
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
WET					**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: 48678				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	ND	0.042	1.0		mg/L	20	9/11/2008 11:12 PM
ICP METALS BY TCLP EXTRACTION							
EPA3010A					**EPA 1311/ 6010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate:	**9/9/2008**	Analyst: **LKN**
Lead	ND	0.023	0.25		mg/L	1	911112008 10:12 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Client Sample ID: #35-Valley View-East-Westbound-Me
Lab Order: 100846
Collection Date: 9/4/2008
Project: WEST COUNTY CONNECTORS, 151396
Matrix: SOLID
Lab ID: 100846-006

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: 48678				PrepDate: **9/9/2008**	Analyst: **LKN**	
Chromium	6.4	0.018	1.0		mg/L	20	9/11/2008 11:15 PM
Lead	5.0	0.042	1.0		mg/L	20	9/11/2008 11:15 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 13111 6010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate: **9/9/2008**	Analyst: **LKN**	
Chromium	ND	0.0034	0.25		mg/L	1	911112008 10:16 AM
Lead	ND	0.023	0.25		mg/L	1	9111/2008 10:16 AM

Qualifiers:
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *12-Sep-08*

CLIENT: TRC
Client Sample ID: #36-Valley View-East-Eastbound-Med
Lab Order: 100846
Collection Date: 9/4/2008
Project: WEST COUNTY CONNECTORS, 151396
Matrix: SOLID
Lab ID: 100846-007

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: ICP8_080911K	*QC* Batch: 48678				PrepDate:	9/9/2008	Analyst: LKN
Lead	110	0.042	1.0		mg/L	20	9/11/2008 11:19 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA I3111 6010B**		
RunID: ICP6_080911A	QC Batch: 48655				PrepDate:	91912008	Analyst: LKN
Lead	ND	0.023	0.25		mg/L	1	911112008 10:20 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample** ID:	#37-Valley View-East-Eastbound-Med
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: **48678**				PrepDate: **9/9/2008**	Analyst: **LKN**	
Chromium	16	0.018	1.0		mg/L	20	9/12/2008 02:25 PM
Lead	16	0.042	1.0		mg/L	20	9/12/2008 02:25 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_080911A**	QC Batch: **48655**				PrepDate: **9/9/2008**	Analyst: **LKN**	
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 10:31 AM
Lead	0.32	0.023	0.25		mg/L	1	9/11/2008 10:31 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	#38-605S to 405 South-Entry-YEL
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	100846-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: 48678				PrepDate: 9/9/2008	Analyst: **LKN**	
Chromium	ND	0.018	1.0		mg/L	20	9/12/2008 02:29 PM
Lead	ND	0.042	1.0		mg/L	20	9/12/2008 02:29 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate: **9/9/2008**	Analyst: **LKN**	
Chromium	ND	0.0034	0.25		mg/L	1	9/1112008 10:35 AM
Lead	ND	0.023	0.25		mg/L	1	9/11/2008 10:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	**TRC**	**Client Sample ID:**	#39-405N **to** 605 North-Exit-YEL
Lab Order:	100846	**Collection Date:**	9/4/2008
Project:	WEST **COUNTY CONNECTORS,** 151396	**Matrix:**	**SOLID**
Lab ID:	100846-010		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_080911K**	QC Batch: 48678				PrepDate: 9/9/2008	Analyst: **LKN**	
Chromium	17	0.018	1.0		mg/L	20	9/12/2008 03:00 PM
Lead	7.6	0.042	1.0		mg/L	20	9/12/2008 03:00 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_080911A**	QC Batch: 48655				PrepDate: 9/9/2008	Analyst: **LKN**	
Chromium	ND	0.0034	0.25		mg/L	1	9/11/2008 10:43 AM
Lead	2.8	0.023	0.25		mg/L	1	9/11/2008 10:43 AM

Qualifiers:
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

CLIENT: TRC
Work Order: 100846
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: **MB-48678A**	SampType: **MBLK**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **PBS**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/11/2008**	SeqNo: **1539592**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: **LCS-48678**	SampType: **LCS**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **LCSS**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/11/2008**	SeqNo: **1539593**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.005	0.050	1.000	0	100	85	115				
Lead	1.133	0.050	1.000	0	113	85	115				

Sample ID: **100827-002A-DUP**	SampType: **DUP**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **ZZZZZZ**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/12/2008**	SeqNo: **1540298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.845	1.0						1.789	3.04	20	
Lead	5.053	1.0						4.925	2.57	20	

Sample ID: **100827-002A-MS**	SampType: **MS**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **ZZZZZZ**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/12/2008**	SeqNo: **1540299**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	3.879	1.0	2.500	1.789	83.6	75	120				
Lead	7.045	1.0	2.500	4.925	84.8	71	118				

Sample ID: **MB-48678B**	SampType: **MBLK**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **9/9/2008**	RunNo: **99435**
Client ID: **PBS**	Batch ID: **48678**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **9/12/2008**	SeqNo: **1540300**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- **H** Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Worlc Order: 100846
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: MB-48678B	SampType: MBLK	TestCode: 6010–ST	Units: mg/L	Prep Date: 91912008	RunNo: 99435
Client ID: PBS	Batch ID: 48678	TestNo: WET/ EPA 60 WET		Analysis Date: 9/12/2008	SeqNo: 1540300

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: 100827-015A-DUP	SampType: DUP	TestCode: 6010–ST	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99435
Client ID: ZZZZZZ	Batch ID: 48678	TestNo: WET/ EPA 60 WET		Analysis Date: 9/12/2008	SeqNo: 1540303

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.239	1.0						0.2383	0	20	
Lead	0.283	1.0						0.2969	0	20	

Sample ID: 100827-015A-MS	SampType: MS	TestCode: 6010–ST	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99435
Client ID: ZZZZZZ	Batch ID: 48678	TestNo: WET/ EPA 60 WET		Analysis Date: 9/12/2008	SeqNo: 1540304

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.343	1.0	2.500	0.2383	84.2	75	120				
Lead	2.492	1.0	2.500	0.2969	87.8	71	118				

Sample ID: 100827-015A-MSD	SampType: MSD	TestCode: 6010–ST	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99435
Client ID: ZZZZZZ	Batch ID: 48678	TestNo: WET/ EPA 60 WET		Analysis Date: 9/12/2008	SeqNo: 1540305

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.303	1.0	2.500	0.2383	82.6	75	120	2.343	1.73	20	
Lead	2.439	1.0	2.500	0.2969	85.7	71	118	2.492	2.12	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100846
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: MB-48655A	SampType: MBLK	TestCode: 6010–TC	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99387
Client ID: PBS	Batch ID: 48655	TestNo: EPA 1311160 EPA3010A		Analysis Date: 9/11/2008	SeqNo: 1538772

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	0.013	0.050									

Sample ID: MB-48631A TCLP	SampType: MBLK	TestCode: 6010–TC	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99387
Client ID: PBS	Batch ID: 48655	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 9/11/2008	SeqNo: 1538773

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.002	0.050									
Lead	ND	0.050									

Sample ID: LCS-48655	SampType: LCS	TestCode: 6010–TC	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99387
Client ID: LCSS	Batch ID: 48655	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 9/11/2008	SeqNo: 1538774

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.049	0.050	1.000	0	105	85	115				
Lead	1.044	0.050	1.000	0.01331	103	85	115				

Sample ID: 100846-009ADUP	SampType: DUP	TestCode: 6010_TC	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99387
Client ID: #38-605S to 405 Sou	Batch ID: 48655	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 9/11/2008	SeqNo: 1538784

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.043	0.25						0.02243	0	20	
Lead	0.140	0.25						0.08202	0	20	

Sample ID: 100846-010AMS	SampType: MS	TestCode: 6010–TC	Units: mg/L	Prep Date: 9/9/2008	RunNo: 99387
Client ID: #39-405N to 605 Nor	Batch ID: 48655	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 9/11/2008	SeqNo: 1538786

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.587	0.25	12.50	0.1167	99.8	75	120				

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 100846
Project: . WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: 100846-010AMS	SampType: MS	TestCode: 6010–TC	Units: mg/L	Prep Date: 91912008	RunNo: 99387
Client ID: #39-405N to 605 Nor	Batch ID: 48655	TestNo: EPA 13111 60	EPA3010A	Analysis Date: 911112008	SeqNo: 1538786

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Quai
Lead	15.191	0.25	12.50	2.787	99.2	71	118				

Sample ID: 100846-010AMSD	SampType: MSD	TestCode: 6010_TC	Units: mg/L	Prep Date: 91912008	RunNo: 99387
Client ID: #39-405N to 605 Nor	Batch ID: 48655	TestNo: EPA 1311/ 60	EPA3010A	Analysis Date: 9/11/2008	SeqNo: 1538787

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.894	0.25	12.50	0.1167	102	75	120	12.59	2.41	20	
Lead	15.397	0.25	12.50	2.787	101	71	118	15.19	1.35	20	

Qualifiers:

- B Analyte detected in tlie associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- **H** Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CHAIN OF CUSTODY RECORD.

Page 1 Page of

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax:(562) 989-4040

P.O. # 151396
Logged By: _____ Date: 9/5/08

FOR LABORATORY USE ONLY

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FedEx ☐ Other: _____

Sample Condition Upon Receipt
1. CHILLED Y ☑ N ☐ 4. SEALED Y ☐ N ☑ n/a
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☑ N ☐
3. CONTAINER INTACT Y ☑ N ☐ 6. PRESERVED Y ☐ N ☑

Client: TRC
Attention: DAVID LENNON
Address: 21 TECHNOLOGY
City: IRVINE State: CA Zip Code: 92618
Tel: 949-727-7458
Fax: 949-727-9336

Project Name: WEST COUNTY CONNECTORS
Project #: 151396
Sampler: (Printed Name) ERIK PAQUETTE (Signature) 5:09pm

Relinquished by: (Signature and Printed Name)	Date	Time	Received by: (Signature and Printed Name)	Date	Time
Natalie Spisak	9/5/08	1347		9/5/08	1347
	9/5/08	1445		9/5/08	1445

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ERIK PAQUETTE 9/4/08 (Print Name / Date)
(Signature)

Send Report To: Attn: DAVID LENNON Co: _____ Addr: 21 TECHNOLOGY City: IRVINE State: CA Zip: 92618

Bill To: Attn: _____ Co: Same Addr: _____ City: _____ State: _____ Zip: _____

Special Instructions/Comments: * Anticipate STLC/TCLP

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION: QA/QC RTNE ☐ CT ☐ SWRCB ☐ Logcode____ OTHER ____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	STLC LEAD	TCLP LEAD	STLC Chromium	TCLP Chromium	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
1	100846-001	#30 - Seal Beach - East - Westbound - Median YEL	9/4/08											X	X	X	X					E		P	
2		#31 - Seal Beach - East - Westbound - Lane - WHT																							
3		#32 - Seal Beach - East - Westbound - Bike Lane																							
4		#33 - Seal Beach - East - Eastbound - Median YEL																							
5		#34 - Seal Beach - East - Eastbound - Lane - WHT																							
6		#35 - Valley View - East - Westbound - Median YEL																							
7		#36 - Valley View - East - Eastbound - Median - BLK																							
8		#37 - Valley View - East - Eastbound - Median - YEL																							
9		#38 - 605 S to 405 South - Entry - YEL																							
10		#39 - 405 N to 605 North - Exit - YEL																							

■ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

October 03,2008

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.:CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 101314

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on September 29,2008 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

for Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT:	TRC	**Client Sample ID:**	X-5-Lane Marker 405 N to 605 N
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-001		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_081002F**	QC Batch: 49195				PrepDate:	913012008	Analyst: **LKN**
Lead	ND	0.042	1.0		mg/L	20	10/2/2008 03:27 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_081002A**	QC Batch: 49199				PrepDate:	101112008	Analyst: **LKN**
Lead	ND	0.023	0.25		mg/L	1	I01212008 10:05 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	X-7-Shoulder Cross Stripe-605 N-WH
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-002		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: ICP8_081002F	QC Batch: 49195				PrepDate:	**9/30/2008**	Analyst: **LKN**
Lead	ND	0.042	1.0		mg/L	20	10/2/2008 03:31 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 13111 6010B**		
RunID: ICP8_081002A	QC Batch: 49199				PrepDate:	**10/1/2008**	Analyst: **LKN**
Lead	ND	0.023	0.25		mg/L	1	10/2/2008 10:08 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *03-Oct-08*

CLIENT:	TRC	**Client Sample ID:**	X-14-Lane Marker-Willow Ramp-YE
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_081002F**	QC Batch: 49195				PrepDate:	913012008	Analyst: **LKN**
Chromium	12	0.018	1.0		mg/L	20	101212008 03:34 PM
Lead	8.0	0.042	1.0		mg/L	20	101212008 03:34 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_081002A**	QC Batch: 49199				PrepDate:	101112008	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	101212008 10:11 AM
Lead	1.2	0.023	0.25		mg/L	1	10/2/2008 10:11 AM

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT:	TRC	**Client Sample ID:**	X-23-605 S **to** 405 S at Tunnel Entry-
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-004		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_081002F**	QC Batch: 49195				PrepDate:	913012008	Analyst: **LKN**
Chromium	11	0.018	1.0		mg/L	20	I01212008 03:37 PM
Lead	8.3	0.042	1.0		mg/L	20	10/2/2008 03:37 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_081002A**	QC Batch: 49199				PrepDate:	101112008	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	10/2/2008 10:15 AM
Lead	0.94	0.023	0.25		mg/L	1	101212008 10:15 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	X-27-605 N-Median-YEL
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
WET					WET/ EPA 6010B		
RunID: ICP8_081002F	QC Batch: 49195				PrepDate: 913012008		Analyst: LKN
Chromium	ND	0.018	1.0		mg/L	20	10/2/2008 03:40 PM
Lead	ND	0.042	1.0		mg/L	20	10/2/2008 03:40 PM
ICP METALS BY TCLP EXTRACTION							
EPA3010A					EPA 1311/ 6010B		
RunID: ICP8_081002A	QC Batch: 49199				PrepDate: 101112008		Analyst: LKN
Chromium	ND	0.0034	0.25		mg/L	1	10/2/2008 10:18 AM
Lead	ND	0.023	0.25		mg/L	1	10/2/2008 10:18 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	X-33-605 N-Carpool Lane-WHT
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_081002F**	**QC Batch: 49195**				PrepDate:	**913012008**	**Analyst: LKN**
Lead	**ND**	**0.042**	**1.0**		mg/L	**20**	10/2/2008 03:43 **PM**
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_081002A**	**QC Batch: 49199**				PrepDate:	**101112008**	**Analyst: LKN**
Lead	**ND**	**0.023**	**0.25**		mg/L	**1**	10/2/2008 10:22 **AM**

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample** ID:	X-34-605 N-Carpool Shoulder-YEL
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_081002F**	QC Batch: 49195				PrepDate:	913012008	Analyst: **LKN**
Chromium	ND	0.018	1.0		mg/L	20	10/2/2008 03:47 PM
Lead	ND	0.042	1.0		mg/L	20	10/2/2008 03:47 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_081002A**	QC Batch: 49199				PrepDate:	101112008	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	10/2/2008 10:25 AM
Lead	ND	0.023	0.25		mg/L	1	10/2/2008 10:25 AM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Print Date: *03-Oct-08*

CLIENT:	TRC	**Client Sample ID:**	X-36-Willow Onramp EB to 605-YEL
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_081002F**	QC Batch: 49195				PrepDate: 913012008	Analyst: **LKN**	
Chromium	ND	0.018	1.0		mg/L	20	10/2/2008 03:57 PM
Lead	ND	0.042	1.0		mg/L	20	10/2/2008 03:57 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_081002A**	QC Batch: 49199				PrepDate: 101112008	Analyst: **LKN**	
Chromium	ND	0.0034	0.25		mg/L	1	10/2/2008 10:35 AM
Lead	ND	0.023	0.25		mg/L	1	10/2/2008 10:35 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	X-45-605 **S** Lane Marker-Median-YE
Lab Order:	101314	**Collection Date:**	9/25/2008
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	101314-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC							
	WET				**WET/ EPA 6010B**		
RunID: **ICP8_081002F**	QC Batch: 49195				PrepDate:	913012008	Analyst: **LKN**
Chromium	ND	0.018	1.0		mg/L	20	10/2/2008 04:00 PM
Lead	ND	0.042	1.0		mg/L	20	10/2/2008 04:00 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_081002A**	QC Batch: 49199				PrepDate:	101112008	Analyst: **LKN**
Chromium	ND	0.0034	0.25		mg/L	1	10/2/2008 10:39 AM
Lead	ND	0.023	0.25		mg/L	1	10/2/2008 10:39 AM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: **101314**
Project: WEST COUNTY CONNECTORS, 151**1396**

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: **MB-49195A**	SampType: **MBLK**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **913012008**	RunNo: **100182**
Client ID: **PBS**	Batch ID: **49195**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **I01212008**	SeqNo: **1553373**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: **LCS-49195**	SampType: **LCS**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **913012008**	RunNo: **100182**
Client ID: **LCSS**	Batch ID: **49195**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **10/2/2008**	SeqNo: **1553374**

Anaiyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.025	0.050	1.000	0	102	85	115				
Lead	1.065	0.050	1.000	0	106	85	115				

Sample ID: **101055-001A-DUP**	SampType: **DUP**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **913012008**	RunNo: **100182**
Client ID: **ZZZZZZ**	Batch ID: **49195**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **101212008**	SeqNo: **1553376**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	10.550	1.0						10.26	2.75	20	
Lead	0.132	1.0						0.1376	0	20	

Sample ID: **101055-001A-MS**	SampType: **MS**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **913012008**	RunNo: **100182**
Client ID: **ZZZZZZ**	Batch ID: **49195**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **101212008**	SeqNo: **1553377**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	11.893	1.0	2.500	10.26	65.2	77	116				S
Lead	2.407	1.0	2.500	0.1376	90.8	71	121				

Sample ID: **MB-49195B**	SampType: **MBLK**	TestCode: **6010–ST**	Units: **mg/L**	Prep Date: **913012008**	RunNo: **100182**
Client ID: **PBS**	Batch ID: **49195**	TestNo: **WET/ EPA 60 WET**		Analysis Date: **10/2/2008**	SeqNo: **1553437**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: **101314**
Project: WEST COUNTY CONNECTORS, **151396**

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: **MB-49195B** SampType: **MBLK** TestCode: **6010–ST** Units: **mg/L** Prep Date: **913012008** RunNo: **100182**
Client ID: **PBS** Batch ID: **49195** TestNo: **WET/ EPA 60 WET** Analysis Date: **101212008** SeqNo: **1553437**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	1.0									
Lead	ND	1.0									

Sample ID: **101059-003A-DUP** SampType: **DUP** TestCode: **6010–ST** Units: **mg/L** Prep Date: **913012008** RunNo: **100182**
Client ID: **ZZZZZZ** Batch ID: **49195** TestNo: **WET/ EPA 60 WET** Analysis Date: **I01212008** SeqNo: **1553439**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.629	1.0						1.647	1.10	20	
Lead	ND	1.0						0	0	20	

Sample ID: **101059-003A-MS** SampType: **MS** TestCode: **6010–ST** Units: **mg/L** Prep Date: **913012008** RunNo: **100182**
Client ID: **ZZZZZZ** Batch ID: **49195** TestNo: **WET/ EPA 60 WET** Analysis Date: **101212008** SeqNo: **1553440**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	3.600	1.0	2.500	1.647	78.1	77	116				
Lead	2.241	1.0	2.500	0	89.6	71	121				

Sample ID: **101059-003A-MSD** SampType: **MSD** TestCode: **6010–ST** Units: **mg/L** Prep Date: **913012008** RunNo: **100182**
Client ID: **ZZZZZZ** Batch ID: **49195** TestNo: **WET/ EPA 60 WET** Analysis Date: **101212008** SeqNo: **1553441**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	3.664	1.0	2.500	1.647	80.7	77	116	3.600	1.77	20	
Lead	2.284	1.0	2.500	0	91.4	71	121	2.241	1.93	20	

Qualifiers:

- **B** Analyte detected in the associated Method Blank
- **E** Value above quantitation range
- **H** Holding times for preparation or analysis exceeded
- **ND** Not Detected at the Reporting Limit
- **R** RPD outside accepted recovery limits
- **S** Spike/Surrogate outside of limits due to matrix interference
- **DO** Surrogate Diluted Out
- Calculations are based on raw values

Advanced Technology Laboratories *3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040*

CLIENT: TRC
Work Order: 101314
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: **MB-49199A**	SampType: **MBLK**	TestCode: **6010–TC**	Units: **mg/L**	Prep Date: **101112008**	RunNo: **100156**
Client ID: **PBS**	Batch ID: **49199**	TestNo: **EPA 1311160 EPA3010A**		Analysis Date: **101212008**	SeqNo: **1552974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: **MB-49196A TCLP**	SampType: **MBLK**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **101112008**	RunNo: **100156**
Client ID: **PBS**	Batch ID: **49199**	TestNo: **EPA 1311160 EPA3010A**		Analysis Date: **10/2/2008**	SeqNo: **1552975**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.000935	0.050									
Lead	ND	0.050									

Sample ID: **LCS-49199**	SampType: **LCS**	TestCode: **6010–TC**	Units: **mg/L**	Prep Date: **10/1/2008**	RunNo: **100156**
Client ID: **LCSS**	Batch ID: **49199**	TestNo: **EPA 1311160 EPA3010A**		Analysis Date: **101212008**	SeqNo: **1552976**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.951	0.050	1.000	0	95.1	85	115				
Lead	1.105	0.050	1.000	0	110	85	115				

Sample ID: **101314-009A-DUP**	SampType: **DUP**	TestCode: **6010–TC**	Units: **mg/L**	Prep Date: **10/1/2008**	RunNo: **100156**
Client ID: **X-45-605 S Lane Ma**	Batch ID: **49199**	TestNo: **EPA 1311160 EPA3010A**		Analysis Date: **10/2/2008**	SeqNo: **1552999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Quai
Chromium	0.004	0.25						0.004305	0	20	
Lead	ND	0.25						0	0	20	

Sample ID: **101314-009A-MS**	SampType: **MS**	TestCode: **6010–TC**	Units: **mg/L**	Prep Date: **101112008**	RunNo: **100156**
Client ID: **X-45-605 S Lane Ma**	Batch ID: **49199**	TestNo: **EPA 1311160 EPA3010A**		Analysis Date: **101212008**	SeqNo: **1553141**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.507	0.25	12.50	0.004305	100	77	116				

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

CLIENT: TRC
Work Order: 101314
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: 101314-009A-MS	SampType: MS	TestCode: 6010–TC	Units: mg/L	Prep Date: 101112008	RunNo: 100156
Client ID: X-45-605 S Lane Ma	Batch ID: 49199	TestNo: EPA 1311/ 60 EPA3010A		Analysis Date: 101212008	SeqNo: 1553141

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	13.848	0.25	12.50	0	111	71	121				

Sample ID: 101314-009A-MSD	SampType: MSD	TestCode: 6010–TC	Units: mg/L	Prep Date: 101112008	RunNo: 100156
Client ID: X-45-605 S Lane Ma	Batch ID: 49199	TestNo: EPA 1311160 EPA3010A		Analysis Date: 101212008	SeqNo: 1553142

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	11.851	0.25	12.50	0.004305	94.8	77	116	12.51	5.38	20	
Lead	13.076	0.25	12.50	0	105	71	121	13.85	5.73	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

FOR LABORATORY USE ONLY

P.O. #:
Logged By: Date: 9/29/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FedEx ☑ Other:

Sample Condition Upon Receipt
1. CHILLED Y ☐ N ☑ 4. SEALED Y ☐ N ☑
2. HEADSPACE (VOA) Y ☐ N ☐ NA 5. # OF SPLS MATCH COC Y ☑ N ☐
3. CONTAINER INTACT Y ☑ N 6. PRESERVED Y ☐ N ☑

Client: TRC
Attention: DAVID LENNON
Address: 21 TECHNOLOGY
City: IRVINE State: CA Zip Code:
Tel: (949) 341-7458
Fax: (949) 727-9336

Project Name: WEST COUNTY CONNECTORS
Project #: 151396
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
ERIK PAQUETTE	9-26-08	@ 4:30pm		9/29/08	13:35
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquishedby: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ERIK PAQUETTE 9/26/08
Print Name / Date
Signature

Send Report To:
Attn: DAVID LENNON
Co: TRC
Addr: 21 TECHNOLOGY
City: IRVINE State: CA Zip: 92618

Bill To:
Attn:
Co: Same
Addr:
City: State: Zip:

Special Instructions/Comments:
ANTICIPATE STLC & TCLP

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode____ OTHER____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	STLC LEAD	TCLP LEAD	STLC CHROMIUM	TCLP CHROMIUM	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	10/3/24-001	X-5 - Lane Marker 405 N to 605 N	9-25-08											X	X							E		P	
	2	X-7 - Shoulder Cross Stripe - 605 N - WHT												X	X										
	3	X-14 - Lane Marker - Willow Ramp - YEL												X	X	X	X								
	4	X-23 - 605 S to 405 S at Tunnel Entry - YEL												X	X	X	X								
	5	X-27 - 605 N - Median - YEL												X	X	X	X								
	6	X-33 - 605 N - Carpool Lane - WHT												X	X										
	7	X-34 - 605 N - Carpool Shoulder - YEL												X	X	X	X								
	8	X-36 - Willow Onramp EB to 605 - YEL												X	X	X	X								
	√1 9	X-45 - 605 S Lane Marker - Median - YEL	↓											X	X	X	X					↓		↓	

¤ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

March 26,2009

David Lennon
TRC
21 Technology Dr.
Irvine, CA 92618
TEL: (949) 341-7458
FAX: (949) 727-7399

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
CSDLAC No.: 10196

Workorder No.: 104687

RE: WEST COUNTY CONNECTORS, 151396

Attention: David Lennon

Enclosed are the results for sample(s) received on March 23,2009 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: TRC
Lab Order: **104687**
Project: WEST COUNTY CONNECTORS, **151396**
Lab ID: **104687-001**

Client Sample ID: **181**
Collection Date: **312012009**
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	QC Batch: 54170				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 07:31 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 07:31 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 11:52 AM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 11:52 AM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_090326C**	QC Batch: 54252				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:23 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:23 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

CLIENT: TRC
Client Sample ID: 182
Lab Order: 104687
Collection Date: 312012009
Project: WEST COUNTY CONNECTORS, 151396
Matrix: SOLID
Lab ID: 104687-002

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: ICP8_090325G	QC Batch: 54170				PrepDate:	3/24/2009	Analyst: CL
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 07:39 PM
Lead	11	0.45	4.0		mg/Kg	1	3/25/2009 07:39 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: ICP6_090326A	QC Batch: R107449				PrepDate:		Analyst: CL
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 11:55 AM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 11:55 AM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: ICP6_090326C	QC Batch: 54252				PrepDate:	3/26/2009	Analyst: CL
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:28 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:28 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT:	TRC	**Client Sample ID:**	183
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-003		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	**QC Batch: 54170**				PrepDate:	**3/24/2009**	**Analyst: CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 07:44 PM
Lead	9.2	0.45	4.0		mg/Kg	1	3/25/2009 07:44 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	**QC Batch: R107449**				PrepDate:		**Analyst: CL**
Chromium	**ND**	**0.018**	**1.0**		mg/L	**20**	**3/26/2009** 11:57 AM
Lead	**ND**	**0.042**	**1.0**		mg/L	**20**	**3/26/2009** 11:57 AM
ICP METALS BY TCLP EXTRACTION							
	EPA1310A				**EPA 1311/6010B**		
RunID: **ICP6_090326C**	**QC Batch: 54252**				PrepDate:	**3/26/2009**	**Analyst: CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:30 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Lab Order: 104687
Project: **WEST** COUNTY CONNECTORS, 151396
Lab ID: 104687-004

Client Sample ID: 184
Collection Date: 312012009
Matrix: SOLID

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	QC Batch: 54170				PrepDate: 3/24/2009		Analyst: **CL**
Chromium	ND	0.59	6.7		mg/Kg	1	3/25/2009 07:48 PM
Lead	ND	0.75	6.7		mg/Kg	1	3/25/2009 07:48 PM
ICP METALS BY STLC							
					WET/ EPA 601CB		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 11:59 AM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 11:59 AM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326C**	QC Batch: 54252				PrepDate: 3/26/2009		Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:32 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:32 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

CLIENT:	TRC	**Client Sample ID:**	185
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-005		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	QC Batch: 54170				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 08:01 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 08:01 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:02 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:02 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_090326C**	QC Batch: 54252				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:35 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	186
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-006		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	QC Batch: 54170				PrepDate: 3/24/2009		Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 08:06 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 08:06 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:04 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:04 PM
ICP METALS BY TCLP EXTRACTION							
	EPA301OA				**EPA 13111601OB**		
RunID: **ICP6_090326C**	QC Batch: 54252				PrepDate: 3/26/2009		Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:37 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:37 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	187
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-007		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	QC Batch: 54170				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 08:10 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 08:10 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:06 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:06 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326C**	QC Batch: 54252				PrepDate:	**3/26/2009**	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:44 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:44 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	188
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-008		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	QC Batch: 54170				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	8.0	0.35	4.0		mg/Kg	1	3/25/2009 08:15 PM
Lead	9.8	0.45	4.0		mg/Kg	1	3/25/2009 08:15 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:09 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:09 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_090326C**	QC Batch: 54252				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:46 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:46 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	189
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-009		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	QC Batch: 54170				PrepDate: 3/24/2009		Analyst: **CL**
Chromium	5.2	0.35	4.0		mg/Kg	1	3/25/2009 08:18 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 08:18 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:20 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:20 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_090326C**	QC Batch: 54252				PrepDate: 3/26/2009		Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:49 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:** 190	
Lab Order:	**104687**	**Collection Date:** 3/20/2009	
Project:	WEST COUNTY CONNECTORS, **151396**	**Matrix:** SOLID	
Lab ID:	**104687-010**		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325G**	**QC Batch: 54170**				PrepDate:	**3/24/2009**	**Analyst: CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 08:22 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 08:22 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	**QC Batch: R107449**				PrepDate:		**Analyst: CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:23 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:23 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_090326C**	**QC Batch: 54252**				PrepDate:	**3/26/2009**	**Analyst: CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:53 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Client Sample ID: 191
Lab Order: 104687
Collection Date: 3/20/2009
Project: WEST COUNTY CONNECTORS, 151396
Matrix: SOLID
Lab ID: 104687-011

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 08:57 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 08:57 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:32 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:32 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326D**	QC Batch: 54253				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:01 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:01 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	192
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-012		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 09:05 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 09:05 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:35 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:35 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326D**	QC Batch: 54253				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:10 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:10 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: TRC
Client Sample ID: 193
Lab Order: 104687
Collection Date: 3/20/2009
Project: WEST COUNTY CONNECTORS, 151396
Matrix: SOLID
Lab ID: 104687-013

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: ICP8_090325H	QC Batch: 54171				PrepDate:	3/24/2009	Analyst: CL
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 09:10 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 09:10 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: ICP6_090326A	QC Batch: R107449				PrepDate:		Analyst: CL
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:37 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:37 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: ICP6_090326D	QC Batch: 54253				PrepDate:	3/26/2009	Analyst: CL
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:12 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	**194**
Lab Order:	**104687**	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, **151396**	**Matrix:**	SOLID
Lab ID:	**104687-014**		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate: 3/24/2009	Analyst: **CL**	
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 09:14 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 09:14 PM
ICP METALS BY STLC							
					WET/ EPA 601CB		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:	Analyst: **CL**	
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:39 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:39 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326D**	QC Batch: 54253				PrepDate: 3/26/2009	Analyst: **CL**	
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:15 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:15 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	**TRC**	**Client Sample ID:**	195
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	**WEST COUNTY CONNECTORS, 15**1396	**Matrix:**	**SOLID**
Lab ID:	104687-015		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 09:19 PM
Lead	9.2	0.45	4.0		mg/Kg	1	3/25/2009 09:19 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:42 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:42 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326D**	QC Batch: 54253				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:17 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:17 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	**196**
Lab Order:	**104687**	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	**104687-016**		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	5.5	0.35	4.0		mg/Kg	1	3/25/2009 09:22 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 09:22 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:53 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:53 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP6_090326D**	QC Batch: 54253				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:19 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Client Sample ID: 197
Lab Order: 104687
Collection Date: 312012009
Project: WEST COUNTY CONNECTORS, 151396
Matrix: SOLID
Lab ID: 104687-017

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: ICP8_090325H	QC Batch: 54171				PrepDate: 3/24/2009		Analyst: CL
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 09:27 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 09:27 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: ICP6_090326A	QC Batch: R107449				PrepDate:		Analyst: CL
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:55 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:55 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: ICP6_090326D	QC Batch: 54253				PrepDate: 3/26/2009		Analyst: CL
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:22 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	198
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-018		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate:	3/24/2009	**Analyst: CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 09:32 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 09:32 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		**Analyst: CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 12:57 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 12:57 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326D**	QC Batch: 54253				PrepDate:	3/26/2009	**Analyst: CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:24 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample** ID:	199
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-019		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 09:44 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 09:44 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: R107449				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:00 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:00 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP6_090326D**	QC Batch: 54253				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:26 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:26 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	**TRC**	**Client Sample ID:**	200
Lab Order:	104687	**Collection Date:**	312012009
Project:	**WEST COUNTY CONNECTORS,** 151396	**Matrix:**	**SOLID**
Lab ID:	104687-020		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 601CB**		
RunID: **ICP8_090325H**	QC Batch: 54171				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	4.0	0.35	4.0		mg/Kg	1	3/25/2009 09:49 PM
Lead	5.7	0.45	4.0		mg/Kg	1	3/25/2009 09:49 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326A**	QC Batch: **R107449**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2609 01:02 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:02 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:09 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	201
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-021		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP'METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	4.1	0.35	4.0		mg/Kg	1	3/25/2009 10:15 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 10:15 PM
ICP METALS BY STLC							
					WET/ EPA 601OB		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:19 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:19 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:12 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:12 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: TRC **Client Sample ID:** **202**
Lab Order: **104687** **Collection Date:** **312012009**
Project: WEST COUNTY CONNECTORS, **151396** **Matrix:** SOLID
Lab ID: **104687-022**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	6.7	0.35	4.0		mg/Kg	1	3/25/2009 10:24 PM
Lead	7.8	0.45	4.0		mg/Kg	1	3/25/2009 10:24 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:22 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:22 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:24 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:24 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- S Spike/Surrogate outside of limits due to matrix interference
- Results are wet unless otherwise specified
- DO Surrogate Diluted Out

CLIENT:	TRC	**Client Sample ID:**	203
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-023		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	**QC Batch: 54172**				PrepDate: **3/24/2009**		Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 10:37 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 10:37 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	**QC Batch: R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:24 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:24 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_090326C**	**QC Batch: 54254**				PrepDate: **3/26/2009**		Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:31 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:31 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	204
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-024		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate: 3/24/2009		Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 10:42 PM
Lead	6.4	0.45	4.0		mg/Kg	1	3/25/2009 10:42 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:27 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:27 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate: 3/26/2009		Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:35 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: TRC
Client Sample ID: **205**
Lab Order: **104687**
Collection Date: 3/20/2009
Project: WEST COUNTY CONNECTORS, **151396**
Matrix: SOLID
Lab ID: **104687-025**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	**QC Batch:** **54172**				PrepDate:	**3/24/2009**	Analyst: **CL**
Chromium	4.3	0.35	4.0		mg/Kg	1	3/25/2009 10:46 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 10:46 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	**QC Batch:** **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:29 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:29 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326C**	**QC Batch:** **54254**				PrepDate:	**3/26/2009**	Analyst: **CL**
Chromium	**ND**	**0.0034**	**0.25**		mg/L	**1**	**3/26/2009** 02:38 **PM**
Lead	**ND**	**0.023**	**0.25**		mg/L	**1**	**3/26/2009** 02:38 **PM**

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample** ID:	206
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-026		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 10:51 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 10:51 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:31 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:31 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:42 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:42 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	207
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-027		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 10:55 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 10:55 PM
ICP METALS BY STLC							
					WET/ EPA 601CB		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:34 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:34 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:45 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:45 PM

Qualifiers:

B	Analyte detected in the associated Method **Blank**	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to mahix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample** ID:	208
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-028		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 11:00 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 11:00 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:36 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:36 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:49 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	209
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-029		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 11:05 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 11:05 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:38 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:38 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326C**	QC Batch: 54254				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 02:53 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 02:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	**TRC**	**Client Sample ID:**	**210**
Lab Order:	**104687**	**Collection Date:**	3/20/2009
Project:	**WEST COUNTY CONNECTORS, 151396**	**Matrix:**	**SOLID**
Lab ID:	**104687-030**		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325I**	QC Batch: 54172				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 11:09 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 11:09 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:41 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:41 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_090326D**	QC Batch: 54255				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 03:42 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 03:42 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	211
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-031		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325J**	QC Batch: 54173				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 11:44 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 11:44 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:56 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:56 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 1311/ 6010B**		
RunID: **ICP8_090326D**	QC Batch: 54255				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 04:03 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 04:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	212
Lab Order:	104687	**Collection Date:**	3/20/2009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-032		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS.							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325J**	QC Batch: 54173				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 11:53 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 11:53 PM
ICP METALS BY STLC							
					WET/ EPA 601CB		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 01:59 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 01:59 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_090326D**	QC Batch: 54255				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 04:08 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 04:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	213
Lab Order:	104687	**Collection Date:**	312012009
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	104687-033		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325J**	QC Batch: 54173				PrepDate:	3/24/2009	Analyst: **CL**
Chromium	ND	0.35	4.0		mg/Kg	1	3/25/2009 11:57 PM
Lead	ND	0.45	4.0		mg/Kg	1	3/25/2009 11:57 PM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 02:01 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 02:01 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 131116010B**		
RunID: **ICP8_090326D**	QC Batch: 54255				PrepDate:	3/26/2009	Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 04:12 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 04:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT:	TRC	**Client Sample ID:**	**214**
Lab Order:	**104687**	**Collection Date:**	**312012009**
Project:	WEST COUNTY CONNECTORS, 151396	**Matrix:**	SOLID
Lab ID:	**104687-034**		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B				**EPA 6010B**		
RunID: **ICP8_090325J**	QC Batch: 54173				PrepDate: 3/24/2009		Analyst: **CL**
Chromium	6.2	0.35	4.0		mg/Kg	1	3/26/2009 12:02 AM
Lead	21	0.45	4.0		mg/Kg	1	3/26/2009 12:02 AM
ICP METALS BY STLC							
					WET/ EPA 6010B		
RunID: **ICP6_090326B**	QC Batch: **R107457**				PrepDate:		Analyst: **CL**
Chromium	ND	0.018	1.0		mg/L	20	3/26/2009 02:03 PM
Lead	ND	0.042	1.0		mg/L	20	3/26/2009 02:03 PM
ICP METALS BY TCLP EXTRACTION							
	EPA3010A				**EPA 13111 6010B**		
RunID: **ICP8_090326D**	QC Batch: 54255				PrepDate: 3/26/2009		Analyst: **CL**
Chromium	ND	0.0034	0.25		mg/L	1	3/26/2009 04:22 PM
Lead	ND	0.023	0.25		mg/L	1	3/26/2009 04:22 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–S

Sample ID: **MB-54170**	SampType: **MBLK**	TestCode: **6010–S**	Units: **mg/Kg**	Prep Date: **312412009**	RunNo: **107435**
Client ID: **PBS**	Batch ID: **54170**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **3/25/2009**	SeqNo: **1682933**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	1.0									
Lead	ND	1.0									

Sample ID: **LCS-54170**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **3/24/2009**	RunNo: **107435**
Client ID: **LCSS**	Batch ID: **54170**	TestNo: **EPA 60108**	**EPA 3050B**	Analysis Date: **3/25/2009**	SeqNo: **1682934**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	42.655	1.0	50.00	0	85.3	80	120				
Lead	48.962	1.0	50.00	0	97.9	80	120				

Sample ID: **104687-010AMS**	SampType: **MS**	TestCode: **6010–S**	Units: **mg/Kg**	Prep Date: **3/24/2009**	RunNo: **107435**
Client ID: **190**	Batch ID: **54170**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **3/25/2009**	SeqNo: **1682946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	412.629	4.0	500.0	3.101	81.9	44	116				
Lead	443.138	4.0	500.0	0	88.6	**33**	120				

Sample ID: **104687-010AMSD**	SampType: **MSD**	TestCode: **6010–S**	Units: **mg/Kg**	Prep Date: **3/24/2009**	RunNo: **107435**
Client ID: **190**	Batch ID: **54170**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **3/25/2009**	SeqNo: **1682947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	410.274	4.0	500.0	3.101	81.4	44	116	412.6	0.572	20	
Lead	440.605	4.0	500.0	0	88.1	33	120	443.1	0.573	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: MB-54171	SampType: MBLK	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107436
Client ID: PBS	Batch ID: 54171	TestNo: EPA 6010B	EPA 3050B	Analysis Date: 3/25/2009	SeqNo: 1682948

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	1.0									
Lead	ND	1.0									

Sample ID: LCS-54171	SampType: LCS	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107436
Client ID: LCSS	Batch ID: 54171	TestNo: EPA 6010B	EPA 3050B	Analysis Date: 3/25/2009	SeqNo: 1682949

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	42.388	1.0	50.00	0	84.8	80	120				
Lead	48.042	1.0	50.00	0	96.1	80	120				

Sample ID: 104687-011ADUP	SampType: DUP	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107436
Client ID: 191	Batch ID: 54171	TestNo: EPA 6010B	EPA 3050B	Analysis Date: 3/25/2009	SeqNo: 1682951

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	4.125	4.0						2.173	62.0	20	R
Lead	0.510	4.0						0	0	20	

Sample ID: 104687-020AMS	SampType: MS	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107436
Client ID: 200	Batch ID: 54171	TestNo: EPA 6010B	EPA 3050B	Analysis Date: 3/25/2009	SeqNo: 1682961

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	422.568	4.0	500.0	4.035	83.7	44	116				
Lead	445.188	4.0	500.0	5.730	87.9	33	120				

Sample ID: 104687-020AMSD	SampType: MSD	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107436
Client ID: 200	Batch ID: 54171	TestNo: EPA 6010B	EPA 3050B	Analysis Date: 3/25/2009	SeqNo: 1682962

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	405.090	4.0	500.0	4.035	80.2	44	116	422.6	4.22	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **104687-020AMSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **3/24/2009**	RunNo: **107436**
Client ID: **200**	Batch ID: **54171**	TestNo: **EPA 60108**	**EPA 30508**	Analysis Date: **3/25/2009**	SeqNo: **1682962**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	**427.707**	**4.0**	**500.0**	**5.730**	**84.4**	**33**	**120**	**445.2**	**4.01**	**20**	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: MB-54172	SampType: MBLK	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107437
Client ID: PBS	Batch ID: 54172	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682963

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	1.0									
Lead	ND	1.0									

Sample ID: LCS-54172	SampType: LCS	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107437
Client ID: LCSS	Batch ID: 54172	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682964

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	42.969	1.0	50.00	0	85.9	80	120				
Lead	47.975	1.0	50.00	0	95.9	80	120				

Sample ID: 104687-021ADUP	SampType: DUP	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107437
Client ID: 201	Batch ID: 54172	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682966

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	4.803	4.0						4.108	15.6	20	
Lead	ND	4.0						0	0	20	

Sample ID: 104687-030AMS	SampType: MS	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107437
Client ID: 210	Batch ID: 54172	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682976

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	406.418	4.0	500.0	1.162	81.1	44	116				
Lead	426.852	4.0	500.0	0	85.4	33	120				

Sample ID: 104687-030AMSD	SampType: MSD	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107437
Client ID: 210	Batch ID: 54172	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682977

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	408.357	4.0	500.0	1.162	81.4	44	116	406.4	0.476	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- **H** Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **104687-030AMSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **3/24/2009**	RunNo: **107437**
Client ID: **210**	Batch ID: **54172**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **3/25/2009**	SeqNo: **1682977**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	**426.831**	**4.0**	**500.0**	**0**	**85.4**	**33**	**120**	**426.9**	**0.00497**	**20**	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
  Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: MB-54173	SampType: MBLK	TestCode: 6010–S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107438
Client ID: PBS	Batch ID: 54173	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682978

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Quai
Chromium	ND	1.0									
Lead	ND	1.0									

Sample ID: LCS-54173	SampType: LCS	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107438
Client ID: LCSS	Batch ID: 54173	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682979

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	44.009	1.0	50.00	0	88.0	80	120				
Lead	48.416	1.0	50.00	0	96.8	80	120				

Sample ID: 104687-031ADUP	SampType: DUP	TestCode: 6010–S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107438
Client ID: 211	Batch ID: 54173	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/25/2009	SeqNo: 1682981

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.542	4.0						1.462	0	20	
Lead	ND	4.0						0	0	20	

Sample ID: 104687-034AMS	SampType: MS	TestCode: 6010_S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107438
Client ID: 214	Batch ID: 54173	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/26/2009	SeqNo: 1682985

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	404.255	4.0	500.0	6.192	79.6	44	116				
Lead	428.514	4.0	500.0	21.33	81.4	33	120				

Sample ID: 104687-034AMSD	SampType: MSD	TestCode: 6010–S	Units: mg/Kg	Prep Date: 3/24/2009	RunNo: 107438
Client ID: 214	Batch ID: 54173	TestNo: EPA 60108	EPA 30508	Analysis Date: 3/26/2009	SeqNo: 1682986

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	408.282	4.0	500.0	6.192	80.4	44	116	404.3	0.991	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **104687-034AMSD** SampType: ***MSD*** TestCode: ***6010-S*** Units: **mg/Kg** Prep Date: ***3/24/2009*** RunNo: ***107438***
Client ID: ***214*** Batch ID: ***54173*** TestNo: ***EPA 6010B*** ***EPA 30508*** Analysis Date: ***3/26/2009*** SeqNo: ***1682986***

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	437.191	4.0	500.0	21.33	83.2	33	120	428.5	2.00	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: MB-54161A	SampType: MBLK	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: PBS	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683233

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: LCS-54161	SampType: LCS	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: LCSS	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683234

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.985	0.050	1.000	0	98.5	85	115				
Lead	1.042	0.050	1.000	0	104	85	115				

Sample ID: 104687-010ADUP	SampType: DUP	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: 190	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683245

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.018	1.0						0	0	20	
Lead	ND	1.0						0	0	20	

Sample ID: 104687-010AMS	SampType: MS	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: 190	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683246

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.413	1.0	2.500	0	96.5	77	116				
Lead	2.430	1.0	2.500	0	97.2	71	121				

Sample ID: MB-54161B	SampType: MBLK	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: PBS	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683253

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	1.0									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limit.
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: MB-54161B	SampType: MBLK	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: PBS	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683253

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.0									

Sample ID: 104687-020ADUP	SampType: DUP	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: 200	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683364

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.037	1.0						0.03900	0	20	
Lead	ND	1.0						0	0	20	

Sample ID: 104687-020AMS	SampType: MS	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: 200	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683365

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.381	1.0	2.500	0.03900	93.7	77	116				
Lead	2.406	1.0	2.500	0	96.2	71	121				

Sample ID: 104687-020AMSD	SampType: MSD	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107449
Client ID: 200	Batch ID: R107449	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683366

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.424	1.0	2.500	0.03900	95.4	77	116	2.381	1.80	20	
Lead	2.453	1.0	2.500	0	98.1	71	121	2.406	1.95	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: MB-54162A	SampType: MBLK	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: PBS	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683371

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: LCS-54162	SampType: LCS	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: LCSS	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683372

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.964	0.050	1.000	0	96.4	85	115				
Lead	1.020	0.050	1.000	0	102	85	115				

Sample ID: 104687-030ADUP	SampType: DUP	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: 210	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683571

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	1.0						0.02388	0	20	
Lead	ND	1.0						0	0	20	

Sample ID: 104687-030AMS	SampType: MS	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: 210	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683572

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.563	1.0	2.500	0.02388	102	77	116				
Lead	2.578	1.0	2.500	0	103	71	121				

Sample ID: MB-54162B	SampType: MBLK	TestCode: 6010–ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: PBS	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683573

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	1.0									

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

Advanced Technology Laboratories
3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562.989.4045 Fax: 562.989.4040

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–ST

Sample ID: MB-54162B	SampType: MBLK	TestCode: 6010_ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: PBS	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683573

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.0									

Sample ID: 104687-034ADUP	SampType: DUP	TestCode: 6010_ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: 214	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683578

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.069	1.0						0.07797	0	20	
Lead	0.061	1.0						0.04585	0	20	

Sample ID: 104687-034AMS	SampType: MS	TestCode: 6010_ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: 214	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683579

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.565	1.0	2.500	0.07797	99.5	77	116				
Lead	2.588	1.0	2.500	0.04585	102	71	121				

Sample ID: 104687-034AMSD	SampType: MSD	TestCode: 6010_ST	Units: mg/L	Prep Date:	RunNo: 107457
Client ID: 214	Batch ID: R107457	TestNo: WET/ EPA 60		Analysis Date: 3/26/2009	SeqNo: 1683580

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.643	1.0	2.500	0.07797	103	77	116	2.565	2.99	20	
Lead	2.683	1.0	2.500	0.04585	106	71	121	2.588	3.63	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: MB-54252	SampType: MBLK	TestCode: 6010_TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107470
Client ID: PBS	Batch ID: 54252	TestNo: EPA 1311160	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683651

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: MB-54238TC	SampType: MBLK	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107470
Client ID: PBS	Batch ID: 54252	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683652

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: LCS-54252	SampType: LCS	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107470
Client ID: LCSS	Batch ID: 54252	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683653

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.980	0.050	1.000	0	98.0	85	115				
Lead	1.033	0.050	1.000	0	103	85	115				

Sample ID: 104687-001ADUP	SampType: DUP	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107470
Client ID: 181	Batch ID: 54252	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683655

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.007	0.25						0.006914	0	20	
Lead	ND	0.25						0	0	20	

Sample ID: 104687-009AMS	SampType: MS	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107470
Client ID: 189	Batch ID: 54252	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683664

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.645	0.25	12.50	0	101	77	116				

Qualifiers:

- **B** Analyte detected in the associated Method Blank
- **E** Value above quantitation range
- **H** Holding times for preparation or analysis exceeded
- **ND** Not Detected at the Reporting Limit
- **R** RPD outside accepted recovery limits
- **S** Spike/Surrogate outside of limits due to matrix interference
- **DO** Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: **104687-009AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107470**
Client ID: **189**	Batch ID: **54252**	TestNo: **EPA 1311160**	**EPA3010A**	Analysis Date: **3/26/2009**	SeqNo: **1683664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.659	0.25	12.50	0	101	71	121				

Sample ID: **104687-009AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107470**
Client ID: **189**	Batch ID: **54252**	TestNo: **EPA 1311160**	**EPA3010A**	Analysis Date: **3/26/2009**	SeqNo: **1683665**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.367	0.25	12.50	0	98.9	77	116	12.64	2.22	20	
Lead	12.281	0.25	12.50	0	98.3	71	121	12.66	3.02	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: MB-54253	SampType: MBLK	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107474
Client ID: PBS	Batch ID: 54253	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 3/26/2009	SeqNo: 1683743

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: MB-54239TC	SampType: MBLK	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107474
Client ID: PBS	Batch ID: 54253	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 3/26/2009	SeqNo: 1683744

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: LCS-54253	SampType: LCS	TestCode: 6010_TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107474
Client ID: LCSS	Batch ID: 54253	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 3/26/2009	SeqNo: 1683745

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	1.006	0.050	1.000	0	101	85	115				
Lead	1.063	0.050	1.000	0	106	85	115				

Sample ID: 104687-OIIADUP	SampType: DUP	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107474
Client ID: 191	Batch ID: 54253	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 3/26/2009	SeqNo: 1683747

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.25						0	0	20	
Lead	ND	0.25						0	0	20	

Sample ID: 104687-019AMS	SampType: MS	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107474
Client ID: 199	Batch ID: 54253	TestNo: EPA 1311/60 EPA3010A		Analysis Date: 3/26/2009	SeqNo: 1683756

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.557	0.25	12.50	0	100	77	116				

Qualifiers:

- **B** Analyte detected in the associated Method Blank
- **E** Value above quantitation range
- **H** Holding times for preparation or analysis exceeded
- **ND** Not Detected at the Reporting Limit
- **R** RPD outside accepted recovery limits
- **S** Spike/Surrogate outside of limits due to matrix interference
- **DO** Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: **104687-019AMS**	SampType: **MS**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107474**
Client ID: **199**	Batch ID: **54253**	TestNo: **EPA 1311/60**	**EPA3010A**	Analysis Date: **3/26/2009**	SeqNo: **1683756**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.507	0.25	12.50	0	100	71	121				

Sample ID: **104687-019AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107474**
Client ID: **199**	Batch ID: **54253**	TestNo: **EPA 1311/60**	**EPA3010A**	Analysis Date: **3/26/2009**	SeqNo: **1683757**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	12.450	0.25	12.50	0	99.6	77	116	12.56	0.856	20	
Lead	12.345	0.25	12.50	0	98.8	71	121	12.51	1.30	20	

Sample ID: **LCS-54253**	SampType: **LCS**	TestCode: **6010–TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107481**
Client ID: **LCSS**	Batch ID: **54253**	TestNo: **EPA 1311160**	**EPA3010A**	Analysis Date: **3/26/2009**	SeqNo: **1683848**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.902	0.050	1.000	0	90.2	85	115				
Lead	1.024	0.050	1.000	0	102	85	115				

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: MB-54254	SampType: MBLK	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107468
Client ID: PBS	Batch ID: 54254	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683635

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: MB-54238TC	SampType: MBLK	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107468
Client ID: PBS	Batch ID: 54254	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683636

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: LCS-54254	SampType: LCS	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107468
Client ID: LCSS	Batch ID: 54254	TestNo: EPA 1311160	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683637

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.902	0.050	1.000	0	90.2	85	115				
Lead	0.996	0.050	1.000	0	99.6	85	115				

Sample ID: 104687-022ADUP	SampType: DUP	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107468
Client ID: 202	Batch ID: 54254	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683641

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.25						0.003952	0	20	
Lead	ND	0.25						0	0	20	

Sample ID: 104687-029AMS	SampType: MS	TestCode: 6010_TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107468
Client ID: 209	Batch ID: 54254	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683649

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	**12.077**	**0.25**	**12.50**	**0.007604**	**96.6**	**77**	**116**				

Qualifiers:

- **B** Analyte detected in the associated Method Blank
- **ND** Not Detected at the Reporting Limit
- **DO** Surrogate Diluted Out
- **E** Value above quantitation range
- **R** RPD outside accepted recovery limits
- Calculations are based on raw values
- **H** Holding times for preparation or analysis exceeded
- **S** Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: **104687-029AMS**	SampType: **MS**	TestCode: **6010–TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107468**
Client ID: **209**	Batch ID: **54254**	TestNo: **EPA 1311/60**	**EPA3010A**	Analysis Date: **3/26/2009**	SeqNo: **1683649**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.579	0.25	12.50	0	101	71	121				

Sample ID: **104687-029AMSD**	SampType: **MSD**	TestCode: **6010–TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107468**
Client ID: **209**	Batch ID: **54254**	TestNo: **EPA 1311/60**	**EPA3010A**	Analysis Date: **3/26/2009**	SeqNo: **1683650**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	11.942	0.25	12.50	0.007604	95.5	77	116	12.08	1.12	20	
Lead	12.560	0.25	12.50	0	100	71	121	12.58	0.147	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
  Calculations are based on raw values
- **H** Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside **of** limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: MB-54255	SampType: MBLK	TestCode: 6010_TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107481
Client ID: PBS	Batch ID: 54255	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683845

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: MB-54239TC	SampType: MBLK	TestCode: 6010_TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107481
Client ID: PBS	Batch ID: 54255	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683847

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: 104687-030ADUP	SampType: DUP	TestCode: 6010–TC	Units: mg/L	Prep Date: 3/26/2009	RunNo: 107481
Client ID: 210	Batch ID: 54255	TestNo: EPA 1311/60	EPA3010A	Analysis Date: 3/26/2009	SeqNo: 1683851

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.25						0	0	20	
Arsenic	ND	0.25						0	0	20	
Barium	0.512	0.25						0.4294	17.6	20	
Beryllium	ND	0.25						0	0	20	
Cadmium	ND	0.25						0	0	20	
Chromium	0.005	0.25						0.004018	0	20	
Lead	ND	0.25						0	0	20	
Nickel	0.014	0.25						0.01306	0	20	
Selenium	ND	0.25						0	0	20	
Silver	ND	0.25						0	0	20	
Thallium	ND	0.25						0	0	20	
Vanadium	0.003	0.25						0.004160	0	20	
Zinc	0.397	0.25						0.3485	12.9	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
  Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Worlc Order: **104687**
Project: WEST COUNTY CONNECTORS, **151396**

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: **104687-033AMS** SampType: **MS** TestCode: **6010_TC** Units: **mg/L** Prep Date: **3/26/2009** RunNo: **107481**
Client ID: **213** Batch ID: **54255** TestNo: **EPA 1311/60 EPA3010A** Analysis Date: **3/26/2009** SeqNo: **1683856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	12.137	0.25	12.50	0	97.1	64	130				
Arsenic	12.272	0.25	12.50	0	98.2	66	128				
Barium	12.058	0.25	12.50	0.4990	92.5	60	129				
Beryllium	12.377	0.25	12.50	0	99.0	77	118				
Cadmium	11.839	0.25	12.50	0	94.7	72	122				
Chromium	11.360	0.25	12.50	0.004002	90.9	77	116				
Lead	11.875	0.25	12.50	0	95.0	71	121				
Nickel	11.838	0.25	12.50	0.01165	94.6	63	125				
Selenium	12.373	0.25	12.50	0	99.0	73	124				
Silver	12.363	0.25	12.50	0	98.9	60	138				
Thallium	10.775	0.25	12.50	0	86.2	66	125				
Vanadium	12.383	0.25	12.50	0.003164	99.0	79	118				
Zinc	12.196	0.25	12.50	0.1737	96.2	71	120				

Sample ID: **104687-033AMSD** SampType: **MSD** TestCode: **6010–TC** Units: **mg/L** Prep Date: **3/26/2009** RunNo: **107481**
Client ID: **213** Batch ID: **54255** TestNo: **EPA 1311/60 EPA3010A** Analysis Date: **3/26/2009** SeqNo: **1683857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	11.882	0.25	12.50	0	95.1	64	130	12.14	2.12	20	
Arsenic	12.001	0.25	12.50	0	96.0	66	128	12.27	2.23	20	
Barium	11.754	0.25	12.50	0.4990	90.0	60	129	12.06	2.56	20	
Beryllium	12.092	0.25	12.50	0	96.7	77	118	12.38	2.33	20	
Cadmium	11.638	0.25	12.50	0	93.1	72	122	11.84	1.71	20	
Chromium	11.108	0.25	12.50	0.004002	88.8	77	116	11.36	2.24	20	
Lead	11.675	0.25	12.50	0	93.4	71	121	11.87	1.70	20	
Nickel	11.592	0.25	12.50	0.01165	92.6	63	125	11.84	2.10	20	
Selenium	12.087	0.25	12.50	0	96.7	73	124	12.37	2.34	20	
Silver	12.046	0.25	12.50	0	96.4	60	138	12.36	2.60	20	
Thallium	10.621	0.25	12.50	0	85.0	66	125	10.78	1.44	20	
Vanadium	12.116	0.25	12.50	0.003164	96.9	79	118	12.38	2.18	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

CLIENT: TRC
Work Order: 104687
Project: WEST COUNTY CONNECTORS, 151396

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010–TC

Sample ID: **104687-033AMSD**	SampType: **MSD**	TestCode: **6010_TC**	Units: **mg/L**	Prep Date: **3/26/2009**	RunNo: **107481**
Client ID: **213**	Batch ID: **54255**	TestNo: **EPA 1311/60 EPA3010A**		Analysis Date: **3/26/2009**	SeqNo: **1683857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Zinc	11.899	0.25	12.50	0.1737	**93.8**	71	120	12.20	2.47	20	

Qualifiers:

- B Analyte detected in the associated Method Blank
- ND Not Detected at the Reporting Limit
- DO Surrogate Diluted Out
- E Value above quantitation range
- R RPD outside accepted recovery limits
- Calculations are based on raw values
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

FOR LABORATORY USE ONLY

P.O. #:
Logged By: Date: 3/23/09

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FedEx ☐ Other:

Sample Condition Upon Receipt
1. CHILLED Y ☐ N ☐ 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attention: DAVID LENNON
Address: 21 TECHNOLOGY DRIVE
City: IRVINE State: CA Zip Code: 92618
Tel: 949-727-9336
Fax: 949-727-7399

Project Name: WEST COUNTY CONNECTORS Project #: 15/396
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
ERIK PAQUETTE	3/23/09	11:30am		3/23/09	11:30
	3/23/09	1220		3/23/09	1220
	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: ERIK PAQUETTE 3/23/09
Print Name Date
Signature

Send Report To:
Attn: DAVE LENNON
Co:
Addr: 21 TECHNOLOGY DRIVE
City: IRVINE State: CA Zip: 92618

Bill To:
Attn: Same
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:
ANTICIPATE Total Lead/Chromium & STLC & TCLP Lead/Chromium
* RESULTS BY 3/26/09 *

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC: RTNE ☐ CT ☐ SWRCB Logcode ☐ OTHER

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Total Lead	Total Chromium	STLC Lead	STLC Chromium	TCLP Lead	TCLP Chromium	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	104687-1	181	3/20/09										X	X	X	X	X	X					D			
	-2	182											X	X	X	X	X	X					D			
	-3	183											X	X	X	X	X	X					D			
	-4	184											X	X	X	X	X	X					D			
	-5	185											X	X	X	X	X	X					D			
	-6	186											X	X	X	X	X	X					D			
	-7	187											X	X	X	X	X	X					D			
	-8	188											X	X	X	X	X	X					D			
	-9	189											X	X	X	X	X	X					D			
	-10	190											X	X	X	X	X	X					D			

* TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☒ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl $N=HNO_3$ $S=H_2SO_4$ C=4°C $Z=Zn(AC)_2$ O=NaOH $T=Na_2S_2O_3$

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

FOR LABORATORY USE ONLY

P.O. #:
Logged By: Date: 3/23/09

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FedEx ☐ Other:

Sample Condition Upon Receipt
1. CHILLED Y ☐ N ☐ 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attention: DAVID LENNON
Address:
City: State: Zip Code:
Tel:
Fax:

Project Name: Project #: #151396
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name)	Date	Time	Received by: (Signature and Printed Name)	Date	Time
ERIK PAQUETTE	3/23/09	11:30am		3/23/09	1130
	3/23/09	1220		3/23/09	1220
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn:
Co:
Addr:
City: State: Zip:

Bill To:
Attn:
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:
Anticipate Total Lead/Chromium & STLC & TCLP Lead/Chromium
* RESULTS BY 3/26/09 *

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.
Storage Fees (applies when storage is requested):
Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐ Logcode
OTHER

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Total Lead	Total Chromium	STLC Lead	STLC Chromium	TCLP Lead	TCLP Chromium	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	104087-11	191	3/20/09											X	X	X	X	X	X							
	-12	192												X	X	X	X	X	X							
	-13	193												X	X	X	X	X	X							
	-14	194												X	X	X	X	X	X							
	-15	195												X	X	X	X	X	X							
	-16	196												X	X	X	X	X	X							
	-17	197												X	X	X	X	X	X							
	-18	198												X	X	X	X	X	X							
	-19	199												X	X	X	X	X	X							
	-20	200	↓											X	X	X	X	X	X				↓			

* TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☒ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=HCl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

FOR LABORATORY USE ONLY

P.O. #:

Logged By: [illegible] Date: 3/23/09

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FedEx ☐ Other:

Sample Condition Upon Receipt
1. CHILLED Y q N q 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y q N ☐
3. CONTAINER INTACT Y q N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attention: DAVID LENNON
Address:
City: State: Zip Code:
Tel:
Fax:
Project Name:
Project #: 157396
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
ERIK PAQUETTE	3/23/09	11:30am		3/23/09	1130
	3/23/09	1220		3/23/09	1220

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn:
Co:
Addr:
City: State: Zip:

Bill To:
Attn:
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:
Anticipate Total Lead/Chromium & STLC & TCLP Lead/Chromium
#RESULTS BY 3/26/09#

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

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Sample :$2.00 / sample /mo (after 45 days)
Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

QA/QC: RTNE ☐ CT ☐ SWRCB ☐ Logcode____ OTHER ____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Total Lead	Total Chromium	STLC Lead	STLC Chromium	TCLP Lead	TCLP Chromium	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	A04C57-21	201	3/20/09										X	X	X	X	X	X					P				
	-22	202											X	X	X	X	X	X									
	-23	203											X	X	X	X	X	X									
	-24	204											X	X	X	X	X	X									
	-25	205											X	X	X	X	X	X									
	-26	206											X	X	X	X	X	X									
	-27	207											X	X	X	X	X	X									
	-28	208											X	X	X	X	X	X									
	-29	209											X	X	X	X	X	X									
	-30	210											X	X	X	X	X	X									

■ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☒ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl $N=HNO_3$ $S=H_2SO_4$ C=4°C $Z=Zn(AC)_2$ O=NaOH $T=Na_2S_2O_3$

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FOR LABORATORY USE ONLY

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Logged By: Date: 3/23/09

Method of Transport: Client ☐ ATL ☑ CA OverN ☐ FedEx ☐ Other:

Sample Condition Upon Receipt
1. CHILLED Y ☐ N ☐ 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: TRC
Attention: DAVID LENNON
Address:
City: State: Zip Code:
Tel:
Fax:

Project Name: Project #: 151396
Sampler: (Printed Name) ERIK PAQUETTE (Signature)

Relinquished by: (Signature and Printed Name) ERIK PAQUETTE	Date: 3/23/09	Time: 11:30	Received by: (Signature and Printed Name)	Date: 3/23/09	Time: 1130
Relinquished by: (Signature and Printed Name)	Date: 3/23/09	Time: 1620	Received by: (Signature and Printed Name)	Date: 3/23/09	Time: 1220
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn:
Co:
Addr:
City: State: Zip:

Bill To:
Attn:
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:
Anticipate Total Lead/Chromium & STLC & TCLP Lead/Chromium
RESULTS BY 3/26/09

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

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Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

QA/QC
RTNE ☐
CT ☐
SWRCB ☐ Logcode
OTHER

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	Total Lead	Total Chromium	STLC Lead	STLC Chromium	TCLP Lead	TCLP Chromium	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	REMARKS
	10456 87-31	211	3/20/09											X	X	X	X	X	X							
	-32	212												X	X	X	X	X	X							
	-33	213												X	X	X	X	X	X							
	-34	214												X	X	X	X	X	X							

a TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☒ D = Urgent 3 Workdays ☒ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=HCl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

APPENDIX E

CONSULTANT CERTIFICATIONS

State of California
Division of Occupational Safety and Health

Certified Asbestos Consultant

Samita D Seneviratne

Name

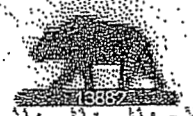
Certification No. 93-0886

Expires on 02/18/09

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code

State of California Department of Public Health

Lead-Related Construction Certificate	Certificate Type	Expiration Date
	Inspector/Assessor	01/04/2009
	Project Monitor	01/04/2009



Samita D. Seneviratne ID #: **9658**

State of California
California Environmental Protection Agency
Department of Toxic Substances Control

REGISTERED ENVIRONMENTAL ASSESSOR I

Issued to: Samita Seneviratne, REA I - 05765

Annual Expires on: June 30, 2008

Signature: Sam Seneviratne.

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Erik S Paquette
Name

Certification No. 07-4157

Expires on 07/19/09

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

State of California Department of Public Health

Lead-Related Construction Certificate

Certificate Type

Inspector/Assessor

Expiration Date

04/18/2009

Erik S. Paquette

ID # **14356**

APPENDIX F

Lead Based Paint Waste Management Plan

REMOVE TRAFFIC STRIPE

Traffic stripe shall be removed at the locations shown on the plans and as directed by the Engineer.

Attention is directed to "Water Pollution Control" of these special provisions.

Waste fiom removal of yellow thermoplastic traffic stripe contains lead chromate in average concentrations greater than or equal to 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. Yellow thermoplastic traffic stripe exists as shown on the plans. Residue produced fiom the removal of yellow thermoplastic contains heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and Title 22 of the California Code of Regulations. The Contractor shall assume that the residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Yellow thermoplastic may produce toxic fumes when heated.

The removed yellow thermoplastic shall be disposed of at a Class 1 disposal facility in conformance with the requirements of the disposal facility operator within 30 days after accumulating 220 pounds of residue and dust. The Contractor shall make necessary arrangements to test the yellow thermoplastic residue as required by the disposal facility and these special provisions. Testing shall include, at a minimum, (1) Total Lead by EPA Method 6010B and Chromium by EPA Method 7000 series, (2) Soluble Lead and Chromium by California Waste Extraction Test, and (3) Soluble Lead and Chromium by Toxicity Characteristic Leaching Procedure. From the first 222 gallons of waste, or portion thereof if less than 222 gallons of waste are produced, a minimum of four randomly selected samples shall be taken and analyzed individually. Samples shall not be composited. From each additional 888 gallons of waste, or portion thereof if less than 888 gallons are produced, a minimum of one additional random sample shall be taken and analyzed. Each sample shall be homogenized prior to analysis by the laboratory performing the analyses. A sample aliquot sufficient to cover the amount necessary for the total and the soluble analyses shall then be taken. This aliquot shall be homogenized a second time and the total and soluble (if necessary) run on this aliquot. The homogenization process shall not include grinding of the samples. The Contractor shall submit the name and location of the disposal facility and analytical laboratory along with the testing requirements to the Engineer not less than 5 days prior to the start of removal of yellow thermoplastic traffic stripe. The analytical laboratory shall be certified by the Department of Health Services Environmental Laboratory Accreditation Program for all analyses to be performed. Test results shall be provided to the Engineer for review prior to signing a waste profile as requested by the disposal facility, prior to issuing an EPA identification number, and prior to allowing removal of the waste from the site.

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling removed yellow thermoplastic residue. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be

submitted to the Engineer at least 7 days prior to beginning removal of yellow thermoplastic.

Prior to removing yellow thermoplastic traffic stripe, personnel who have no prior training, including State personnel, shall complete a safety training program provided by the Contractor that meets the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead," and the Contractor's Lead Compliance Program.

Personal protective equipment, training, and washing facilities required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 3.

Where grinding or other methods approved by the Engineer are used to remove yellow thermoplastic traffic stripe, the removed residue, including dust, shall be contained and collected immediately. Collection shall be by a high efficiency particulate air (HEPA) filter equipped vacuum attachment operated concurrently with the removal operations or other equally effective methods approved by the Engineer. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow thermoplastic traffic stripe to the Engineer for approval not less than 7 days prior to the start of the removal operations. Removal operations shall not be started until the Engineer has approved the work plan.

The removed yellow thermoplastic traffic stripe residue shall be stored and labeled in covered containers. Labels shall conform to the provisions of Title 22, California Code of Regulations, Sections 66262.31 and 66262.32. Labels shall be marked with date when the waste is generated, the words "Hazardous Waste," composition and physical state of the waste (for example, asphalt grindings with thermoplastic or paint), the word "Toxic," the name and address of the Engineer, the Engineer's telephone number, contract number, and Contractor or subcontractor. The containers shall be a type approved by the United States Department of Transportation for the transportation and temporary storage of the removed residue. The containers shall be handled so that no spillage will occur. The containers shall be stored in a secured fenced enclosure at a location within the project limits until disposal, as approved by the Engineer.

If the yellow thermoplastic traffic stripe residue is transported to a Class 1 disposal facility as a hazardous waste, a manifest shall be used, and the transporter shall be registered with the California Department of Toxic Substance Control. The Contractor shall submit a written request for the United States Environmental Protection Agency Identification Number (US EPA ID Number) to the Engineer. The Engineer will obtain the US EPA ID Number and sign all manifests as the generator within 2 working days of receiving sample test results, approving the test methods, and receiving the written request for the US EPA ID Number from the Contractor. The Contractor shall submit receiving landfill documentation of proper disposal to the Engineer.

Nothing in these special provisions shall relieve the Contractor of the Contractor's responsibilities as specified in Section7-1.09, "Public Safety," of the Standard Specifications.

Full compensation for providing a written work plan for the removal, storage, and disposal of yellow thermoplastic traffic stripe and for providing receiving landfill documentation of proper disposal of yellow thermoplastic traffic stripe shall be

considered as included in the contract prices paid per foot for remove yellow thermoplastic traffic stripe and no separate payment will be made therefor.

FOUNDATION REPORT
405-22 HOV CONNECTOR SEPARATION
BRIDGE NO. 55-1103E
12-ORA-405-PM 20.66, CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr., # 200
Irvine, CA 92612

Prepared By:

Group Delta Consultants, Inc.
32 Mauchly, Suite B
Irvine, CA 92618

GDC Project No. I-436
October 23, 2008
Revised February 17, 2009
Revised April 13, 2009

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

October 23, 2008
Revised February 17, 2009
Revised April 13, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr ., # 200
Irvine, CA 92612

Attention: Mohsen Mohseni, P.E.

Subject: Foundation Report
405-22 HOV Connector Separation
BRIDGE NO. 55-1103E
12-ORA-405-PM 20.66, CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our Structure Foundation Report (SFR) for the 405-22 HOV Connector Separation in Orange County, California. This report presents the results of our field and laboratory investigations, and provides recommendations for the foundation design of the proposed new connector. This report has been revised to incorporate the second set of comments from Caltrans dated March 26, 2009 (see Appendix F).

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 450-2100.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

Kul Bhushan, Ph.D., G.E.
President

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Sinniah K. Navaratnarajah
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
SINNIAH K. NAVARATNARAJAH
No. 74387
Exp. 6/30/09
CIVIL
STATE OF CALIFORNIA

Distribution: Addressee (8 hard copies plus PDF file on CD)

32 Mauchly, Suite B ▲ Irvine, California 92618-2336 ▲ (949) 450-2100 voice ▲ (949) 450-2108 fax
Torrance, California (310) 320-5100 ▲ San Diego, California (858) 524-1500
www.GroupDelta.com

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FOUNDATION REPORT
405-22 HOV CONNECTOR SEPARATION
BRIDGE NO. 55-1103E
12-ORA-405-PM 20.66, CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The proposed project has been divided into 2 segments, and the overall project name is "West County Connector Project." The easterly segment is named "I-405/SR-22 HOV Connector Segment," which extends from Valley View Street to just east of Seal Beach Boulevard, and the westerly segment is named "I-405/I-605 HOV Connector Segment," which extends from just east of Seal Beach Boulevard to the I-605 interchange. The 405-22 HOV Connector Separation is part of the easterly segment. The site location is shown in Figure 1.

1.1 Project Description

The length of main portion of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405, from just east of Valley View Street to just east of Seal Beach Boulevard (see Figure 1). In addition, from just east of Valley View Street to just east of Springdale Street, several signs are proposed which are outside the main project area. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges (Bolsa Chica Road OC over SR-22 and 22/405 Connector Separation [to be renamed S405-E22 Connector Separation]), and construct a new HOV Connector bridge (405-22 HOV Connector Separation);
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls (RW3311+3312 at east abutment of S405-E22 HOV Connector Separation);
- Pre-cast Lightweight Fill (PCLW) Retaining Walls (RW1325+1326 at west abutment of 405-22 HOV Connector Separation, RW1299+1300 at east abutment of 405-22 HOV Connector Separation, and RW3319+3320 at west abutment of S405-E22 HOV Connector Separation);

- Drainage improvements; and
- Lighting, roadside signs, and overhead signs.

This report presents the 405-22 HOV Connector Separation foundation recommendations.

1.1.1 Location

The site of the proposed new 405-22 HOV Connector Separation is shown in Figure 1. The bridge site latitude and longitude are approximately as follows:

- Latitude: 33.7749^{O}
- Longitude: -118.0427^{O}

1.1.2 Datum Shift

We understand that the datum (El. 0) for the as-built plans is 2.3 feet higher than the datum used for the current plans. ***All as-built logs of test borings and plans at the S405-E22 Connector Separation at the south side of the HOV Connector must be adjusted to the current datum by adding 2.3 feet to the as-built elevations.*** Elevations mentioned in this report have been adjusted and refer to the current datum.

1.1.3 Existing Bridge

There is no existing bridge at the location of the proposed HOV Connector. The adjacent existing bridge (Rte. 22/405 Separation) just south of the 405-22 HOV Connector Separation was designed and built around 1963, and will be demolished and replaced as part of this project. It is a 4-span structure with existing foundations supported on driven Class-I 45-ton concrete piles for abutments and Class II 45-ton concrete piles for bents. The bridge was seismic retrofitted in 1994 by adding additional Class 70 ton concrete piles at Bents 2 & 4 foundations. Selected as-built plans (including as-built Log of Test Borings) are shown in Appendix C.

1.1.4 Proposed HOV Connector

The new proposed HOV connector bridge will be an 5-span Cast-in-Place Pre-Stressed Concrete Box Girder structure that originates just north of the east abutment of existing 405/22 Separation (Abutment 1), crosses over an unpaved area between existing westbound SR-22 and northbound I-405 (Abutment 1 through Bent 3), then crosses NB I-405 (Bent 3 to Bent 4), and ends in the HOV lanes in the I-405 median (Abutment 6). Abutment approaches will be Precast Light Weight Fill (Cellular

Concrete) walls (PCLW) on both sides at Abutment 6, and at Abutment 1 will be combination PCLW walls and conventional embankment. End spans (Abutment 1 to Bent 2, and Bent 5 to Abutment 6) are 180 feet and 190 feet, respectively. Center spans (between Bents 2, 3, 4, and 5) range from 240 to 250 feet. Bridge width is about 59 feet. The General, Foundation, Pile Layout and Footing Detail Plans are presented in Figures 2A through 2G.

1.2 Scope of Work

Our scope of work for this project included the following:

- Review existing data;
- Perform subsurface investigation along the proposed connector alignment;
- Perform laboratory testing on selected samples of the subsurface soils;
- Develop geologic profiles and engineering parameters for foundation design;
- Perform geotechnical analyses;
- Develop geotechnical recommendations for design and construction of the bridge foundations; and
- Present the results of our investigations and our recommendations in this report.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

The subsurface conditions at the subject bridge were investigated by Group Delta Consultants, Inc. (GDC) by performing four (4) soil borings and five (5) Cone Penetration Tests (CPTs) during the period of March 27th to April 15th, 2008. The borings were performed to depths of 51.5 feet to 137 feet below ground surface (bgs) and the CPTs were performed to depths of 105.5 feet to 150.3 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at the subject connector location. Locations of the borings and CPTs are presented in Figures 3. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1 of Appendix A.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, engineering, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

Test	ASTM Designation	Purpose
• Moisture Content and Dry Density	ASTM D 2216	Soil Classification
• Grain Size Distribution (Sieve Analysis)	ASTM D 422	Soil Classification
• Percent Passing #200 Sieve	ASTM D 1140	Soil Classification
• Atterberg Limits	ASTM D 4318	Soil Classification
• Direct Shear	ASTM D 3080	Shear Strength
• Pocket Penetrometer		Undrained Shear Strength
• Soil Corrosivity (pH, sulfate, and chloride)	CT 422. 443 417, and 643	Corrosion Potential
• Consolidation	ASTM D 2435	Compressibility

Moisture content, dry density, percentage passing a No. 200 sieve, and the pocket penetrometer readings are shown on the boring logs in Appendix A. Detailed descriptions of the other tests performed and their results are presented in Appendix B.

2.3 Existing Data

In 1959 Caltrans performed 2 rotary soil boring and 2 penetration borings for the existing S405-E22 Connector Separation Bridge. The approximate locations of the Caltrans 1959 borings are shown on the current boring location plan in Figure 3. The as-built Log of Test Borings (LOTB) sheet is presented in Figure 4. No laboratory data from the original investigation are available.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The bridge site is located between existing SR-22 and I-405. Original site grades were relatively level near El. 24 to 30 feet. Current freeway grades are between El. 28 and 30 feet, and existing abutment approaches are near El. 56 feet on the east abutment and El. 50 feet on the west abutment of the existing 22/405 Separation Bridge. An unpaved area and drainage ditch are present between SR-22 and I-405 with a low elevation of about El. +20 feet between proposed Abutment 1 and Bent 3.

3.2 Geologic Conditions

3.2.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange County coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

3.2.2 Stratigraphy

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County coastal plain of the southern portion of the Central Block of the Los Angeles Basin. The basin is in filled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of poorly consolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Stratigraphy consists

of alternating layers of sands, silts, and clays (Figure 5B). Shallow compacted roadway fills and abutment approach fills up to about 30 feet high have been placed in the area over the natural alluvial deposits. Relative density and stiffness of the alluvial soils generally increases with depth.

3.2.3 Geologic Structure

Since the bedrock is more than 4,000 ft deep, geologic structure at the site is not a design issue.

3.2.4 Geologic Hazards

Geologic hazards include landslides, expansive or collapsible soils, and seismic hazards include liquefaction, lateral spreading, seismic slope stability, fault rupture, tsunamis, and seismic shaking. The site is not located in landslide prone area and no natural slopes are present. Expansive soils are present and recommendations regarding expansive soils with 4 ft of the finished grade are provided in the GDR and in expansive soil exclusion zone are provided in Section 4.5 of this report.

3.3 Subsurface Conditions

3.3.1 Generalized Soil Profile

The soil conditions are generally consistent with those disclosed by the as-built LOTB in Figure 4. The soils profile and general engineering characteristics of the subsurface soils are illustrated in the Geotechnical Cross-Section in Figure 5. The soil profile is divided into 5 general layers. Layer descriptions and approximate layer boundary elevations are described below, and engineering properties for design are presented in Section 3.3.3.

3.3.1.1 Layer 1 – Fill and Stiff Native (El. 16+ ft)

Road fill, abutment approach fill, and stiff native soils are present above about El. +16 feet. The upper native alluvial material is similar in engineering properties to the compacted fill. Fill and stiff native alluvial soils encountered in the test borings and CPTs consist primarily of very stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent layers of medium dense silty sands (SM) and clayey sands (SC).

3.3.1.2 Layer 2 – Firm to Stiff CL (El. +16 ft to +2 ft)

This layer is mostly below the water table, and is present throughout the project area. It is typically about 12 to 15 feet thick, and classifies as locally firm but predominantly

stiff lean clay or lean sandy clay (CL) with typical undrained shear strengths of 1.0 to 1.4 ksf based on CPT correlations and pocket penetrometer readings. Thin seams of sand to silty sand to sandy silt are present in this layer (see Figure 5). Layer 2 is generally overconsolidated with respect to the freeway grades, but is close to normally consolidated where present under the 25 to 30 feet of abutment fill. Since it is fairly shallow below the freeway grades and is generally the weakest and most compressible layer at the site, it typically controls the magnitude and time rate of settlement and global stability of slopes at the site.

3.3.1.3 Layer 3 – Very Stiff CL, ML (El. +2 ft to -14 ft)

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with thin interbeds of medium dense to dense silty sands (SM) and sandy silts (ML). Pocket penetrometer readings in the fine grained materials generally range from 2.0 to 4.5 ksf, and CPT correlations indicate average undrained shear strengths in this layer on average are generally more than 3.0 ksf. These clays are over consolidated. This layer is as deep as El. -25 ft in the vicinity of Bent 4. Zones of medium dense to dense sands and silty sands are present within this layer.

3.3.1.4 Layer 4 – Dense to V. Dense SM/ML/SP (El. varies)

Layer 4 is a predominantly granular layer up to about 25 feet thick on the east end (near Abutment 1 to Bent 3). The layer appears to thin to less than 5 feet thick near Bent 4 (CPT-7). The sandy materials are interbedded with very stiff to hard clayey silt and clay (ML, CL). The sandy layers are primarily dense to very dense sand (SP), sand with silt (SM-SM, SW-SM), and silty sand to sandy silt (SM, ML). CPT tip resistance is generally between 150 and 450 tsf, and Standard Penetration Test (SPT) blowcounts of 35 to more than 50 blows per foot. Based on CPT correlations and pocket penetrometer readings, the clayey interbeds have undrained shear strength of 3 to more than 4 ksf. The layer appears to have thicker sand layers on the east end (near Abutment 1), becoming increasingly interbedded with clay layers and siltier materials moving toward the west. As shown in Figure 5, this layer pinches out and is only 5 ft thick near CPT -7.

3.3.1.5 Layer 5 – V. Dense SP & Hard CL/ML (below El. -30/-40 ft)

This layer is composed of alternating beds of dense to very dense sands and very stiff to hard clays and silts. The sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 600 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf.

3.3.2 Surface Water and Groundwater

3.3.2.1 Surface Water

Surface water generally consists of sheet flow to existing storm drainage facilities. Bolsa Chica Channel, a south-flowing open channel north and south of the freeways, passes below the freeways and proposed structure in a buried triple 12' x 10' Reinforced Concrete Box (RCB) culvert.

3.3.2.2 Groundwater

In the Caltrans 1959 As-Built LOTB, groundwater was reported near El. +3 feet. Groundwater was measured in Boring A-08-122 near El. +15.5 feet. Based on California Geological Survey (CGS) (previously known as California Department of Conservation (CDC) Division of Mines and Geology) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater is at a depth of about 10 to 20 feet. The reference elevation is not known. If the 10 foot depth is taken below freeway grade (El. 26 ft) then the groundwater would be near El. 16 feet, which is consistent with our investigation data. Based on the above data, we selected a design groundwater elevation of 16 feet for analysis.

3.3.3 Engineering Parameters

Recommended design engineering properties for the soil layers shown in Figure 5 were developed from the field and laboratory data from our investigation, and are summarized in Table 1. Index properties of soils were based on testing for natural moisture content and dry density, percent passing No. 200 sieve, grain size distribution, and Atterberg Limits. Drained strength parameters for c-ϕ soils were taken from results of direct shear tests. Undrained shear strengths of clays were taken from conservative interpretation of CPT test results, pocket penetrometer readings, and torvane readings. Friction angles of sandy soils below the water table were based on CPT and SPT penetration resistance correlations. Consolidation parameters for poorly consolidated clays were developed based on consolidation testing in combination with correlations of natural moisture content, ratio of undrained shear strength to effective overburden stress, and Atterberg Limits. Compressibility of sands and very stiff overconsolidated clays were based on published CPT and SPT penetration resistance correlations. Boring and CPT data are presented in Appendix A, and laboratory test results are presented in Appendix B.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Seismic Evaluation

4.1.1 Potential Seismic Hazards

The project is located in a seismically active area. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding. The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 7. A summary of the nearby fault data is provided below:

Fault Name	Fault Type	MCE Magnitude	Closest Distance (km)	
			1996 Map[6]	EQFAULT[7]
Los Alamitos[1,4]	Reverse-Oblique[5]	6.0[6]	1.7	N/A
Newport-Inglewood / Rose Canyon East[1,2]	Strike-Slip[6]	7.0[6]	Use EQFAULT	5.2
San Joaquin Hills[2,3]	Blind-Thrust[7]	7.0[8]	N/A	13.6
Puente Hills[2,3]	Blind-Thrust[7]	7.25[7]	N/A	18.1

Footnotes:
1. Included on Caltrans 1996 Map
2. Included in CGS 2002 Fault Data (EQFAULT)
3. Not included in Caltrans 1996 Map
4. Not included in CGS 2002 Fault Data (EQFAULT)
5. Unclassified in Caltrans 1996 Report, classified by others as Reverse-Oblique
6. From Caltrans 1996 Map and Report
7. From CGS 2002 Fault Data, except M=7.25 for Puente Hills per Caltrans
8. Listed as 6.6 in CGS 2002, revised to 7.0 by Caltrans (SR-22 Phase 1)

4.1.2 Ground Surface Rupture

The site is not located in the Alquist-Priolo Earthquake Fault Zone, and the closest known active fault is the Los Alamitos Fault at a distance of about 1.7 km. Due to the distance from the closest faults ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed.

4.1.3 Ground Motion

The bridge site latitude and longitude are approximately as follows:

- Latitude: 33.7749° North
- Longitude: 118.0427° West

GDC performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base, as well as seismic data from the Caltrans 1996 map (see Figure 7). Los Alamitos is not in the EQFAULT CGS 2002 data base, and the closest mapped fault to the site according to EQFAULT is the Newport / Inglewood Strike-Slip Fault at a distance of 5.2 km, with a rated maximum credible magnitude of M=7.0. The bridge site is located between the 0.4 and 0.5g contours, which would indicate a rounded up design PBA of 0.5g. For EQFAULT analysis and the Los Alamitos Fault we used the attenuation relationships presented by Sadigh et. al. (1997). EQFAULT output and deterministic analyses using Sadigh relationships are presented in Appendix E-1. A summary of Peak Ground Acceleration (PGA) from Sadigh 1997 – Soil and PBA from Sadigh 1997 - Rock, and PBA per Caltrans Map, for the bridge is presented in the following table:

Fault	Caltrans 1996 Map Fault to Site Distance (km)	EQFAULT Fault to Site Distance (km)	Rounded-up Caltrans 1996 Map PBA (g's)	Sadigh 1997 Rock PBA (g's)	Sadigh 1997 Soil PGA (g's)
Los Alamitos M=6.0	1.7	N/A	0.5	0.59	0.50
Newport-Inglewood M=7.0	Use EQFAULT	5.2	0.5	0.51	0.42
San Joaquin Hills M=7.0	N/A	13.6	N/A	0.36	0.35
Puente Hills M=7.25	N/A	18.1	N/A	0.32	0.32

The PBA for a magnitude 6.0 earthquake on Los Alamitos Fault is 0.6g and for a magnitude 7.0 earthquake on Newport-Inglewood is 0.5g. Peak Ground Acceleration (PGA) may be taken as 0.50g for M_w=6.0 and 0.42g for M_w=7.0 (for liquefaction analysis we conservatively rounded up to 0.45g). For seismic slope stability evaluation,

we recommend using a horizontal acceleration coefficient of Kh=0.17 or 1/3 of the maximum PGA.

4.1.4 ARS Curve

Per Caltrans Foundation Reviews dated 12-11-07 and 01-11-08 (See Appendix D) ARS curves for the project may be taken as Seismic Design Criteria (SDC) ARS curves for PBA of 0.5g and MCE magnitude of 7.25+/-0.25 for Proposed 405-22 HOV Connector Separation. Based on CPT data, boring data, and our liquefaction assessment at the site, the soil profile classifies as Type D in accordance with Caltrans SDC (see Appendix E-2). To account for near-source effect (site less than 15 km from fault), the following adjustments on the spectral acceleration values are recommended on the Caltrans SDC response spectra:

- 20% increase for periods equal to or greater than 1.0 second.
- No changes for periods less than 0.5 second.
- Linear interpolation for periods between 0.5 second and 1.0 second.

The recommended ARS curve is shown in Figure 8.

4.1.5 Liquefaction Evalauation

The site is located within a State Liquefaction Hazard Zone (CDMG, 1999). Highest historical groundwater in this area based on Figure 6 is between the 10 and 20 foot depth contours. Groundwater was encountered at El. 15.5 feet in boring A-08-122, which is about 10 feet below lowest freeway grades. Sediments below the groundwater at the site are primarily stiff to very stiff clays and dense to very dense sands, but contain localized thin interbeds of loose to medium dense sands, silty sands, and silts that may be prone to liquefaction.

We performed liquefaction calculations for CPT-08-006, 007, 009, 013, and 015 assuming a high historical groundwater depth of a groundwater elevation of El. +16 feet (see Appendix E-3). Triggering evaluation was based on the CPT method from the NCEER 1996/1998 Workshops (Youd and Idriss, 2001). Settlements were calculated using the method of Tokimatsu and Seed (1987), and residual strengths were based on the method of Seed and Harder (1990). Calculations were carried to a depth of 60 feet below the existing grades. We determined that use of Magnitude 7.0 and PGA of 0.45g was more critical than using Magnitude 6.0 and PGA of 0.5g, and therefore used the higher magnitude in our analyses. The resulting analyses show that limited 1 to 5 foot thick layers of silty and sandy soils below El. 16 feet may liquefy in the design earthquake. Potentially liquefiable layers are shown on Figure 5. Estimated liquefaction-induced ground settlements for 5 CPTs range between 0 inch and 0.8 inch

with an average value of less than ½ inch. A summary of the liquefaction settlements is included in Table 2, and calculations are in Appendix E-3.

Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1,500 psf. The N1-60cs for liquefiable layers adjusted in accordance with Seed and Harder (1990) range from 17 to more than 30 blows per foot (average 28), and estimated residual shear strengths range from a minimum of 875 psf up to a limiting value of 1,500 psf (average 1400 psf).

Due to the relatively isolated thin liquefied layers, depth of liquefiable layers, small ground settlements, and relatively high residual shear strengths, it is our conclusion that liquefaction does not have a significant impact on the design of piles or stability of the slopes at the site. The piles are anticipated to have adequate capacity to resist any downdrag loads from liquefaction.

4.1.6 Other Seismic Hazards

The site has no known history of subsidence. The site is generally level and the embankment slopes were engineered during construction and liquefiable soil layer are relatively thin and isolated. Therefore, the impact of liquefaction on seismic slope stability is not an issue. Static and seismic stability of abutment slopes is evaluated later in this report.

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the 100-yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

4.2 Soil Corrosivity

Caltrans Corrosion Guidelines (2003) define a corrosive area as “an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates or has a pH of less than 5.5.”

Representative samples of the fill and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests performed are summarized as:

BORING NO	SAMPLE NO	DEPTH (ft)	USCS CLASS.	PH CALTRANS 643	CHLORIDE CONTENT CALTRANS 422 (ppm)	SULFATE CONTENT CALTRANS 417 (ppm)
A-08-122	B-1	1.2-5.0	SC	8.3	163	132
R-08-011	S-3	15-16.5	CL	8.2	1330	189
R-08-017	R-4	20-21.5	CL	7.7	1311	62
R-08-017	S-7	35-36.5	ML	8.8	255	576

Based on these test data the site soils classify as corrosive due to high chlorides in accordance with Caltrans Corrosion Guidelines (2003). Based on testing elsewhere in the overall site, high sulfates (between 2,000 and 15,000 ppm) are also present locally in the site area.

4.2.1 Corrosion Mitigation for Reinforced Concrete

Design of reinforced concrete in contact with native soils should consider the site corrosion potential in accordance with Bridge Design Specifications (BDS) Section 8.22 (July 2000):

- For 500 to 5000 ppm Chlorides in soil the minimum concrete cover and mix design for protection of reinforcement against corrosion due to chlorides shall be as provided in BDS Table 8.22.1:
    - The maximum water to cementitious material ratio shall not exceed 0.40;
    - Minimum concrete cover for footings and pile caps is 3 inches;
    - Minimum concrete cover for walls and columns is 3 inches;
    - Minimum concrete cover for precast piles is 2 inches, and Mineral admixtures conforming to ASTM Designation C1240 and/or ASTM Designation C618 Type F and/or N, may be required.;
- For 2000 to 15,000 ppm Sulfates in soil the minimum requirements for protection of concrete against sulfate exposure shall conform to the requirements in BDS Table 8.22.2:
    - Cement shall be Type II modified or Type V;

  - The minimum cementitious material content shall be 658 pounds per cubic yard with a 25% mineral admixture replacement by weight. Maximum water to cementitious material ratio shall not exceed 0.40.
- Concrete abutment piles shall be class 200.

We understand that the design concrete cover for the bridge columns and walls is 2 inches, which is not adequate to resist corrosion from native soils. To avoid contact between native soils and concrete columns and walls, the special provisions should require that all backfill within 2.5 ft of the column or wall concrete be non-corrosive imported structural backfill with pH >5.5, sulfates < 2000 ppm and chlorides <500 ppm.

4.2.2 Corrosion Mitigation for Steel Pipe Piles

Steel piles in a corrosive environment must consider a sacrificial corrosion rate of 0.001 inches per year for 75 years, or 0.075 inches off all outside exposed surfaces of steel pipe piles in accordance with Memo to Designers 3-1 (July, 2008). This only applies to a depth of 3 feet below the water table, which is only 3 feet below the pile cap for our CISS piles. So ultimate design wall thickness in this zone is 0.75 inch – 0.075 inch = 0.675 inch, and design pile diameter in this zone will be reduced by 0.15 inches. This corrosion loss was considered in the pile moment of inertia for lateral pile calculations.

4.3 Scour Potential

The proposed bridge is not located in a flood/drainage or river channel. Therefore, scour potential is not an issue for this bridge.

4.4 Foundation Recommendations

4.4.1 Foundation Type

We recommend pre-cast pre-stressed reinforced concrete piles at Abutments 1 and 6 since they are considered to be the most economical. Due to high demand and shallow groundwater, we recommend 48-in. diameter CISS piles for the bents.

The Abutment Piles are designed in accordance with WSD design method bent piles are designed in accordance with LRFD. In accordance with the LRFD memo to Designers 3-1 (July 2008), pile Loads are summarized in Table 3A. Pile details, design method, bottom of footing elevation, pile cut off elevation, pile cap size, allowable settlement, and number of piles per support are shown in Table 3B.

4.4.2 Axial Capacity

4.4.2.1 Abutment Piles

Driven prestressed concrete piles will derive their capacity by a combination of skin friction on the sides of the piles and from end bearing at the pile tip. Abutment 1 piles may be predrilled through the embankment fills to El. 30 feet in accordance with Caltrans practice, and axial capacity in this zone was ignored in computations. We computed axial friction and end bearing capacities using the method of Meyerhof for sands, and we used the α-method for skin friction in clays. End bearing in clays was taken as 9 times undrained shear strength. Axial pile capacities versus depth are shown in Figures 9A and 9B, and calculations are presented in Appendix E-4.

Specified tip elevation at Abutment 1 is El. -28 feet, and is El. -50 ft at Abutment 6. Abutment pile lengths are 69 feet at both abutments. The axial capacities and tip elevations are summarized in the Foundation Recommendations for Abutments, Table 3C and Pile Data Table, Table 3E.

Since the piles are driven into dense sand at the tip, there is expected to be sufficient reserve capacity to resist any downdrag loads from the small predicted liquefaction settlements.

We recommend that all the piles be installed at a minimum spacing of 3 pile diameters or 3.5 feet center-to-center. Piles with this minimum spacing will not require a reduction in vertical capacity for group action.

4.4.2.2 Bent Piles

Driven 48-in. diameter steel pipe piles with top portion filled with concrete (CISS) are proposed for the bents. Nominal axial pile capacity of 1,150 kips is required for Bents 2 and 5, and 1,800 kips is required for Bent 3 and 4 piles. We calculated the capacity of open ended pipe piles using the procedure recommended in American Petroleum Institute API RP 2A (1991). The pile capacity at any depth is taken as the lower of the following two values:

(1) Outside friction + inside friction + end bearing on steel area
(2) Outside friction + end bearing on the gross cross-section of the pile

As long as the inside friction during driving is less than the end bearing on the plug area, the soil plug keeps moving up and equation (1) controls the pile capacity. When the inside friction becomes greater than the end bearing on the plug, the pile behaves as "plugged" and equation (2) controls the pile capacity. The pile may act as plugged

where end bearing is in clay and then again act as unplugged if high end bearing in sand is encountered. In addition, the friction during continuous driving in clay may be 25% to 50% of the long-term friction and a pile may act as unplugged during driving but may act as plugged after setup. In the final condition, after drilling out the plug and filling with concrete, the pile will behave as plugged.

Ground settlements at the site are generally less than ½ inch due to liquefaction, with a maximum estimated value of 0.8 inches. To ensure that dynamic settlement of piles due to liquefaction is not more than ½ inch, we conservatively used the worst case CPT (CPT-13 with 0.8 inch total settlement) and assumed a downdrag load (negative skin friction) can develop from settling soils on the pile shaft above a point defined as the "Neutral Plane," or the point below which liquefaction settlement is less than ½ inch. The neutral plane was estimated at El. -6 feet.

Downdrag load or outside skin friction above the neutral plane is estimated as 125 to 133 kips (using 50% ultimate friction above neutral plane), as shown in Figures 9C through 9F. Estimated outside skin friction below the neutral plane for each bent is shown in Figures 9C through 9F, along with minimum end bearing (assuming plugged condition after filling pile with concrete and conservatively using 10% of the ultimate end bearing for ½ inch settlement of 125 kips. The pile capacity below the neutral plane, under dead plus seismic load (including downdrag), has a factor of safety of greater than 1.0, as shown in Figures 9C through 9F. Therefore, we conclude that the piles have adequate capacity to resist downdrag, and that settlement due to liquefaction and downdrag will be less than ½ inch.

The calculated capacity of the pile with depth is shown in Figures 9C through 9F. The specified tip elevations range from El. -63 to -59.5 for Bents 2 and 5, and from El. -82.5 ft to El. -85.5 ft at Bents 3 and 4. The piles should be installed to a capacity of Dead plus Seismic Compression load plus 2 times the downdrag, or 1110 kips or the nominal capacity 1,150 kips at Bents 2 and 5 and 1725 kips or the nominal capacity of 1,800 kips at Bents 3 and 4. These data indicate that the nominal capacities of 1,150 kip and 1,800 kip control the design and not the downdrag case. Due to uncertainty regarding plugging and end-bearing, only the outside friction and end-bearing on steel area were considered in selecting the specified tip elevation.

The axial capacities and tip elevations for bents are summarized in the Foundation Recommendations for Bents, Table 3D and Pile Data Table 3E, respectively. The axial capacities will be confirmed by an axial pile load test and an indicator pile program with Pile Driving Analyzer (PDA) measurements (refer to GDC Pile Drivability and Load Test Report, February 5, 2009).

It should be noted that capacity during initial driving will be less, and that substantial increase of friction will occur with set-up over time. The required capacity will likely not be achieved at end of initial driving, but will require consideration of set-up. The set-up will be evaluated in the indicator and pile load test program, and included in the final driving criteria. The load test must be performed after at least 15 days of initial pile driving, drilling out the soil plug and placing a 5-ft concrete plug as recommended in the Pile Driveability and Load Test Report dated February 5, 2009. The load test should verify the nominal capacities of 1,150 kip and 1,800 kip for the Bents 2 and 5 and Bents 3 and 4, respectively.

4.4.3 Lateral Capacity

Lateral capacity of pile groups includes the passive resistance on the pile cap and lateral resistance of the piles.

Estimates of lateral pile capacity of Abutment and Bent piles were made using the computer program LPILE Plus 4.0 (Ensoft, 2000) and soils data from our investigation. For the piles spaced at 3 diameters on centers we used an average group p-multiplier of 0.5 to model reduction due to group effects. Maximum bending moments were estimated utilizing the higher p-multiplier of 0.75 for the leading row piles, which generates higher bending moments. The structural engineer is using a pinned connection at both abutments and fixed connection at the bents; therefore analyses were performed for free-head conditions at the abutments and fixed head conditions at the bents. For abutment batter piles, the horizontal component of axial capacity may be added to the lateral capacity. The results are summarized in Tables 4A & 4B. Computer outputs are presented in Appendix E-5.

At the request of Caltrans, a comparison run was made by using both version 4.0 and 5.0 to verify that no significant difference in results is present between the two versions for the cases analyzed. The comparison is shown in Appendix E-9.

We computed passive resistance on the Bent pile cap using Rankine theory and an undrained shear strength of 1.2 ksf for the stiff native clays for bents 2, 3 and 4 and 1.0 ksf for the firm native clays for bent 5 at the pile cap level. The recommended passive resistance versus deflection is shown in Figures 10A & 10B. Calculations are included in Appendix E-6.

Due to thin, isolated, and deep liquefiable layers with relatively high residual strength, liquefaction will not affect the lateral capacity of the foundations.

4.4.4 Pile Settlement

We used dead plus live load (Service I Limit State Total Load per Support, Table 3A) for estimating settlements of the pile groups. Dead plus live load for abutment piles is 142-144 kips per pile. Ultimate load per pile at the abutment for 0.4 inch settlement is 369-426 kips. Settlement of a single pile to mobilize design loads of 140 kips is about 0.15 inches. Pile groups settle more than a single pile. The group settlement factor was calculated as $\zeta = (B/b)^{1/2}$ in which b = width of the pile and B is the equivalent width of the group (Vesic, 1977). Using this formula, the calculated settlement of the abutment pile groups is less than 1 inch.

For bents 2 and 5 piles the dead plus live load is 554 kip per pile and for Bents 3 and 4, the dead plus live load is 826 kips per pile. For Bents 2 and 5, the ultimate capacity for 0.4 inch settlement is taken as 1,150 kips. For a mobilized dead plus live load of 554 kips, the single pile settlement is about 0.19 inch. Pile groups settle more than a single pile. The group factor was calculated as $\zeta = (B/b)^{1/2}$ in which b = width of the pile and B is the equivalent width of the group (Vesic, 1977). Using this formula, the calculated settlement of the Bent 2 and 5 pile groups is less than 1 inch. For Bents 3 and 4, the ultimate load for 0.4 inch settlement is taken as 1,800 kips and the single pile settlement under dead plus live load of 826 kips is 0.18 inch. The group factor was calculated as $\zeta = (B/b)^{1/2}$ in which b = width of the pile and B is the equivalent width of the group (Vesic', 1977). Using this formula, the calculated settlement of the groups is less than 1 inch. Calculations for the pile settlement are shown in Appendix E-7.

4.4.5 Pile Installation

Detailed pile driveability and load test recommendations for 48-in. diameter CISS piles are provided in a separate report titled, "Pile Driveability Studies and Load Test," dated February 5, 2009.

4.4.5.1 Hard Driving

While the clays should be fairly easily penetrated, layers of dense sand are present locally above the specified tip elevations. Due to presence of these zones with higher end bearing, hard driving for several feet at these depths should be anticipated, especially in the concrete abutment piles, although the layers are thin enough that the piles are expected to punch through. The steel pipe piles can more readily cut through these layers.

4.4.5.2 Hammer Selection

Due to presence of these layers, we recommend that abutment piles be driven with a hammer with rated capacity of at least 90,000 ft lbs. per blow (such as a Delmag D-36/32). For 48-in. diameter pipe piles, the D-80 or D-100 or equivalent hammers should be used.

4.4.5.3 Blowcount Criteria

We performed driveability analysis and developed blowcount criteria for the piles using the computer program GRLWEAP. Concrete piles driven with a Delmag D36-32 should be driven to a minimum blowcount of 25 blows per foot assuming a set up of about 80 kips. For the 48-in. diameter pipe piles, the resistance during continuous driving may be 50% or less of the ultimate capacity. Detailed pile driveability and load test recommendations for 48-in. diameter CISS piles are provided in a separate report titled, "Pile Driveability Studies and Load Test," dated February 5, 2009. Final driving recommendations will be provided after the load test and indicator program are completed.

4.4.5.4 Pre-Drilling

At Abutment 1, piles may be predrilled through the abutment fills in accordance with Caltrans practice as recommended in Section 4.4.2.1. We recommend that piles otherwise be driven without pre-drilling. If excessively difficult driving is encountered during construction, use of undersized pre-drilling can be considered with the written approval of Group Delta. Undersized pre-drilling should be done with a maximum 12-inch auger for 14-inch piles. Although not anticipated, drilling the plug may be needed for some bent piles to reach the specified tip.

4.4.5.5 Indicator Pile Program

We recommend that an indicator pile program be performed with Pile Driving Analyzer (PDA) measurements. The benefits of the PDA measurements include:

- monitor hammer efficiency by measuring the energy delivered to the pile
- monitor compressive stresses at the end of pile driving to determine refusal blow count and compressive stress damage
- monitor tensile stresses during soft driving and to assess the potential for tensile stress damage
- confirm the ultimate dynamic friction and end bearing capacity

- determine setup so that long term frictional uplift and downdrag capacity can be verified
- optimize the blow count criteria
- optimize the production pile lengths

The indicator program should consist of driving a minimum of 12 PDA test piles (6 prestressed concrete piles at abutments and 6 steel pipe piles at Bents 3, 4, and 5 [see Figures 2D and 2F]). The length of the test piles should be at least 10 ft longer than the lengths based on the recommended pile tip elevations in Table 3. In addition to the indicator piles, a load test is proposed at Bent 2 to test two piles with 8 reaction piles as discussed in a separate report titled, "Pile Driveability Studies and Load Test," dated February 5, 2009. Recommendations for PDA on the load test piles are presented in that report. The conclusions and recommendations of this report are summarized in Section 4.4.5.6, and a copy of the report and our responses to Caltrans comments are included as Appendix G.

A minimum set-up period of 2 weeks should be required after initial driving of the CISS piles, followed by re-strikes of the piles, to evaluate the pile set-up or increase in capacity with time. For concrete abutment piles, a minimum set-up period of 2 days is recommended.

Final pile driving criteria and production pile lengths should be defined after the results of the indicator pile and load test program are available. The suggested PDA test pile locations are shown in Figures 2B through 2G.

4.4.5.6 Pile Load Test

A pile static load test will be performed at Bent 2, as recommended in our report in Appendix G. The load test program should be carried out in accordance with our recommendations and Caltrans comments. The load test program is summarized as follows:

- Pile load tests should be in general accordance with ASTM D 1143 and any applicable Caltrans Special Provisions;
- Load test piles meeting design requirements may be used as production piles;
- Production pile lengths at Bent 2 are 75 feet;
- One compressive load test will be performed on a 75-ft long pile utilizing four 75-ft long reaction piles;

- One compressive load test will be performed on a 100-ft long pile utilizing four 100-ft long reaction piles (therefore, 5 piles will be longer than the design production piles);
- The reaction piles should be monitored for uplift load and deflection during the compression load test;
- Each compression test should be carried out on a production pile in the center row of Bent 2 footing;
- The four reaction piles should be placed two pile rows away from the compression test piles, which provides a minimum clear distance of 5 diameters from the compression pile in accordance with ASTM D 1143.
- Figure 2F-2 shows the recommended locations of the 75-ft long test pile (Pile C) and the four 75-ft reaction piles (Piles G, H, I, J), and Figure 2F-3 shows the recommended locations of the 100-ft long test pile (Pile D) and the four 100-ft reaction piles (Piles K, L, M, N);
- The recommended procedure is as follows:
    - Drive 75-ft piles C, G, H, I, J and 100-ft piles D, K, L, M, N;
    - Both test piles and one reaction piles from each group should be monitored with PDA. The hammer driving energy, blow counts, and depth of the soil plug at the end of the driving should be recorded;
    - For PDA piles, pre-drill a 60-inch diameter hole to the bottom of the pile cap elevation (El. 15.5 ft) at each to simulate the prototype condition;
    - Wait at least 15 days and re-tap each PDA pile prior to drilling out the plug to monitor the setup. Make sure that the pile is driven no more than 20 blows or 1 inch, whichever comes first, recording blows per inch;
    - For each PDA pile drill the soil plug to 5 feet below the depth of structural concrete in the production piles, remove any water in the pile, and pour a 5 ft thick concrete plug (this is not for sealing purposes but to make the pile behave more like a plugged pile similar to prototype condition). Re-tap the pile with PDA to monitor the effect of drilling out the plug on the capacity. Make sure that the pile is driven no more than 20 blows or 1 inch, whichever comes first, recording blows per inch;
    - Perform CAPWAP analysis on selected blows and determine pile frictional and end bearing capacity of the piles and amount of set up.
    - Load the test pile in compression using the quick load increment method using each load increment as 10% of the maximum load;
    - Monitor the downward movement of the test pile and upward movement of the reaction piles with dial gages;

- The test should be carried out to a maximum load equal to the required compression nominal resistance (1,150 kip for 75 ft piles and 1800 kip for 100 ft piles), failure in compression, or pull out of the reaction piles, whichever occurs first. If the downward movement at the nominal load is less than 2 inch, load the pile to failure, or the maximum jack load, or until the movement is at least 2 inches;
- If the testing is performed by Caltrans as currently anticipated, as a minimum Caltrans 2000 kip test frame and preferably 4000 kip test frame should be used for the testing.

- The load test results will be correlated with the PDA measurements on the test piles and CPT data. If the pile load tests indicate that the piles meet the design requirements, PDA alone or in conjunction with CPT data may be used to confirm the capacity of the remaining production piles. If the tests do not achieve the design capacity, a redesign and an additional load test may be needed to verify the revised design.

4.4.5.7 Drilling of the CISS Soil Plug

The soil plug within the CISS piles will be partially drilled out and filled with concrete and re-bar. We understand that the concrete and steel will extend to a depth of 44 ft below the pile cap, leaving at least a 31-ft long soil plug for the 75-ft long Bent 2 and Bent 5 piles and a 56 ft soil plug for the 100-ft long Bent 3 and 4 piles. This length of plug is expected to be stable and not to blow out under the hydrostatic uplift pressures.

4.5 Approach Fill Earthwork

Existing 1.5H:1V and 2.H:1V abutment fills were constructed during the original project grading. The abutments for the 405-22 HOV Connector Separation will be a short seat abutment at Abutment 1, and a full height cantilever abutment at Abutment 6. Additional new fills will be placed behind the abutments and on the approaches at both abutments. Abutment 1 footing will be founded within new embankment placed alongside the existing embankment for 22/405 Separation, with pre-cast lightweight fill retaining walls above the abutment footing elevation and new embankment slopes on both sides. Slopes will be inclined at 2h: 1v. Abutment 6 will have lightweight cellular concrete walls full height on both sides of the approach and behind the abutment wall.

A temporary soil surcharge is recommended at Abutment 1 to mitigate post construction settlements at the abutment and side wing walls. Consolidation settlements will occur under the soil surcharge. The soil surcharge should be left in place until long term settlements under the final grades (embankment plus lightweight fill) are sufficiently complete that no significant post-construction settlements will occur

at the abutment or wing walls. A portion of the surcharge will be removed and replaced by lightweight fill. The surcharge fills should be placed as soon as possible in Stage 1 construction, and left in place for at least a 12 month waiting period. Settlements should be monitored during fill placement and during the waiting period. After completion of the surcharge (at the discretion of GDC), the abutment may be excavated and piles driven, and wing retaining walls (RW1300 and RW1299, Precast Lightweight Fill Walls) may be excavated to foundation level and constructed. Details of the surcharge program and Abutment 1 retaining walls are presented in the project Geotechnical Design Report and Foundation report for the walls.

Precast walls with lightweight cellular concrete backfill are recommended on the Abutment 6 approach and wing walls (RW1325 and RW1326). The lightweight cellular concrete will be used for the entire abutment approach fill and behind the abutment. The net loading will be small and soils will be overconsolidated with respect to the loading. Therefore, no significant long term settlement will occur, and no waiting period is required prior to abutment construction. Details of the retaining walls and approach fills are provided in the RW1325 and RW1326 Foundation Report. The abutment will be backfilled with cellular concrete. Structural backfill will be used only behind the abutment backwall for passive resistance. Assuming structural backfill with 34 degrees friction angle, the passive wedge behind the backwall may be assumed inclined at an angle of 28 degrees to the horizontal.

All earthwork and grading shall comply with Section 19 of the Standard Specifications. The entire footprint of areas to receive new fill shall be cleared and grubbed of any vegetation, and the subgrade shall be proof-rolled using loaded heavy equipment under observation of GDC. Any soft, loose, wet, pumping, organic, or other unsuitable materials shall be removed to the depth and limits recommended by GDC in the field, and replaced with engineered fill. After successfully proof-rolling or stabilizing the subgrade, the surface shall be scarified and recompacted. Abutment wall backfill shall conform to Caltrans Standard Specifications for structural fill. All new fill placed within 150 feet of the abutment should have an expansion index (EI) of less than 50. Positive surface drainage away from foundation areas should be maintained. The required expansive soil exclusion zone in a bridge abutment is illustrated in Figure 11.

4.6 Slope Stability

Existing abutment slopes are very stiff to hard compacted clayey fills, were engineered during original grading of the project, and based on our visual observations the slopes have performed well. The fill and upper stiff native alluvium are underlain by a weaker firm to stiff clay layer. We performed slope stability analyses for the proposed abutment and new fill slopes, with a maximum inclination of 2h: 1v and maximum height of about 32 feet. General soil layering and shear strengths used in our analyses

are shown in Table 1. For static analyses, we used ultimate (post-peak) drained shear strengths for clayey fills, and undrained shear strengths for Layer 2 (which is more critical than the drained condition). For seismic analyses, we used peak drained strengths for the fill and undrained shear strength for Layer 2. Since residual undrained shear strengths of any liquefied layers present are generally greater than the undrained shear strength of Layer 2, their presence need not be considered in the calculations.

The stability analyses show that the stability of the slopes is controlled by deeper surfaces passing into Layer 2. Analyses for static conditions indicate factors of safety in excess of 1.5, and for pseudo-static analyses using Kh=0.17 indicate factors of safety in excess of 1.1, and therefore meet Caltrans requirements for static and seismic stability. Calculations are included in Appendix E-8.

4.7 Earth Pressures

4.7.1 Active Pressures

Static and seismic (if required) earth pressures for abutment walls with level backfill designed in accordance with Caltrans standards may be taken as:

- Unit Weight, γ = 120 pcf
- Active Earth Pressure Coefficient, K_a = 0.30
- Lateral earth pressure = 36 pcf
- Horizontal pressure due to areal surcharge loads = K_a x vertical pressure
- Additional Seismic earth pressure = 15 pcf as inverted triangular pressure

Note that where lightweight cellular concrete fill is used, it is placed in 2 ft to 3 ft lifts then allowed to set. The lateral pressures exerted on the walls while the concrete is liquid are equivalent to a fluid with the specified unit weight of the cellular concrete materials. After the cellular concrete has set, it exerts no lateral pressures.

4.7.2 Passive Resistance of Abutments

The ultimate lateral capacity of an abutment wall backfilled with structure backfill is a function of the height of the abutment wall that is acted on by the passive soil pressure on the backfill. The Caltrans Seismic Design Criteria (SDC), Section 7.8, dated February 2004 recommends a passive pressure of 5 ksf for a wall height of 5.5 feet based on full-scale abutment testing conducted at UC Davis. For wall heights other than 5.5 feet, the passive pressure may be determined by multiplying the 5-ksf value with the ratio (H/5.5) where H is wall height in feet in accordance with SDC. For higher

walls the maximum value of the passive resistance should be limited to 7.3 ksf corresponding to an abutment height of 8 feet.

4.8 Temporary Excavation and Shoring

Temporary shoring will likely be required for Bent footings or other project excavations. Excavations should be readily accomplished with conventional equipment such as backhoes and excavators. Excavation safety is the responsibility of the contractor and shall comply with all applicable OSHA regulations. The safety of all excavations shall be verified by the designated competent person in the field, and excavation slopes or shoring modified as necessary to maintain a safe and stable excavation. No surcharge loads should be permitted within a horizontal distance of 5 feet or the depth of the shoring, whichever is greater, unless the excavation / shoring has been designed for these loads. In general, temporary excavations above the water table within the very stiff clay existing fills may be made near vertical for cuts up to about 5 feet without shoring. Where not supporting existing improvements, higher temporary cuts above the water table may be made at maximum inclinations of ¾ h: 1v to depths of up to about 20 feet below grade. Vertical cuts higher than 5 feet, or cuts encroaching into a 1:1 plane below the edge of existing infrastructure, or excavations extending below groundwater, should be properly shored. Cantilever shoring may consist of soldier piles and lagging. Tied-back shoring may be required to facilitate construction or limit deflections.

For temporary cantilevered shoring consisting of soldier piles and lagging, lateral earth pressures may be determined based on Figure 5.5.5.6-4 of Bridge Design Specifications (BDS) Section 5.5.5.6 (August 2003), "Simplified Lateral Earth Pressure Distributions for Temporary Non-gravity Cantilevered Walls with Vertical Wall Elements Embedded in Cohesive Soil and Retaining Cohesive Soil." For temporary braced or tied-back shoring, lateral earth pressures may be determined in accordance with BDS Section 5.5.5.7.2. Undrained shear strengths, drained friction angles, unit weights, and elevations of the cohesive soil layers may be determined using Table 1.

4.9 Dewatering

Footings for Bent 2, Bent 3, Bent 4, and Bent 5 will be excavated to at or below the permanent groundwater table. Perched zones may be encountered at higher elevations. Due to primarily clayey soils at the anticipated excavation levels, groundwater volumes will likely be sufficiently small so that dewatering (if needed) can be accomplished by pumping from sumps. Due to potential for water or wet soils at the bottom of excavations, it may be desirable to place a 1 to 2 ft thick gravel layer to act as a working surface and to allow for easier dewatering.

4.10 Footing Encroachment into Bolsa Chica Channel R/W

There is an existing triple 12' x 10' Reinforced Concrete Box (RCB) culvert [Bolsa Chica Channel] that passes below the freeway just west of proposed Bent 3 of the 405-22 HOV Connector Separation (see Figures 2A and 2B), within the Orange County Flood Control District (OCFCD) right of way (R/W). The top of the RCB is between about El. 22 and 24 feet, and the bottom is between about El. 10 and 12 feet. There are existing bridge footings for the existing Rte. 22/405 Separation immediately adjacent to the RCB. This bridge is to be demolished. New Bent 3 footings for the HOV Connector Separation will encroach slightly into the OCFCD R/W, within about 21 feet of the existing RCB. Future widening of the RCB may result in reduced clearance between bridge footings and the box of as little as about 11 feet.

Transient lateral load may be imposed on the bridge foundations in an extreme seismic event, resulting in some lateral loading on the RCB. Maximum design displacement of the bridge foundations under seismic loading is 1 inch, so displacements of the box would be less than 1 inch. We estimate that the lateral pressure exerted on the RCB from the bridge footing in a major seismic event will be 1 ksf or less, and last for less than a few seconds. To accommodate the pressures, we recommend that the new box wall be designed for lateral earth pressures assuming 15 feet of soil cover over the box following Section 6 of Caltrans Bridge Design Practice (1992). Portions of the existing box where passing below I-405 South / Bolsa Chica Road off-ramp have been designed for at least this much soil cover. This will be adequate to resist lateral earth loads plus transient seismic loading on the bridge foundations.

When the future RCB is installed, we recommend maintaining a clear distance of at least 8 feet (2 pile diameters) between the piles and RCB exterior wall. At this distance, the installation of the box will not adversely impact the frictional capacity of the piles.

4.11 Construction Considerations

The following construction considerations should be taken into account by bidders and contractors:

- SR-22 and I-405 have daily commuter traffic, and construction will need to be carefully planned to minimize impacts to traffic;
- Stage construction, surcharging at Abutment 1, and other construction activities should be considered and coordinated in construction planning;
- Work at freeway level will require traffic control and/or lane closure;
- Construction staging areas are limited;
- Buried utilities are present and may cause construction conflicts;

- The surcharge fill for Abutment 1 area should be placed as soon as possible in Stage 1 construction, and left in place for at least a 12 month waiting period. Settlement should be monitored with settlement plates. Details of the surcharge program, monitoring, and Abutment 1 retaining walls are presented in the project Geotechnical Design Report and Foundation report for the walls. Piles should not be driven until completion of the surcharge program.
- For Abutment 6, approach fill will be lightweight fill and no long-term settlement or waiting period is required before driving piles.
- The surrounding area contains residential development and noise from pile driving may be an issue;
- Localized zones of hard driving may be encountered above the tip elevations, undersized pre-drilling will only be allowed if necessary with written approval of Group Delta Consultants;
- The pile caps will require temporary excavations, and deeper excavations may encounter groundwater and wet soils. Excavations may require temporary shoring to support existing improvements. The contractor should submit temporary excavation and shoring shop drawings for the engineer's approval prior to excavation. Water pumped from excavations should be properly stored and disposed of as necessary.
- Our subsurface characterization is based on the borings performed at the locations shown in Figures 3A & 3B. Subsurface conditions between borings and CPTs are based on extrapolation between these points. Therefore, if conditions different than those assumed in the design are encountered during construction, excavation, or pile driving, we should be notified immediately so that we can assess the impact to our current recommendations and make appropriate modifications, if required.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report, or portions of this report, are provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report.

6.0 REFERENCES

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TABLES

TABLE 1
SUMMARY OF ENGINEERING PROPERTIES
405-22 HOV CONNECTOR SEPARATION

Layer No.	Soil Type	El. (feet)	Index Properties*	SPT N-Value (blow/ft)	Drained Shear Strength Parameters				Undrained Shear Strength (psf)	Compressibility Parameters				
					Peak Cohesion c' (psf)	Peak Friction Angle ϕ' (deg)	Ultimate Cohesion c' (psf)	Ultimate Friction Angle ϕ' (deg)		Modulus E (ksf)	$Cc/(1+e_0)$	$Cr/(1+e_0)$	OCR	Cv (ft^2/day)
1	Very Stiff to Hard Sandy Clay / Silt (CL, ML)	Above +16	**(-)#200**=40 to 82% (avg 58%) **LL**=26 to 34 (avg 31) **PL**=15 to 20 (avg 18) **PI**=11 to 14 (avg 13) ω_N=7 to 32% (avg 20%) γ=125 pcf (average)	**Borings:** 17 to 43 (avg 24)	400	30	250	30	3,000	-	-	0.018	7	**Over Consolidated:** 2.3
2	Firm to Stiff Sandy Clay (CL)	+16 to +2	**(-)#200**=26 to 86% (avg 58%) **LL**=33 to 39 (avg 36) **PL**=19 to 21 (avg 20) **PI**=12 to 19 (avg 16) ω_N=23 to 34% (avg 28%) γ=120 pcf (average)	**Borings:** 6 to 17 (avg 11) **CPT:** 5 to 20 (avg 10)#	250	28	100	28	1,000	-	0.17	0.016	2.5 at Freeway 1.0 below Abuts	**Normally Consolidated:** 0.33 **Over Consolidated:** 2.1
3	Very Stiff Clay, Sandy Clay, Silty Clay and Sandy to Clayey Silt (CL, ML)	+2 to -14	**(-)#200**=68 to 97% (avg 83%) **LL**=29 **PL**=19 **PI**=10 ω_N=25 to 41% (avg 30%) γ=125 pcf (average)	**Borings:** 12 to 50+ (avg 29) **CPT:** 12 to 50 (avg 23)#	-	-	-	-	2,000	-	-	0.019	>3	**Over Consolidated:** 3.3
4	Dense to Very dense Silty Sand, Sandy Silt, Sand and Stiff to Hard Clayey Silt and Clay (SM, ML, SP & CL, ML)	Varies (per Figure 5A and 5B)	**(-)#200**=2 to 86% (avg 35%) ω_N=15 to 40% (avg 25%) γ=125 pcf (average)	**Borings:** 34 to 50+ (avg 50+) **CPT:** 18to 50+ (avg 36)#	-	-	-	-	-	1,000	-	-	-	-
5 clay	Very Stiff to Hard Clay and Silt (CL, ML)	Varies (per Figure 5A and 5B)	**(–200)**=27 to 96% (avg 60%) **LL**=31 **PL**=15 **PI**=16 ω_N=17 to 45% (avg 28%) γ=125 pcf (average)	**CPT:** 8-50+ (avg 26)#	-	-	-	-	3,000	-	-	0.017	>2	**Over Consolidated:** 3.3
5 sand	Dense to Very Dense Sand and Silty Sand (SP, SM)			**CPT:** 38-50+ (avg 50+)#	0	38	-	-	-	3,000	-	-	-	-

* Where data not present average values from the overall project were used

\# CPT N-Values are based on available correlations (Robertson et al., 1983) -see Appendix A

TABLE 2

SUMMARY OF LIQUFACTION ANALYSES
405-22 HOV CONNECTOR SEPARATION

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)	Neutral Plane El. (feet)
CPT-08-006	0.00	0.00	0.00	N/A
CPT-08-007	0.24	0.00	0.24	N/A
CPT-08-009	0.24	0.02	0.26	N/A
CPT-08-013	0.78	0.02	0.80	-6.0
CPT-08-015	0.68	0.02	0.70	+1.0
NOTE: Design groundwater at El. +16 ft		Average:	0.40	
		Max:	0.80	
		Min:	0.00	

Table 3A

Foundation Design Loads											
Support No.	Service-I Limit State			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load (kips)		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. per Pile	Per Support	Per Support	Max. per Pile	Per Support	Max. per Pile	Per Support	Max. per Pile	Per Support	Max. per Pile
Abut 1	3268	200	2888	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent2	9962	N/A	9030	13744	800	0	0	10660	850	0	0
Bent 3L	5469	N/A	4893	7746	1260	0	0	5925	1350	0	0
Bent 3R	6717	N/A	6141	8994	1260	0	0	6214	1350	0	0
Bent 4L	7434	N/A	6725	9946	1260	0	0	7034	1460	0	0
Bent 4R	4546	N/A	3837	7058	1260	0	0	6834	1460	0	0
Bent 5	9450	N/A	8328	12388	800	0	0	10660	850	0	0
Abut 6	4612	200	4230	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: Loads provided by structural engineer.
Loads listed include the appropriate load factors.

Table 3B
Foundation Design Data Sheet

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Bottom of Footing Elevation (ft)	Cut-Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)*	Number of Piles per Support**
						B	L		
Abut 1	WSD	Class 200, ALT "X"	48.0	41.0	41.5	10	61	1	23
Bent2	LRFD	CISS NPS 48 x 0.75"	23.0	15.5	16.0	32	68	1	18
Bent 3L	LRFD	CISS NPS 48 x 0.75"	27.0	15.5	16.0	32	32	1	9
Bent 3R	LRFD	CISS NPS 48 x 0.75"	24.0	14.5	15.0	32	32	1	9
Bent 4L	LRFD	CISS NPS 48 x 0.75"	27.0	16.5	17.0	32	32	1	9
Bent 4R	LRFD	CISS NPS 48 x 0.75"	26.0	17.5	18.0	32	32	1	9
Bent 5	LRFD	CISS NPS 48 x 0.75"	27.0	12.0	12.5	32	68	1	18
Abut 6	WSD	Class 200, ALT"X"	26.0	19.0	19.5	14	61	1	32

*Based on CALTRANS' current practice, the total permissible settlement is one inch for multi-span structures with continuous spans or multi-column bents, one inch for singe span structures with diaphragm abutments, and two inches for single span structures with seat abutments. Different permissible settlement under service loads may be allowed if a structural analysis verifies that required level of serviceability is met.

**Bents 3L, 3R, 4L, 4R refer to individual footings at outrigger bents.

Table 3C. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations										
Support	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
				Total	Perma-nent					
Abut 1	Class 200 Alt. "X"	41.0	41.5	3270	2890	200	400	-28 (a), +16 (d)	-28	400
Abut 6	Class 200 Alt. "X"	19.0	19.5	4615	4230	200	400	-50 (a), -6 (d)	-50	400

Notes:
1. Design tip elevations are controlled by: a) compression, (c) settlement, (d) lateral load, respectively. Settlement of piles driven to nominal load is less than 1 inch.
2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load.
4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3D

Bent Foundations Design Recommendations												
Support Location	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
						Strength Limit		Extreme Event				
						Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)			
Bent2	CISS NPS 48 x 0.75"	15.5	16.0	9965	1	1150	0	850	0	-59.5 (a-1); -44.5 (d)	-59.5	1150
Bent 3L	CISS NPS 48 x 0.75"	15.5	16.0	5470	1	1800	0	1350	0	-84.5(a-1); -44.5 (d)	-84.5	1800
Bent 3R	CISS NPS 48 x 0.75"	14.5	15.0	6720	1	1800	0	1350	0	-85.5(a-1); -45.5 (d)	-85.5	1800
Bent 4L	CISS NPS 48 x 0.75"	16.5	17.0	7435	1	1800	0	1460	0	-83.5(a-1); -43.5 (d)	-83.5	1800
Bent 4R	CISS NPS 48 x 0.75"	17.5	18.0	4550	1	1800	0	1460	0	-82.5(a-1); -42.5 (d)	-82.5	1800
Bent 5	CISS NPS 48 x 0.75"	12.0	12.5	9450	1	1150	0	850	0	-63(a-1); -48.0 (d)	-63	1150

Notes:
1. Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) settlement, (d) lateral load. Settlement of piles driven to nominal load is less than 1 inch.
2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load.
4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3E

Pile Data Table						
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 200 Alt. "X"	400	0	-28 (a), +16 (d)	-28	400
Bent 2	CISS NPS 48 x 0.75"	1150	0	-59.5 (a); -44.5 (d)	-59.5	1150
Bent 2[3] (Load Test and Anchor Piles)	CISS NPS 48 x 0.75"	1150	580	-59.5 (a); -39 (b); -44.5 (d)	-59.5	1150
Bent 2[4] (Load Test and Anchor Piles)	CISS NPS 48 x 0.75"	1800	900	-84.5(a); -61(b) -44.5 (d)	-84.5	1800
Bent 3L	CISS NPS 48 x 0.75"	1800	0	-84.5(a); -44.5 (d)	-84.5	1800
Bent 3R	CISS NPS 48 x 0.75"	1800	0	-85.5(a); -45.5 (d)	-85.5	1800
Bent 4L	CISS NPS 48 x 0.75"	1800	0	-83.5(a); -43.5 (d)	-83.5	1800
Bent 4R	CISS NPS 48 x 0.75"	1800	0	-82.5(a); -42.5 (d)	-82.5	1800
Bent 5	CISS NPS 48 x 0.75"	1150	0	-63(a); -48.0 (d)	-63	1150
Abut 6	Class 200 Alt. "X"	400	0	-50 (a), -6 (d)	-50	400

Notes:

*1. Design tip elevations for **Abutments** are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load. Settlement of piles driven to nominal load is less than 1 inch.*

*2. Design tip elevations for **Bents** are controlled by: (a) Compression, (b) Tension, (c) Settlement, (d) Lateral Load. Settlement of piles driven to nominal load is less than 1 inch.*

3. 5 of the Bent 2 production piles at the locations shown on the plans shall be installed as load test and anchor piles to the same tip elevation as the other Bent 2 production piles

4. 5 of the Bent 2 production piles at the locations shown on the plans shall be installed as load test and anchor piles to the same tip elevation as the Bent 3L production piles

GROUP DELTA CONSULTANTS

TABLE 4A
SUMMARY OF LATERAL CAPACITY OF PROPOSED PILES

I-436 West County Connectors Project - 405/22 HOV Segment

405-22 HOV Connector Separation (Abutments 1 and 6)

Pile Type	Location	Loading Direction	Head Condition	Top Deflection (inches)	Top Shear (kips)	Maximum Bending Moment (foot-kips)	Depth to Maximum Bending Moment (feet)
Class 200 14" Square Pre-Cast Pre-Stressed Concrete Pile	Abutment 1	Longitudinal	Free / Pinned	0.25	18	55	4.7
				0.5	24	86	5.0
				1.0	32	135	5.7
		Transverse	Free / Pinned	0.25	24	66	4.0
				0.5	32	102	4.7
				1.0	43	159	5.3
	Abutment 6	Longitudinal/ Transverse	Free / Pinned	0.25	12	41	5.0
				0.5	16	63	6.0
				1.0	21	100	6.5

Notes: 1) The horizonal component of axial load in batter piles may be added to the capacities above.

2) The above lateral capacity values use a group average p-multiplier of 0.5 to account for lateral load group effects.

3) Maximum bending moments were computed using the higher p-multiplier of 0.75 for leading row piles.

4) Structural capacity of piles shall be checked by the structural engineer.

5) 2h:1v sloping ground considered in longitudinal Abutment 1 capacities.

TABLE 4B
SUMMARY OF LATERAL CAPACITY OF PROPOSED PILES

I-436 West County Connectors Project - 405/22 HOV Segment

405-22 HOV Connector Separation (Bent 2, 3, 4 and 5)

Pile Type	Free or Fixed Head	Top Deflection (inches)	Top Shear (kips)	Maximum Bending Moment (foot-kips)	Depth to Maximum Moment (feet)
4 ft Diameter CISS Pile (Bents 2, 3, 4 & 5)	Free	0.25	64	606	13
		0.5	90	1000	15
		1.0	127	1620	16
		2.0	182	2635	18
	Fixed	0.25	137	1518	0
		0.5	197	2458	0
		1.0	284	3987	0
		2.0	408	6471	0

Notes: 1) The above lateral capacity values use a group average p-multiplier of 0.5 to account for lateral load group effects.

2) Maximum bending moments were computed using the higher p-multiplier of 0.75 for leading row piles.

3) Corroded section used for upper 3 feet of pile section (0.001 inches per year for 75 years).

4) Structural capacity of piles shall be checked by the structural engineer.

FIGURES

The base maps are from Microsoft Virtual Earth

GROUP DELTA CONSULTANTS

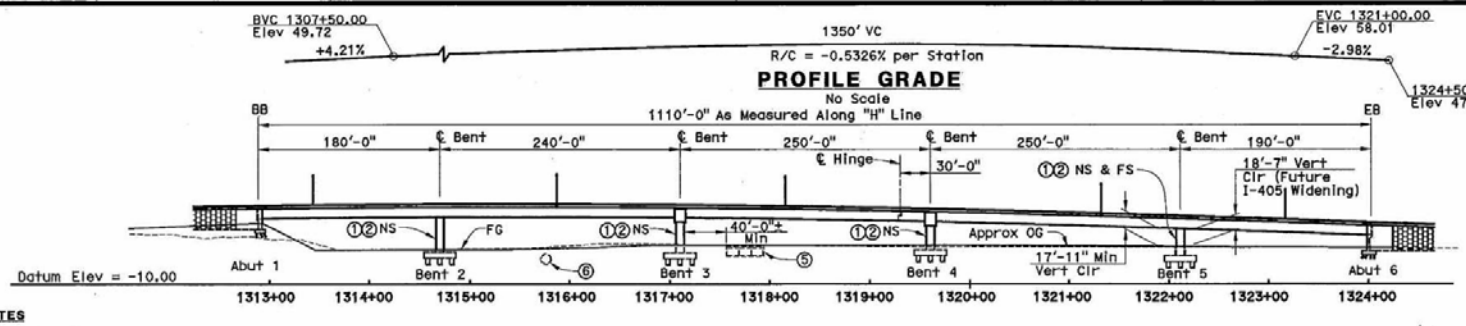
GDC Project No. I-436

405-22 HOV Connector Separation

Garden Grove/Seal Beach, CA

VICINITY MAP

Figure 1



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

UTHAYA SANDIRASEGARAN No. C61444 Exp. 06/30/09 CIVIL STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

NOTES

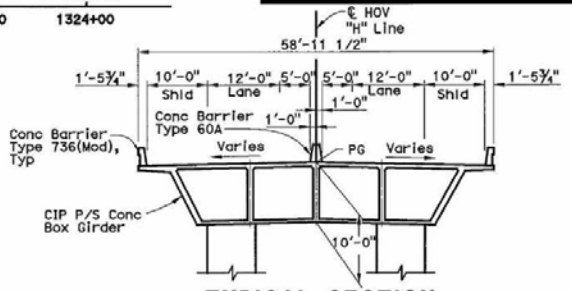
1. Paint "405-22 HOV Connector Separation"
2. Paint "Bridge No. 55-1103E
3. Structure Approach Type N(30S)
4. Concrete Barrier Type 60A
5. Exist Bolsa Chica Channel (Triple 12'± x 10'± RC Box Culvert), Br. No. 55-0334
6. Exist Garden Grove Storm Channel RC Pipe (9' dia)
7. Electrolier
8. Deck drain, See "Drainage Details" sheet.

LEGEND

- Point of Minimum Vertical Clearance
- Point of Minimum Vertical Clearance (Future I-405 Widening)

ELEVATION

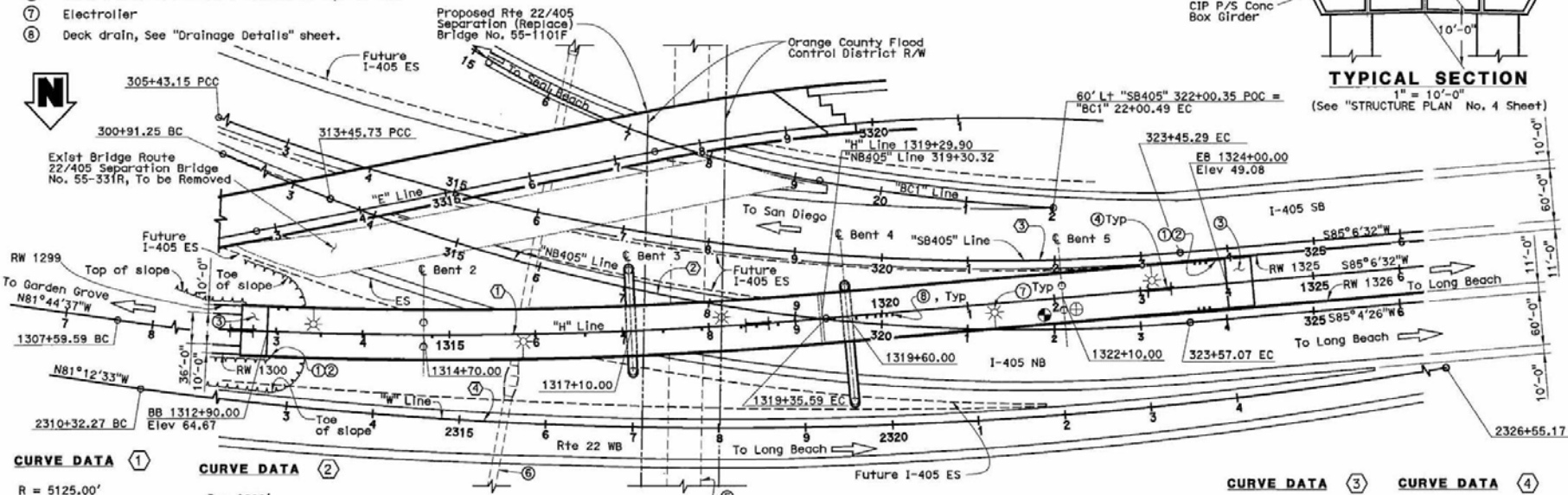
1" = 60'



TYPICAL SECTION

1" = 10'-0"

(See "STRUCTURE PLAN No. 4 Sheet)



PLAN

1" = 60'

Note: Traffic lanes during construction not shown for clarity, see "Structure Plan" sheets and "Road Plans"

CURVE DATA 1

R = 5125.00'
Δ = 13°08'50"
L = 1176.01'
T = 590.60'

CURVE DATA 2

R = 2200'
Δ = 26°20'20"
L = 1011.34'
T = 514.77'

CURVE DATA 3

R = 2500'
Δ = 41°18'07"
L = 1802.14'
T = 942.23'

CURVE DATA 4

R = 5075'
Δ = 18°19'20"
L = 1622.90'
T = 818.44'

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 2A

Jdhakar Vatti DESIGN OVERSIGHT SIGN OFF DATE	DESIGN	BY U. Sandirasegaran	CHECKED	LOAD FACTOR DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E POST MILES 20.66	405-22 HOV CONNECTOR SEPARATION GENERAL PLAN
	DETAILS	BY P. Johnson	CHECKED	LAYOUT	BY	CHECKED			
	QUANTITIES	BY J. Lee	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	CU 12235 EA 071621		

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/26/08)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 1 OF 55

USERNAME => $USER DATE PLOTTED => $TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

NOTES

1. All Piles not shown.
2. Surcharge Shall be Placed in Accordance with Details Shown on "Road Plans". Abutment 1 Construction and Pile Driving Operations Shall be Differed Until the Specified Settlement Period has Passed and Surcharge Material is Removed.
3. Contours shown represent existing ground.

LEGEND

- XX.XX — Indicates Bottom of Footing
- ○ — Indicates Cast-in-Steel-Shell Pile
- □ — Indicates Vertical Driven PC/PS Conc Pile
- ▱ — Indicates 1:3 Battered Driven PC/PS Conc Pile (batter in direction of arrow)

UTILITIES

① Exist Bolsa Chica Channel Triple 12'± x 10'± RC Box Culvert
② Exist Garden Grove Storm Channel RC Pipe

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

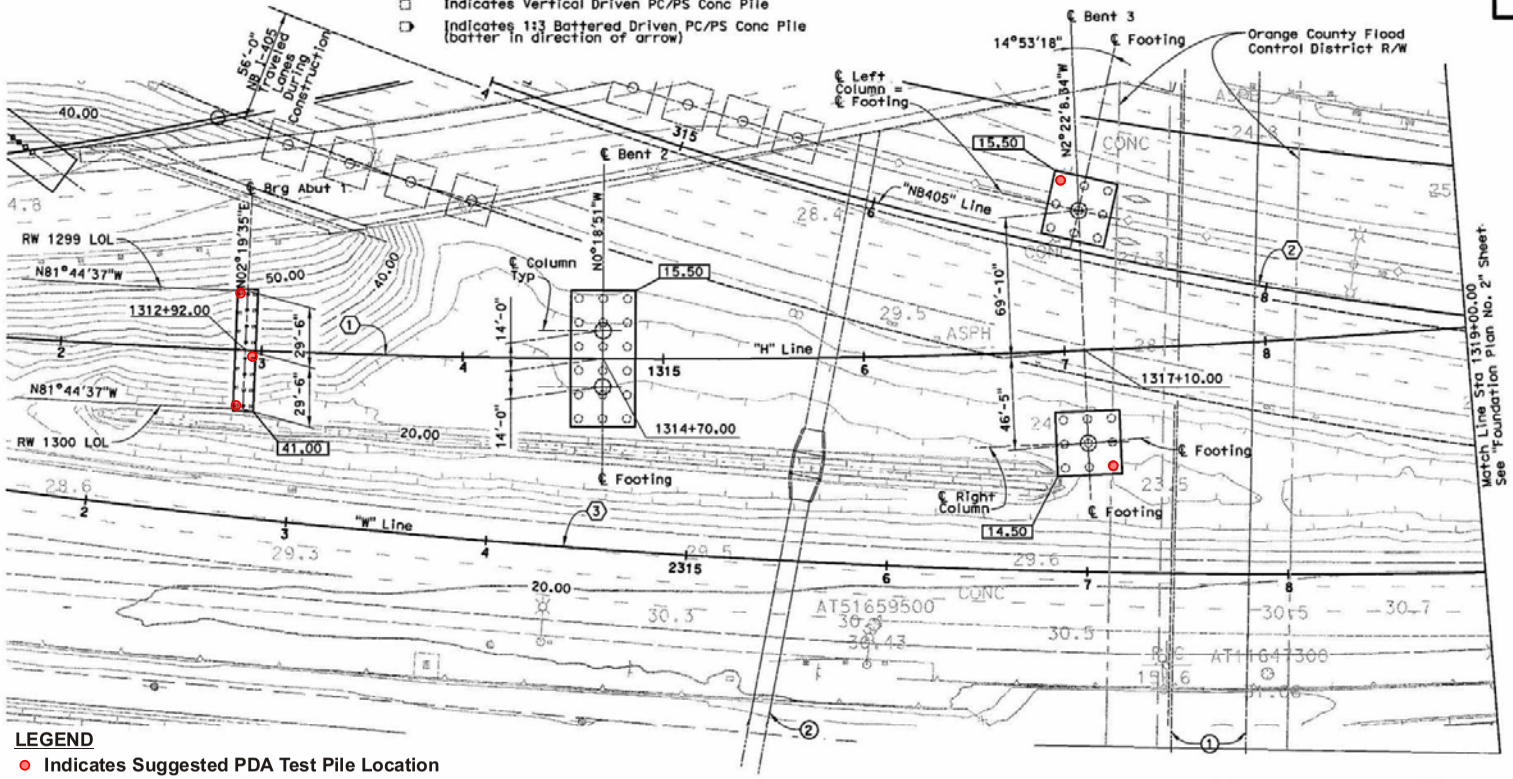
REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. 061444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863



LEGEND

● Indicates Suggested PDA Test Pile Location

Note:
Recommendations for PDA on load test piles at Bent 2 provided in our 02/05/09 Report

PLAN
1" = 30'

PDA Notes:
PDA Test Pile lengths should be at least 10 ft. longer than lengths based upon recommended pile tip elevations

CURVE DATA ①	CURVE DATA ②	CURVE DATA ③
R = 5125.00'	R = 2200'	R = 5075'
Δ = 13°08'50"	Δ = 26°20'20"	Δ = 18°19'20"
L = 1176.01'	L = 1011.34'	L = 1622.90'
T = 590.60'	T = 514.77'	T = 818.44'

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 2B

GEOTECHNICAL PROFESSIONAL — APPROVAL DATE

Sudhakar Vatti	SCALE: 1"=30'	VERT.DATUM X	HORZ.DATUM X	DESIGN	BY U. Sandirasegaran	CHECKED X	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E
DESIGN OVERSIGHT	PHOTOGRAMMETRY AS OF: X	ALIGNMENT TIES X		DETAILS	BY P. Johnson	CHECKED X			POST MILE 20.66
X	SURVEYED BY X	DRAFTED BY X		QUANTITIES	BY J. Le	CHECKED X		CU 12235 EA 071621	405-22 HOV CONNECTOR SEPARATION
SIGN OFF DATE	FIELD CHECKED BY X	CHECKED BY X							FOUNDATION PLAN NO. 1

FOUNDATION PLAN SHEET (ENGLISH) (REV. 2-25-05) — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — FILE => @REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 8 OF 55

DESIGNED => ROSEN — DATE PLOTTED => 8/TIME — TIME PLOTTED => 8/TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL
12	Ora	22, 405	RO.7E/R1.2 20.5/22.2		

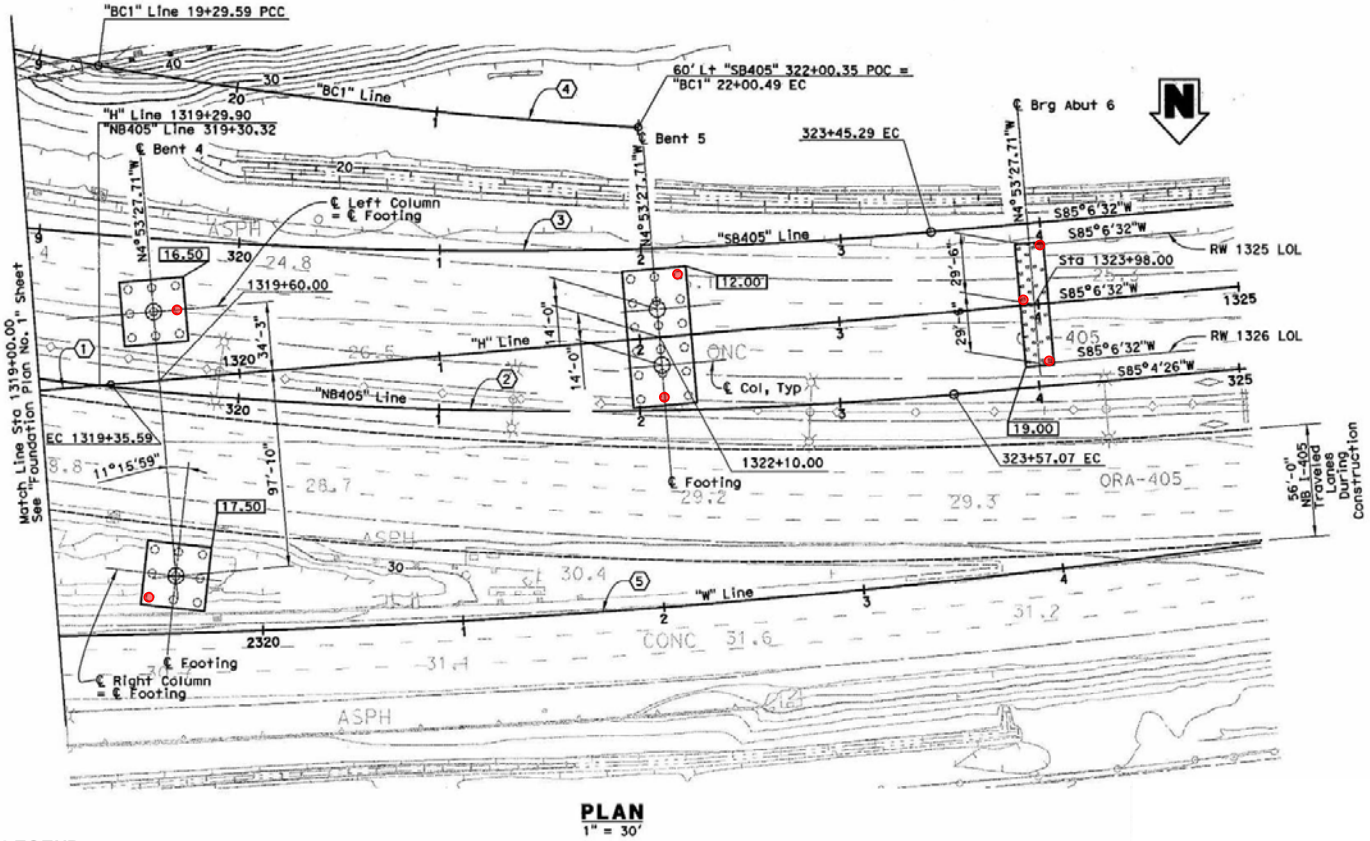
REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. C61444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863



PLAN
1" = 30'

LEGEND

- Indicates Suggested PDA Test Pile Location

NOTES

1. All Piles not shown.
2. Surcharge Shall be Placed in Accordance with Details Shown on "Road Plans". Abutment 1 Construction and Pile Driving Operations Shall be Differed Until the Specified Settlement Period has Passed and Surcharge Material is Removed.
3. Contours shown represent existing ground.

LEGEND

- XX.XX — Indicates Bottom of Footing
- ○ — Indicates Cast-in-Steel-Shell Pile
- □ — Indicates Vertical Driven PC/PS Conc Pile
- ▷ — Indicates 1:3 Battered Driven PC/PS Conc Pile (batter in direction of arrow)

PDA Notes:
PDA Test Pile lengths should be at least 10 ft. longer than lengths based upon recommended pile tip elevations

CURVE DATA ①	CURVE DATA ②	CURVE DATA ③	CURVE DATA ④	CURVE DATA ⑤
R = 5125.00'	R = 2200'	R = 2500'	R = 2440'	R = 5075'
△ = 13°08'50"	△ = 26°20'20"	△ = 41°18'07"	△ = 06°21'41"	△ = 18°19'20"
L = 1176.01'	L = 1011.34'	L = 1802.14'	L = 270.90'	L = 1622.90'
T = 590.60'	T = 514.77'	T = 942.23'	T = 135.59'	T = 818.44'

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 2C

GEOTECHNICAL PROFESSIONAL APPROVAL DATE

Sudhakar Vatti
DESIGN OVERSIGHT
X
SIGN OFF DATE

SCALE: 1"=30' | VERT.DATUM X | HORZ.DATUM X
PHOTOGRAMMETRY AS OF: X | ALIGNMENT TIES X
SURVEYED BY X | DRAFTED BY X
FIELD CHECKED BY X | CHECKED BY X

DESIGN BY U. Sandirasegaram CHECKED X
DETAILS BY P. Johnson CHECKED X
QUANTITIES BY J. Le CHECKED X

PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

CU 12235
EA 071621

BRIDGE NO. 55-1103E
POST MILE 20.66

405-22 HOV CONNECTOR SEPARATION
FOUNDATION PLAN NO. 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 9 OF 55

FOUNDATION PLAN SHEET (ENGLISH) (REV. 2-23-05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

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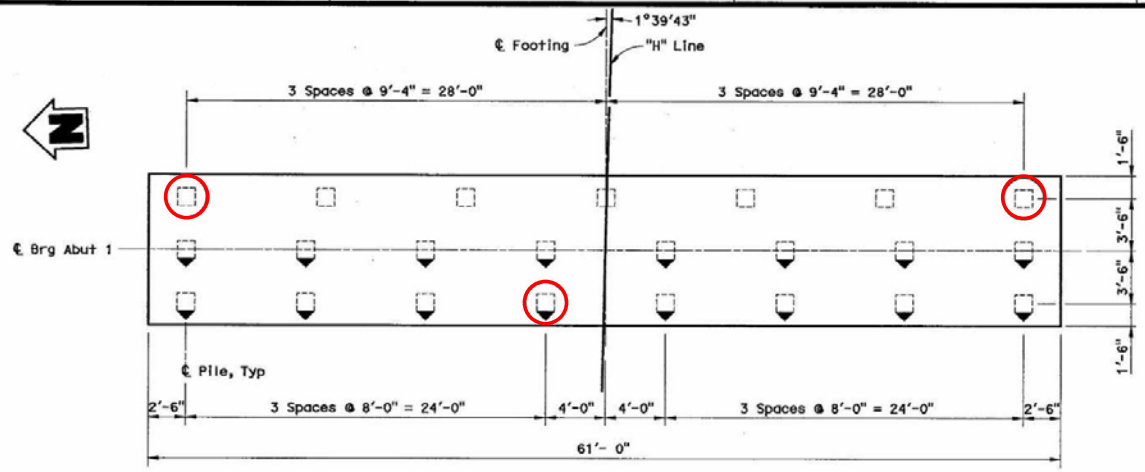
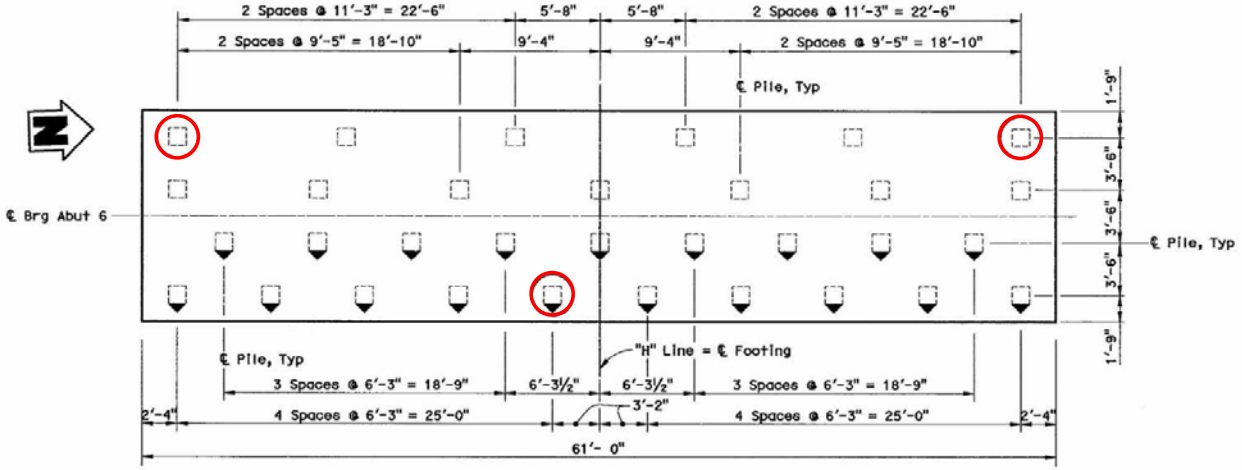


ABUTMENT 1 PILE LAYOUT

1/4" = 1'-0"



ABUTMENT 6 PILE LAYOUT

1/4" = 1'-0"

NOTES:

For bottom of footing elevations, see "Foundation Plan" sheet.

LEGEND:

- Indicates Vertical Driven PC/PS Conc Pile
- Indicates 1:3 Battered Driven PC/PS Conc Pile (batter in direction of arrow)
- Indicates PDA Test Pile Location
- Indicates PDA Test Pile Location

PDA Notes:
PDA Test Pile lengths should be at least 10 ft. longer than lengths based upon recommended pile tip elevations

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 2D

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

UTHAYA SANDIRASEGARAM No. C61444 Exp. 06/30/09 CIVIL STATE OF CALIFORNIA

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

Sudhakar Vatti
DESIGN OVERSIGHT
X
SIGN OFF DATE

DESIGN BY U. Sandirasegaram CHECKED X
DETAILS BY P. Johnson/E. Abapo CHECKED X
QUANTITIES BY J. Le CHECKED X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55-1103E
POST MILE 20.66

CU 12235
EA 0T1621

405-22 HOV CONNECTOR SEPARATION
ABUTMENT PILE LAYOUT

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 10/17/08

SHEET 15 OF 55

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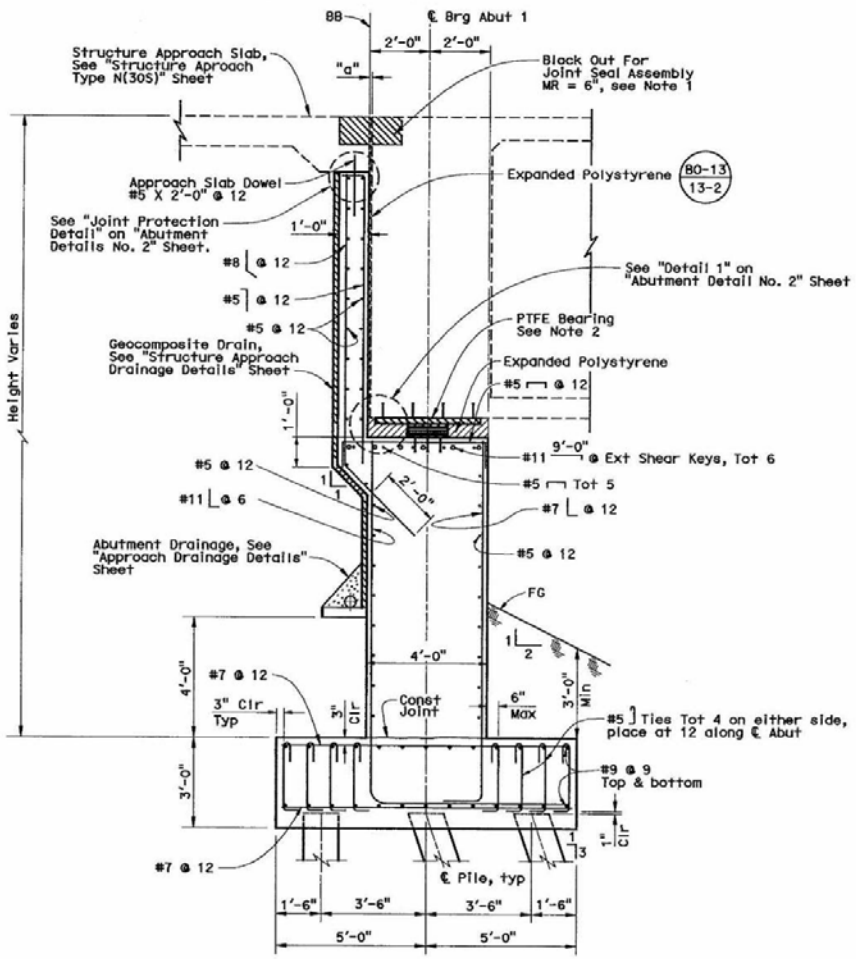
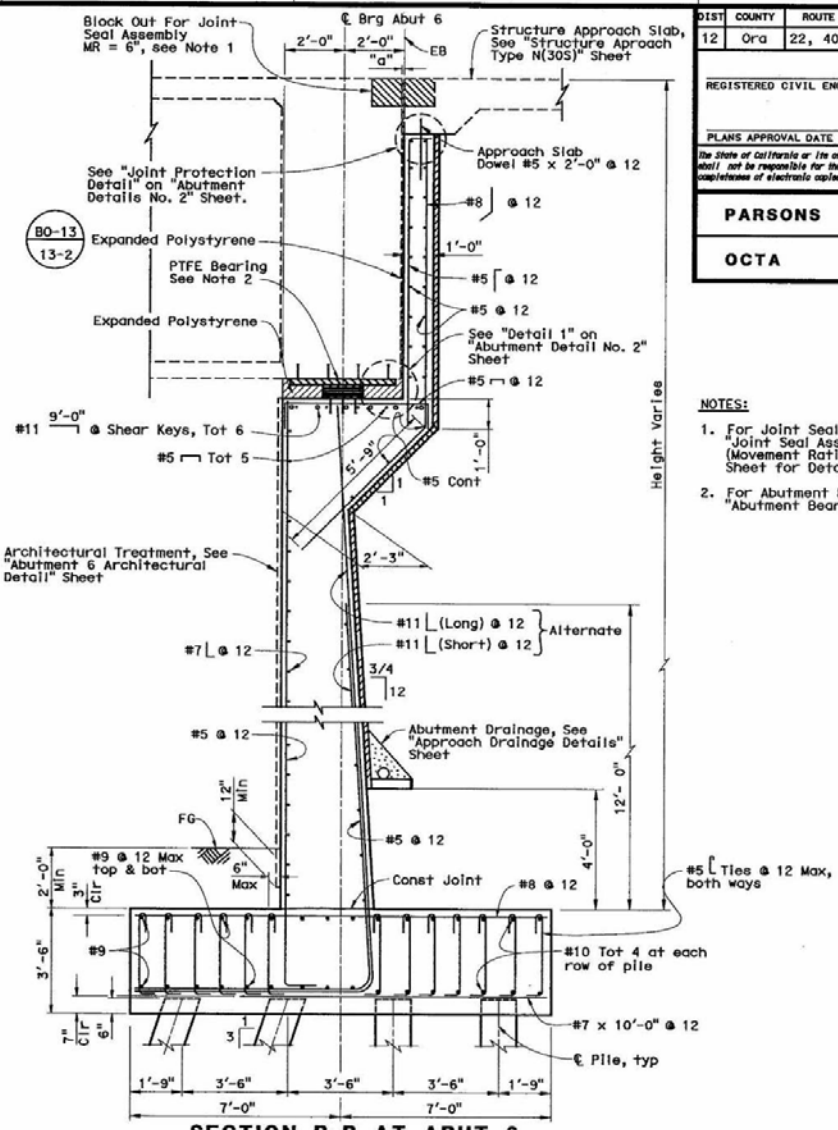


SECTION A-A AT ABUT 1

½" = 1'-0"

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material



SECTION B-B AT ABUT 6

½" = 1'- 0"

NOTES:

1. For Joint Seal Assembly Details, See "Joint Seal Assembly Details (Movement Rating Greater Than 4") Sheet for Details.
2. For Abutment Bearing Details, See "Abutment Bearing Details" Sheet.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2	112	

REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

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UTHAYA SANDIRASEGARAM No. 061444 Exp. 06/30/09 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

Figure 2E

Sudhakar Vatti — DESIGN OVERSIGHT — X — SIGN OFF DATE

DESIGN DETAIL SHEET (ENGLISH) (REV. 8/05/08)

	BY	CHECKED
DESIGN	U. Sandirasegaram	X
DETAILS	P. Johnson/E. Abapo	X
QUANTITIES	J. Le	X

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI — PROJECT ENGINEER

CU 12235
EA 071621

BRIDGE NO. 55-1103E
POST MILE 20.66

405-22 HOV CONNECTOR SEPARATION

ABUTMENT DETAILS NO. 1

STANDARD PRIVATE BEARING EARLIER REVISION DATES —

REVISION DATES (PRELIMINARY STAGE ONLY) — 10/01/08

SHEET 12 OF 55

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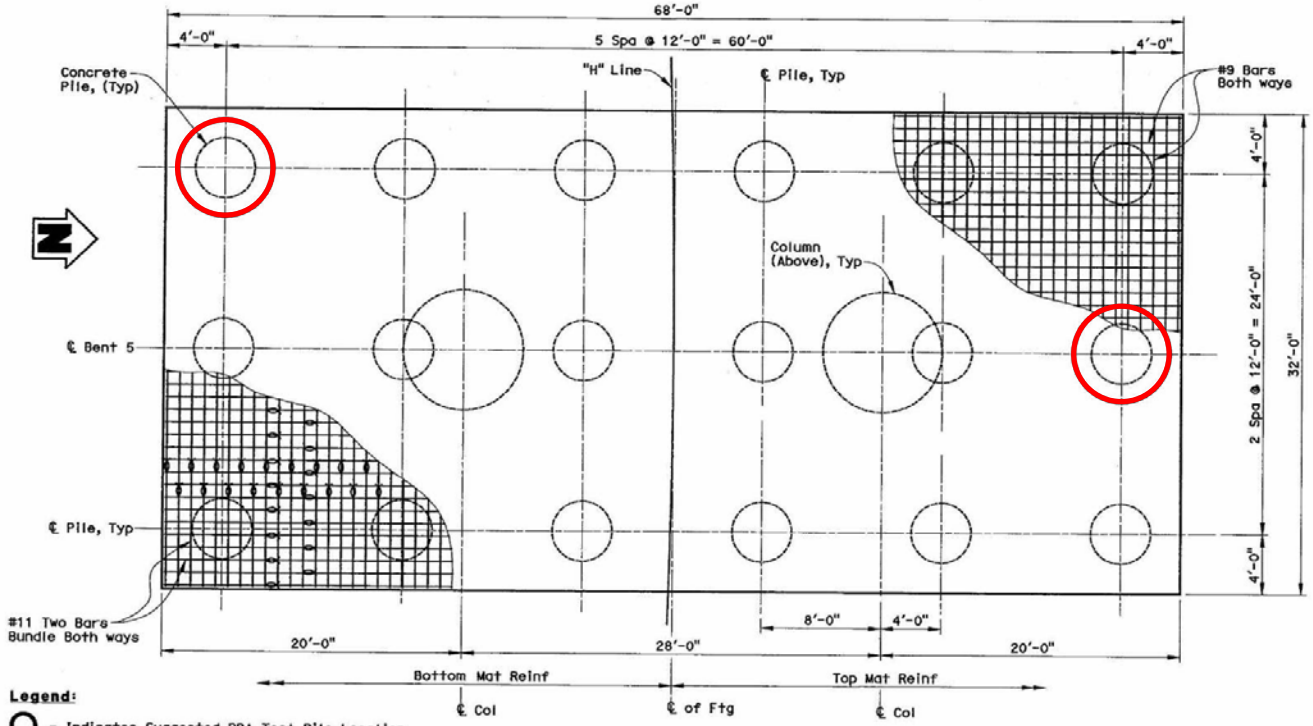


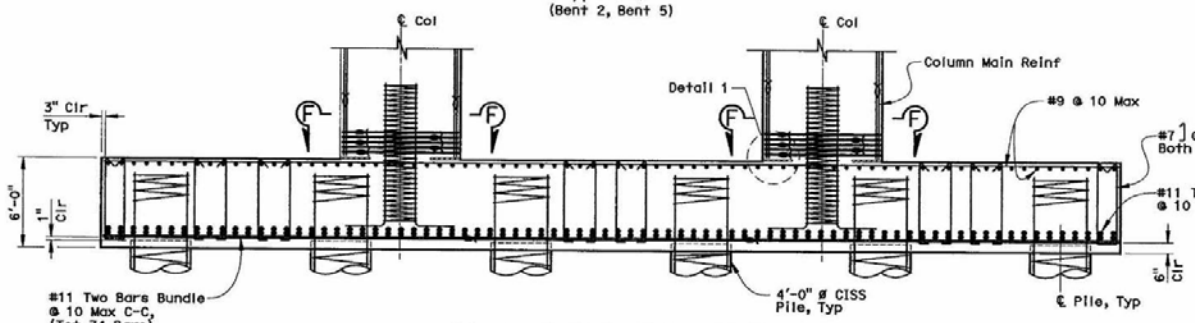
Legend:

○ - Indicates Suggested PDA Test Pile Location

FOOTING PILE LAYOUT

1/4" = 1'-0"

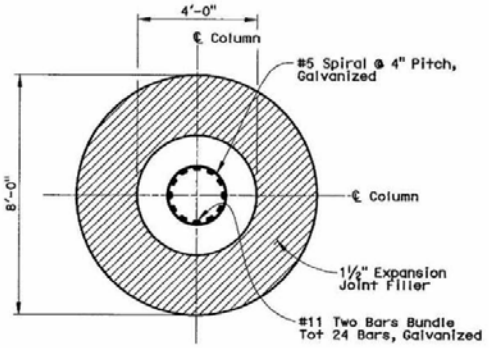
(Bent 2, Bent 5)



FOOTING REINFORCEMENT

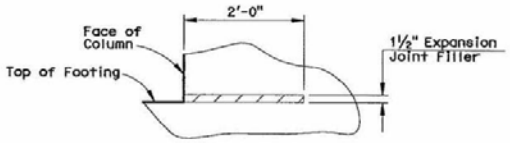
1/4" = 1'-0"

(Bent 2, Bent 5)



SECTION J-J

1/2" = 1'-0"



DETAIL 1

No Scale

NOTE:

Not all Reinforcement shown.

<X Denotes Bundled Bars

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

○ Indicates Suggested PDA Test Pile Location at Bent 5

Figure 2F

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. 061444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

Sudhakar Vatti	DESIGN	BY U. Sandirasegaram	CHECKED X
DESIGN OVERSIGHT X SIGN OFF DATE	DETAILS	BY E. Abapo	CHECKED X
	QUANTITIES	BY J. Le	CHECKED X

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/06)

ORIGINAL SCALE IN INCHES FOR RECORD PLANS 0 1 2 3

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI PROJECT ENGINEER

CU 12235
EA 071621

BRIDGE NO. 55-1103E
POST MILE 20.66

405-22 HOV CONNECTOR SEPARATION
BENT FOOTING DETAIL NO. 1

STANDARD PRINTS BEARING EARLIER REVISION DATES → 10-17-08

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 23 OF 55

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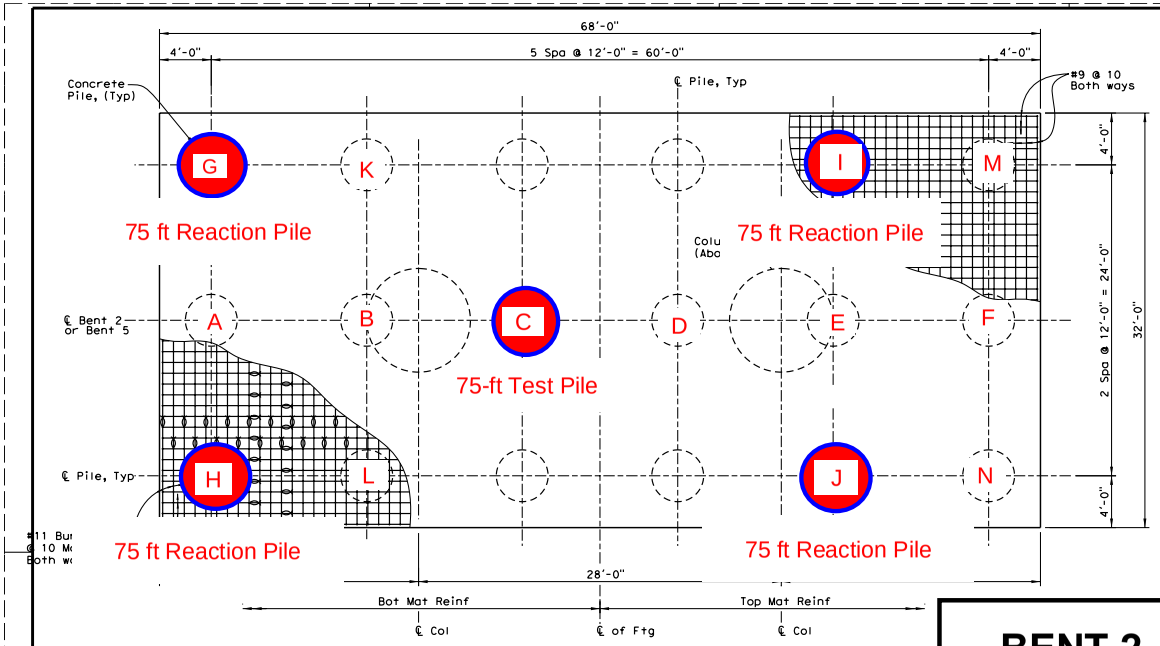
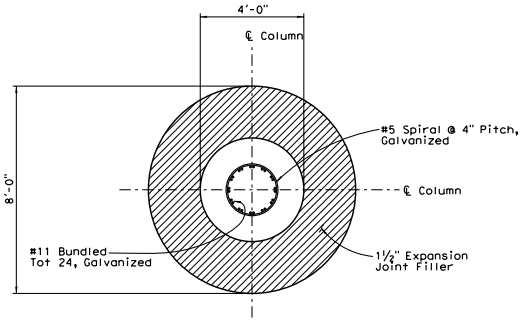
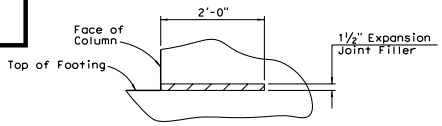


FOOTING PILE LAYOUT
¼" = 1'-0"

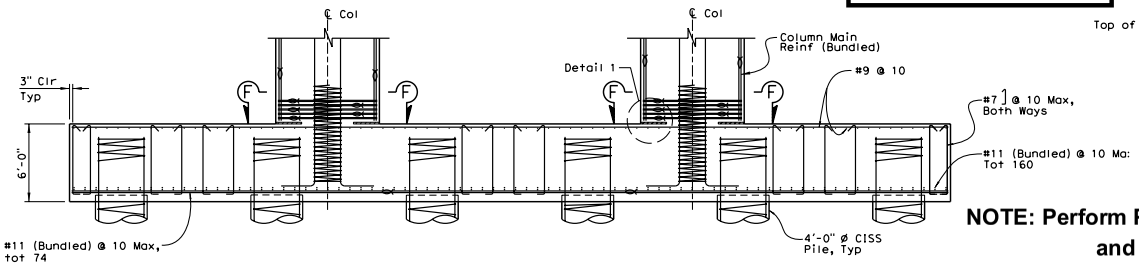
BENT 2



SECTION F-F
½" = 1'-0"



DETAIL 1
No Scale



FOOTING REINFORCEMENT
¼" = 1'-0"

NOTE: Perform PDA on Piles C and G.

FIGURE 2F-2

75-FT TEST PILE WITH 4 REACTION PILES

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE
PLANS APPROVAL DATE
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

UTHAYA SANDIRASEGARAM, No. C61444, Exp. 06/30/09, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CAL FORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN	BY U. Sandirasegaram	CHECKED X
DETAILS	BY P. Johnson	CHECKED X
QUANTITIES	BY J. Lee	CHECKED X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	405-22 HOV CONNECTOR SEPARATION
55-1103E	BENT FOOTING DETAIL NO. 1
POST MILE 20.66	

CU 12235
EA 071621

FILE => 55-1103Er1-h-b01fd101.dgn

DESIGN OVERSIGHT — SIGN OFF DATE

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 4-28-08

SHEET 23 OF

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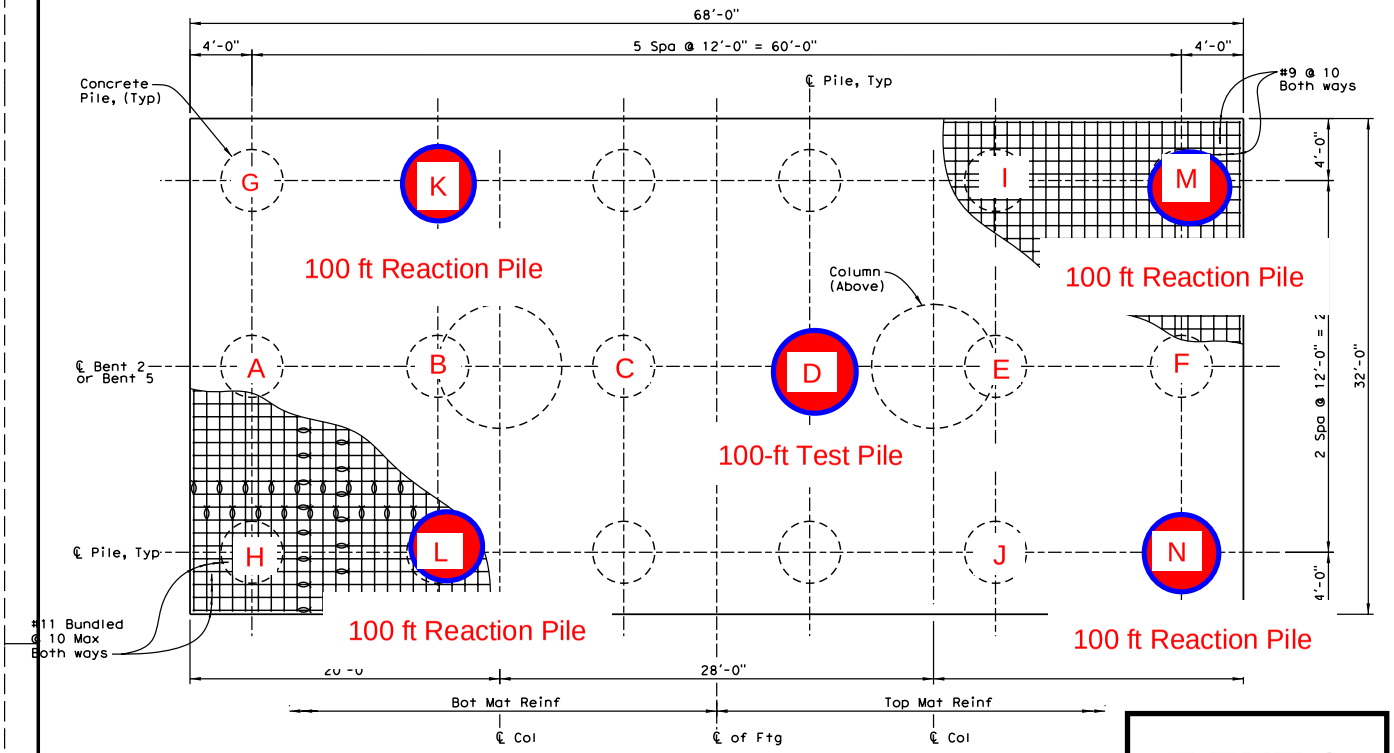
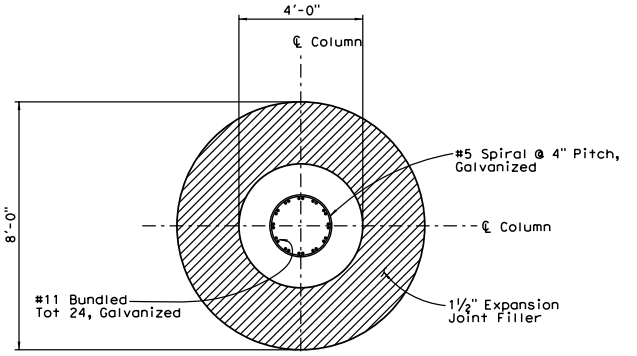
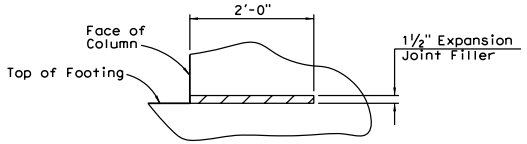


FOOTING PILE LAYOUT
1/4" = 1'-0"

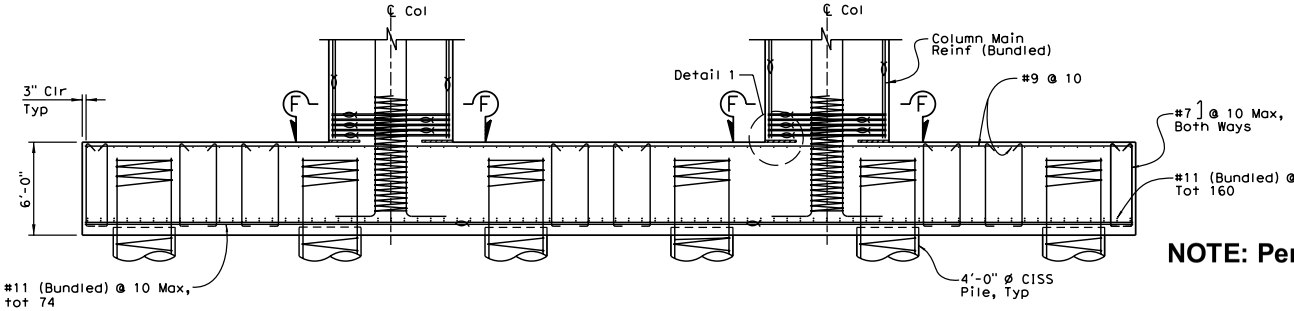
BENT 2



SECTION F-F
½" = 1'-0"



DETAIL 1
No Scale



FOOTING REINFORCEMENT
1/4" = 1'-0"

NOTE: Perform PDA on Piles D and N.

FIGURE 2F-3

100 FT TEST PILE WITH 4 REACTION PILES

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE
PLANS APPROVAL DATE
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REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. C61444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN	U. Sandirasegaram	CHECKED	X
DETAILS	P. Johnson	CHECKED	X
QUANTITIES	J. Lee	CHECKED	X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	55-1103E
POST MILE	20.66

405-22 HOV CONNECTOR SEPARATION
BENT FOOTING DETAIL NO. 1

CU 12235
EA 071621

FILE => 55-1103Er1-h-b01fdt01.dgn

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 4-28-08

SHEET 23 OF

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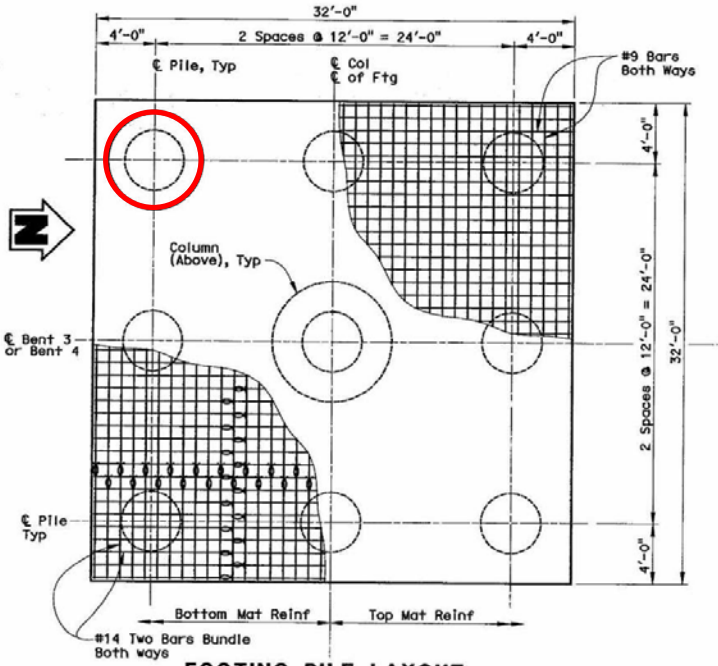
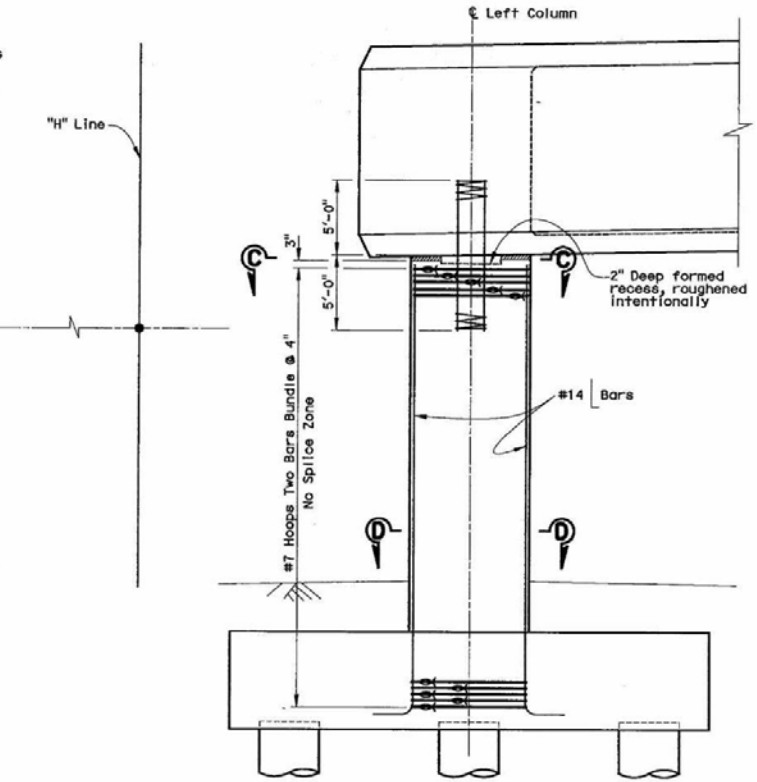


FOOTING PILE LAYOUT

1/4" = 1'-0"
(Bent 4 Left Shown)

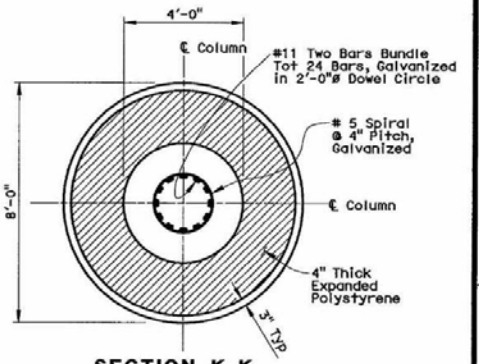
Legend:

O - Indicates Suggested PDA Test Pile Location



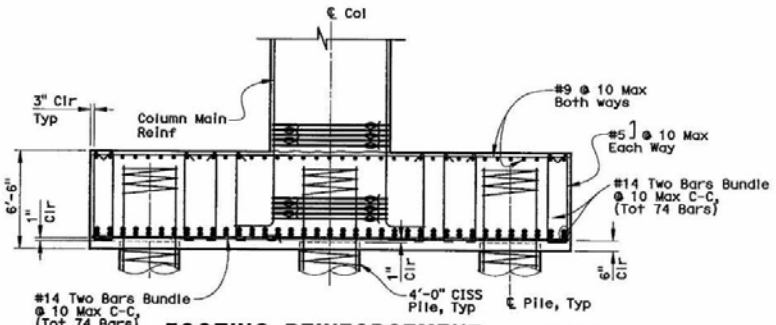
ELEVATION

1/4" = 1'-0"
(Bent 3 Left shown other locations similar)



SECTION K-K

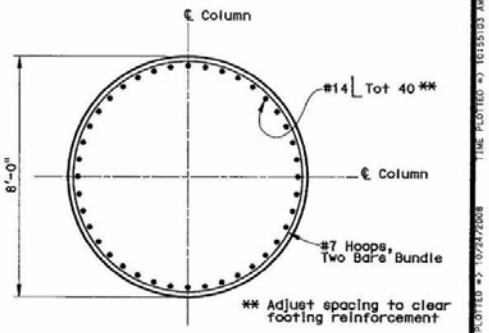
1/2" = 1'-0"



FOOTING REINFORCEMENT

1/4" = 1'-0"
(Bent 3, Bent 4)

NOTE:
Not all Reinforcement shown.
<X Denotes Bundled Bars



SECTION L-L

1/2" = 1'-0"

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

O Indicates Suggested PDA Test Pile Location at Bents 3 and 4

Figure 2G

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE X

UTKAYA SANDIRASEGARAM No. 061444 Exp. 06/30/09 CIVIL STATE OF CAL. FORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

PARSONS — 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA — 550 SOUTH MAIN STREET ORANGE, CA 92863

Sudhakar Vatti
DESIGN OVERSIGHT
X
SIGN OFF DATE

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/06)

	BY	CHECKED
DESIGN	U. Sandirasegaram	X
DETAILS	E. Abapo	X
QUANTITIES	J. Le	X

ORIGINAL SCALE IN INCHES FOR REVISED PLANS: 0 1 2 3

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

CU 12235
EA 071621

BRIDGE NO. 55-1103E
POST MILE 20.66

STANDARD DELETE BEARING EARLIER REVISION DATES —

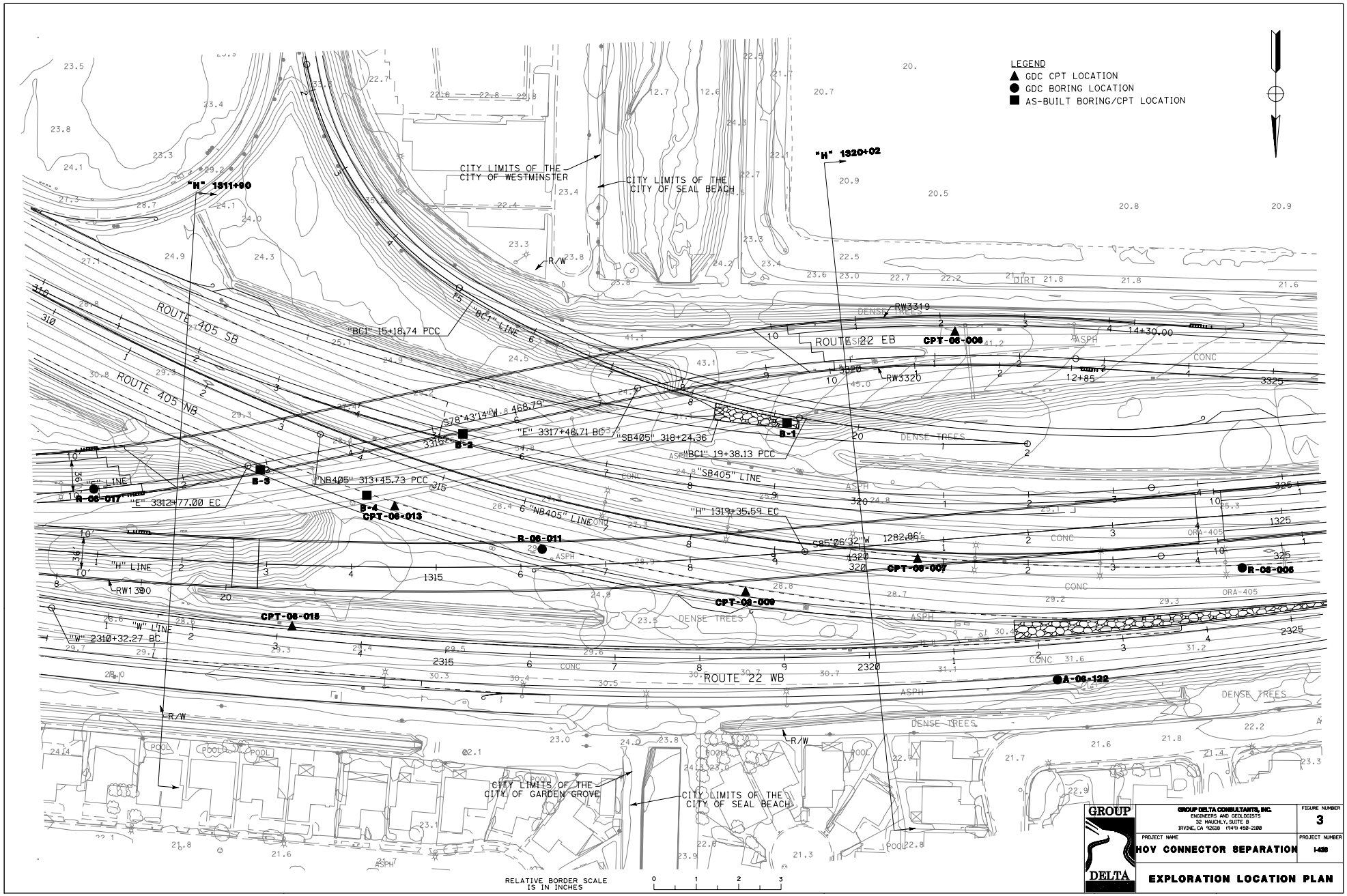
REVISION DATES (PRELIMINARY STAGE ONLY)

405-22 HOV CONNECTOR SEPARATION
BENT FOOTING DETAIL NO. 2

SHEET 24 OF 55

FILE => h:\646929_octa 1405-sr22 hov connector project\SHT\STRUCTURES\1405_SR22 HOV Connector\55-1103Erl-h-b01fd02.dgn

DGNNAME => p0006922 DATE PLOTTED => 10/24/2008 TIME PLOTTED => 16:15:03 AM



GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER 3

PROJECT NAME: HOV CONNECTOR SEPARATION

PROJECT NUMBER: I-420

EXPLORATION LOCATION PLAN

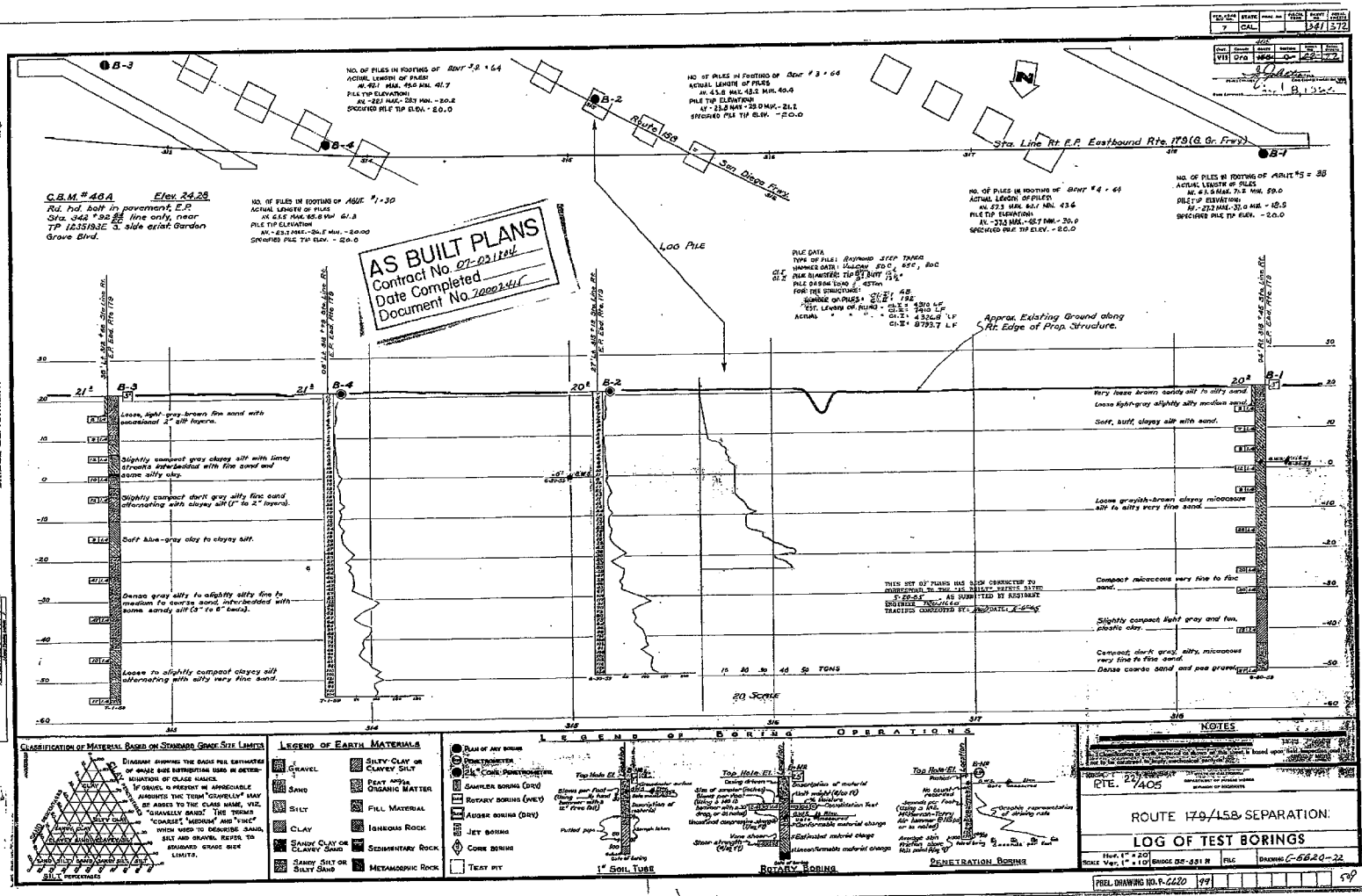

AS BUILT PLANS
Contract No. 07-021104
Date Completed
Document No. 20002445
B-3
B-4
B-2
B-1
Route 133
San Diego Frwy.
Sta. Line Rt E.P. Eastbound Rte. 178 (S. Gr. Frwy.)
C.B.M. # 46A Elev. 24.29
Rd. hd. bolt in pavement, E.P. Sta. 342 +92.82 ℄ line only, near TP 12.251932 S. side of at Garden Grove Blvd.
Log Pile
Approx. Existing Ground along Rt. Edge of Prop. Structure.
Loose, light-gray brown fine sand with occasional 2" silt layers.
Slightly compact gray clayey silt with limey streaks interbedded with fine sand and some silty clay.
Slightly compact dark gray silty fine sand alternating with clayey silt (1" to 2" layers).
Soft blue-gray clay to clayey silt.
Dense gray silty to slightly silty fine to medium to coarse sand, interbedded with some sandy silt (3" to 6" beds).
Loose to slightly compact clayey silt alternating with silty very fine sand.
Very loose brown sandy silt to silty sand.
Loose light-gray slightly silty medium sand.
Soft, buff, clayey silt with sand.
Loose greyish-brown clayey micaceous silt to silty very fine sand.
Compact micaceous very fine to fine sand.
Slightly compact light gray and tan, plastic clay.
Compact, dark gray, silty, micaceous very fine to fine sand.
Dense coarse sand and pea gravel.
20 Scale
CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS
LEGEND OF EARTH MATERIALS
Gravel
Sand
Silt
Clay
Sandy Clay or Clayey Sand
Sandy Silt or Silty Sand
Silty Clay or Clayey Silt
Peat and/or Organic Matter
Fill Material
Igneous Rock
Sedimentary Rock
Metamorphic Rock
LEGEND OF BORING OPERATIONS
Plan of Any Boring
Penetrometer
2½" Cont. Penetrometer
Sampler Boring (Dry)
Rotary Boring (Wet)
Auger Boring (Dry)
Jet Boring
Core Boring
Test Pit
1" Soil Tube
Rotary Boring
Penetration Boring
NOTES
RTE. 22/405
ROUTE 179/158 SEPARATION
LOG OF TEST BORINGS
Hor. 1" = 20'
Ver. 1" = 10'
BRIDGE 55-331 R
FILE
DRAWING C-6620-22
PREL. DRAWING NO. P-6620
BRIDGE DEPARTMENT
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION OF THE DIRECTOR OF PUBLIC WORKS.
DATE 2-10-22 SIGNATURE

FIGURE 4

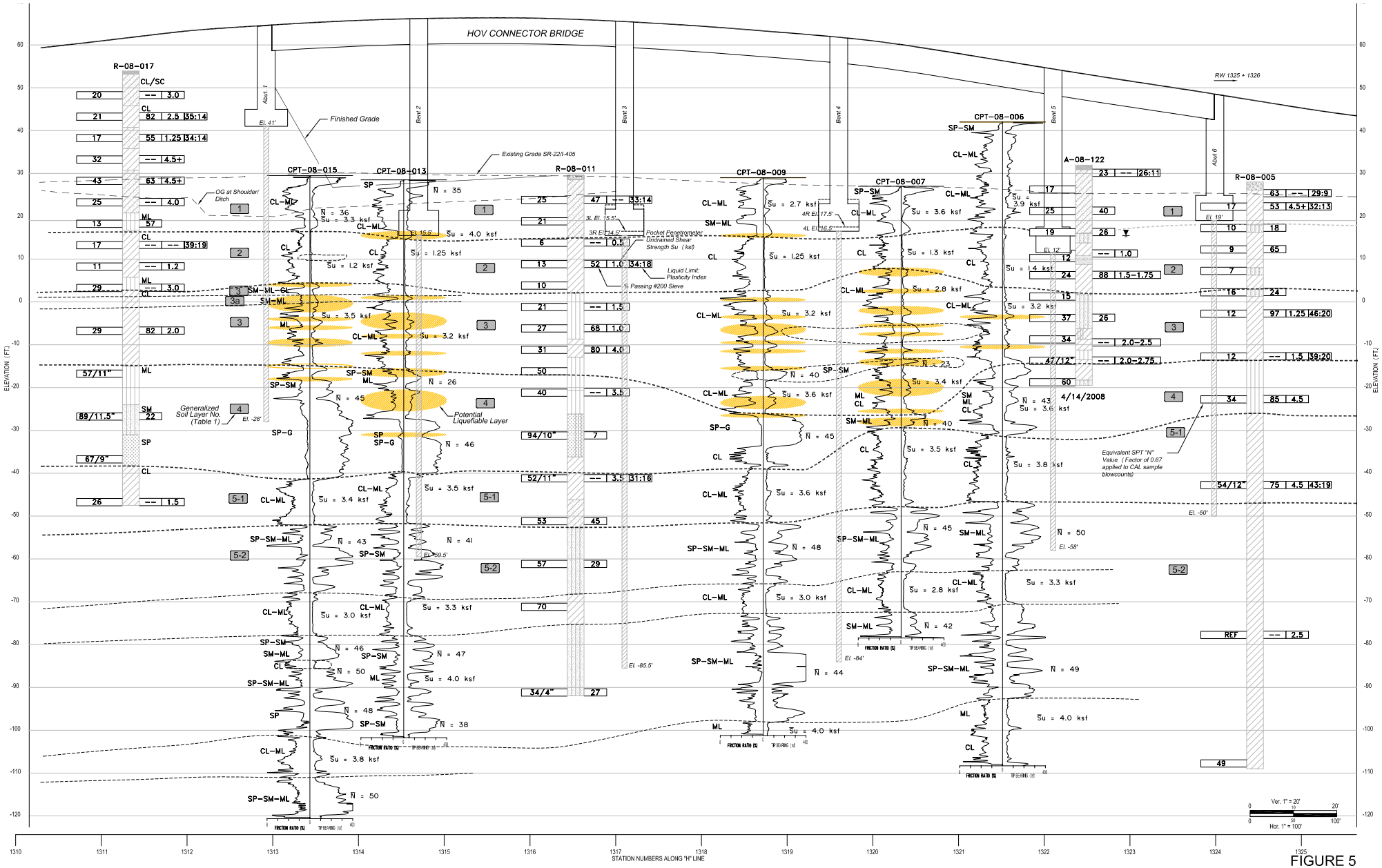
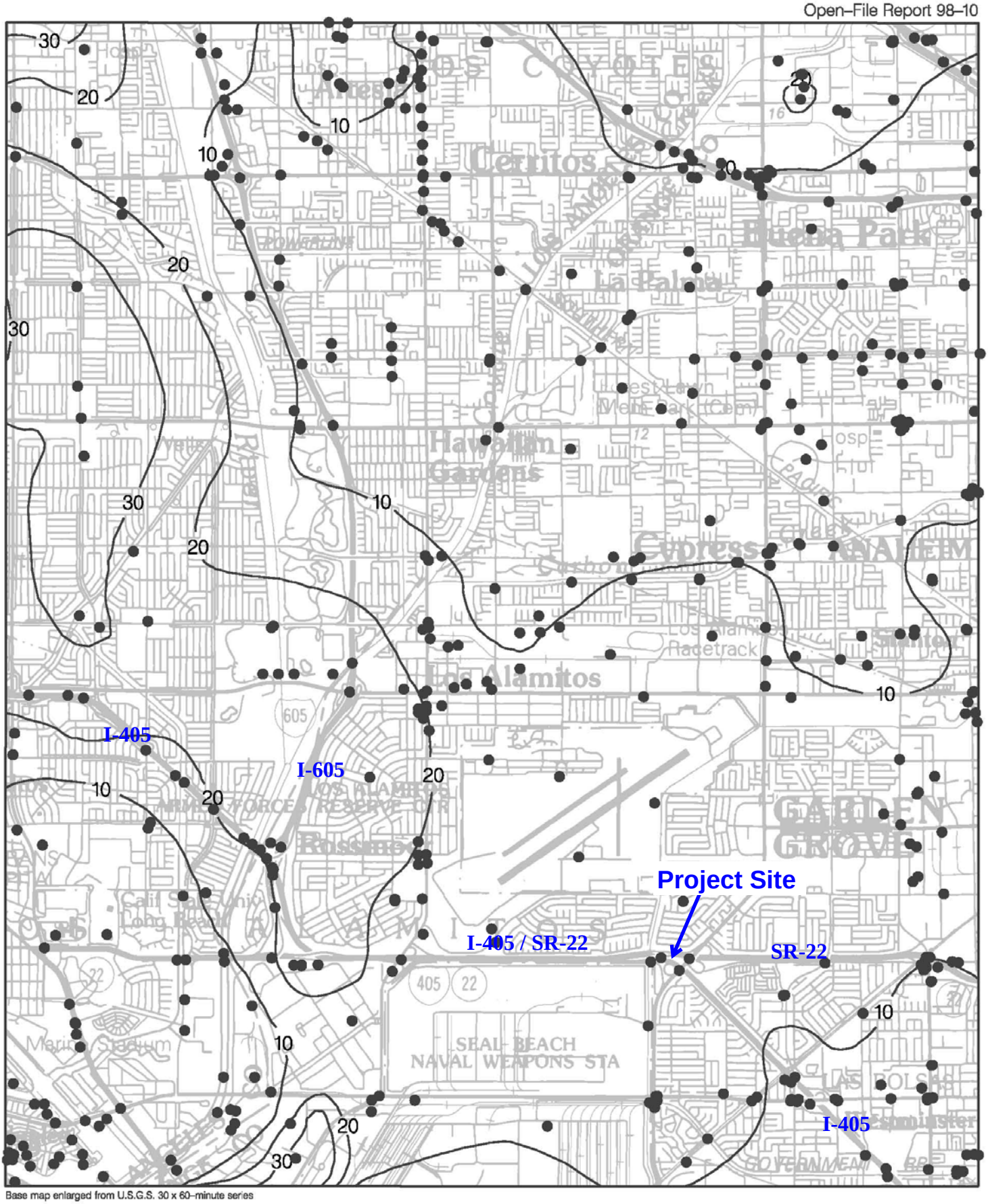


FIGURE 5
Geotechnical Cross Section



Base map enlarged from U.S.G.S. 30 x 60–minute series

Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

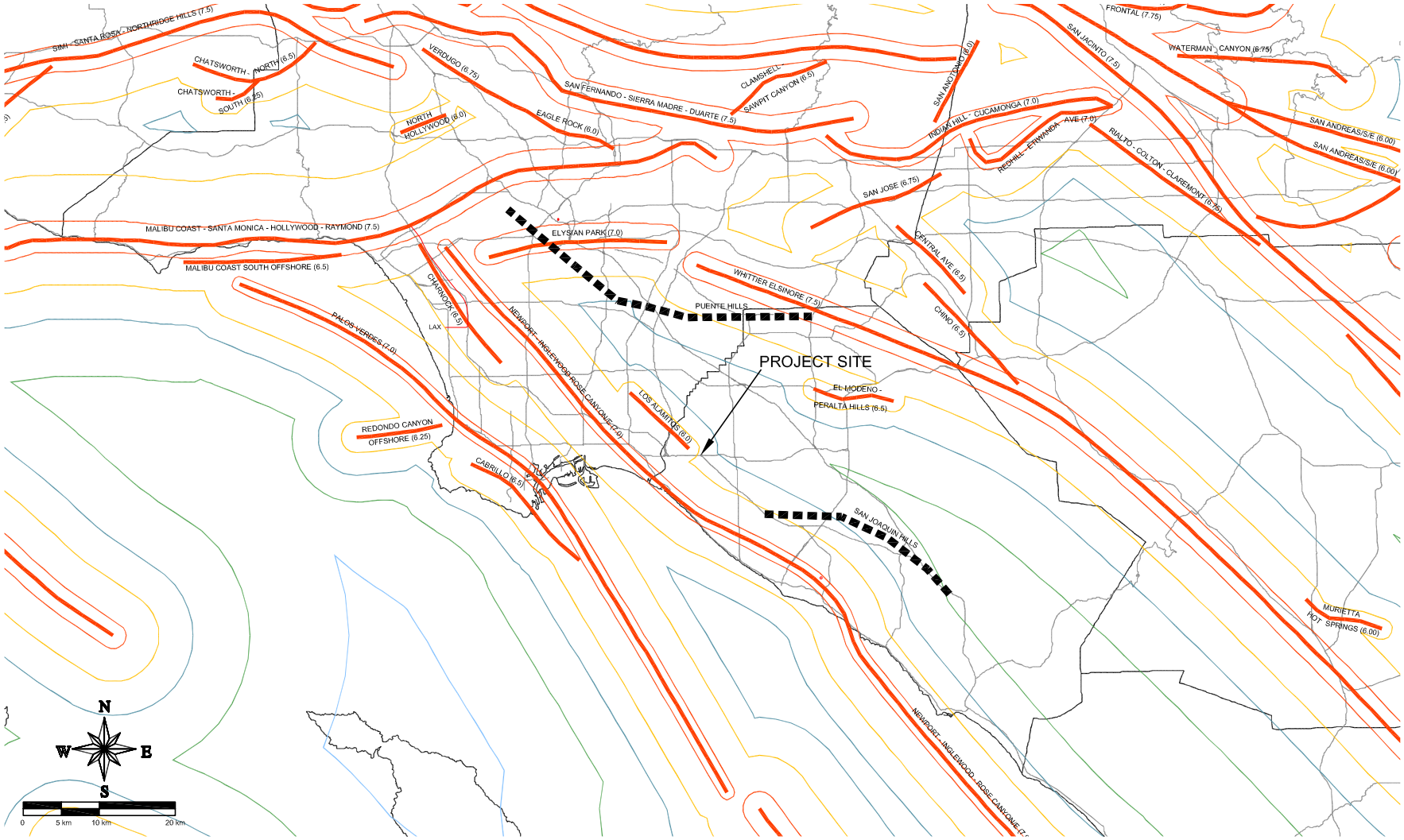
● Borehole Site

30 Depth to ground water in feet

ONE MILE

SCALE

FIGURE 6
Highest Historical Groundwater Map



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills fault in Orange County is currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

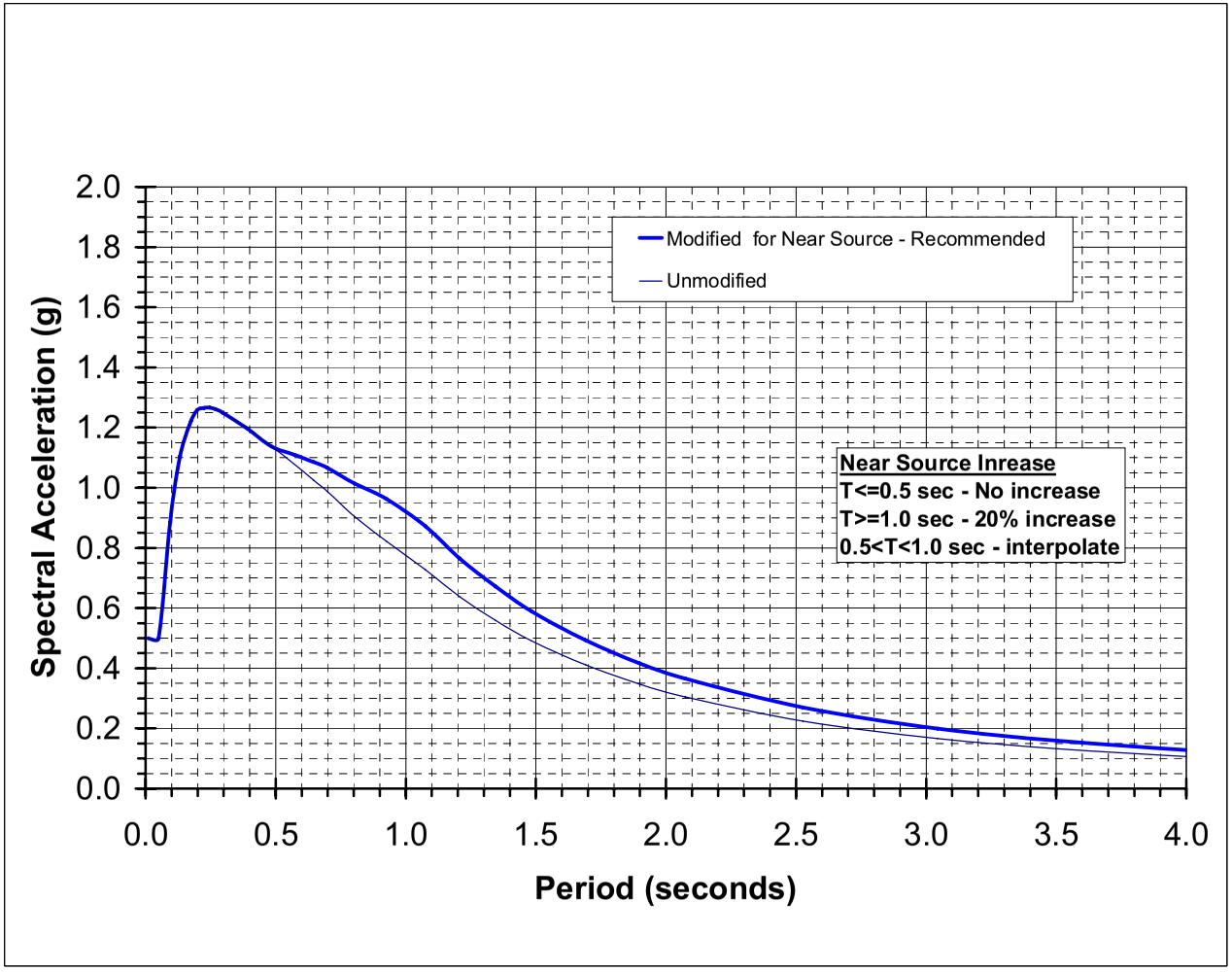
GROUP DELTA

GDC PROJECT NO. I-436

405-22 HOV Connector Separation
Garden Grove/Seal Beach, CA

Caltrans Fault and PBA Map

Figure 7



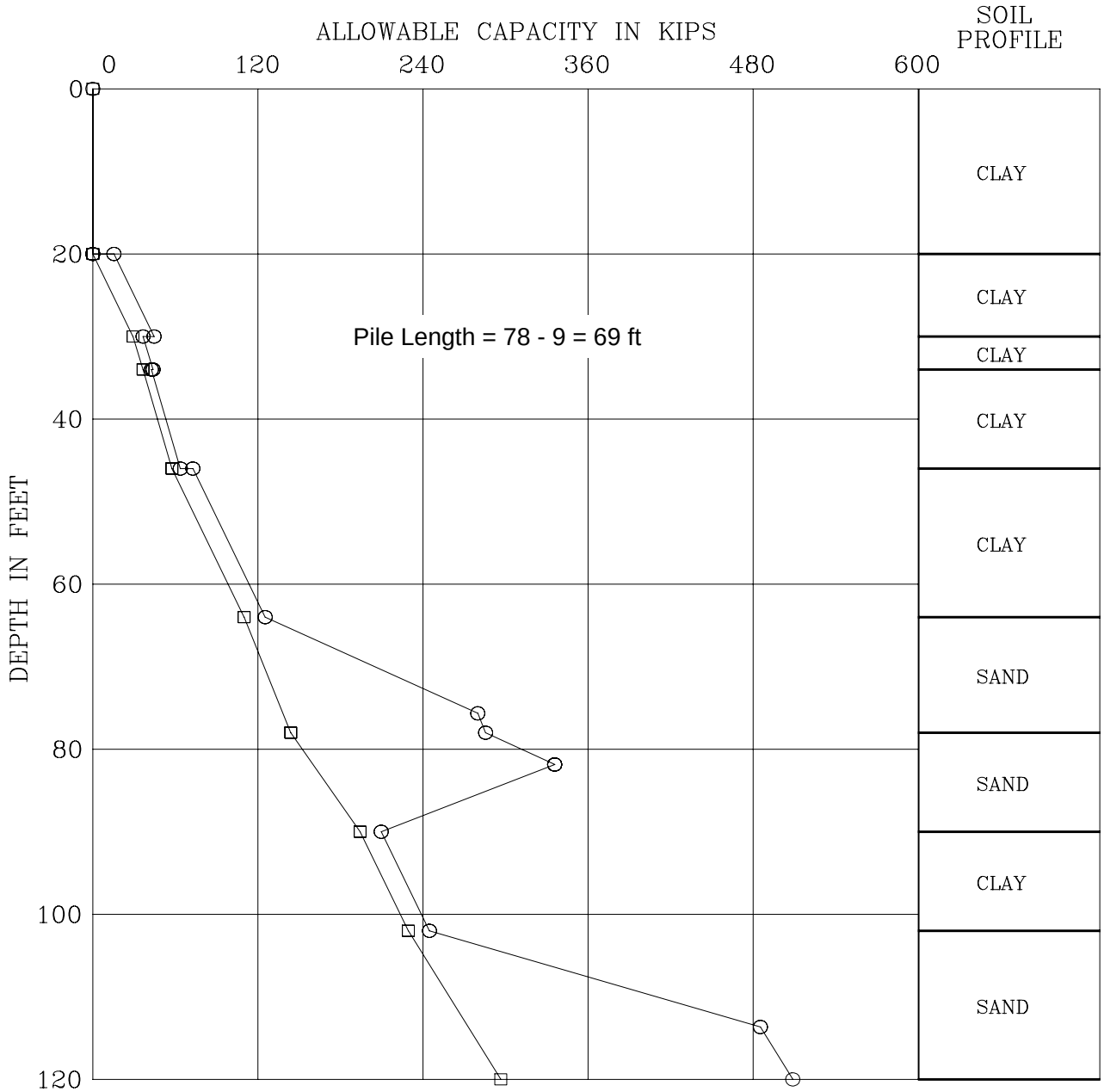
Digitized Spectra
M7_0.5g_Type D

PERIOD (Seconds)	Unmodified ARS-G'S	Near-Source Modified ARS-G'S
0.0100	0.5003	0.5003
0.0500	0.5002	0.5002
0.0946	0.8854	0.8854
0.1322	1.1055	1.1055
0.1748	1.2211	1.2211
0.1985	1.2587	1.2587
0.2252	1.2656	1.2656
0.2462	1.2661	1.2661
0.2687	1.2611	1.2611
0.2968	1.2488	1.2488
0.3880	1.1985	1.1985
0.4833	1.1370	1.1370
0.5719	1.0782	1.1092
0.6448	1.0263	1.0857
0.6980	0.9874	1.0656
0.8042	0.9033	1.0132
0.9257	0.8227	0.9628
1.0764	0.7270	0.8724
1.2056	0.6380	0.7656
1.3462	0.5593	0.6712
1.4843	0.4909	0.5891
1.6922	0.4107	0.4928
1.8989	0.3472	0.4166
2.0738	0.3044	0.3653
2.5266	0.2244	0.2693
3.0435	0.1659	0.1991
3.5058	0.1326	0.1591
4.0000	0.1064	0.1277

GROUP DELTA CONSULTANTS

Caltrans SDC ARS Curves
Soil Type D, M=7.25+/-0.25, PBA=0.5g

Figure 8



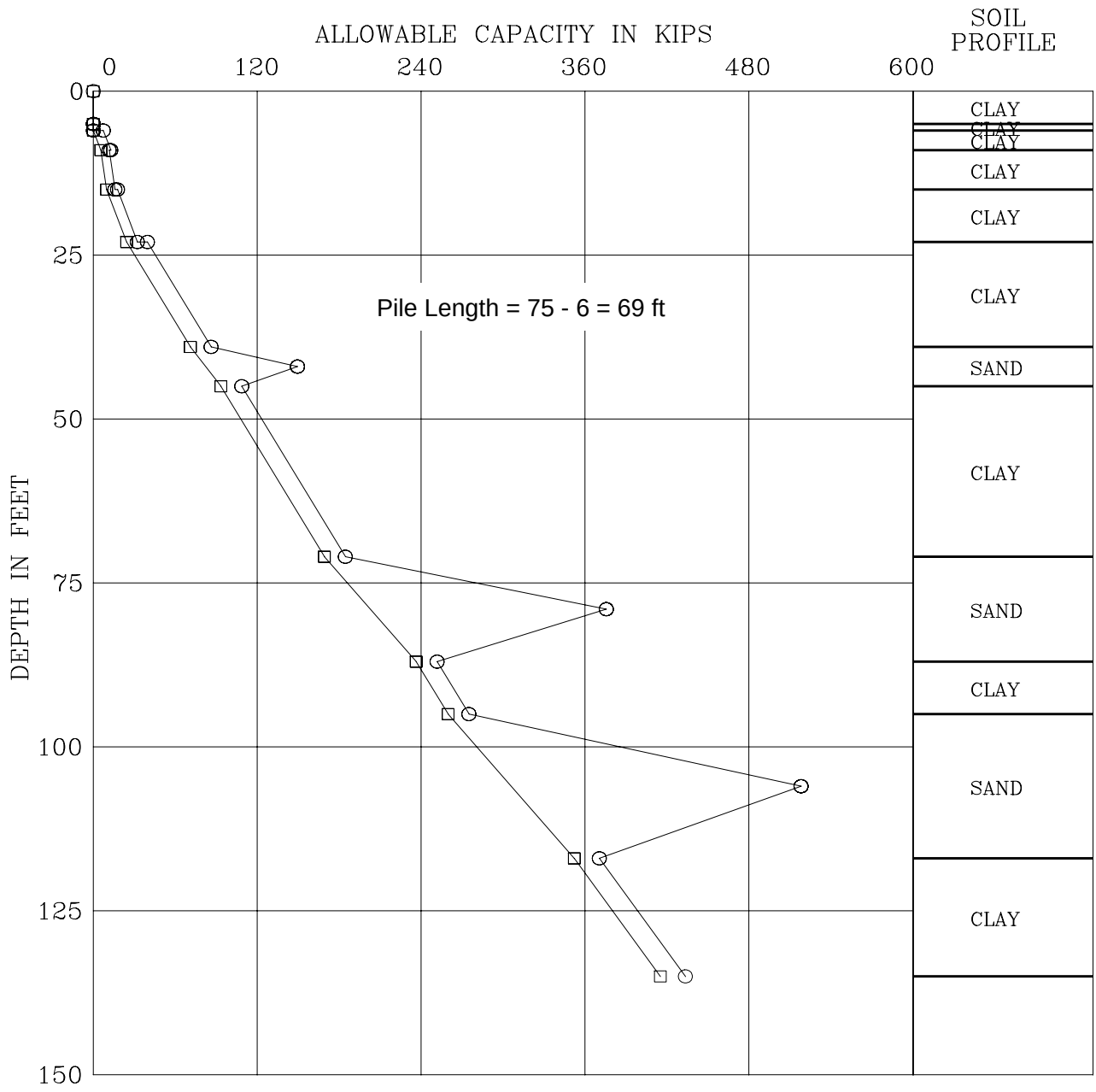
LEGEND

□ SKIN FRICTION
○ TOTAL PILE CAPACITY

PILE DIAMETER	:	1.17 ft.
PILE TYPE	:	DRIVEN,LD
FACTOR OF SAFETY		
END BEARING	:	2.00
SKIN FRICTION	:	2.00

ABUTMENT 1	SR-22 PHASE 2 – HOV CONNECTOR
GROUP DELTA CONSULTANTS, INC.	ALLOWABLE PILE CAPACITY

Figure 9A



LEGEND

- □ SKIN FRICTION
- ○ TOTAL PILE CAPACITY

PILE DIAMETER	:	1.17 ft.
PILE TYPE	:	DRIVEN,LD
FACTOR OF SAFETY		
END BEARING	:	2.00
SKIN FRICTION	:	2.00

ABUTMENT 6	SR-22 PHASE 2 - HOV CONNECTOR Abut 6
GROUP DELTA CONSULTANTS, INC.	ALLOWABLE PILE CAPACITY

Figure 9B

API RP2A Capacity for Steel Pipe Piles
HOV Connector (Bent 2)

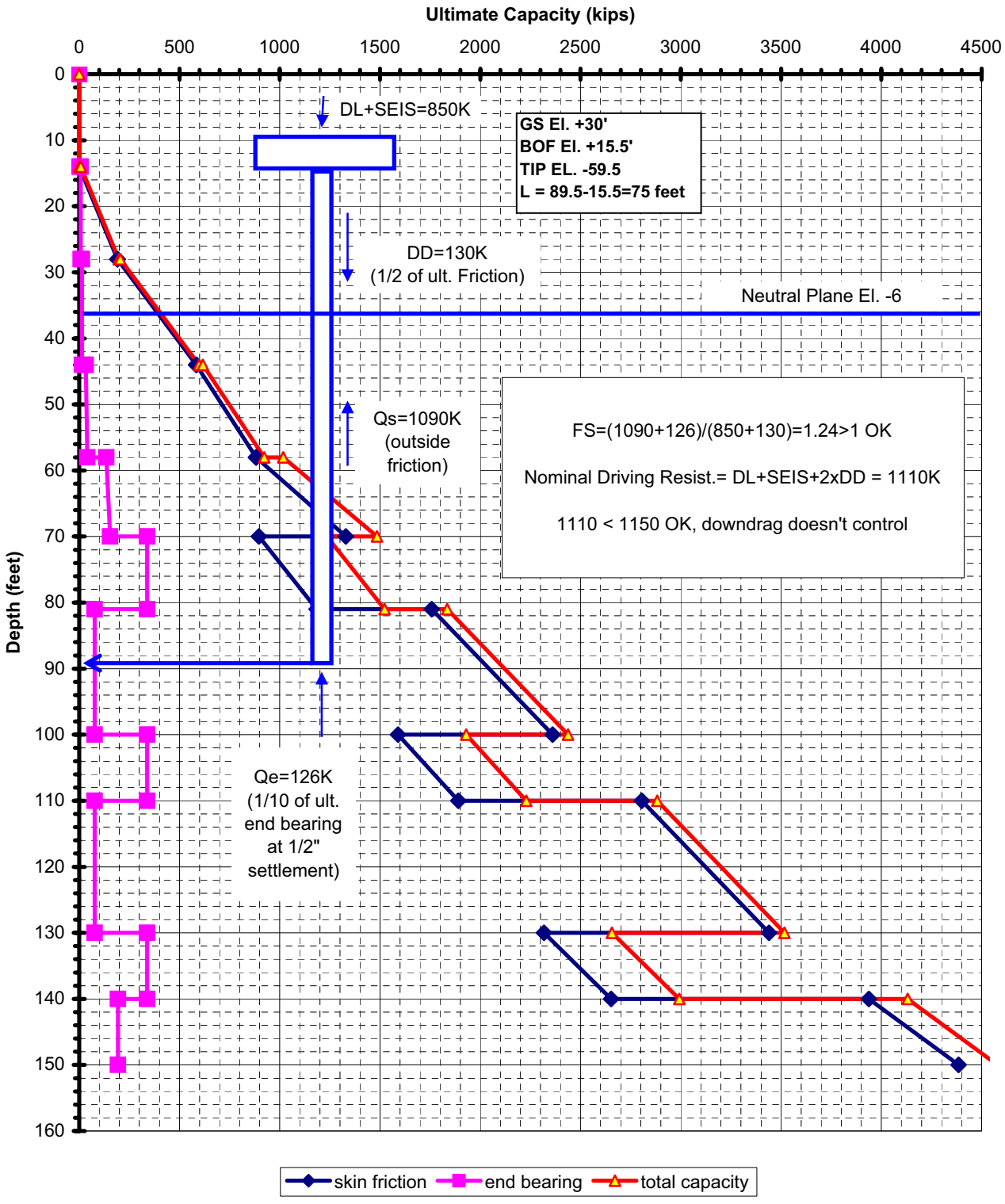


FIGURE 9C

API RP2A Capacity for Steel Pipe Piles
HOV Connector (Bent 3)

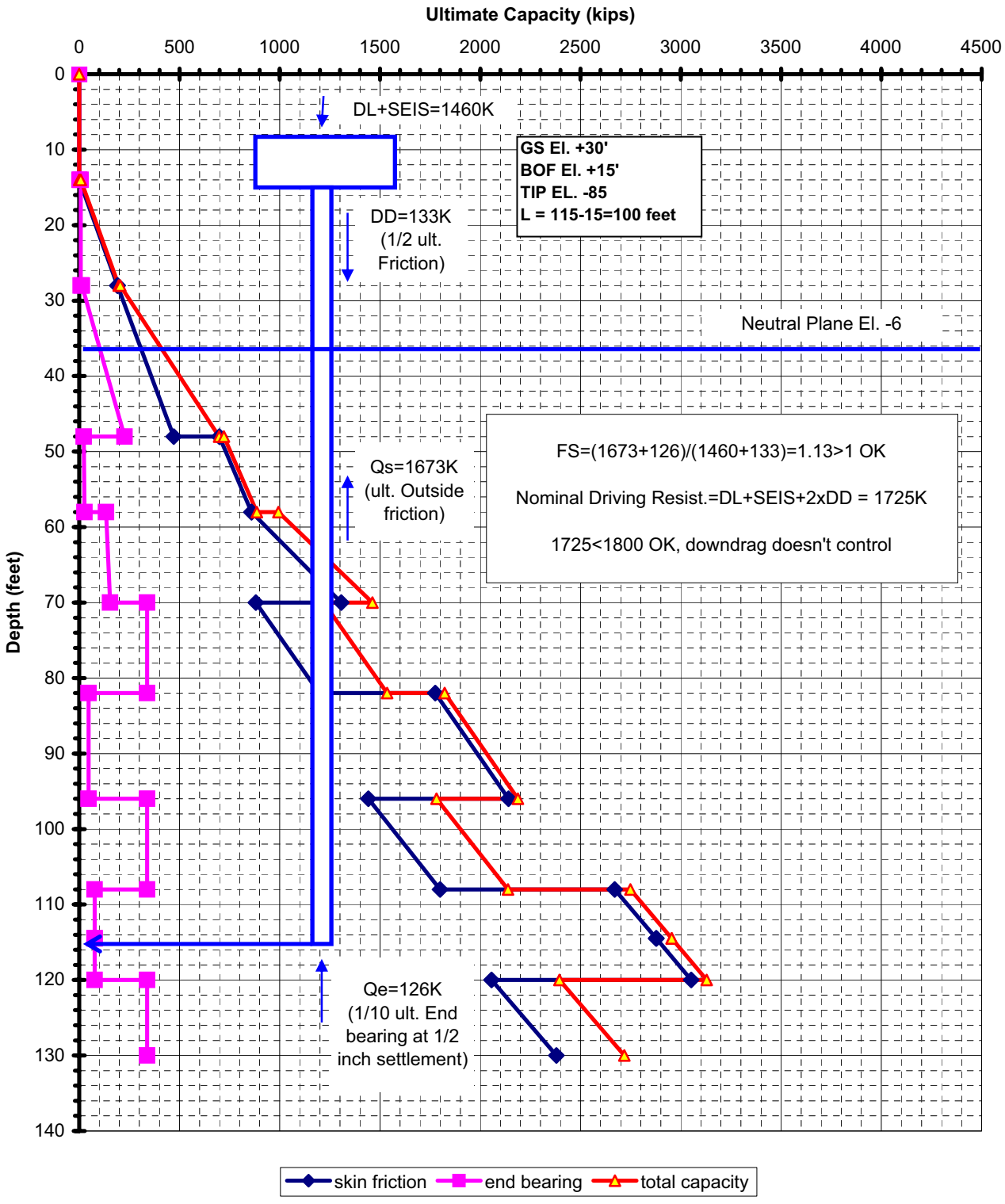


FIGURE 9D

API RP2A Capacity for Steel Pipe Piles
HOV Connector (Bent 4)

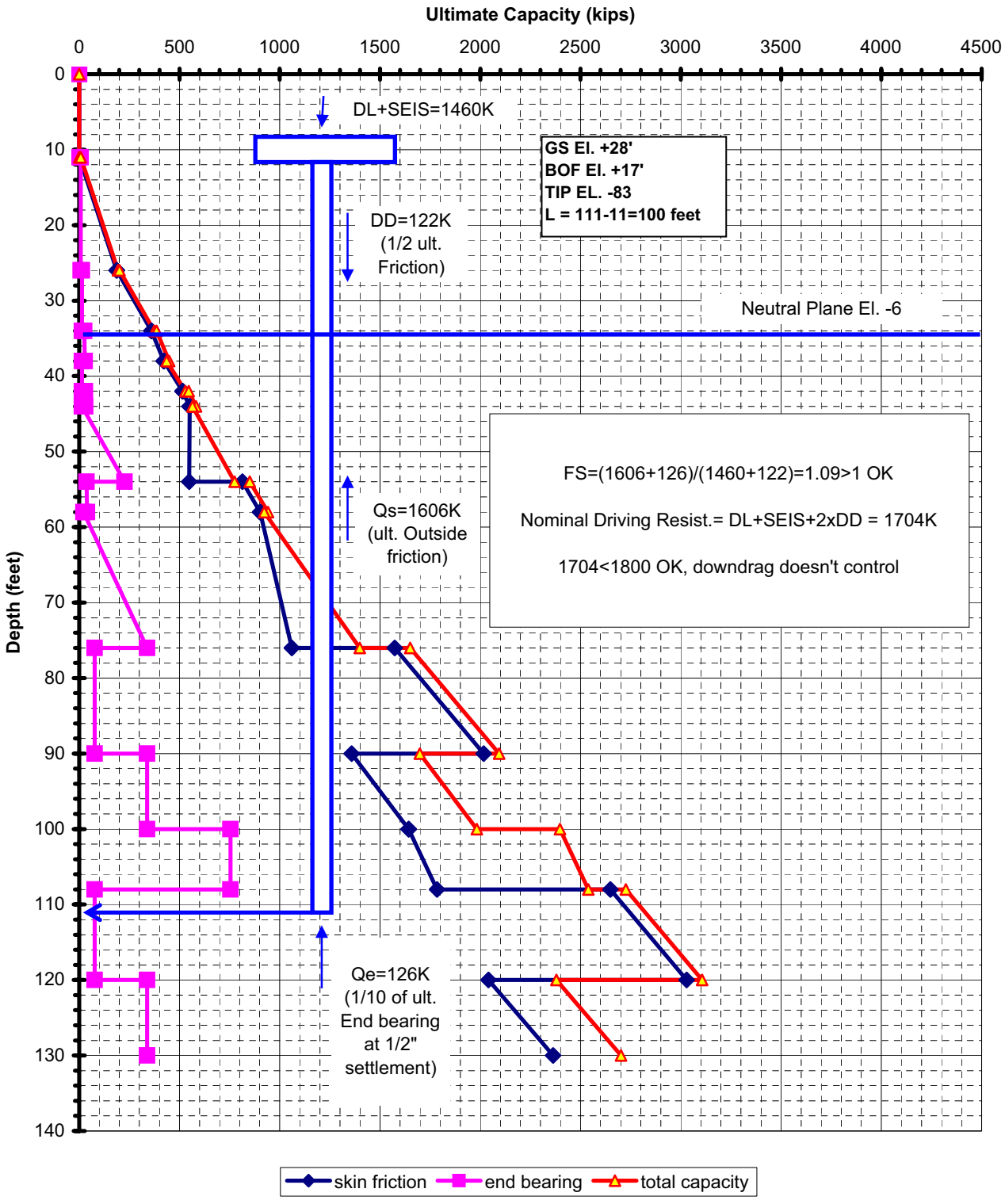


FIGURE 9E

API RP2A Capacity for Steel Pipe Piles
HOV Connector (Bent 5)

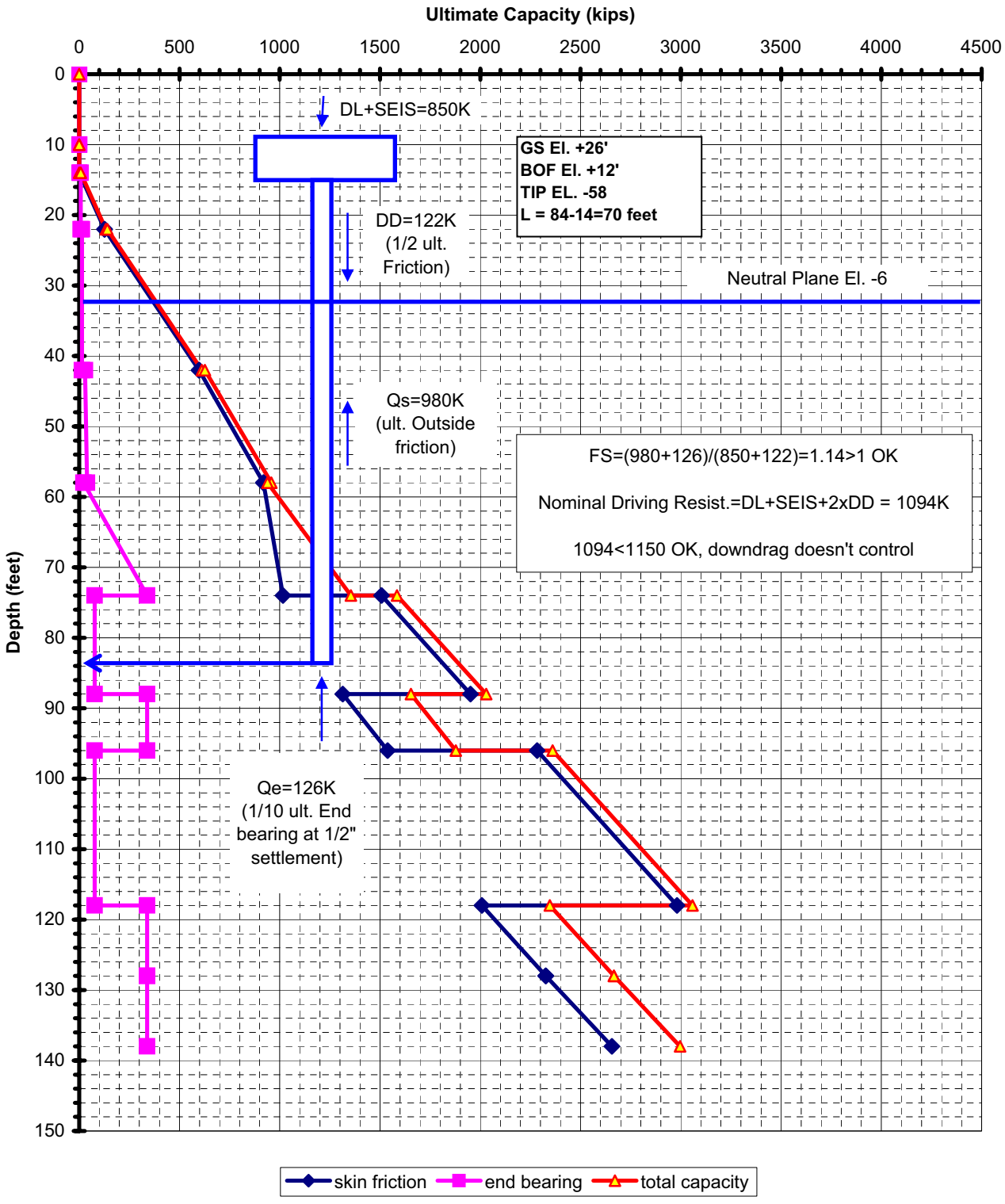


FIGURE 9F

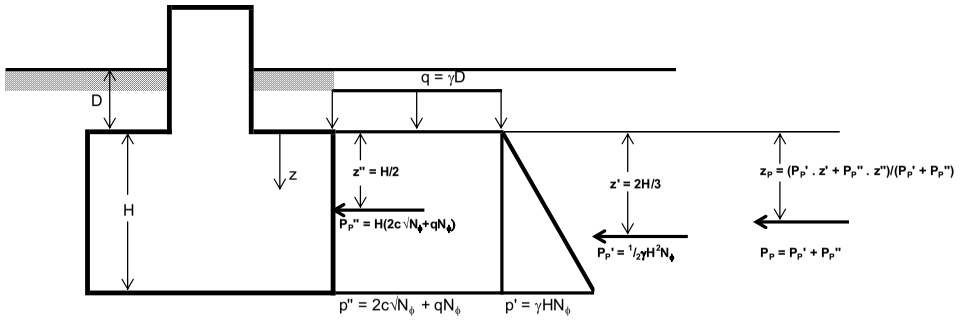
PASSIVE LATERAL RESISTANCE ON AN EMBEDDED FOOTING

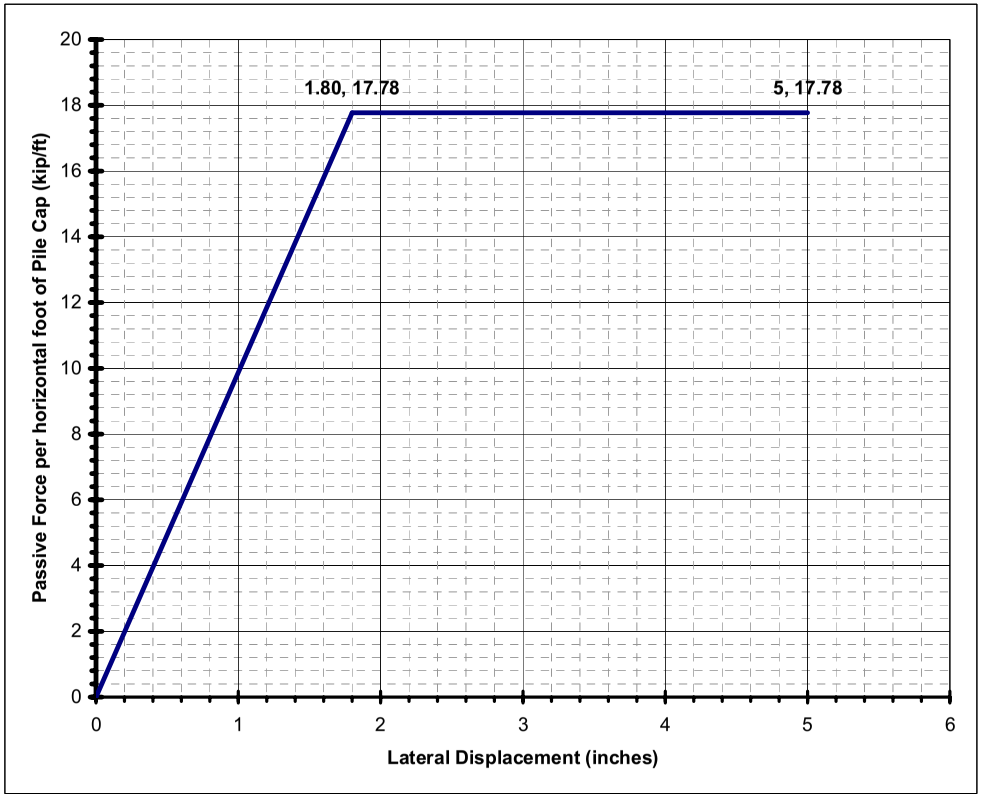
Input	
Sand or Clay (S or C) =	C
Soft, Firm, Stiff (S,F,ST) =	ST
Unit Wt, γ (pcf) =	125.0
Cohesion, c (psf) =	1,200
Friction Angle, ϕ (deg) =	0.00
Soil Cover, D (ft) =	1.50
Footing Thickness, H (feet)=	6.00

Output		
Movement to mobilize full passive, δ_{ult} (inches) =	1.80	
Surcharge above top of footing, q (psf) =	188	= γD
Factor N_ϕ =	1.00	= $\tan^2(45+\phi/2)$
Passive pressure at top of footing, p" (psf) =	2,588	= $2c\sqrt{N_\phi}+qN_\phi$
Increase in passive pressure btwn top and bottom of footing, p' (psf) =	750.0	= γHN_ϕ
Passive pressure at bottom of footing, p" + p' (psf) =	3,337.5	= $2c\sqrt{N_\phi}+qN_\phi+\gamma HN_\phi$
Passive Force from Rectanglar Block, P_P" (lbs/ft) =	15,525	= $H(2c\sqrt{N_\phi}+qN_\phi)$
Depth of P_P" below top of footing, z" (feet) =	3.00	= H/2
Passive Force from Trianglar Block, P_P' (lbs/ft) =	2,250	= $1/2\gamma H^2N_\phi$
Depth of P_P' below top of footing, z' (feet) =	4.00	= 2H/3
Total Ultimate Passive Force, P_P (lbs/ft) =	**17,775**	= P_P" + P_P'
Depth of P_P below top of footing, z_P (feet) =	3.13	= $(P_P" \cdot z" + P_P' \cdot z')/(P_P" + P_P')$

Plot Data

δ (inch)	Pp (kip/ft)
0	0.00
1.80	17.78
5	17.78





DISPLACEMENT REQUIRED FOR FULL PASSIVE AS A FUNCTION OF SOIL TYPE

Soil Type	δ/(H+D) for Full Passive	δ (inch)
Dense Sand	0.002	0.180
Medium Dense Sand	0.004	0.360
Loose Sand	0.006	0.540
Soft Clay	0.040	3.600
Firm Clay	0.030	2.700
Stiff Clay	0.020	1.800

Reference: NAVFAC - DESIGN MANUAL 7.02, "Foundations & Earth Structures," Revalidated by Change September 1, 1986, Section 2, Figure 1, Page 7.2-60.

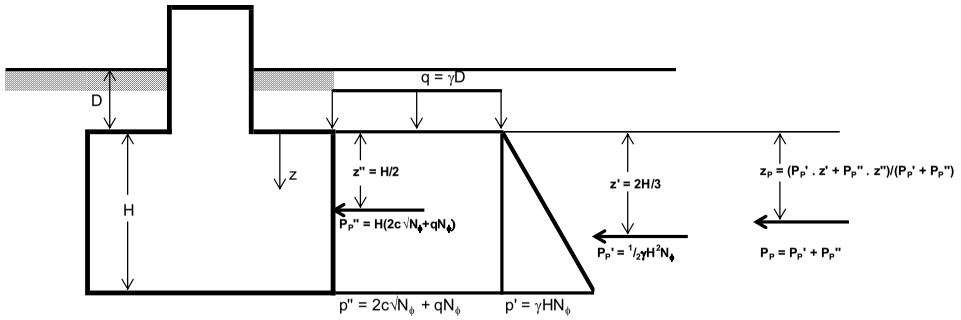
Reference:
Passive Earth Pressure of Cohessive Soils in Contact with Smooth Vertical Surface, "Soil Mechanics in Engineering Practice", Karl Terzaghi and Ralph B.Peck, 2nd Edition, John Wiley & Sons, New York, 1967

FIGURE 10A
PASSIVE RESISTANCE OF PILE CAP - BENTS 2, 3 and 4
AGAINST NATIVE STIFF CLAY

PASSIVE LATERAL RESISTANCE ON AN EMBEDDED FOOTING

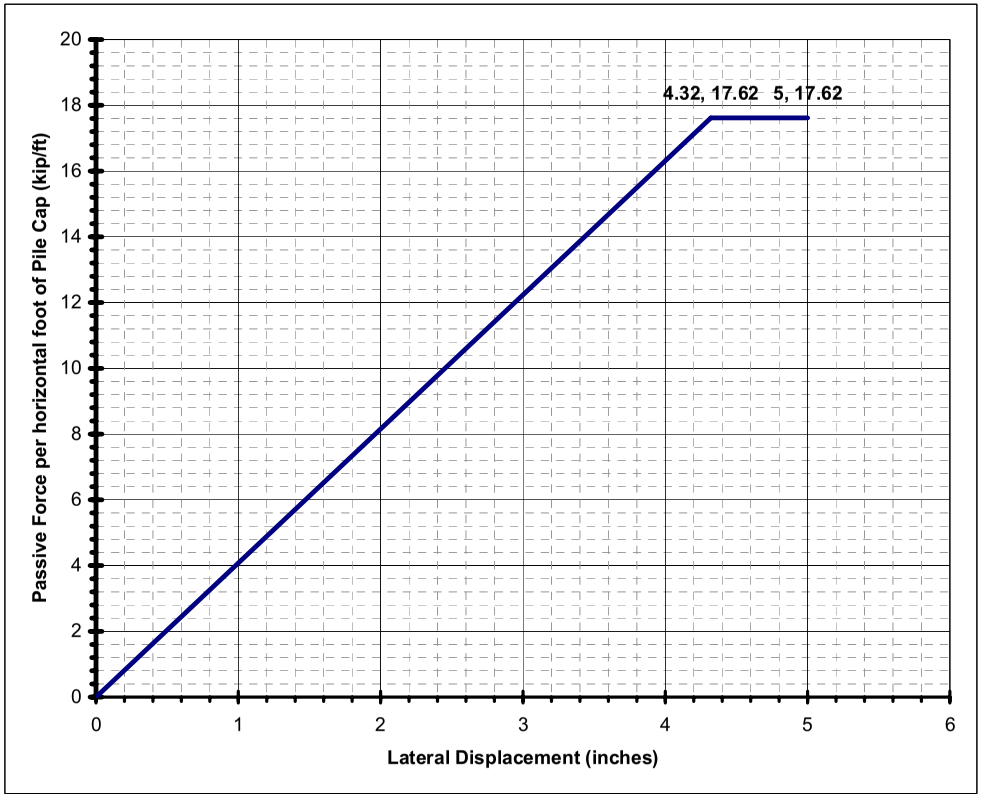
Input	
Sand or Clay (S or C) =	C
Soft, Firm, Stiff (S,F,ST) =	F
Unit Wt, γ (pcf) =	104.0
Cohesion, c (psf) =	1,000
Friction Angle, ϕ (deg) =	0.00
Soil Cover, D (ft) =	6.00
Footing Thickness, H (feet)=	6.00

Output		
Movement to mobilize full passive, δ_{ult} (inches) =	4.32	
Surcharge above top of footing, q (psf) =	624	= γD
Factor N_ϕ =	1.00	= $\tan^2(45+\phi/2)$
Passive pressure at top of footing, p" (psf) =	2,624	= $2c\sqrt{N_\phi}+qN_\phi$
Increase in passive pressure btwn top and bottom of footing, p' (psf) =	624.0	= γHN_ϕ
Passive pressure at bottom of footing, p" + p' (psf) =	3,248.0	= $2c\sqrt{N_\phi}+qN_\phi+\gamma HN_\phi$
Passive Force from Rectanglar Block, P_P" (lbs/ft) =	15,744	= $H(2c\sqrt{N_\phi}+qN_\phi)$
Depth of P_P" below top of footing, z" (feet) =	3.00	= H/2
Passive Force from Trianglar Block, P_P' (lbs/ft) =	1,872	= $1/2\gamma H^2N_\phi$
Depth of P_P' below top of footing, z' (feet) =	4.00	= 2H/3
Total Ultimate Passive Force, P_P (lbs/ft) =	**17,616**	= P_P" + P_P'
Depth of P_P below top of footing, z_P (feet) =	3.11	= $(P_P" \cdot z" + P_P' \cdot z')/(P_P" + P_P')$



Plot Data

δ (inch)	Pp (kip/ft)
0	0.00
4.32	17.62
5	17.62



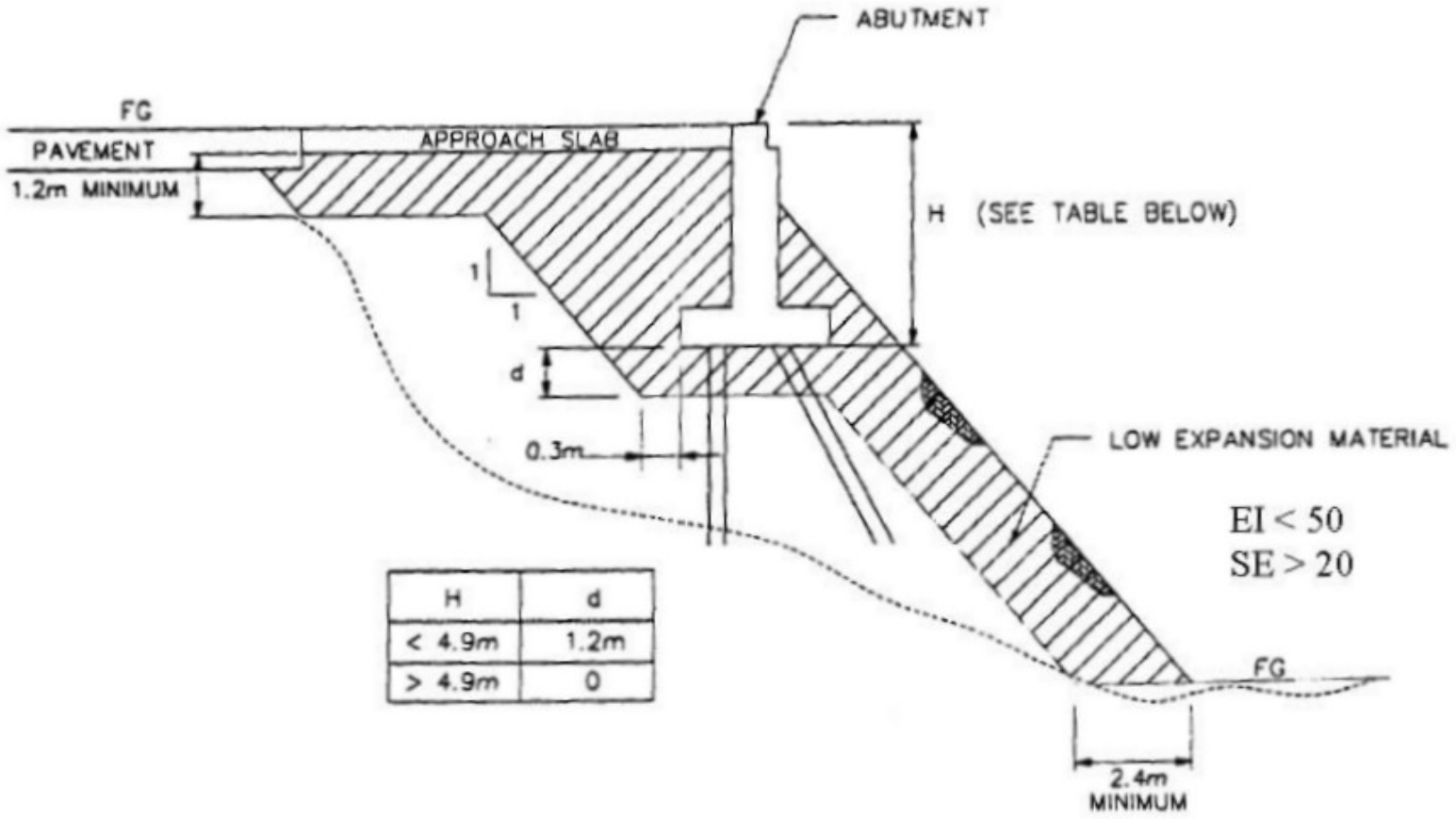
DISPLACEMENT REQUIRED FOR FULL PASSIVE AS A FUNCTION OF SOIL TYPE

Soil Type	δ/(H+D) for Full Passive	δ (inch)
Dense Sand	0.002	0.288
Medium Dense Sand	0.004	0.576
Loose Sand	0.006	0.864
Soft Clay	0.040	5.760
Firm Clay	0.030	4.320
Stiff Clay	0.020	2.880

Reference: NAVFAC - DESIGN MANUAL 7.02, "Foundations & Earth Structures," Revalidated by Change September 1, 1986, Section 2, Figure 1, Page 7.2-60.

Reference:
Passive Earth Pressure of Cohessive Soils in Contact with Smooth Vertical Surface, "Soil Mechanics in Engineering Practice", Karl Terzaghi and Ralph B.Peck, 2nd Edition, John Wiley & Sons, New York, 1967

FIGURE 10B
PASSIVE RESISTANCE OF PILE CAP - BENT 5
AGAINST NATIVE FIRM CLAY



H	d
< 4.9m	1.2m
> 4.9m	0

NOT TO SCALE

GDC Project No. I-436

405-22 HOV Connector Separation
Orange County, CA

EXPANSIVE SOIL EXCLUSION ZONE

Figure 11

PLATES

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing — 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

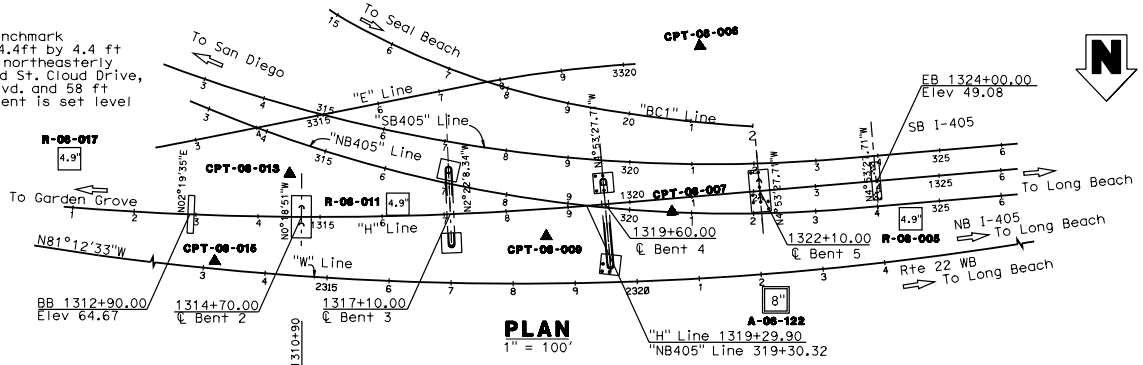
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

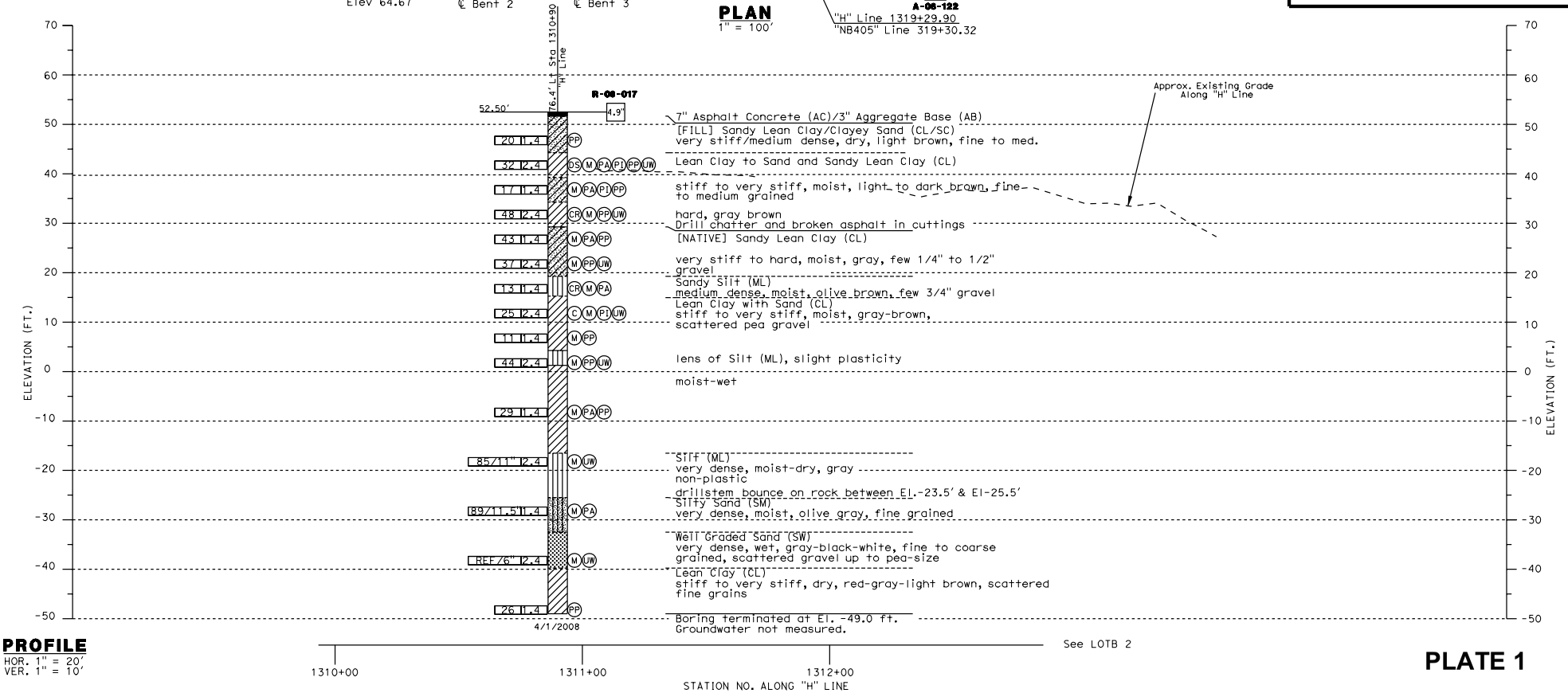
Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 6 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 1

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E POST MILES 20.66	405-22 HOV CONNECTOR SEPARATION LOG OF TEST BORINGS 1 OF 7
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 10/28/08 02/20/09 05/18/09 — SHEET 49 OF 55

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
Exp. 06-30-09 Geotechnical
STATE OF CALIFORNIA

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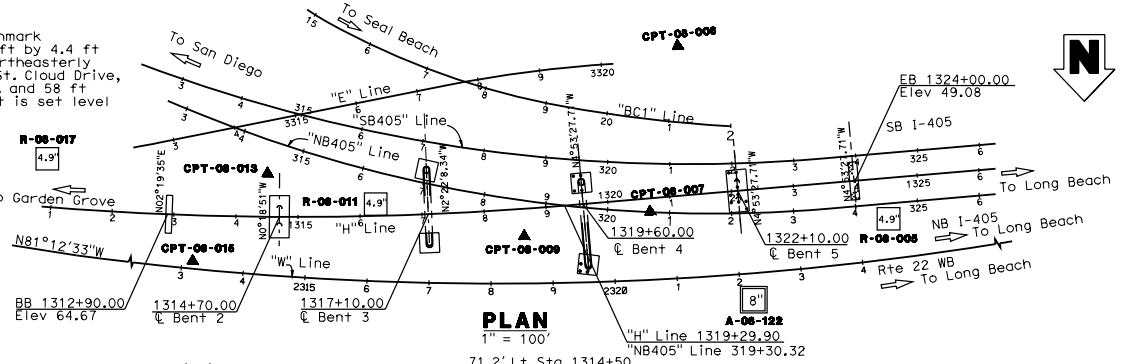
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

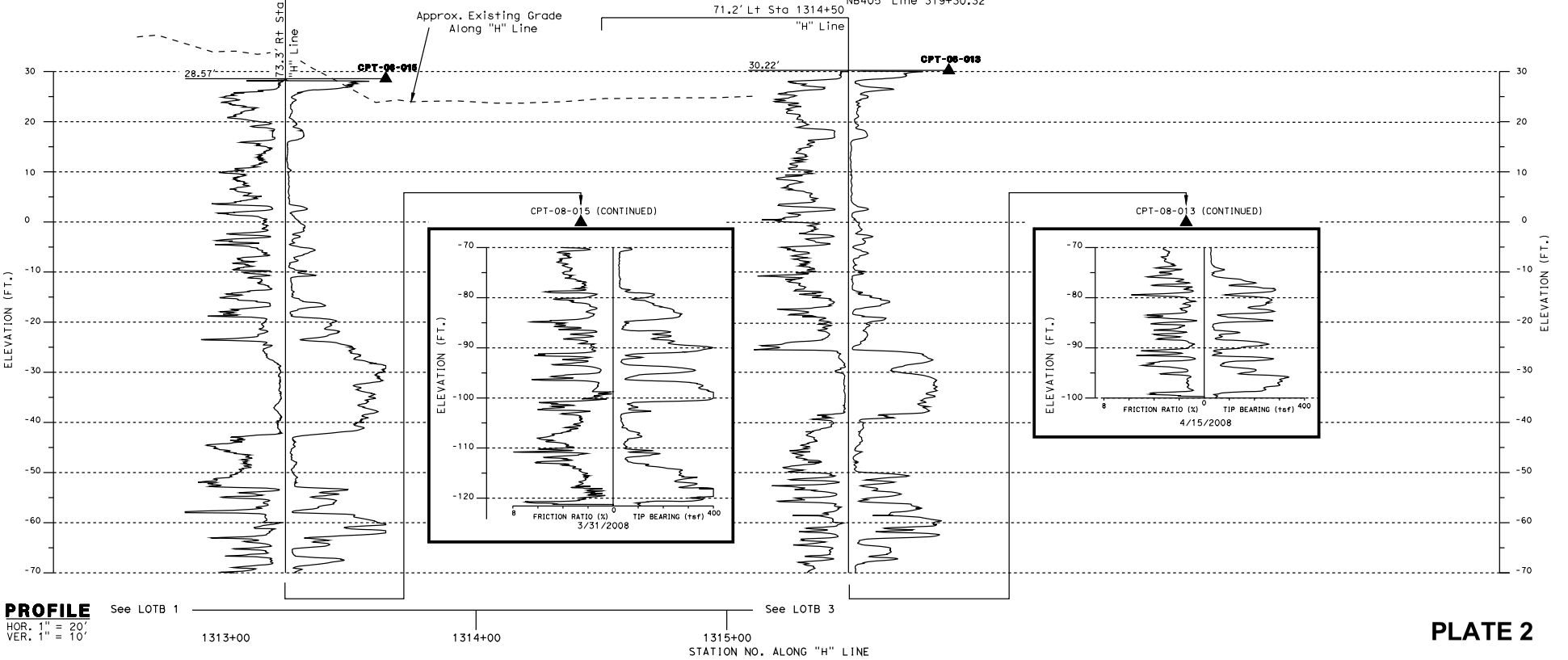
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :
This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 100'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1 — See LOTB 3

1313+00 1314+00 1315+00
STATION NO. ALONG "H" LINE

PLATE 2

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E POST MILES 20.66	405-22 HOV CONNECTOR SEPARATION LOG OF TEST BORINGS 2 OF 7
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES REVISION DATES: 10/28/08 02/20/09 05/18/09	SHEET 50 OF 55

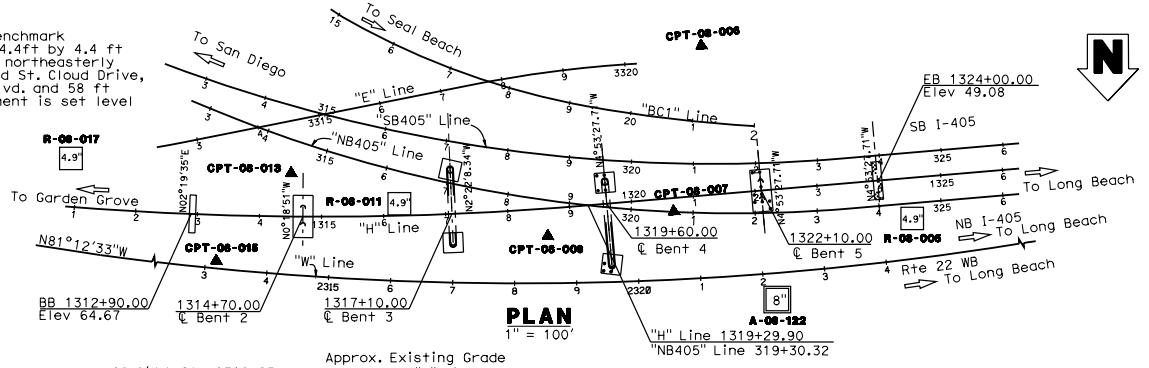
FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 6 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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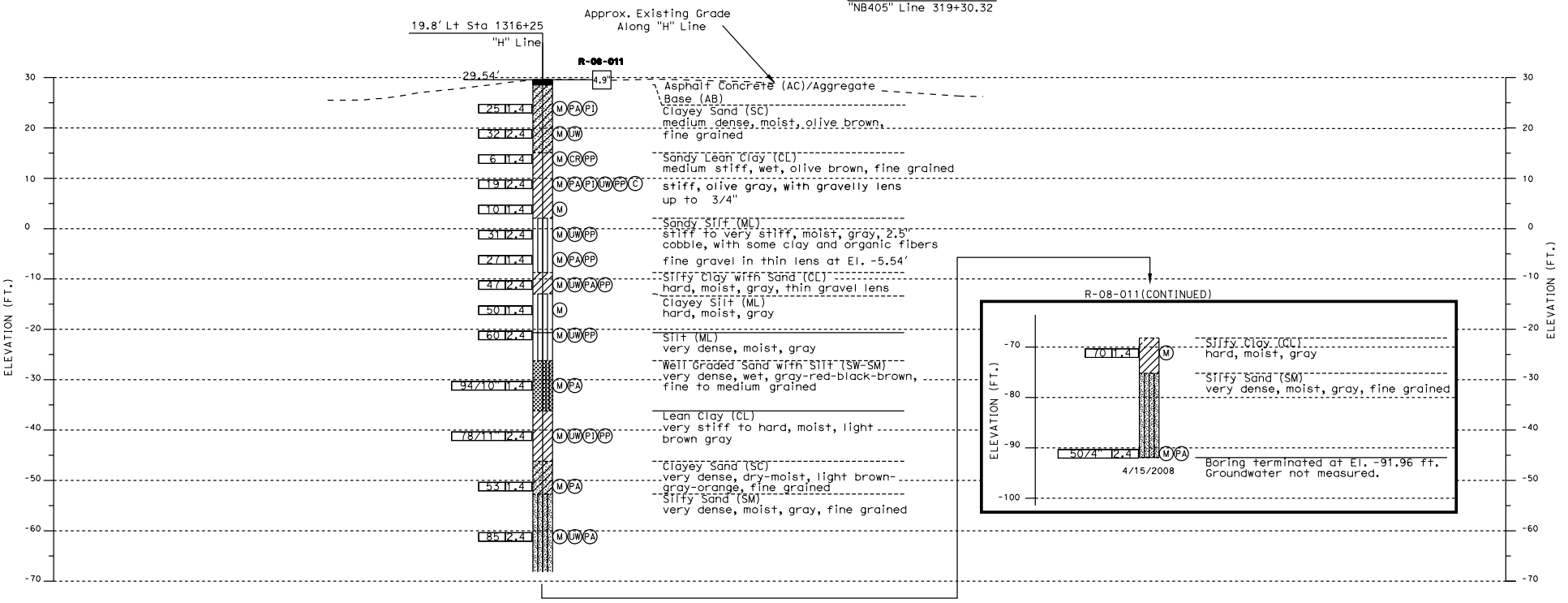
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



PROFILE See LOTB 2
HOR. 1" = 20'
VER. 1" = 10'

1315+00 1316+00 1317+00 1318+00 See LOTB 4
STATION NO. ALONG "H" LINE

PLATE 3

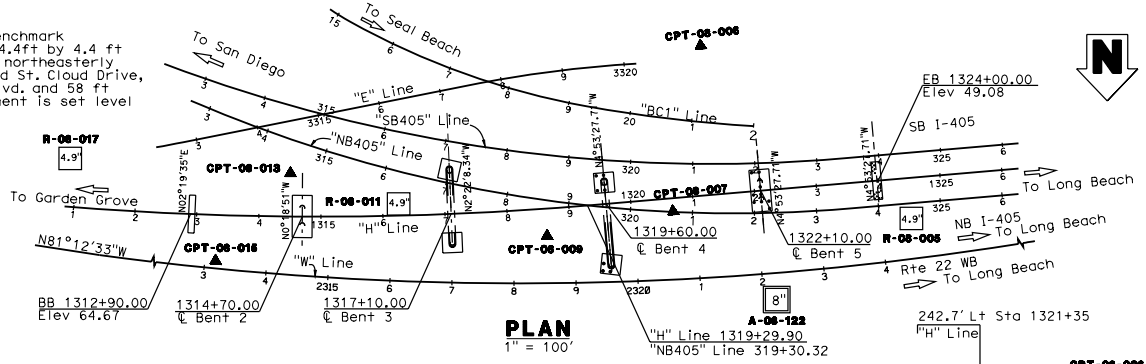
DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E POST MILES 20.66	405-22 HOV CONNECTOR SEPARATION LOG OF TEST BORINGS 3 OF 7
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES REVISION DATES: 10/28/08 02/20/09 05/18/09	SHEET 51 OF 55

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



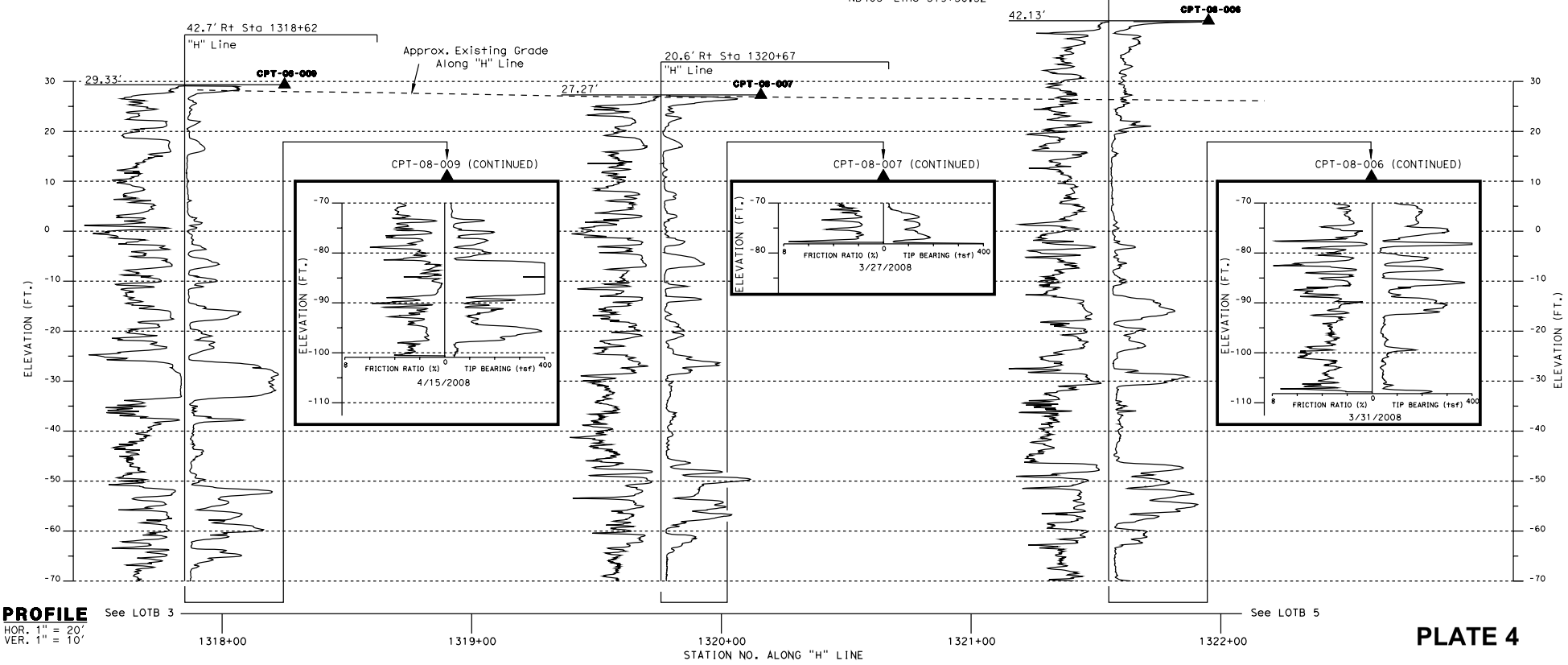


PLATE 4

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E POST MILES 20.66

405-22 HOV CONNECTOR SEPARATION

LOG OF TEST BORINGS 4 OF 7

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/28/08 02/20/09 05/18/09

SHEET 52 OF 55

FILE => $REQUEST

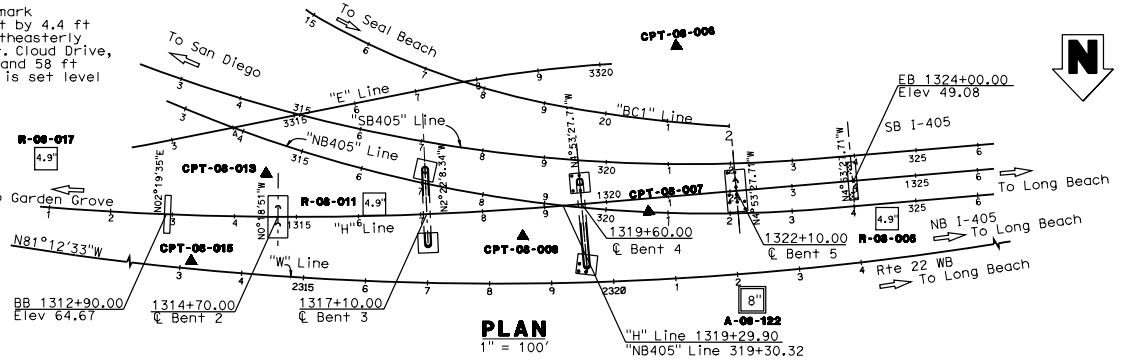
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 6 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 100'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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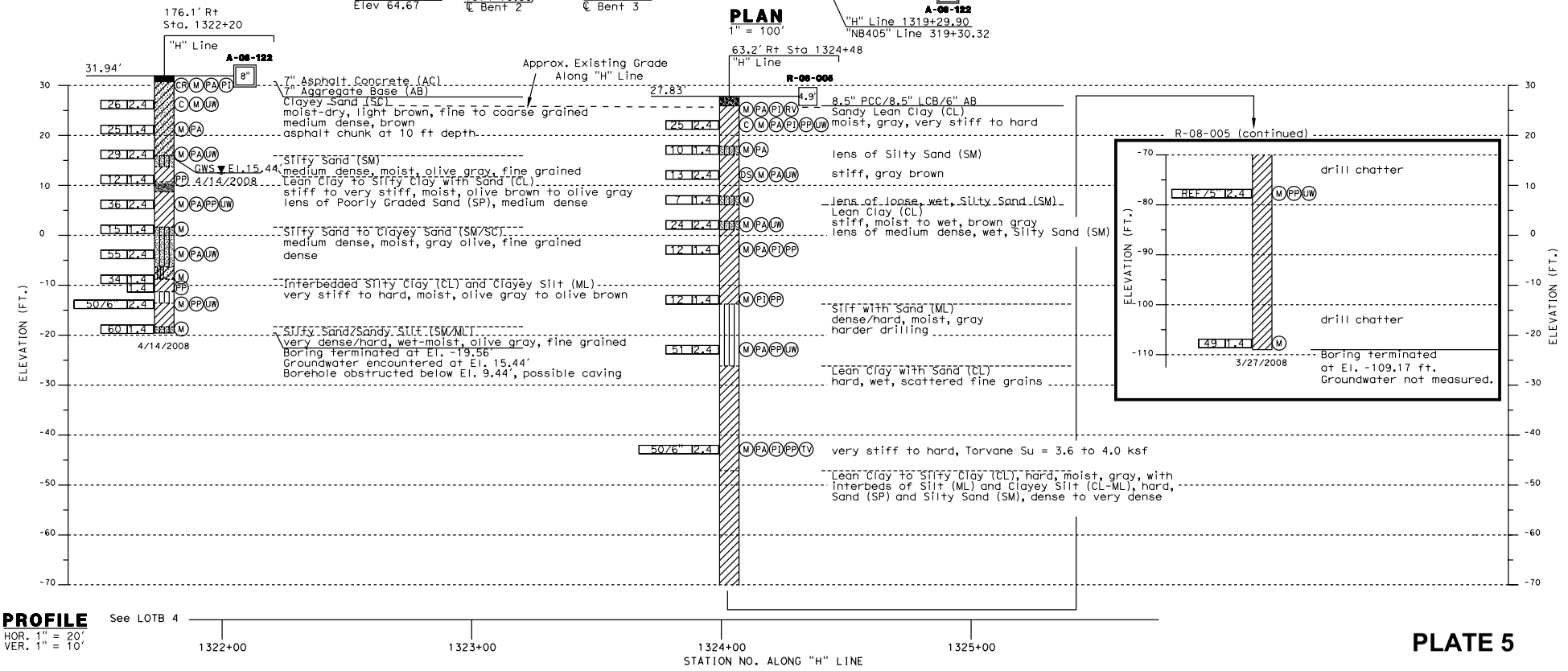
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863
PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
GROUP DELTA CONSULTANTS, INC. 32 MAUCHLY, SUITE B IRVINE, CA 92618	GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'
See LOTB 4

1322+00 1323+00 1324+00 1325+00
STATION NO. ALONG "H" LINE

PLATE 5

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES / CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E / POST MILES 20.66	405-22 HOV CONNECTOR SEPARATION / LOG OF TEST BORINGS 5 OF 7
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 10/28/08 02/20/09 05/18/09 — SHEET 53 OF 55

FILE => $REQUEST
DATE PLOTTED => $DATE TIME PLOTTED => $TIME USERNAME => $USER

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

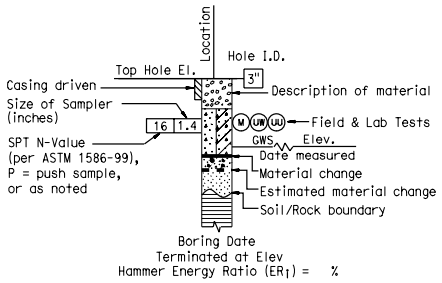
Notes :

1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

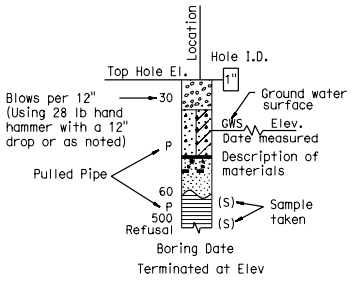
2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers in rotary borings. A 140 lbs. automatic hammer with a drop height of 30" was used to advance the drive samplers in hollow-stem auger borings.

3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval

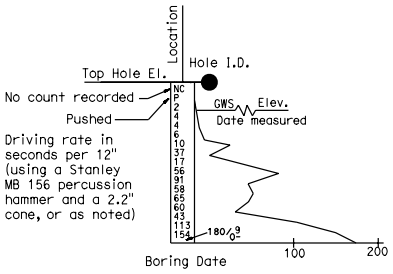
PLATE 6



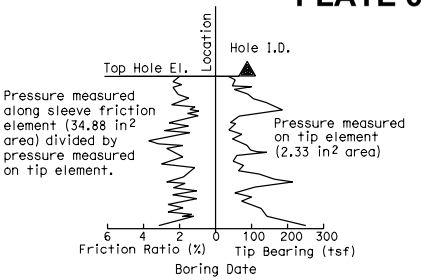
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E POST MILES 20.66	SOIL LEGEND LOG OF TEST BORINGS 6 OF 7
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		CU 12235 EA 071621 FILE => $REQUEST		DISREGARD PRINTS BEARING EARLIER REVISION DATES REVISION DATES: 10/28/08 02/20/09 05/18/09	SHEET 54 OF 55

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166)
  Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 7

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55-1103E
POST MILES 20.66

CU 12235
EA 071621

SOIL LEGEND
LOG OF TEST BORINGS 7 OF 7

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/28/08 02/28/09 05/18/09

SHEET 55 OF 55

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the subject bridge were investigated by Group Delta Consultants, Inc. (GDC) by performing four (4) soil borings and five (5) Cone Penetration Tests (CPTs) during the period of March 27th to April 15th, 2008. The borings were performed to depths of 51.5 feet to 137 feet below ground surface (bgs) and the CPTs were performed to depths of 105.5 feet to 150.3 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at the subject overcrossing location. Locations of the borings and CPTs are presented in Figure 3 of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1 of this appendix.

The borings and CPTs were performed from the freeway lanes and shoulders of SR-22 and I-405 within the Caltrans Right-of-Way (ROW). Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night.

The exploration methods are described in the following sections. Boring and CPT logs from the current exploration program are presented in Figures A-2a through A-5e and A-6a through A-10e, respectively.

A.2 Soil Drilling and Sampling

A total of four (4) soil borings; one (1) hollow stem auger boring (A-08-122) and three (3) rotary wash borings (R-08-005, R-08-011 and R-08-017) were drilled and sampled at the subject bridge during this project. R & C Drilling, Inc. of Van Nuys, California advanced the hollow stem auger borings to desired depths using a Mobile B-61 drill rig and 8-inch o.d. auger. C & L Drilling, Inc. of La Habra, California advanced the rotary wash borings to desired depths using a Mayhew 1000 drill rig and a 4.875-inch drill bit in conjunction with bentonite slurry. All drill rigs were truck mounted. All drilling companies acted as subcontractors to GDC.

All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS). All soils were assigned a group name and group

symbol, as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The boring logs are presented in Figures A-2a and A-5e.

A bulk sample of the near-surface soil was collected from the hollow stem auger boring. Drive samples were generally collected from the borings at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using either a downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured.

The hollow stem auger boring was abandoned by backfilling the borehole with soil cuttings. The rotary wash borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the boreholes was filled with asphalt patch as necessary.

Rotary wash borings drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method

8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of five (5) CPT soundings (CPT-08-006, CPT-08-007, CPT-08-009, CPT-08-013, and CPT-08-015) were performed at the subject bridge to depths ranging from 105.5 feet to 150.2 feet bgs. Kehoe Testing and Engineering, Inc. of Long Beach, California performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D3441 test standard using an electronic cone penetrometer. A 0.155-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in this appendix on Figures A-6a through A-10e. Soil behavior type and other interpretations of the CPT data provided by Kehoe are in our files.

At the completion of each sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned by backfilling bentonite into the hole to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1 Summary of Field Explorations

List of Figures

Figure A-1a Key for Soil Classification
Figure A-1b Boring Legend
Figures A-2a to A-5e Boring Logs
Figures A-6a to A-10e Cone Penetration Test Results

TABLE A-1
SUMMARY OF TEST EXPLORATIONS
SR-22 WEST ORANGE COUNTY CONNECTORS PROJECT
405-22 HOV CONNECTOR SEPARATION

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Plan Figure No.	Appendix Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
R-08-005	1324+48 63 R	3/27/2008	Rotary Wash Boring	27.83	137.0	L-7	A-2	NA	NA	
CPT-08-006	1321+35 243L	3/31/2008	CPT	42.13	150.3	L-6	A-6	Hole obstructed at 20' (dry)	NA	GW is below Elev. 22 feet
CPT-08-007	1320+67 21 R	3/27/2008	CPT	27.27	105.5	L-6	A-7	Hole obstructed at 7' (dry)	NA	GW is below Elev. 20 feet
CPT-08-009	1318+62 43 R	4/15/2008	CPT	29.33	130.3	L-6	A-8	Hole obstructed at 17' (dry)	NA	GW is below Elev. 12 feet
R-08-011	1316+25 20 L	4/15/2008	Rotary Wash Boring	29.54	121.5	L-6	A-3	NA	NA	
CPT-08-013	1314+50 71 L	4/15/2008	CPT	30.22	130.3	L-6	A-9	Hole obstructed at 16' (dry)	NA	GW is below Elev. 12.5 feet
CPT-08-015	1313+33 73 R	3/31/2008	CPT	28.57	150.2	L-6	A-10	Hole obstructed at 12' (dry)	NA	GW is below EL. 17.5 feet
R-08-017	1310+93 76 L	4/1/2008	Rotary Wash Boring	52.50	101.5	L-6	A-4	NA	NA	
A-08-122	1322+20 176R	4/14/2008	Hollow Stem Auger	31.94	51.5	L-7	A-5	16.5	15.44	

Notes:
1. Stationing relative to SR-22 "H" line. Right and left offsets defined by looking along SR-22 centerline in direction of increasing station.
2. Elevations based on survey conducted in January 2009

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

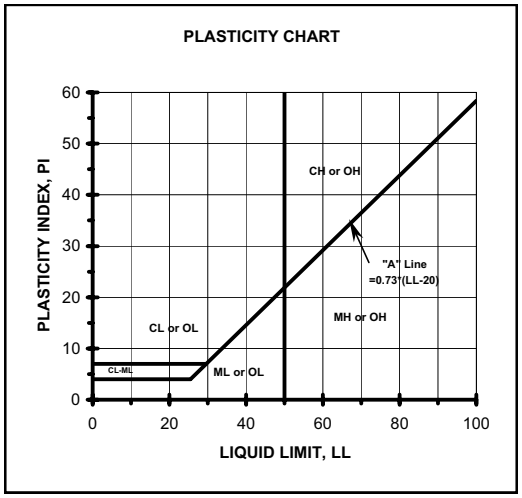
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375 inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	31.94	▼ 16.5 / *15.4*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **7" Aggregate Base (AB)**
	30		B1			7	CR	23	26:11			**Clayey Sand (SC)** moist-dry, light brown, fine to coarse grained with pieces of hard brown clay up to 3/4"
5			R2	5 7 19	107.6	18	CN					medium dense, becomes brown, finer, with scattered gravel up to 1/2"
	25											
10			S3	5 11 14		13		40				with chunk of asphalt at 10 feet depth
	20											
15			R4	11 13 16	100	23		26				▼ **Silty Sand (SM)** medium dense, moist, olive gray, fine grained
	15											**Lean Clay (CL)** stiff, moist, olive brown
20			S5	3 4 8						1.0		
	10											**Poorly Graded Sand (SP)** medium dense, moist, orange brown
												Silty Clay with Sand (CL) stiff to very stiff, moist, olive gray

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	31.94	▼ 16.5 / *15.4*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R6	9 16 20	87.2	31		88		1.5-1.75		**Silty Clay (CL)** stiff to very stiff, moist, olive gray
	5											
30			S7	5 6 9		26						**Silty Sand (SM)** medium dense, moist, gray olive, fine grained
	0											
35			R8	11 20 35	96.8	28		26				dense, some clay
	-5											**Silty to Clayey Sand (SC/SM)** dense, wet, olive gray, fine grained
40			S9a	13 14 20		30						
			S9b							2.0-2.5		**Silty Clay (CL)** very stiff to hard, moist, olive gray
	-10											**Clayey Silt (ML)** very stiff to hard, moist, olive brown
45			R10	20 50/6"	86.4	35				2.0-2.75		**Silty Clay (CL)** very stiff to hard, wet-moist, olive gray
	-15											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
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FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-122**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/14/2008	4/14/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	31.94	▼ 16.5 / *15.4*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S11	20 30 30		27						**Silty Sand/Sandy Silt (SM/ML)** very dense/hard, wet-moist, olive gray, fine grained
	-20											*Boring terminated at 51.5 feet below ground surface (bgs).* *Groundwater encountered at 16.5 feet bgs.* *Borehole obstructed below 22.5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
55	-25											
60	-30											
65	-35											
70	-40											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	1 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												8.5" Concrete Pavement (PCC) **8.5" Lean Concrete/slurry** **6" Aggregate Base (AB)**
	25		B1			16	RV	63	29:9			**Sandy Lean Clay (CL)** moist, gray, very fine grains and few coarse grains, rolls very good thread
5			R1	3 9 16	108.3	19	CN PA	53	32:13	4.5+		dark gray, very stiff to hard, with silt
	20											
10			S2	3 5 5		26	PA	18				**Silty Sand (SM)** loose to medium dense, moist-wet, gray brown, fine grained
	15											**Sandy Silty Clay (CL)** stiff, moist, brown gray, fine grained
15			R3	5 6 7	98	27	DS	65				
	10											
20			S4	3 3 4		29						**Silty Sand (SM)** loose, wet, gray brown, fine grained with scattered coarse grains
	5											**Silty Clay with Sand (CL)** stiff, moist, brown gray, fine grained

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	2 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	7 12 12	97.6	26		24				**Silty Sand (SM)** medium dense, wet, gray brown, fine grained with scattered coarse grains and fine gravel of clay cemented coarse sand
	0											**Lean Clay (CL)** stiff, wet-moist, gray brown
30			S6	3 4 8		41		97	46:20	1.25		
	-5											
35												
	-10											
40			S7	4 4 8		31			39:20	1.5		with very fine to coarse sand grains and some silt
	-15											**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay harder drilling
45												
	-20											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	3 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R8	18 28 23	103	23		85		4.5		**Silt with Sand (ML)** dense/hard, moist, gray, trace of clay, slight to no plasticity
	-25											
55												**Lean Clay with Sand (CL)** hard, wet, scattered fine grains
	-30											
60												
	-35											
65												
	-40											
70			R9	30 50/6"		45		75	43:19	4.5		very stiff to hard Torvane = 3.6 to 4.0 ksf
	-45											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-3 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	4 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML) hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
	-50											
80												
	-55											
85												
	-60											
90												
	-65											
95												
	-70											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-3 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	5 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
105	-75	⋈	R10	50/5"	82.4	39				2.5		**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)**hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray, drill chatter at 100'
110	-80											
115	-85											
120	-90											
	-95											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-3 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-005**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	3/27/2008	6 of 6

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	137	27.83	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
130	-100											**Lean Clay to Silty Clay (CL) with interbeds of Silt (ML) and Clayey Silt (CL-ML)** hard, **Sand (SP) and Silty Sand (SM)** dense to very dense hard, moist, gray
												drill chatter
135	-105		S11	12 17 32		27						
	-110											*Bottom of boring at 137 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
140												
	-115											
145												
	-120											

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FIGURE A-3 f

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Asphalt Concrete (AC) **Aggregate Base (AB)**
												Clayey Sand (SC) medium dense, moist, olive brown, fine grained, with some silt
5	25		S1	7 12 13		19		47	33:14			
10	20		R2	7 12 20	96.9	19						
15	15		S3	2 2 4		31	CR			0.5		**Sandy Lean Clay (CL)** firm, wet, olive brown, fine grained, scattered few fine gravel, rolls very good thread
20	10		R4	4 8 11	94.6	24	CN	52	34:18	1.0		stiff, olive gray, with gravelly lense at 20' to 20.3' containing sunrounded to angular black and gray with orange limonite stained granite pieces 1/4" to 3/4"
	5											

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FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	4 5 5		46						**Sandy Lean Clay (CL)** stiff, wet, olive brown, fine grained, with few fine gravel
	0											**Sandy Silt (ML)** stiff to very stiff, moist, gray, single black and white granodiorite cobble 2.5", with some clay and decomposed organic fibers
30			R6	5 13 18	93.2	30				1.5		
	-5											
35			S7	4 11 16		28		68		1.0		with fine angular gravel in thin lense at 35', little to no clay
	-10											**Silty Clay with Sand (CL)** hard, moist, gray, rolls very poor thread, with some gravel in lense at 40'
40			R8	11 15 32	97.9	25		80		4.0		
	-15											
45			S9	10 20 30		33						**Clayey Silt (ML)** hard, moist, gray, no gravel
	-20											

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 3 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	14 24 36	83.9	35				3.5		**Clayey Silt (ML)** hard, moist, gray, no gravel **Silt (ML)** very dense, moist, gray, trace to no clay
55	-25											
												Well Graded Sand with Silt (SW-SM) very dense, wet, gray-red-black-brown, fine to medium grained
60	-30		S11	26 44 50/4"		15	PA	7				
65	-35											**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains
70	-40		R12	27 28 50/5"	114.8	17			31:16	3.5		
	-45											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-4 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-50		S13	11 21 32		17		45				**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains **Clayey Sand (SC)** very dense, dry-moist, light brown-gray-orange, fine grained
85	-55											**Silty Sand (SM)** very dense, moist, gray, fine grains barely visible, trace to no clay
90	-60		R14	20 37 48	102.4	24		29				
95	-65											**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-70											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-4 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S15	11 22 48		40						**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-75											
105												**Silty Sand (SM)** very dense, moist, gray, fine grained
	-80											
110												
	-85											
115												
	-90											
120			R16	40 50/4"		24		27				*Boring termination at 121.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-95											

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FIGURE A-4 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-017

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **3" Aggregate Base (AB)** **[FILL]** **Lean Clay with Sand/Clayey Sand (CL/SC)** very stiff/medium dense, dry, light brown, fine to medium grained
5	50		S1	7 10 10						3.0		
	45											**Lean Clay with Sand (CL)** very stiff, moist, dark brown with orange mottling, scattered fine grains
10			R2	6 10 22	89.3	32	DS	82	35:14	2.5		
	40											**Sandy Lean Clay (CL)** stiff to very stiff, light brown, fine to medium grained
15			S3	4 6 11		27		55	34:14	1.25		
	35											**Lean Clay with Sand (CL)** hard, moist, gray brown, fine grained 19' - 19.5' Drill chatter
20			R4	8 23 25	108.8	19	CR			4.5+		at 21' Drill chatter and broken asphalt in cuttings, old asphalt in sampler shoe
	30											**[NATIVE]** **Sandy Lean Clay (CL)** hard, moist, gray, fine grained with scattered coarse grains and few 1/2" claystone gravel

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FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-017

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	8 20 23		20		63		4.5+		**Sandy Lean Clay (CL)** hard, moist, gray, scattered coarse grains and few 1/2" claystone gravel
30	25		R6	5 13 24	109.3	15				4.0		very stiff to hard, with scattered fine grains and few 1/4" gravel of dark purple-gray slate Torvane = 8.0 tsf
35	20		S7	5 5 8		34	CR	57				**Sandy Silt (ML)** medium dense, moist, olive brown, scattered coarse grains and few 3/4" pieces of slate, non-plastic
40	15		R8	8 10 15	96.2	28	CN		39:19			**Lean Clay (CL)** stiff to very stiff, moist, gray-brown, few fine grains and scattered pea-sized slate gravel
45	10		S9	3 4 7		36				1.2		no gravel
	5											**Silt (ML)** medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-5 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	7 15 29	100.0	25				3.0		**Silt (ML)** medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity
	0											**Lean Clay with Sand (CL)** very stiff, moist-wet, gray-brown, scattered fine grains and pea-sized gray claystone gravel
55												
	-5											
60			S11	11 15 14		31		82		2.0		becomes gray, no gravel
	-10											
65												
	-15											
70			R12	21 35 50/5"	96.7	27						**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic
	-20											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

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FIGURE A-5 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-25											**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic 76' - 78' drillstem bounce on rock
80			S13	35 39 50/5.5"		19		22				**Silty Sand (SM)** very dense, moist, olive gray, fine grained, no gravel
	-30											
85												**Well Graded Sand (SW)** very dense, wet, gray-black-white, fine to coarse grained, with scattered granite gravel up to pea-size, no clay
	-35											
90			R14	50/6" 50/3"	111.4	18						
	-40											**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
95												
	-45											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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32 Mauchly, Suite B
Irvine, CA 92618

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FIGURE A-5 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S15	6 9 17						1.5		**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
	-50											*Boring termination at 101.5 feet below ground surface (bgs).* *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
105												
	-55											
110												
	-60											
115												
	-65											
120												
	-70											

GDC_LOG_BORING_1A I-436 405_22 HOV CONNECTOR BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
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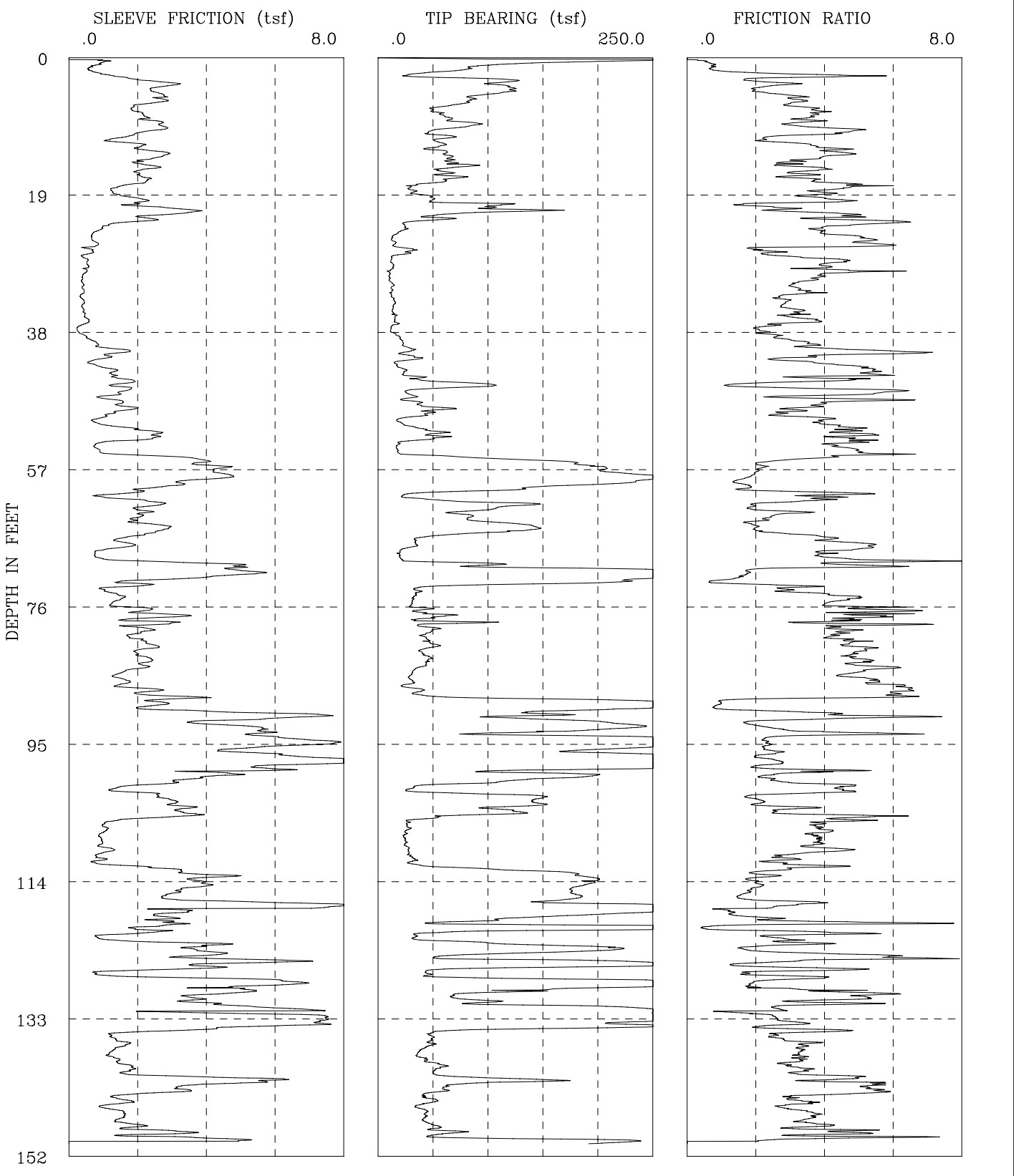
FIGURE A-5 e



I-436 SR-22 Phase 2	CPT-08-006
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-6a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-006
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 23.95013

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	162.45	0.77	0.48	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	76.38	0.63	0.82	0.09	sand to silty sand	>90	>48	18	UNDEFINED
0.95	3	63.52	1.49	2.35	0.15	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
1.25	4	113.90	2.86	2.51	0.22	silty sand to sandy silt	>90	46-48	36	UNDEFINED
1.55	5	115.30	2.51	2.17	0.28	silty sand to sandy silt	80-90	46-48	37	UNDEFINED
1.85	6	84.43	2.76	3.27	0.33	sandy silt to clayey silt	UNDFND	UNDFD	32	5.6
2.15	7	63.54	2.01	3.17	0.39	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
2.45	8	54.73	2.06	3.76	0.45	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
2.75	9	70.87	2.42	3.42	0.51	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
3.05	10	73.38	2.72	3.70	0.57	clayey silt to silty clay	UNDFND	UNDFD	35	4.8
3.35	11	54.98	1.90	3.46	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	56.38	1.52	2.69	0.69	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
3.95	13	53.42	2.17	4.07	0.75	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
4.25	14	63.43	2.72	4.28	0.81	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
4.55	15	73.86	2.10	2.84	0.87	sandy silt to clayey silt	UNDFND	UNDFD	28	4.8
4.85	16	62.42	2.22	3.56	0.93	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
5.15	17	65.35	2.18	3.34	0.98	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
5.45	18	42.04	1.86	4.43	1.04	silty clay to clay	UNDFND	UNDFD	27	2.7
5.75	19	31.71	1.28	4.04	1.10	silty clay to clay	UNDFND	UNDFD	20	2.0
6.05	20	48.78	1.96	4.01	1.16	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
6.40	21	104.43	2.40	2.30	1.23	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
6.70	22	79.82	3.00	3.76	1.29	clayey silt to silty clay	UNDFND	UNDFD	38	5.2
7.00	23	42.95	2.00	4.65	1.35	silty clay to clay	UNDFND	UNDFD	27	2.7
7.35	24	23.52	0.94	3.99	1.41	silty clay to clay	UNDFND	UNDFD	15	1.4
7.65	25	14.30	0.67	4.67	1.46	clay	UNDFND	UNDFD	14	.8
7.95	26	14.61	0.79	5.38	1.48	clay	UNDFND	UNDFD	14	.8
8.25	27	28.39	0.61	2.15	1.51	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
8.55	28	13.67	0.46	3.40	1.54	silty clay to clay	UNDFND	UNDFD	9	.8
8.85	29	13.23	0.54	4.12	1.57	clay	UNDFND	UNDFD	13	.7
9.15	30	10.79	0.47	4.38	1.60	clay	UNDFND	UNDFD	10	.6
9.45	31	10.52	0.39	3.68	1.63	clay	UNDFND	UNDFD	10	.5
9.75	32	13.07	0.41	3.11	1.65	silty clay to clay	UNDFND	UNDFD	8	.7
10.05	33	12.31	0.40	3.24	1.68	silty clay to clay	UNDFND	UNDFD	8	.6
10.35	34	14.68	0.41	2.81	1.71	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.65	35	13.72	0.40	2.95	1.74	silty clay to clay	UNDFND	UNDFD	9	.7
10.95	36	14.96	0.45	3.03	1.77	silty clay to clay	UNDFND	UNDFD	10	.8
11.25	37	16.01	0.53	3.31	1.80	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	11.83	0.26	2.20	1.82	clayey silt to silty clay	UNDFND	UNDFD	6	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.63	0.45	2.55	1.85	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	22.52	0.77	3.43	1.88	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	27.99	1.43	5.13	1.91	clay	UNDFND	UNDFD	27	1.7
12.80	42	29.48	0.96	3.27	1.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	17.73	0.83	4.67	1.97	clay	UNDFND	UNDFD	17	1.0
13.40	44	24.24	1.32	5.42	2.00	clay	UNDFND	UNDFD	23	1.4
13.75	45	55.41	1.62	2.93	2.03	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.05	46	64.79	1.58	2.43	2.06	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
14.35	47	29.69	1.21	4.07	2.09	silty clay to clay	UNDFND	UNDFD	19	1.7
14.65	48	32.38	1.44	4.44	2.12	silty clay to clay	UNDFND	UNDFD	21	1.9
14.95	49	52.70	1.67	3.17	2.14	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
15.25	50	32.61	1.01	3.10	2.17	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
15.55	51	22.71	0.93	4.11	2.20	silty clay to clay	UNDFND	UNDFD	15	1.3
15.85	52	47.86	2.26	4.73	2.23	silty clay to clay	UNDFND	UNDFD	31	2.9
16.15	53	47.63	2.28	4.79	2.26	silty clay to clay	UNDFND	UNDFD	30	2.9
16.45	54	18.02	0.82	4.52	2.29	clay	UNDFND	UNDFD	17	.9
16.75	55	21.24	1.11	5.21	2.31	clay	UNDFND	UNDFD	20	1.1
17.05	56	120.80	3.63	3.01	2.34	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8
17.35	57	195.95	4.16	2.12	2.37	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
17.65	58	227.67	4.46	1.96	2.40	sand to silty sand	70-80	40-42	>50	UNDEFINED
17.95	59	242.58	3.71	1.53	2.43	sand to silty sand	70-80	40-42	>50	UNDEFINED
18.25	60	144.72	2.54	1.75	2.46	sand to silty sand	60-70	38-40	35	UNDEFINED
18.55	61	32.52	1.34	4.12	2.48	silty clay to clay	UNDFND	UNDFD	21	1.9
18.85	62	92.90	2.38	2.56	2.51	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
19.20	63	94.62	2.15	2.27	2.54	silty sand to sandy silt	50-60	36-38	30	UNDEFINED
19.50	64	82.54	2.00	2.42	2.57	sandy silt to clayey silt	UNDFND	UNDFD	32	5.2
19.80	65	126.10	2.42	1.92	2.60	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.15	66	104.68	2.48	2.37	2.63	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.45	67	35.75	1.52	4.24	2.66	silty clay to clay	UNDFND	UNDFD	23	2.1
20.75	68	29.61	1.56	5.27	2.69	clay	UNDFND	UNDFD	28	1.7
21.05	69	19.51	0.76	3.91	2.72	silty clay to clay	UNDFND	UNDFD	12	1.0
21.35	70	51.59	2.44	4.73	2.75	silty clay to clay	UNDFND	UNDFD	33	3.1
21.65	71	183.98	4.92	2.67	2.78	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	284.59	4.66	1.64	2.81	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.25	73	178.65	2.05	1.15	2.83	sand to silty sand	60-70	38-40	43	UNDEFINED
22.55	74	37.16	1.16	3.11	2.86	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
22.85	75	32.94	1.51	4.59	2.89	silty clay to clay	UNDFND	UNDFD	21	1.8
23.15	76	30.33	1.31	4.33	2.92	silty clay to clay	UNDFND	UNDFD	19	1.7
23.45	77	40.64	2.27	5.57	2.95	clay	UNDFND	UNDFD	39	2.4
23.75	78	49.14	2.50	5.08	2.98	clay	UNDFND	UNDFD	47	2.9
24.05	79	58.91	2.43	4.12	3.00	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
24.35	80	46.35	2.11	4.55	3.03	silty clay to clay	UNDFND	UNDFD	30	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	43.88	2.01	4.57	3.06	silty clay to clay	UNDFND	UNDFD	28	2.6
24.95	82	49.09	2.41	4.90	3.09	silty clay to clay	UNDFND	UNDFD	31	2.9
25.25	83	41.14	2.00	4.87	3.12	silty clay to clay	UNDFND	UNDFD	26	2.4
25.60	84	45.40	2.28	5.01	3.15	clay	UNDFND	UNDFD	43	2.6
25.90	85	35.27	1.95	5.52	3.18	clay	UNDFND	UNDFD	34	2.0
26.20	86	29.36	1.41	4.82	3.21	clay	UNDFND	UNDFD	28	1.6
26.55	87	27.94	1.59	5.70	3.24	clay	UNDFND	UNDFD	27	1.5
26.85	88	36.55	2.29	6.28	3.27	clay	UNDFND	UNDFD	35	2.0
27.15	89	144.06	2.95	2.05	3.30	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
27.45	90	276.73	2.43	0.88	3.32	sand	70-80	40-42	>50	UNDEFINED
27.75	91	155.74	5.46	3.51	3.35	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.0
28.05	92	162.70	4.92	3.03	3.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	224.38	5.18	2.31	3.41	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
28.65	94	156.75	5.65	3.60	3.44	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
28.95	95	316.45	7.30	2.31	3.47	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
29.25	96	221.44	5.16	2.33	3.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
29.55	97	292.69	6.53	2.23	3.52	sand to silty sand	70-80	40-42	>50	UNDEFINED
29.85	98	304.81	7.81	2.56	3.55	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
30.15	99	185.34	5.18	2.80	3.58	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	172.86	4.09	2.37	3.61	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.75	101	72.03	2.46	3.42	3.64	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
31.05	102	45.82	1.71	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
31.35	103	145.21	2.81	1.93	3.69	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
31.65	104	129.56	3.25	2.51	3.72	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
32.00	105	106.14	3.35	3.16	3.75	sandy silt to clayey silt	UNDFND	UNDFD	41	6.6
32.30	106	33.99	1.49	4.39	3.78	silty clay to clay	UNDFND	UNDFD	22	1.8
32.60	107	27.13	1.05	3.88	3.81	silty clay to clay	UNDFND	UNDFD	17	1.3
32.95	108	24.39	0.93	3.79	3.84	silty clay to clay	UNDFND	UNDFD	16	1.1
33.25	109	24.87	0.93	3.75	3.87	silty clay to clay	UNDFND	UNDFD	16	1.2
33.55	110	27.90	1.14	4.09	3.90	silty clay to clay	UNDFND	UNDFD	18	1.4
33.85	111	31.44	0.89	2.82	3.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
34.15	112	40.50	1.37	3.38	3.96	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
34.45	113	149.32	3.39	2.27	3.99	silty sand to sandy silt	50-60	36-38	48	UNDEFINED
34.75	114	195.25	4.02	2.06	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	184.39	3.78	2.05	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.35	116	178.86	3.01	1.68	4.07	sand to silty sand	60-70	36-38	43	UNDEFINED
35.65	117	166.93	4.09	2.45	4.10	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	293.52	6.35	2.16	4.13	sand to silty sand	70-80	38-40	>50	UNDEFINED
36.25	119	203.09	2.92	1.44	4.16	sand to silty sand	60-70	36-38	49	UNDEFINED
36.55	120	89.66	2.95	3.29	4.18	sandy silt to clayey silt	UNDFND	UNDFD	34	5.5
36.85	121	284.22	2.34	0.82	4.21	sand	70-80	38-40	>50	UNDEFINED
37.15	122	36.08	1.23	3.42	4.24	clayey silt to silty clay	UNDFND	UNDFD	17	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6d

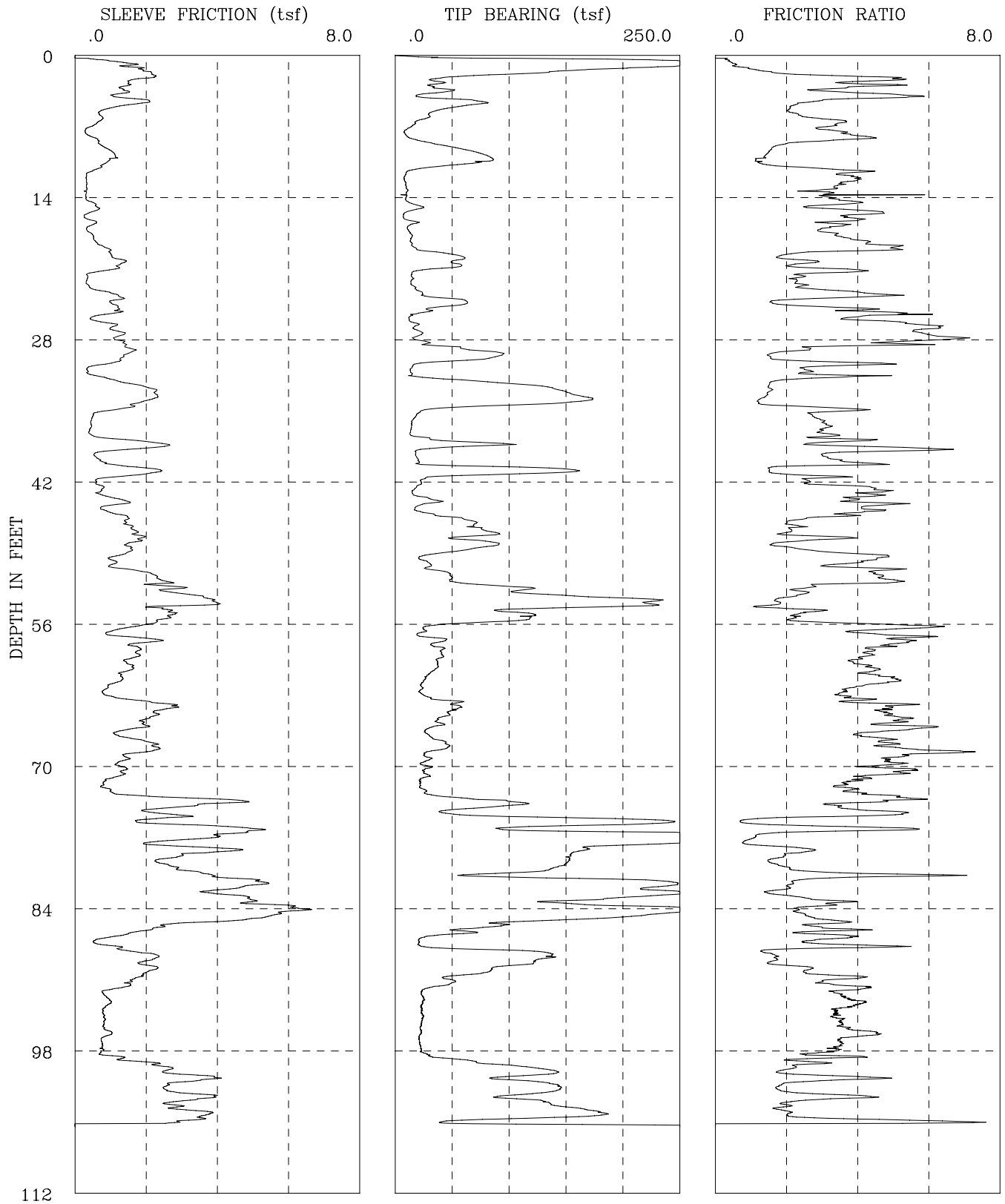
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	101.45	3.10	3.05	4.27	sandy silt to clayey silt	UNDFND	UNDFD	39	6.2
37.75	124	194.66	3.85	1.98	4.30	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.05	125	83.68	4.24	5.07	4.33	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	220.43	4.73	2.14	4.36	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.70	127	46.37	1.29	2.78	4.39	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
39.00	128	205.41	4.99	2.43	4.42	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.35	129	242.22	5.49	2.27	4.45	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
39.65	130	78.54	4.06	5.17	4.48	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	98.93	3.91	3.96	4.50	clayey silt to silty clay	UNDFND	UNDFD	47	6.0
40.25	132	241.09	5.40	2.24	4.53	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
40.55	133	283.46	6.92	2.44	4.56	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.85	134	243.92	6.92	2.84	4.59	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
41.15	135	99.59	2.95	2.96	4.62	sandy silt to clayey silt	UNDFND	UNDFD	38	6.1
41.45	136	48.78	1.29	2.65	4.65	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
41.75	137	46.78	1.61	3.44	4.67	clayey silt to silty clay	UNDFND	UNDFD	22	2.5
42.05	138	37.42	1.22	3.27	4.70	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
42.35	139	41.42	1.36	3.29	4.73	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
42.65	140	56.91	1.74	3.07	4.76	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2
42.95	141	53.32	1.97	3.70	4.79	clayey silt to silty clay	UNDFND	UNDFD	26	2.9
43.25	142	121.91	5.49	4.51	4.82	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	62.84	3.38	5.37	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.85	144	44.82	1.97	4.39	4.87	silty clay to clay	UNDFND	UNDFD	29	2.4
44.15	145	47.98	1.57	3.26	4.90	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
44.45	146	39.48	1.21	3.06	4.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.0
44.80	147	42.47	1.55	3.65	4.96	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
45.10	148	49.22	1.82	3.70	4.99	clayey silt to silty clay	UNDFND	UNDFD	24	2.6
45.40	149	61.08	2.67	4.37	5.02	clayey silt to silty clay	UNDFND	UNDFD	29	3.4
45.75	150	144.76	2.88	1.99	5.05	silty sand to sandy silt	50-60	34-36	46	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-6e



CPT-08-007	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-7a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-007
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :03/28/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	216.40	0.96	0.45	0.03	sand	>90	>48	41	UNDEFINED
0.60	2	148.05	1.98	1.34	0.09	sand to silty sand	>90	>48	35	UNDEFINED
0.95	3	36.63	1.61	4.41	0.15	silty clay to clay	UNDFND	UNDFD	23	2.4
1.25	4	33.72	1.28	3.79	0.22	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
1.55	5	64.49	1.68	2.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
1.85	6	33.60	0.75	2.22	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.15	7	18.31	0.61	3.34	0.39	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
2.45	8	9.44	0.34	3.64	0.45	clay	UNDFND	UNDFD	9	.5
2.75	9	31.55	0.69	2.20	0.51	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
3.05	10	72.20	1.06	1.46	0.57	silty sand to sandy silt	60-70	42-44	23	UNDEFINED
3.35	11	64.99	0.86	1.32	0.61	silty sand to sandy silt	60-70	40-42	21	UNDEFINED
3.65	12	11.54	0.42	3.62	0.64	clay	UNDFND	UNDFD	11	.7
3.95	13	8.86	0.32	3.62	0.67	clay	UNDFND	UNDFD	8	.5
4.25	14	10.13	0.32	3.12	0.69	silty clay to clay	UNDFND	UNDFD	6	.6
4.55	15	15.04	0.48	3.21	0.72	silty clay to clay	UNDFND	UNDFD	10	.9
4.85	16	11.13	0.43	3.88	0.75	clay	UNDFND	UNDFD	11	.6
5.15	17	13.23	0.46	3.47	0.78	silty clay to clay	UNDFND	UNDFD	8	.8
5.45	18	13.02	0.42	3.24	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	14.38	0.64	4.45	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	39.97	1.00	2.49	0.86	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
6.40	21	52.08	1.27	2.44	0.89	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
6.70	22	15.80	0.47	2.97	0.93	clayey silt to silty clay	UNDFND	UNDFD	8	.9
7.00	23	15.40	0.37	2.40	0.95	clayey silt to silty clay	UNDFND	UNDFD	7	.9
7.35	24	33.74	1.09	3.22	0.98	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
7.65	25	46.17	1.13	2.44	1.02	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
7.95	26	16.16	0.72	4.48	1.04	clay	UNDFND	UNDFD	15	.9
8.25	27	17.66	1.02	5.79	1.07	clay	UNDFND	UNDFD	17	1.0
8.55	28	20.56	1.25	6.08	1.10	clay	UNDFND	UNDFD	20	1.2
8.85	29	45.96	1.48	3.22	1.13	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
9.15	30	84.14	1.39	1.65	1.16	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
9.45	31	18.11	0.61	3.39	1.19	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
9.75	32	28.07	0.69	2.46	1.21	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
10.05	33	121.53	1.87	1.54	1.24	sand to silty sand	60-70	40-42	29	UNDEFINED
10.35	34	162.61	2.22	1.37	1.27	sand to silty sand	70-80	42-44	39	UNDEFINED
10.65	35	82.46	1.50	1.82	1.30	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
10.95	36	18.02	0.51	2.83	1.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
11.25	37	14.18	0.44	3.09	1.36	silty clay to clay	UNDFND	UNDFD	9	.7
11.55	38	22.16	0.78	3.51	1.38	clayey silt to silty clay	UNDFND	UNDFD	11	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.90	2.08	3.59	1.41	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
12.15	40	18.74	0.61	3.27	1.44	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
12.45	41	82.92	1.54	1.86	1.47	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
12.80	42	60.95	1.26	2.07	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	18.19	0.72	3.96	1.53	silty clay to clay	UNDFND	UNDFD	12	1.0
13.40	44	27.22	1.09	4.01	1.56	silty clay to clay	UNDFND	UNDFD	17	1.6
13.75	45	22.13	0.96	4.33	1.59	clay	UNDFND	UNDFD	21	1.2
14.05	46	58.74	1.44	2.45	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.35	47	77.98	1.64	2.11	1.65	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
14.65	48	72.15	1.76	2.43	1.68	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
14.95	49	62.49	1.51	2.42	1.70	sandy silt to clayey silt	UNDFND	UNDFD	24	3.9
15.25	50	25.22	1.09	4.32	1.73	silty clay to clay	UNDFND	UNDFD	16	1.4
15.55	51	36.25	1.53	4.22	1.76	silty clay to clay	UNDFND	UNDFD	23	2.2
15.85	52	51.84	2.38	4.59	1.79	silty clay to clay	UNDFND	UNDFD	33	3.2
16.15	53	107.86	2.72	2.52	1.82	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
16.45	54	202.76	3.78	1.87	1.85	sand to silty sand	70-80	40-42	49	UNDEFINED
16.75	55	138.33	2.65	1.92	1.87	silty sand to sandy silt	60-70	38-40	44	UNDEFINED
17.05	56	100.37	2.43	2.42	1.90	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
17.35	57	25.59	1.26	4.94	1.93	clay	UNDFND	UNDFD	25	1.4
17.65	58	34.30	1.82	5.31	1.96	clay	UNDFND	UNDFD	33	2.0
17.95	59	39.10	1.73	4.42	1.99	silty clay to clay	UNDFND	UNDFD	25	2.3
18.25	60	38.65	1.56	4.03	2.02	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
18.55	61	34.27	1.50	4.37	2.04	silty clay to clay	UNDFND	UNDFD	22	2.0
18.85	62	25.51	1.25	4.89	2.07	clay	UNDFND	UNDFD	24	1.4
19.20	63	23.04	0.85	3.71	2.10	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	44.90	1.96	4.37	2.13	silty clay to clay	UNDFND	UNDFD	29	2.7
19.80	65	50.87	2.44	4.79	2.16	silty clay to clay	UNDFND	UNDFD	32	3.1
20.15	66	37.85	1.98	5.22	2.19	clay	UNDFND	UNDFD	36	2.2
20.45	67	28.16	1.29	4.58	2.22	clay	UNDFND	UNDFD	27	1.6
20.75	68	42.73	2.05	4.80	2.25	silty clay to clay	UNDFND	UNDFD	27	2.5
21.05	69	31.04	1.80	5.81	2.28	clay	UNDFND	UNDFD	30	1.7
21.35	70	27.73	1.31	4.73	2.31	clay	UNDFND	UNDFD	27	1.5
21.65	71	26.57	1.33	4.99	2.34	clay	UNDFND	UNDFD	25	1.4
21.95	72	21.70	0.81	3.75	2.37	silty clay to clay	UNDFND	UNDFD	14	1.1
22.25	73	30.80	1.36	4.41	2.39	silty clay to clay	UNDFND	UNDFD	20	1.7
22.55	74	95.42	3.88	4.06	2.42	clayey silt to silty clay	UNDFND	UNDFD	46	6.0
22.85	75	63.37	2.47	3.90	2.45	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
23.15	76	196.07	2.70	1.38	2.48	sand to silty sand	70-80	40-42	47	UNDEFINED
23.45	77	239.29	4.55	1.90	2.51	sand to silty sand	70-80	40-42	>50	UNDEFINED
23.75	78	255.20	2.71	1.06	2.54	sand	80-90	40-42	49	UNDEFINED
24.05	79	158.51	3.65	2.30	2.56	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	149.73	2.50	1.67	2.59	sand to silty sand	60-70	38-40	36	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

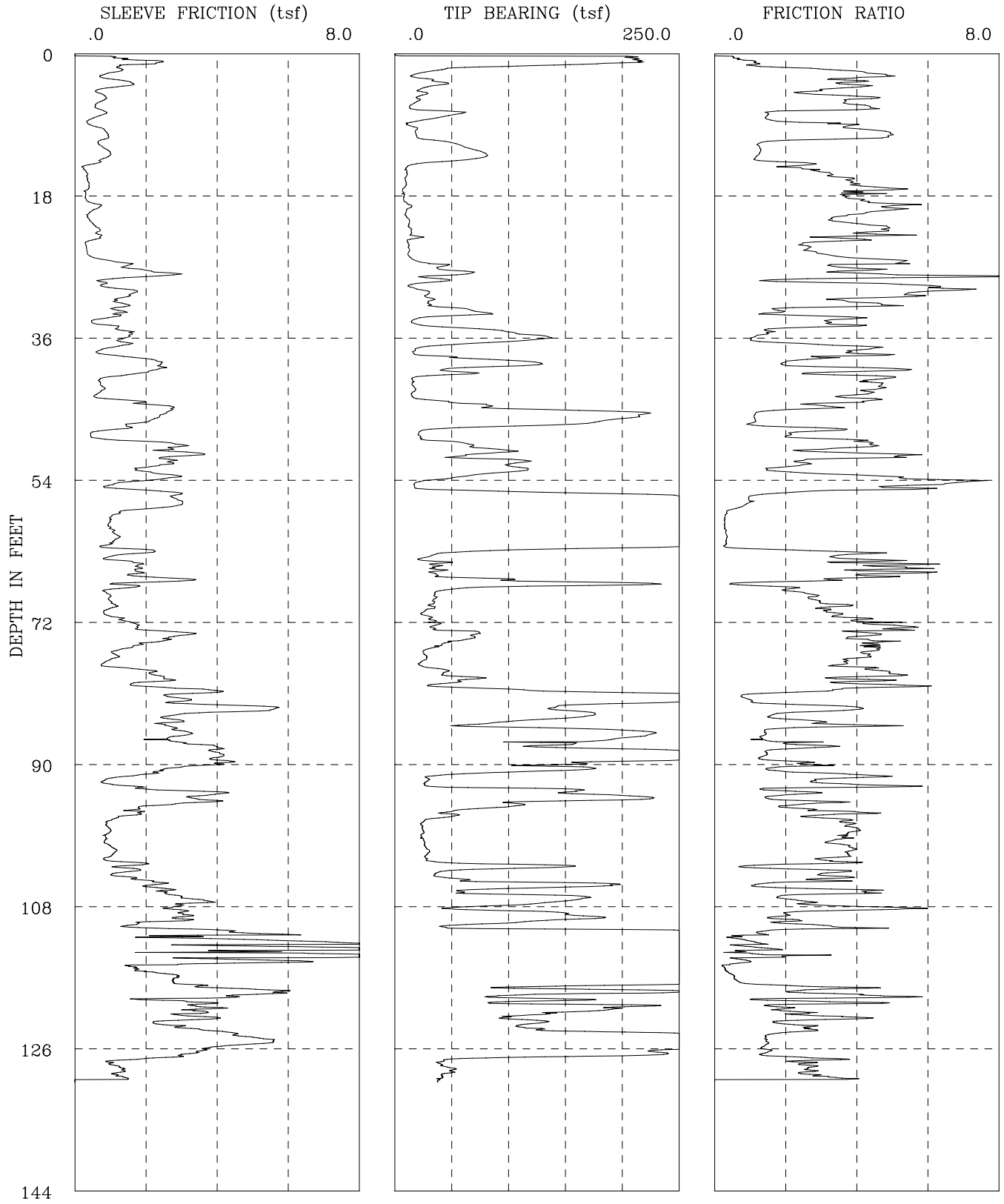
Figure A-7c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	103.90	3.48	3.35	2.62	sandy silt to clayey silt	UNDFND	UNDFD	40	6.6
24.95	82	226.47	5.02	2.22	2.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
25.25	83	233.29	4.22	1.81	2.68	sand to silty sand	70-80	40-42	>50	UNDEFINED
25.60	84	190.99	5.45	2.86	2.71	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
25.90	85	225.64	5.62	2.49	2.74	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
26.20	86	93.86	3.01	3.20	2.77	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
26.55	87	40.37	1.25	3.11	2.80	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
26.85	88	41.22	0.99	2.41	2.83	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
27.15	89	133.06	2.15	1.62	2.86	sand to silty sand	50-60	36-38	32	UNDEFINED
27.45	90	100.53	2.07	2.06	2.88	silty sand to sandy silt	50-60	34-36	32	UNDEFINED
27.75	91	57.92	1.80	3.11	2.91	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
28.05	92	37.83	1.33	3.52	2.94	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
28.35	93	23.96	0.86	3.60	2.97	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
28.65	94	23.41	0.89	3.79	3.00	silty clay to clay	UNDFND	UNDFD	15	1.1
28.95	95	23.63	0.81	3.44	3.03	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
29.25	96	22.55	0.82	3.64	3.05	silty clay to clay	UNDFND	UNDFD	14	1.1
29.55	97	21.59	0.88	4.06	3.08	silty clay to clay	UNDFND	UNDFD	14	1.0
29.85	98	22.18	0.77	3.45	3.11	clayey silt to silty clay	UNDFND	UNDFD	11	1.0
30.15	99	37.59	1.04	2.77	3.14	sandy silt to clayey silt	UNDFND	UNDFD	14	2.1
30.45	100	106.00	2.43	2.29	3.17	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
30.75	101	114.31	3.36	2.94	3.20	sandy silt to clayey silt	UNDFND	UNDFD	44	7.2
31.05	102	139.99	2.63	1.88	3.22	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.35	103	112.41	3.46	3.08	3.25	sandy silt to clayey silt	UNDFND	UNDFD	43	7.0
31.65	104	148.84	2.83	1.90	3.28	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
32.00	105	128.25	3.49	2.72	3.31	silty sand to sandy silt	50-60	36-38	41	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-7d



CPT-08-009	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-8a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-009
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	176.67	1.34	0.76	0.03	sand	>90	>48	34	UNDEFINED
0.60	2	110.06	1.54	1.40	0.09	sand to silty sand	>90	>48	26	UNDEFINED
0.95	3	22.26	0.92	4.15	0.15	silty clay to clay	UNDFND	UNDFD	14	1.4
1.25	4	38.08	1.47	3.86	0.22	clayey silt to silty clay	UNDFND	UNDFD	18	2.5
1.55	5	24.56	0.72	2.93	0.28	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
1.85	6	20.87	0.82	3.92	0.33	silty clay to clay	UNDFND	UNDFD	13	1.3
2.15	7	14.98	0.61	4.09	0.39	clay	UNDFND	UNDFD	14	.9
2.45	8	49.86	0.76	1.53	0.45	silty sand to sandy silt	50-60	40-42	16	UNDEFINED
2.75	9	18.88	0.39	2.08	0.51	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
3.05	10	18.26	0.78	4.29	0.57	clay	UNDFND	UNDFD	17	1.1
3.35	11	23.79	0.87	3.67	0.61	silty clay to clay	UNDFND	UNDFD	15	1.5
3.65	12	56.98	0.72	1.26	0.64	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.95	13	77.32	0.97	1.25	0.67	silty sand to sandy silt	60-70	40-42	25	UNDEFINED
4.25	14	49.19	0.71	1.44	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.70	0.27	2.52	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	9.98	0.34	3.45	0.75	clay	UNDFND	UNDFD	10	.6
5.15	17	9.53	0.38	4.04	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.31	0.31	4.30	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	8.33	0.34	4.09	0.84	clay	UNDFND	UNDFD	8	.4
6.05	20	12.40	0.63	5.05	0.86	clay	UNDFND	UNDFD	12	.7
6.40	21	10.39	0.38	3.68	0.89	clay	UNDFND	UNDFD	10	.6
6.70	22	12.52	0.52	4.17	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	14.35	0.67	4.70	0.95	clay	UNDFND	UNDFD	14	.8
7.35	24	14.78	0.48	3.25	0.98	silty clay to clay	UNDFND	UNDFD	9	.8
7.65	25	12.39	0.33	2.65	1.02	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.95	26	13.31	0.52	3.90	1.04	clay	UNDFND	UNDFD	13	.7
8.25	27	34.75	1.37	3.94	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
8.55	28	53.92	2.35	4.35	1.10	silty clay to clay	UNDFND	UNDFD	34	3.4
8.85	29	33.92	1.08	3.17	1.13	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.15	30	18.05	1.14	6.32	1.16	clay	UNDFND	UNDFD	17	1.0
9.45	31	29.51	1.48	5.02	1.19	clay	UNDFND	UNDFD	28	1.8
9.75	32	31.42	1.31	4.16	1.21	silty clay to clay	UNDFND	UNDFD	20	1.9
10.05	33	70.50	1.19	1.69	1.24	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
10.35	34	24.79	0.79	3.20	1.27	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
10.65	35	44.75	1.01	2.26	1.30	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.95	36	116.99	1.53	1.30	1.33	sand to silty sand	60-70	40-42	28	UNDEFINED
11.25	37	87.31	1.36	1.56	1.36	silty sand to sandy silt	50-60	38-40	28	UNDEFINED
11.55	38	19.08	0.79	4.16	1.38	silty clay to clay	UNDFND	UNDFD	12	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	60.44	1.67	2.76	1.41	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
12.15	40	99.25	2.42	2.44	1.44	silty sand to sandy silt	60-70	38-40	32	UNDEFINED
12.45	41	47.95	1.73	3.61	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	15.69	0.72	4.57	1.50	clay	UNDFND	UNDFD	15	.8
13.10	43	16.90	0.76	4.48	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	22.82	0.95	4.16	1.56	silty clay to clay	UNDFND	UNDFD	15	1.3
13.75	45	88.21	2.42	2.74	1.59	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
14.05	46	212.87	2.47	1.16	1.62	sand	80-90	42-44	41	UNDEFINED
14.35	47	166.63	1.83	1.10	1.65	sand to silty sand	70-80	40-42	40	UNDEFINED
14.65	48	35.55	0.96	2.71	1.68	sandy silt to clayey silt	UNDFND	UNDFD	14	2.1
14.95	49	27.45	0.85	3.11	1.70	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
15.25	50	69.66	2.81	4.03	1.73	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
15.55	51	78.70	3.02	3.84	1.76	clayey silt to silty clay	UNDFND	UNDFD	38	5.0
15.85	52	99.36	2.61	2.63	1.79	sandy silt to clayey silt	UNDFND	UNDFD	38	6.4
16.15	53	107.93	1.96	1.82	1.82	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
16.45	54	57.10	2.58	4.52	1.85	silty clay to clay	UNDFND	UNDFD	36	3.5
16.75	55	18.35	1.12	6.10	1.87	clay	UNDFND	UNDFD	18	1.0
17.05	56	142.23	2.50	1.76	1.90	silty sand to sandy silt	60-70	38-40	45	UNDEFINED
17.35	57	302.62	2.91	0.96	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	359.93	2.22	0.62	1.96	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.95	59	357.37	1.09	0.31	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	345.25	0.96	0.28	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	350.09	1.07	0.31	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	348.41	1.16	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	205.38	1.35	0.66	2.10	sand	70-80	40-42	39	UNDEFINED
19.50	64	31.89	1.24	3.88	2.13	silty clay to clay	UNDFND	UNDFD	20	1.8
19.80	65	36.97	1.68	4.55	2.16	silty clay to clay	UNDFND	UNDFD	24	2.2
20.15	66	36.07	1.72	4.78	2.19	clay	UNDFND	UNDFD	35	2.1
20.45	67	129.77	2.38	1.83	2.22	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
20.75	68	86.11	1.28	1.49	2.25	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.05	69	35.09	0.95	2.71	2.28	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0
21.35	70	33.27	1.08	3.24	2.31	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
21.65	71	27.00	0.87	3.21	2.34	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
21.95	72	32.72	1.31	4.01	2.37	silty clay to clay	UNDFND	UNDFD	21	1.8
22.25	73	35.45	1.81	5.09	2.39	clay	UNDFND	UNDFD	34	2.0
22.55	74	70.72	2.93	4.14	2.42	clayey silt to silty clay	UNDFND	UNDFD	34	4.4
22.85	75	47.99	2.14	4.45	2.45	silty clay to clay	UNDFND	UNDFD	31	2.9
23.15	76	28.22	1.25	4.43	2.48	silty clay to clay	UNDFND	UNDFD	18	1.5
23.45	77	26.78	1.07	4.00	2.51	silty clay to clay	UNDFND	UNDFD	17	1.4
23.75	78	27.32	1.08	3.95	2.54	silty clay to clay	UNDFND	UNDFD	17	1.5
24.05	79	48.32	2.26	4.68	2.56	silty clay to clay	UNDFND	UNDFD	31	2.9
24.35	80	54.32	2.17	3.99	2.59	clayey silt to silty clay	UNDFND	UNDFD	26	3.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	103.75	3.23	3.11	2.62	sandy silt to clayey silt	UNDFND	UNDFD	40	6.5
24.95	82	326.66	2.89	0.88	2.65	sand	80-90	40-42	>50	UNDEFINED
25.25	83	182.41	4.15	2.28	2.68	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
25.60	84	163.72	3.76	2.30	2.71	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
25.90	85	100.74	2.70	2.68	2.74	sandy silt to clayey silt	UNDFND	UNDFD	39	6.3
26.20	86	166.32	2.91	1.75	2.77	sand to silty sand	60-70	38-40	40	UNDEFINED
26.55	87	200.53	2.78	1.38	2.80	sand to silty sand	70-80	38-40	48	UNDEFINED
26.85	88	160.88	3.75	2.33	2.83	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.15	89	286.40	4.04	1.41	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.45	90	206.49	4.04	1.95	2.88	sand to silty sand	70-80	38-40	49	UNDEFINED
27.75	91	139.13	2.57	1.85	2.91	silty sand to sandy silt	60-70	36-38	44	UNDEFINED
28.05	92	34.29	1.29	3.75	2.94	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
28.35	93	45.98	1.29	2.81	2.97	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
28.65	94	170.87	3.51	2.05	3.00	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.95	95	163.46	3.43	2.10	3.03	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
29.25	96	77.60	1.86	2.39	3.05	sandy silt to clayey silt	UNDFND	UNDFD	30	4.7
29.55	97	43.32	1.43	3.29	3.08	clayey silt to silty clay	UNDFND	UNDFD	21	2.5
29.85	98	24.11	0.91	3.76	3.11	silty clay to clay	UNDFND	UNDFD	15	1.2
30.15	99	24.52	0.95	3.87	3.14	silty clay to clay	UNDFND	UNDFD	16	1.2
30.45	100	24.94	0.85	3.42	3.17	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
30.75	101	27.60	1.05	3.81	3.20	silty clay to clay	UNDFND	UNDFD	18	1.4
31.05	102	28.23	1.01	3.58	3.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.4
31.35	103	75.49	1.43	1.90	3.25	silty sand to sandy silt	40-50	32-34	24	UNDEFINED
31.65	104	67.26	1.44	2.14	3.28	silty sand to sandy silt	<40	30-32	21	UNDEFINED
32.00	105	69.78	1.79	2.56	3.31	sandy silt to clayey silt	UNDFND	UNDFD	27	4.2
32.30	106	131.75	2.34	1.77	3.34	silty sand to sandy silt	50-60	36-38	42	UNDEFINED
32.60	107	121.84	2.82	2.32	3.37	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
32.95	108	114.00	3.24	2.84	3.40	sandy silt to clayey silt	UNDFND	UNDFD	44	7.1
33.25	109	118.33	3.01	2.55	3.43	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
33.55	110	143.40	2.65	1.85	3.46	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
33.85	111	120.94	2.56	2.12	3.49	silty sand to sandy silt	50-60	34-36	39	UNDEFINED
34.15	112	459.01	4.06	0.88	3.52	gravelly sand to sand	>90	42-44	>50	UNDEFINED
34.45	113	625.38	6.09	0.97	3.55	gravelly sand to sand	>90	42-44	>50	UNDEFINED
34.75	114	651.22	7.45	1.14	3.57	sand	>90	42-44	>50	UNDEFINED
35.05	115	611.68	7.34	1.20	3.60	sand	>90	42-44	>50	UNDEFINED
35.35	116	636.71	2.30	0.36	3.63	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.65	117	550.17	2.55	0.46	3.66	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.95	118	370.38	2.95	0.80	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	185.88	4.99	2.69	3.72	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
36.55	120	121.64	3.70	3.04	3.74	sandy silt to clayey silt	UNDFND	UNDFD	47	7.6
36.85	121	163.10	3.63	2.23	3.77	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.15	122	139.79	3.30	2.36	3.80	silty sand to sandy silt	50-60	36-38	45	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

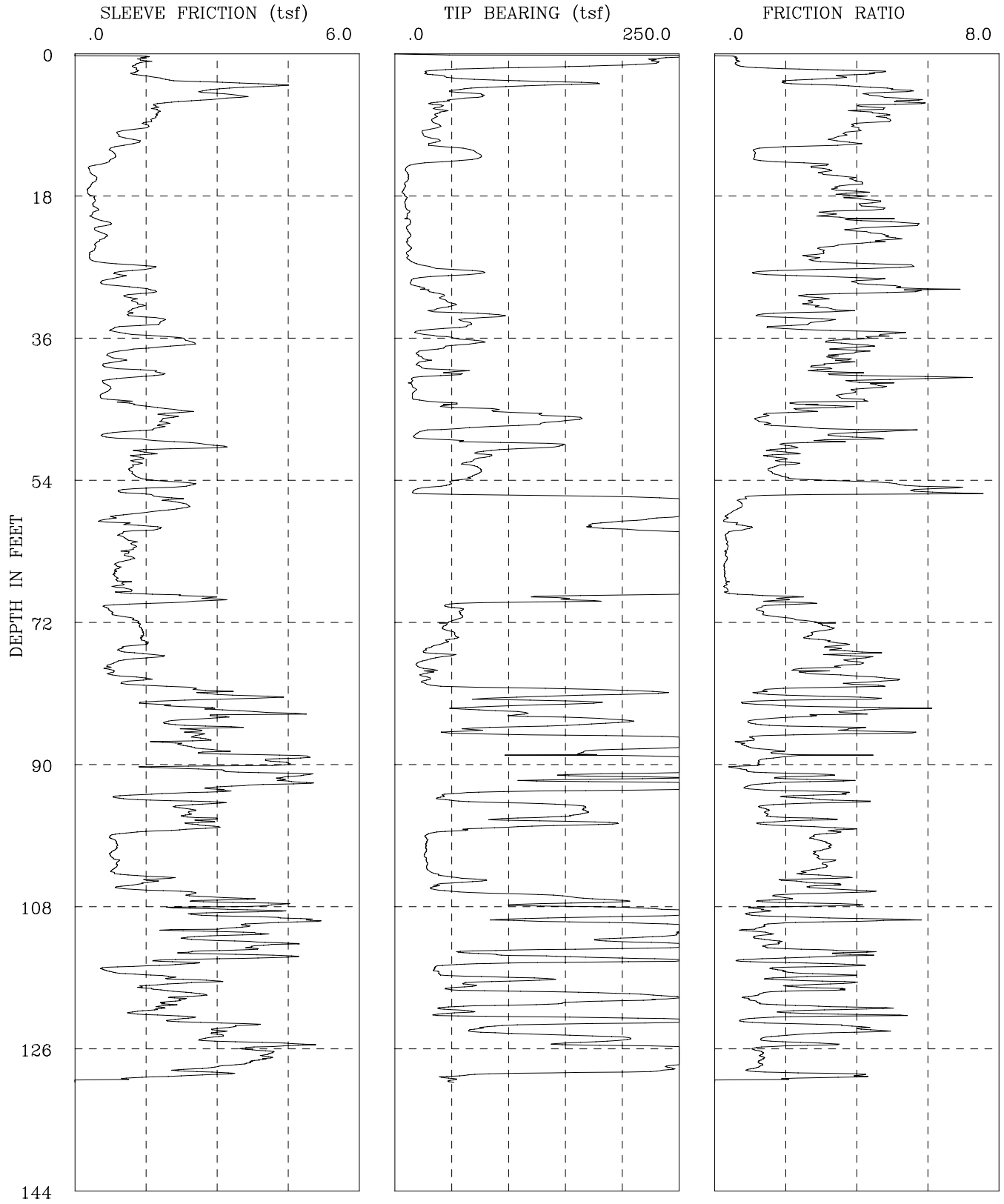
Figure A-8d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	116.43	2.94	2.52	3.83	silty sand to sandy silt	50-60	34-36	37	UNDEFINED
37.75	124	130.60	3.39	2.60	3.86	silty sand to sandy silt	50-60	34-36	42	UNDEFINED
38.05	125	327.37	4.90	1.50	3.89	sand to silty sand	80-90	40-42	>50	UNDEFINED
38.40	126	325.27	4.64	1.43	3.92	sand	80-90	40-42	>50	UNDEFINED
38.70	127	217.86	3.28	1.51	3.95	sand to silty sand	60-70	38-40	>50	UNDEFINED
39.00	128	49.93	1.36	2.73	3.97	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
39.35	129	47.90	1.27	2.65	4.01	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
39.65	130	39.94	0.87	2.19	4.04	sandy silt to clayey silt	UNDFND	UNDFD	15	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8e



CPT-08-013	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-9a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-013
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	221.69	1.21	0.54	0.03	sand	>90	>48	42	UNDEFINED
0.60	2	152.50	1.28	0.84	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	37.31	1.44	3.86	0.15	clayey silt to silty clay	UNDFND	UNDFD	18	2.4
1.25	4	131.37	3.31	2.52	0.22	silty sand to sandy silt	>90	>48	42	UNDEFINED
1.55	5	62.35	2.98	4.78	0.28	silty clay to clay	UNDFND	UNDFD	40	4.1
1.85	6	60.18	3.00	4.98	0.33	silty clay to clay	UNDFND	UNDFD	38	3.9
2.15	7	36.81	1.72	4.67	0.39	silty clay to clay	UNDFND	UNDFD	24	2.4
2.45	8	38.49	1.74	4.51	0.45	silty clay to clay	UNDFND	UNDFD	25	2.5
2.75	9	34.86	1.55	4.44	0.51	silty clay to clay	UNDFND	UNDFD	22	2.2
3.05	10	30.49	1.20	3.93	0.57	silty clay to clay	UNDFND	UNDFD	19	1.9
3.35	11	32.88	1.11	3.38	0.61	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
3.65	12	39.30	0.98	2.48	0.64	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
3.95	13	73.07	0.83	1.13	0.67	silty sand to sandy silt	60-70	40-42	23	UNDEFINED
4.25	14	51.62	0.72	1.39	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.53	0.32	3.02	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	11.70	0.41	3.51	0.75	silty clay to clay	UNDFND	UNDFD	7	.7
5.15	17	9.41	0.36	3.84	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.53	0.28	3.69	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	9.60	0.41	4.24	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	10.03	0.43	4.30	0.86	clay	UNDFND	UNDFD	10	.5
6.40	21	11.42	0.39	3.41	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	12.43	0.64	5.13	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	12.24	0.53	4.32	0.95	clay	UNDFND	UNDFD	12	.7
7.35	24	11.49	0.53	4.62	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	13.00	0.40	3.09	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	11.21	0.31	2.79	1.04	silty clay to clay	UNDFND	UNDFD	7	.6
8.25	27	22.68	1.08	4.78	1.07	clay	UNDFND	UNDFD	22	1.4
8.55	28	63.75	1.09	1.71	1.10	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
8.85	29	18.14	0.71	3.90	1.13	silty clay to clay	UNDFND	UNDFD	12	1.0
9.15	30	23.23	1.25	5.37	1.16	clay	UNDFND	UNDFD	22	1.4
9.45	31	39.65	1.28	3.22	1.19	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.75	32	48.68	1.32	2.71	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	49.00	1.19	2.43	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.35	34	72.45	1.65	2.28	1.27	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
10.65	35	54.74	1.20	2.19	1.30	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
10.95	36	29.90	1.37	4.59	1.33	silty clay to clay	UNDFND	UNDFD	19	1.8
11.25	37	65.90	2.40	3.64	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.2
11.55	38	31.44	1.21	3.86	1.38	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-9b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	24.01	0.84	3.48	1.41	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
12.15	40	22.03	0.70	3.20	1.44	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	47.99	1.67	3.49	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	14.78	0.73	4.92	1.50	clay	UNDFND	UNDFD	14	.8
13.10	43	17.07	0.70	4.10	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	18.06	0.70	3.86	1.56	silty clay to clay	UNDFND	UNDFD	12	1.0
13.75	45	58.87	1.54	2.62	1.59	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.05	46	128.95	2.08	1.61	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	135.90	1.84	1.36	1.65	sand to silty sand	60-70	40-42	33	UNDEFINED
14.65	48	40.11	1.35	3.36	1.68	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.95	49	30.92	1.08	3.50	1.70	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
15.25	50	126.49	2.68	2.12	1.73	silty sand to sandy silt	60-70	38-40	40	UNDEFINED
15.55	51	79.67	1.40	1.76	1.76	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
15.85	52	66.65	1.33	2.00	1.79	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
16.15	53	74.04	1.18	1.60	1.82	silty sand to sandy silt	40-50	36-38	24	UNDEFINED
16.45	54	65.99	1.35	2.05	1.85	silty sand to sandy silt	40-50	34-36	21	UNDEFINED
16.75	55	42.30	2.20	5.20	1.87	clay	UNDFND	UNDFD	41	2.6
17.05	56	42.41	1.22	2.88	1.90	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
17.35	57	270.93	2.05	0.76	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	322.94	2.17	0.67	1.96	sand	>90	42-44	>50	UNDEFINED
17.95	59	271.44	1.00	0.37	1.99	gravelly sand to sand	80-90	42-44	43	UNDEFINED
18.25	60	184.07	1.06	0.57	2.02	sand	70-80	40-42	35	UNDEFINED
18.55	61	240.92	1.31	0.54	2.04	sand	80-90	40-42	46	UNDEFINED
18.85	62	335.61	1.11	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	343.25	1.19	0.35	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	347.37	1.14	0.33	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	325.24	0.93	0.29	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	308.74	0.85	0.27	2.19	gravelly sand to sand	80-90	42-44	49	UNDEFINED
20.45	67	294.69	0.94	0.32	2.22	gravelly sand to sand	80-90	42-44	47	UNDEFINED
20.75	68	312.45	1.05	0.33	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	193.92	2.23	1.15	2.28	sand	70-80	40-42	37	UNDEFINED
21.35	70	85.13	1.54	1.81	2.31	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.65	71	57.93	0.75	1.30	2.34	silty sand to sandy silt	<40	32-34	18	UNDEFINED
21.95	72	54.08	1.20	2.22	2.37	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
22.25	73	43.96	1.39	3.15	2.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.6
22.55	74	53.03	1.43	2.69	2.42	sandy silt to clayey silt	UNDFND	UNDFD	20	3.2
22.85	75	42.52	1.42	3.33	2.45	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
23.15	76	29.27	1.07	3.65	2.48	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
23.45	77	36.28	1.39	3.83	2.51	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
23.75	78	22.25	0.73	3.27	2.54	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
24.05	79	28.59	0.88	3.07	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	27.66	1.25	4.53	2.59	clay	UNDFND	UNDFD	26	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-9c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	151.28	2.53	1.67	2.62	sand to silty sand	60-70	38-40	36	UNDEFINED
24.95	82	135.12	3.32	2.46	2.65	silty sand to sandy silt	60-70	36-38	43	UNDEFINED
25.25	83	122.70	1.99	1.62	2.68	sand to silty sand	50-60	36-38	29	UNDEFINED
25.60	84	105.54	3.53	3.34	2.71	sandy silt to clayey silt	UNDFND	UNDFD	40	6.7
25.90	85	187.58	2.18	1.16	2.74	sand	70-80	38-40	36	UNDEFINED
26.20	86	73.92	2.71	3.66	2.77	clayey silt to silty clay	UNDFND	UNDFD	35	4.5
26.55	87	216.57	2.51	1.16	2.80	sand	70-80	38-40	41	UNDEFINED
26.85	88	253.25	2.43	0.96	2.83	sand	70-80	40-42	49	UNDEFINED
27.15	89	193.09	3.70	1.91	2.86	sand to silty sand	70-80	38-40	46	UNDEFINED
27.45	90	336.49	4.31	1.28	2.88	sand	80-90	40-42	>50	UNDEFINED
27.75	91	329.36	2.78	0.84	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	176.66	4.55	2.57	2.94	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.35	93	316.67	3.81	1.20	2.97	sand	80-90	40-42	>50	UNDEFINED
28.65	94	98.30	2.18	2.22	3.00	silty sand to sandy silt	50-60	34-36	31	UNDEFINED
28.95	95	68.39	1.98	2.90	3.03	sandy silt to clayey silt	UNDFND	UNDFD	26	4.1
29.25	96	165.82	2.33	1.41	3.05	sand to silty sand	60-70	38-40	40	UNDEFINED
29.55	97	135.73	2.55	1.88	3.08	silty sand to sandy silt	50-60	36-38	43	UNDEFINED
29.85	98	150.63	2.73	1.81	3.11	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
30.15	99	46.04	1.57	3.41	3.14	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
30.45	100	27.76	0.81	2.91	3.17	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
30.75	101	27.47	0.87	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.05	102	26.69	0.76	2.86	3.22	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
31.35	103	28.13	0.89	3.16	3.25	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.65	104	30.83	0.82	2.65	3.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.00	105	58.65	1.60	2.72	3.31	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
32.30	106	36.49	1.23	3.38	3.34	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
32.60	107	124.23	2.74	2.21	3.37	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.95	108	165.71	3.35	2.02	3.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
33.25	109	266.87	3.17	1.19	3.43	sand	70-80	38-40	>50	UNDEFINED
33.55	110	150.47	4.47	2.97	3.46	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
33.85	111	260.23	3.10	1.19	3.49	sand	70-80	38-40	50	UNDEFINED
34.15	112	231.12	3.09	1.34	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	233.85	3.79	1.62	3.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.75	114	119.93	3.08	2.57	3.57	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
35.05	115	193.54	3.19	1.65	3.60	sand to silty sand	60-70	36-38	46	UNDEFINED
35.35	116	48.11	1.36	2.82	3.63	sandy silt to clayey silt	UNDFND	UNDFD	18	2.7
35.65	117	46.39	1.00	2.17	3.66	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
35.95	118	92.32	2.29	2.48	3.69	sandy silt to clayey silt	UNDFND	UNDFD	35	5.6
36.25	119	91.47	1.84	2.02	3.72	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
36.55	120	229.01	2.35	1.03	3.74	sand	70-80	38-40	44	UNDEFINED
36.85	121	95.88	1.88	1.96	3.77	silty sand to sandy silt	40-50	32-34	31	UNDEFINED
37.15	122	56.55	1.58	2.80	3.80	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

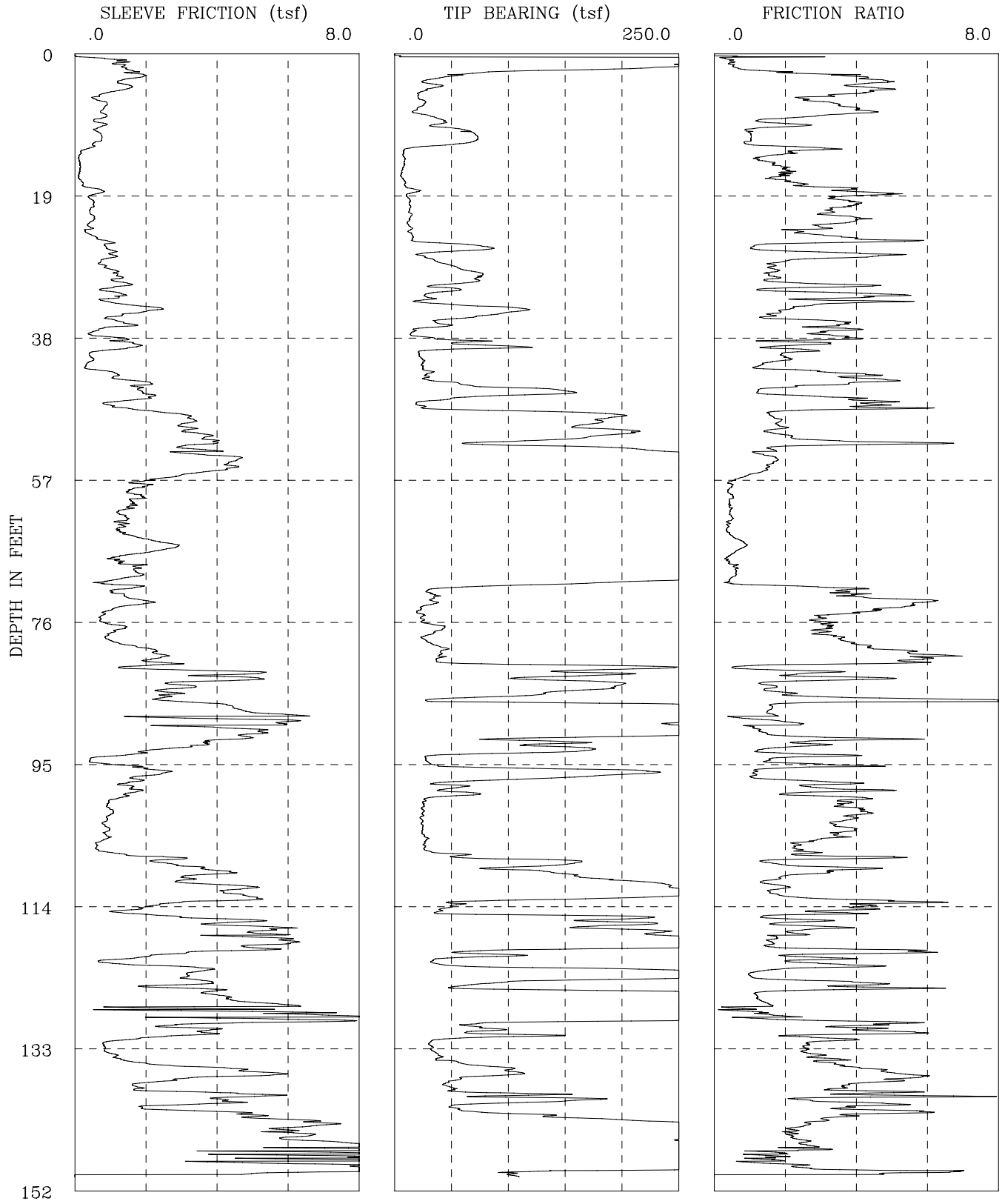
Figure A-9d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.82	2.62	1.17	3.83	sand	70-80	38-40	43	UNDEFINED
37.75	124	76.88	3.16	4.11	3.86	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
38.05	125	168.18	2.89	1.72	3.89	sand to silty sand	60-70	36-38	40	UNDEFINED
38.40	126	217.42	3.96	1.82	3.92	sand to silty sand	60-70	38-40	>50	UNDEFINED
38.70	127	313.08	4.04	1.29	3.95	sand	70-80	40-42	>50	UNDEFINED
39.00	128	290.48	3.81	1.31	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	216.19	2.80	1.29	4.01	sand	60-70	38-40	41	UNDEFINED
39.65	130	52.30	1.29	2.48	4.04	sandy silt to clayey silt	UNDFND	UNDFD	20	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-9e



CPT-08-015	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-10a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: HOV Connector
Job No. : CPT-08-015
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :04/01/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	188.91	0.68	0.36	0.03	sand	>90	>48	36	UNDEFINED
0.60	2	245.14	1.33	0.54	0.09	sand	>90	>48	47	UNDEFINED
0.95	3	80.00	1.73	2.16	0.15	silty sand to sandy silt	80-90	46-48	26	UNDEFINED
1.25	4	30.23	1.34	4.43	0.22	silty clay to clay	UNDFND	UNDFD	19	2.0
1.55	5	31.90	1.39	4.35	0.28	silty clay to clay	UNDFND	UNDFD	20	2.1
1.85	6	20.96	0.64	3.07	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
2.15	7	25.59	0.84	3.29	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
2.45	8	19.04	0.78	4.09	0.45	silty clay to clay	UNDFND	UNDFD	12	1.2
2.75	9	37.50	0.71	1.89	0.51	sandy silt to clayey silt	UNDFND	UNDFD	14	2.4
3.05	10	42.04	0.75	1.78	0.57	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
3.35	11	68.39	0.67	0.99	0.61	sand to silty sand	60-70	40-42	16	UNDEFINED
3.65	12	69.52	0.68	0.97	0.64	sand to silty sand	60-70	40-42	17	UNDEFINED
3.95	13	21.50	0.39	1.83	0.67	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
4.25	14	7.98	0.13	1.66	0.69	clayey silt to silty clay	UNDFND	UNDFD	4	.4
4.55	15	8.56	0.13	1.52	0.72	clayey silt to silty clay	UNDFND	UNDFD	4	.5
4.85	16	6.84	0.14	2.04	0.75	silty clay to clay	UNDFND	UNDFD	4	.3
5.15	17	6.58	0.12	1.84	0.78	silty clay to clay	UNDFND	UNDFD	4	.3
5.45	18	9.47	0.25	2.64	0.81	silty clay to clay	UNDFND	UNDFD	6	.5
5.75	19	16.34	0.67	4.13	0.84	clay	UNDFND	UNDFD	16	1.0
6.05	20	12.53	0.46	3.65	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	13.31	0.48	3.61	0.89	silty clay to clay	UNDFND	UNDFD	9	.8
6.70	22	13.93	0.49	3.49	0.93	silty clay to clay	UNDFND	UNDFD	9	.8
7.00	23	12.17	0.43	3.53	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
7.35	24	14.05	0.37	2.67	0.98	clayey silt to silty clay	UNDFND	UNDFD	7	.8
7.65	25	16.25	0.70	4.28	1.02	clay	UNDFND	UNDFD	16	.9
7.95	26	70.30	0.91	1.30	1.04	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
8.25	27	36.15	1.09	3.00	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
8.55	28	35.95	0.79	2.20	1.10	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
8.85	29	57.12	0.96	1.68	1.13	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
9.15	30	74.57	1.22	1.63	1.16	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
9.45	31	57.77	1.32	2.29	1.19	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
9.75	32	45.23	0.98	2.17	1.21	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.05	33	27.73	1.11	3.99	1.24	silty clay to clay	UNDFND	UNDFD	18	1.7
10.35	34	60.12	1.61	2.68	1.27	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
10.65	35	101.12	1.84	1.82	1.30	silty sand to sandy silt	60-70	38-40	32	UNDEFINED
10.95	36	49.06	1.12	2.28	1.33	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
11.25	37	33.56	1.14	3.41	1.36	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
11.55	38	18.57	0.62	3.32	1.38	clayey silt to silty clay	UNDFND	UNDFD	9	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-10b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	57.41	1.51	2.63	1.41	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
12.15	40	64.46	1.18	1.84	1.44	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
12.45	41	22.56	0.45	2.01	1.47	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
12.80	42	24.89	0.35	1.40	1.50	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
13.10	43	28.76	0.97	3.37	1.53	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
13.40	44	35.14	1.50	4.27	1.56	silty clay to clay	UNDFND	UNDFD	22	2.1
13.75	45	104.77	1.87	1.78	1.59	silty sand to sandy silt	60-70	38-40	33	UNDEFINED
14.05	46	99.53	2.07	2.08	1.62	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.35	47	25.19	1.11	4.40	1.65	silty clay to clay	UNDFND	UNDFD	16	1.4
14.65	48	96.06	1.98	2.06	1.68	silty sand to sandy silt	50-60	38-40	31	UNDEFINED
14.95	49	190.00	3.26	1.72	1.70	sand to silty sand	70-80	40-42	45	UNDEFINED
15.25	50	169.05	3.14	1.86	1.73	sand to silty sand	70-80	40-42	40	UNDEFINED
15.55	51	200.67	3.40	1.69	1.76	sand to silty sand	70-80	40-42	48	UNDEFINED
15.85	52	127.34	3.82	3.00	1.79	sandy silt to clayey silt	UNDFND	UNDFD	49	8.2
16.15	53	163.46	3.32	2.03	1.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
16.45	54	262.62	3.75	1.43	1.85	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.75	55	265.52	4.41	1.66	1.87	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.05	56	287.07	4.15	1.45	1.90	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.35	57	328.80	2.71	0.83	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	402.74	1.90	0.47	1.96	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.95	59	382.21	1.58	0.41	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	368.25	1.75	0.47	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	357.14	1.59	0.45	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	286.20	1.29	0.45	2.07	gravelly sand to sand	80-90	42-44	46	UNDEFINED
19.20	63	318.32	1.35	0.43	2.10	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
19.50	64	344.13	1.28	0.37	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	319.72	1.72	0.54	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	317.79	2.67	0.84	2.19	sand	80-90	42-44	>50	UNDEFINED
20.45	67	345.99	1.91	0.55	2.22	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.75	68	311.68	1.17	0.38	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	290.11	1.74	0.60	2.28	sand	80-90	42-44	>50	UNDEFINED
21.35	70	299.59	1.72	0.57	2.31	sand	80-90	42-44	>50	UNDEFINED
21.65	71	194.12	1.06	0.54	2.34	sand	70-80	40-42	37	UNDEFINED
21.95	72	39.99	1.33	3.34	2.37	clayey silt to silty clay	UNDFND	UNDFD	19	2.3
22.25	73	33.88	1.53	4.51	2.39	silty clay to clay	UNDFND	UNDFD	22	1.9
22.55	74	30.84	1.76	5.71	2.42	clay	UNDFND	UNDFD	30	1.7
22.85	75	22.20	0.91	4.10	2.45	silty clay to clay	UNDFND	UNDFD	14	1.1
23.15	76	24.14	0.72	2.98	2.48	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
23.45	77	38.80	1.22	3.15	2.51	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
23.75	78	31.52	0.99	3.14	2.54	clayey silt to silty clay	UNDFND	UNDFD	15	1.7
24.05	79	28.49	1.07	3.76	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	41.83	2.01	4.80	2.59	silty clay to clay	UNDFND	UNDFD	27	2.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-10c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	40.15	2.37	5.91	2.62	clay	UNDFND	UNDFD	38	2.3
24.95	82	96.28	2.21	2.29	2.65	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
25.25	83	192.03	3.50	1.82	2.68	sand to silty sand	70-80	38-40	46	UNDEFINED
25.60	84	150.60	4.23	2.81	2.71	silty sand to sandy silt	60-70	38-40	48	UNDEFINED
25.90	85	192.89	2.94	1.52	2.74	sand to silty sand	70-80	38-40	46	UNDEFINED
26.20	86	124.28	2.62	2.11	2.77	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
26.55	87	127.55	3.23	2.53	2.80	silty sand to sandy silt	50-60	36-38	41	UNDEFINED
26.85	88	302.79	4.70	1.55	2.83	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.15	89	377.33	4.52	1.20	2.86	sand	80-90	42-44	>50	UNDEFINED
27.45	90	288.73	5.02	1.74	2.88	sand to silty sand	80-90	40-42	>50	UNDEFINED
27.75	91	373.10	5.08	1.36	2.91	sand	80-90	42-44	>50	UNDEFINED
28.05	92	141.71	4.30	3.03	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.0
28.35	93	149.17	3.11	2.08	2.97	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
28.65	94	82.90	1.51	1.82	3.00	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
28.95	95	29.29	0.57	1.95	3.03	sandy silt to clayey silt	UNDFND	UNDFD	11	1.5
29.25	96	138.01	2.12	1.54	3.05	sand to silty sand	50-60	36-38	33	UNDEFINED
29.55	97	171.93	1.99	1.16	3.08	sand to silty sand	60-70	38-40	41	UNDEFINED
29.85	98	53.36	1.55	2.90	3.11	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
30.15	99	54.62	1.64	3.00	3.14	sandy silt to clayey silt	UNDFND	UNDFD	21	3.2
30.45	100	36.76	1.22	3.31	3.17	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
30.75	101	25.05	0.93	3.70	3.20	silty clay to clay	UNDFND	UNDFD	16	1.2
31.05	102	24.96	1.03	4.12	3.22	silty clay to clay	UNDFND	UNDFD	16	1.2
31.35	103	23.64	0.86	3.65	3.25	silty clay to clay	UNDFND	UNDFD	15	1.1
31.65	104	24.51	0.91	3.72	3.28	silty clay to clay	UNDFND	UNDFD	16	1.2
32.00	105	26.15	0.89	3.40	3.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
32.30	106	26.36	0.65	2.46	3.34	sandy silt to clayey silt	UNDFND	UNDFD	10	1.3
32.60	107	34.79	0.85	2.44	3.37	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.95	108	106.57	2.39	2.24	3.40	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
33.25	109	116.40	3.31	2.84	3.43	sandy silt to clayey silt	UNDFND	UNDFD	45	7.3
33.55	110	150.02	3.75	2.50	3.46	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
33.85	111	213.65	3.32	1.55	3.49	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.15	112	256.62	4.60	1.79	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	223.71	4.88	2.18	3.55	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
34.75	114	56.36	2.74	4.87	3.57	silty clay to clay	UNDFND	UNDFD	36	3.3
35.05	115	42.68	1.52	3.56	3.60	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
35.35	116	191.27	3.91	2.04	3.63	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.65	117	194.66	4.81	2.47	3.66	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	234.83	5.22	2.22	3.69	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.25	119	363.67	5.96	1.64	3.72	sand to silty sand	80-90	40-42	>50	UNDEFINED
36.55	120	223.36	4.94	2.21	3.74	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
36.85	121	73.36	2.36	3.22	3.77	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
37.15	122	37.67	1.21	3.22	3.80	clayey silt to silty clay	UNDFND	UNDFD	18	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-10d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.69	3.52	1.57	3.83	sand to silty sand	70-80	38-40	>50	UNDEFINED
37.75	124	259.10	3.23	1.25	3.86	sand	70-80	38-40	50	UNDEFINED
38.05	125	70.69	3.06	4.33	3.89	clayey silt to silty clay	UNDFND	UNDFD	34	4.2
38.40	126	262.06	3.92	1.50	3.92	sand to silty sand	70-80	38-40	>50	UNDEFINED
38.70	127	353.82	4.72	1.33	3.95	sand	80-90	40-42	>50	UNDEFINED
39.00	128	421.27	3.74	0.89	3.97	sand	80-90	40-42	>50	UNDEFINED
39.35	129	417.08	6.27	1.50	4.01	sand	80-90	40-42	>50	UNDEFINED
39.65	130	99.45	4.22	4.24	4.04	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	82.31	3.78	4.59	4.06	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
40.25	132	67.03	1.77	2.64	4.09	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
40.55	133	31.70	0.83	2.60	4.12	sandy silt to clayey silt	UNDFND	UNDFD	12	1.5
40.85	134	37.19	1.02	2.73	4.15	sandy silt to clayey silt	UNDFND	UNDFD	14	1.9
41.15	135	47.45	1.54	3.24	4.18	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
41.45	136	93.02	3.97	4.27	4.21	clayey silt to silty clay	UNDFND	UNDFD	45	5.6
41.75	137	86.19	4.64	5.38	4.23	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	47.31	2.08	4.40	4.26	silty clay to clay	UNDFND	UNDFD	30	2.6
42.35	139	62.94	2.61	4.15	4.29	clayey silt to silty clay	UNDFND	UNDFD	30	3.6
42.65	140	137.47	4.63	3.37	4.32	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.6
42.95	141	73.51	3.05	4.15	4.35	clayey silt to silty clay	UNDFND	UNDFD	35	4.3
43.25	142	89.26	4.07	4.56	4.38	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	198.93	5.95	2.99	4.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
43.85	144	268.30	6.43	2.40	4.43	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.15	145	285.73	6.27	2.19	4.46	sand to silty sand	70-80	38-40	>50	UNDEFINED
44.45	146	287.74	7.20	2.50	4.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
44.80	147	347.89	7.60	2.18	4.52	sand to silty sand	80-90	38-40	>50	UNDEFINED
45.10	148	492.38	7.21	1.47	4.55	sand	>90	40-42	>50	UNDEFINED
45.40	149	363.36	7.15	1.97	4.58	sand to silty sand	80-90	40-42	>50	UNDEFINED
45.75	150	140.86	5.16	3.66	4.61	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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Figure A-10e

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. These samples were then transported to the laboratory for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of Moisture Content and Dry Unit Weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Consolidation, R-Value, and Soil Corrosivity. A summary of laboratory test results are included in Table B-1. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The USCS soil classifications are presented on key for soil classification and on the boring logs in Figures A-1a to A-5e of Appendix A and summarized in Table B-1.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented in Table B-1 and on the boring logs in Figures A-2a to A-5e of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318.

Results of these tests are presented on the boring logs in Figures A-2a to A-5e of Appendix A and Table B-1 and Figures B-1a to B-1b of this appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided in Figure B-2 and Table B-1 of this appendix. The relative proportion (or percentage) by dry weight of fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a to A-5e of Appendix A.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under additional normal loads for selected samples. The test results are presented in Tables B-2a & B-2b and Figure B-3 of this appendix.

B.7 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included soil minimum resistivity and pH (Caltrans method 643), water-soluble chlorides (Caltrans Test method 422), and water-soluble sulfates (Caltrans Test Method 417). The test results are summarized in Table B-3 of this appendix.

B.8 Consolidation Test

One-dimensional consolidation test was performed on selected undisturbed samples in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation test are graphically shown in Figures B-4a to B-4d and consolidation parameters are summarized in Table B-4 of this appendix.

B.9 R-Value

A Resistance or R-value test was performed on a selected bulk sample of the subgrade soils encountered under proposed pavement locations. The test was conducted in general accordance with CTM 301. The test results are provided in Table B-5 of this appendix.

B.10 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table B-1	Summary of Laboratory Test Results
Table B-2a	Summary of Single Point Direct Shear Test Results
Table B-2b	Summary of Direct Shear Test Results
Table B-3	Summary of Corrosion Test Results
Table B-4	Summary of Consolidation Test Results
Table B-5	Summary of R-Value Test Results

List of Figures

Figure B-1a, b	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figure B-3	Direct Shear Test Results
Figure B-4a to B-4d	Consolidation Test Results

TABLE B-1:
SUMMARY OF LABORATORY TEST RESULTS

Boring Number	Sample Number	Depth (feet)	USCS Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
A-08-122	B-1	1.2-5	SC	-	7	-	-	23	26	15	11	-
A-08-122	R-2	5	SC	107.6	18	-	-	-	-	-	-	-
A-08-122	S-3	10	SC	-	13	-	-	40	-	-	-	-
A-08-122	R-4	15	SM	100	23	-	-	26	-	-	-	-
A-08-122	S-5	20	CL	-	-	-	-	-	-	-	-	1
A-08-122	R-6	25	CL	87.2	31	-	-	88	-	-	-	1.5-1.75
A-08-122	S-7	30	SM	-	26	-	-	-	-	-	-	-
A-08-122	R-8	35	SM	96.8	28	-	-	26	-	-	-	-
A-08-122	S-9A	40	SC/SM	-	30	-	-	-	-	-	-	-
A-08-122	S-9B	40.75	CL	-	-	-	-	-	-	-	-	2.0-2.5
A-08-122	R-10	45	CL	86.4	35	-	-	-	-	-	-	2.0-2.75
A-08-122	S-11	50	SM/ML	-	27	-	-	-	-	-	-	-
R-08-005	B-1	1.9-5	CL	-	16	-	-	63	29	20	9	-
R-08-005	R-1	5	CL	108.3	19	7	40	53	32	19	13	4.5+
R-08-005	S-2	10	SM	-	26	0	82	18	-	-	-	-
R-08-005	R-3	15	CL	98	27	-	-	65	-	-	-	-
R-08-005	S-4	20	SM	-	29	-	-	-	-	-	-	-
R-08-005	R-5	25	SM	97.6	26	-	-	24	-	-	-	-

TABLE B-1:
SUMMARY OF LABORATORY TEST RESULTS

Boring Number	Sample Number	Depth (feet)	USCS Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-005	S-6	30	CL	-	41	-	-	97	46	26	20	1.25
R-08-005	S-7	40	CL	-	31	-	-	-	39	19	20	1.5
R-08-005	R-8	50	ML	103	23	-	-	86	-	-	-	4.5
R-08-005	R-9	70	CL	-	45	-	-	75	43	24	19	4.5
R-08-005	R-10	105	CL	82.4	39	-	-	-	-	-	-	2.5
R-08-005	S-11	135	CL	-	27	-	-	-	-	-	-	-
R-08-011	S-1	5	SC	-	19	-	-	47	33	19	14	-
R-08-011	R-2	10	SC	96.9	19	-	-	-	-	-	-	-
R-08-011	S-3	15	CL	-	31	-	-	-	-	-	-	0.5
R-08-011	R-4	20	CL	94.6	24	-	-	52	34	16	18	1
R-08-011	S-5	25	CL	-	46	-	-	-	-	-	-	-
R-08-011	R-6	30	ML	93.2	30	-	-	-	-	-	-	1.5
R-08-011	S-7	35	ML	-	28	-	-	68	-	-	-	1
R-08-011	R-8	40	CL	97.9	25	-	-	80	-	-	-	4
R-08-011	S-9	45	ML	-	33	-	-	-	-	-	-	-
R-08-011	R-10	50	ML	83.9	35	-	-	-	-	-	-	3.5
R-08-011	S-11	60	SW-SM	-	15	4	89	7	-	-	-	-
R-08-011	R-12	70	CL	114.8	17	-	-	-	31	15	16	3.5

TABLE B-1:
SUMMARY OF LABORATORY TEST RESULTS

Boring Number	Sample Number	Depth (feet)	USCS Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-011	S-13	80	SC	-	17	-	-	45	-	-	-	-
R-08-011	R-14	90	SM	-	24	-	-	29	-	-	-	-
R-08-011	S-15	100	CL	-	40	-	-	-	-	-	-	-
R-08-011	R-16	120	SM	-	24	-	-	27	-	-	-	-
R-08-017	S-1	5	CL/SC	-	-	-	-	-	-	-	-	3
R-08-017	R-2	10	CL	89.3	32	-	-	82	35	21	14	2.5
R-08-017	S-3	15	CL	-	27	-	-	55	34	20	14	1.25
R-08-017	R-4	20	CL	108.8	19	-	-	-	-	-	-	4.5+
R-08-017	S-5	25	CL	-	20	-	-	63	-	-	-	4.5+
R-08-017	R-6	30	CL	109.3	15	-	-	-	-	-	-	4
R-08-017	S-7	35	ML	-	34	-	-	57	-	-	-	-
R-08-017	R-8	40	CL	96.2	28	-	-	-	39	20	19	-
R-08-017	S-9	45	CL	-	36	-	-	-	-	-	-	1.2
R-08-017	R-10	50	ML	100	25	-	-	-	-	-	-	3
R-08-017	S-11	60	CL	-	31	-	-	82	-	-	-	2
R-08-017	R-12	70	ML	96.7	27	-	-	-	-	-	-	-
R-08-017	S-13	80	SM	-	19	-	-	22	-	-	-	-
R-08-017	R-14	90	SW	111.4	18	-	-	-	-	-	-	-
R-08-017	S-15	100	CL	-	-	-	-	-	-	-	-	1.5

TABLE B-2a:
SUMMARY OF SINGLE POINT DIRECT SHEAR TEST RESULTS

Boring No.	Sample No.	Sample Depth (ft.)	Description	Shear Rate (in./min.)	Normal Stress (psf)	Peak Shear Stress (psf)	Shear Stress at 0.25 in.(psf)
R-08-005	R-3	16-16.5	Silty Clay with Sand (CL)	0.0042	800	780 @ 0.11	700
R-08-005	R-3	16-16.5	Silty Clay with Sand (CL)	0.0042	5000	3350 @ 0.185	3320

TABLE B-2b:
SUMMARY OF DIRECT SHEAR TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Peak		Ultimate	
				Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
R-08-017	R-2	10	CL	750	24	350	20

TABLE B-3:
SUMMARY OF CORROSION TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-122	B-1	1.2-5.0	SC	2750	8.3	132	163
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20 - 21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35 - 36.5	ML	NA	8.8	576	255

TABLE B-4:
SUMMARY OF CONSOLIDATION TEST RESULTS

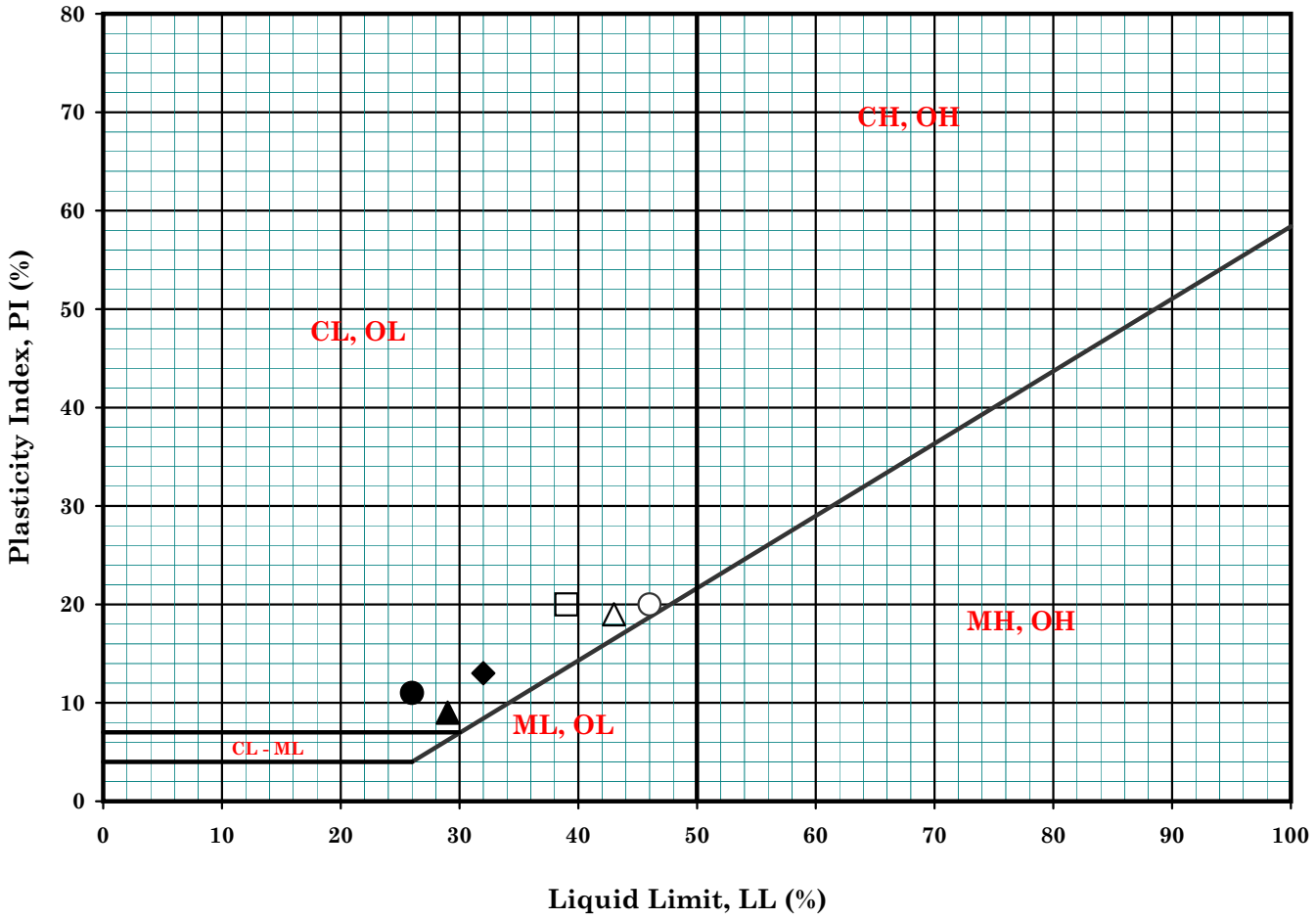
Boring Number	Sample Number	Depth (feet)	Soil Type	Consolidation Parameters					
				Cc	Cr	Ccε	Crε	e_0	σ'_p (psf)
A-08-122	R-2	6	SC	0.096	0.025	0.064	0.016	0.503	6500
R-08-005	R-1	6	CL	0.136	0.023	0.090	0.015	0.510	5900
R-08-011	R-4	21	CL	0.228	0.022	0.137	0.013	0.667	3700
R-08-017	R-8	41	CL	0.300	0.038	0.170	0.022	0.744	4800

Note: The value of C_v was based on available correlations.

TABLE B-5:
SUMMARY OF R-VALUE TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	R-Value
R-08-005	B-1	2 - 5	CL	25

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-122	B-1	1.2	5.0	0.366	1.525	7	26	15	11	-0.73	Light Brown Clayey Sand (SC)
▲	R-08-005	B-1	2.0	5.0	0.6	1.5	16	29	20	9	-0.44	Gray Sandy Lean Clay (CL)
◆	R-08-005	R-1	6.0	6.5	1.8	2.0	19	32	19	13	0.00	Dark Gray Sandy Lean Clay (CL)
○	R-08-005	S-6	30.0	31.5	9.2	9.6	41	46	26	20	0.75	Gray Brown Lean Clay (CL)
□	R-08-005	S-7	40.0	41.5	12.2	12.7	31	39	19	20	0.60	Gray Brown Lean Clay (CL)
△	R-08-005	R-9	70.5	71.0	21.5	21.7	45	43	24	19	1.11	Lean Clay with Sand (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 - West County Connectors Segment

Project No. : I-436

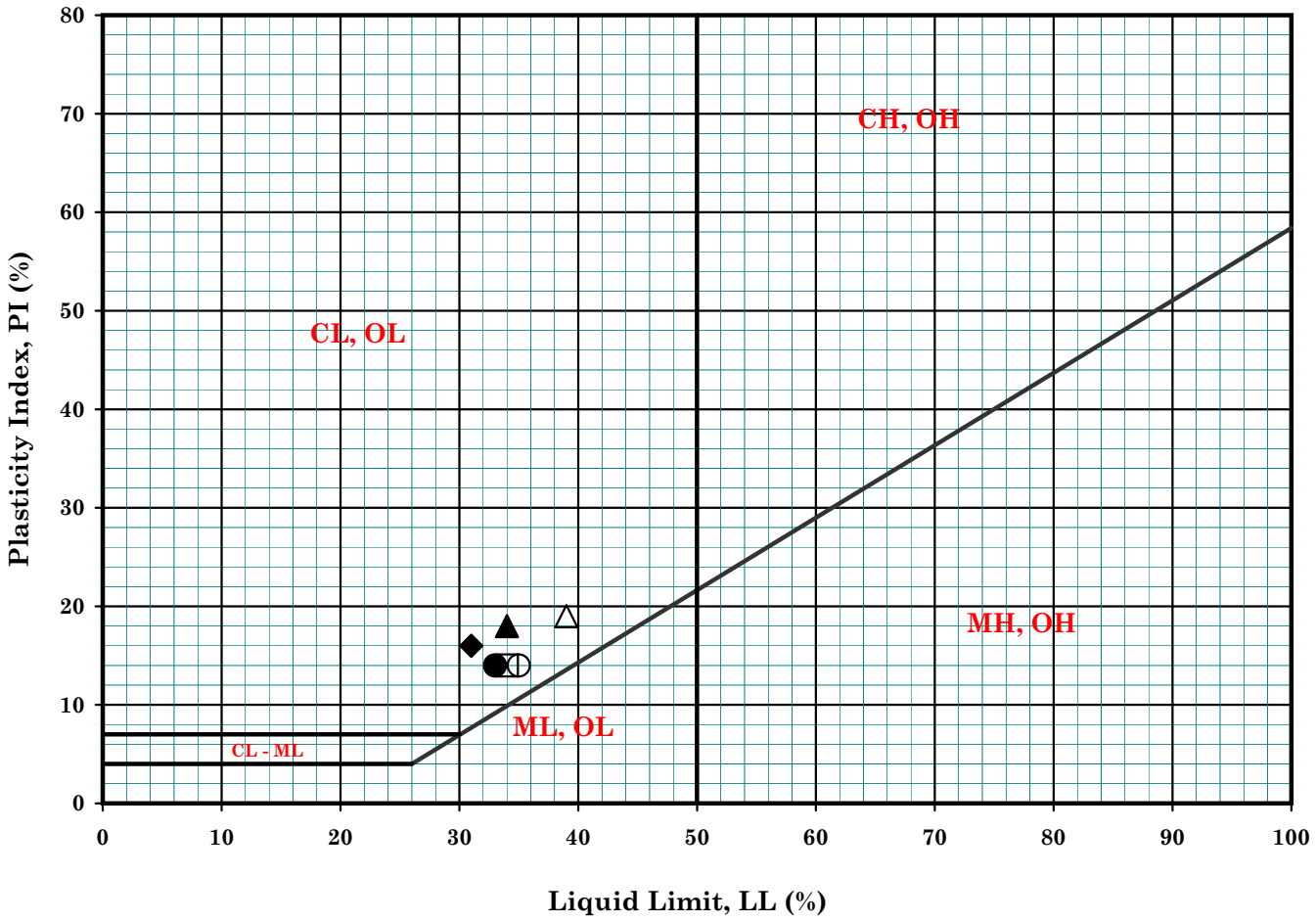
Date : 05/28/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1a

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-011	S-1	5.0	6.5	1.5	2.0	19	33	19	14	0.00	Olive Brown Clayey Sand (SC)
▲	R-08-011	R-4	20.0	21.5	6.1	6.6	24	34	16	18	0.44	Olive Gray Sandy Lean Clay(CL)
◆	R-08-011	R-12	71.0	71.5	21.7	21.8	17	31	15	16	0.13	Light Brown-Gray Lean Clay (CL)
○	R-08-017	R-2	11.0	11.5	3.4	3.5	32	35	21	14	0.79	Dark Brown Lean Clay with Sand (CL)
□	R-08-017	S-3	15.0	16.5	4.6	5.0	27	34	20	14	0.50	Light Brown Sandy Lean Clay (CL)
△	R-08-017	R-8	41.0	41.5	12.5	12.7	28	39	20	19	0.42	Gray Brown Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 - West County Connectors Segment

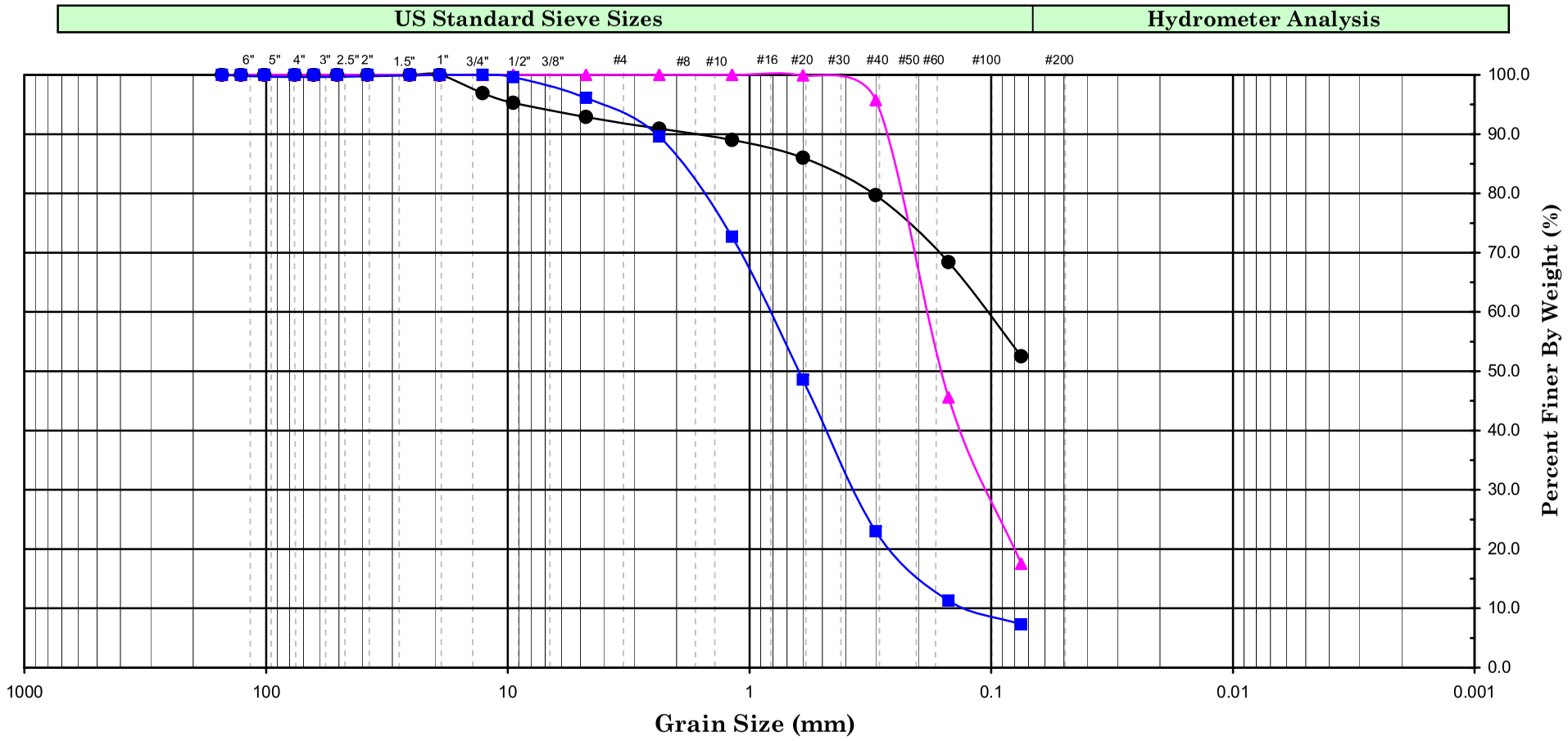
Project No. : I-436

Date : 05/28/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1b



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	R-08-005	R-1	5.0	6.5	1.53	1.98	Gray	Sandy Lean Clay (CL)	CL
▲	R-08-005	S-2	10.0	11.5	3.05	3.51	Gray Brown	Silty Sand (SM)	SM
■	R-08-011	S-11	60.0	61.3	18.30	18.70	Gray Brown	Well Graded Sand with Silt (SW-SM)	SW-SM

Remark :

GROUP DELTA CONSULTANTS

SR-22

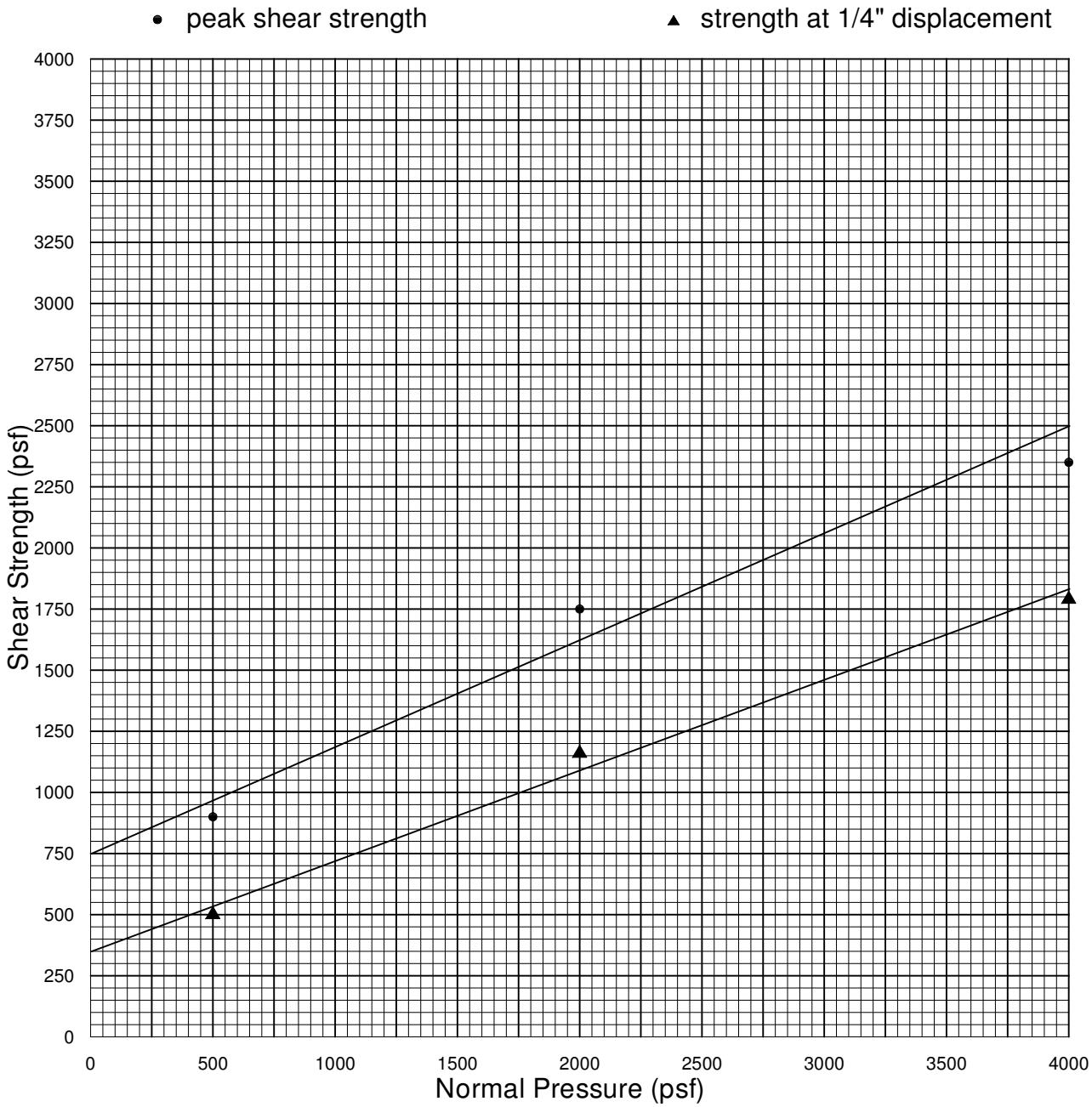
Project No. : I-436 **Date :** 05/28/08

GRAIN SIZE ANALYSIS

(ASTM D-422-63)

Figure No. : B-2

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-017 @ 10'-11.5'	Undisturbed & Saturated	Lean Clay w/Sand (CL)	92.4	25.8

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	900 @ 0.0500"	500
2000	1750 @ 0.0550"	1160
4000	2350 @ 0.0650"	1790
	C = 750 psf	C = 350 psf
	ϕ = 24 deg.	ϕ = 20 deg.

Figure No. B-3

Boring / Sample No.	A-08-122	Depth:	5' - 6.5'	Date	05-13-08

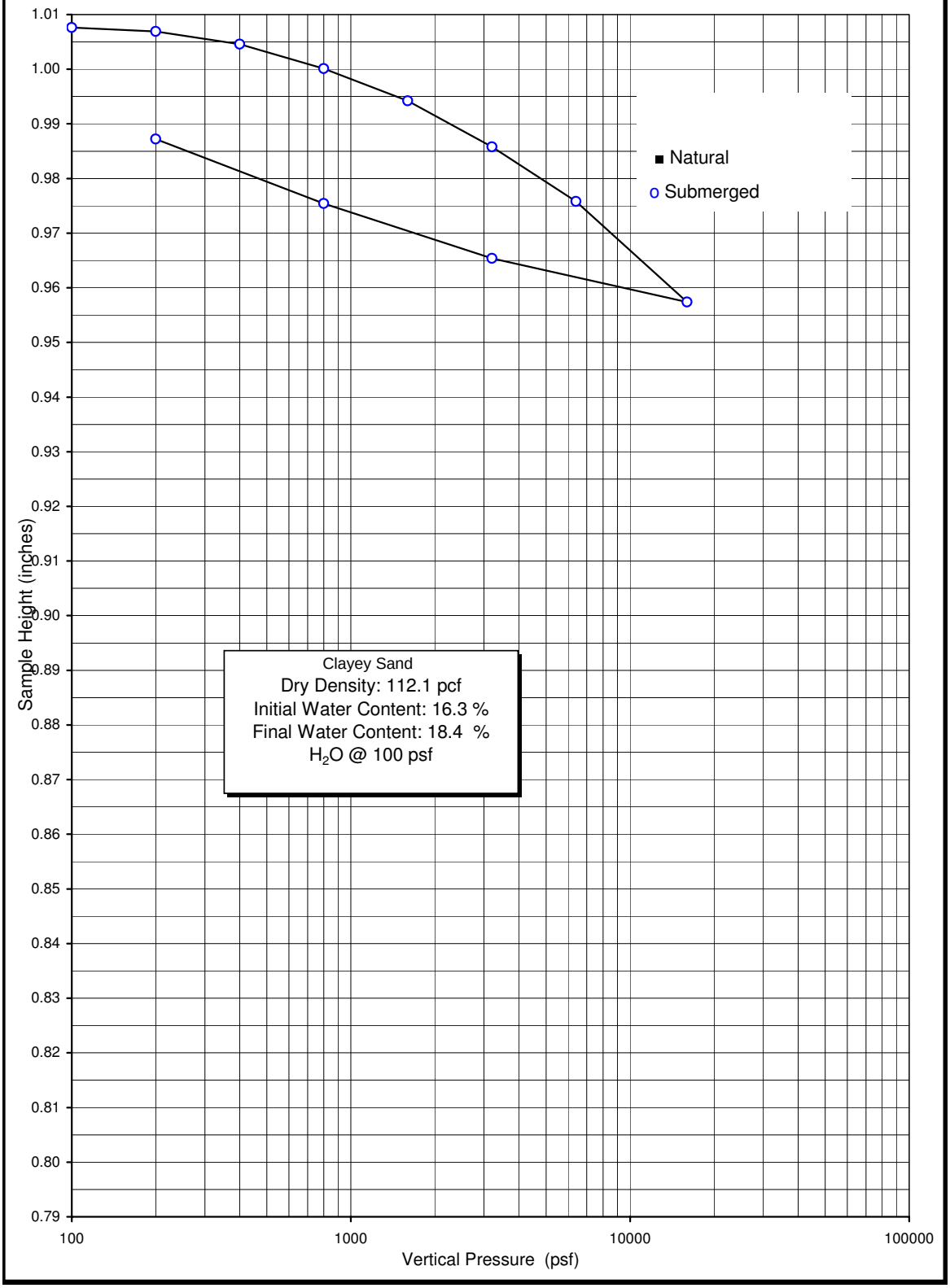


Figure No. B-4d

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-005	Depth:	5' - 6.5'	Date	05-13-08

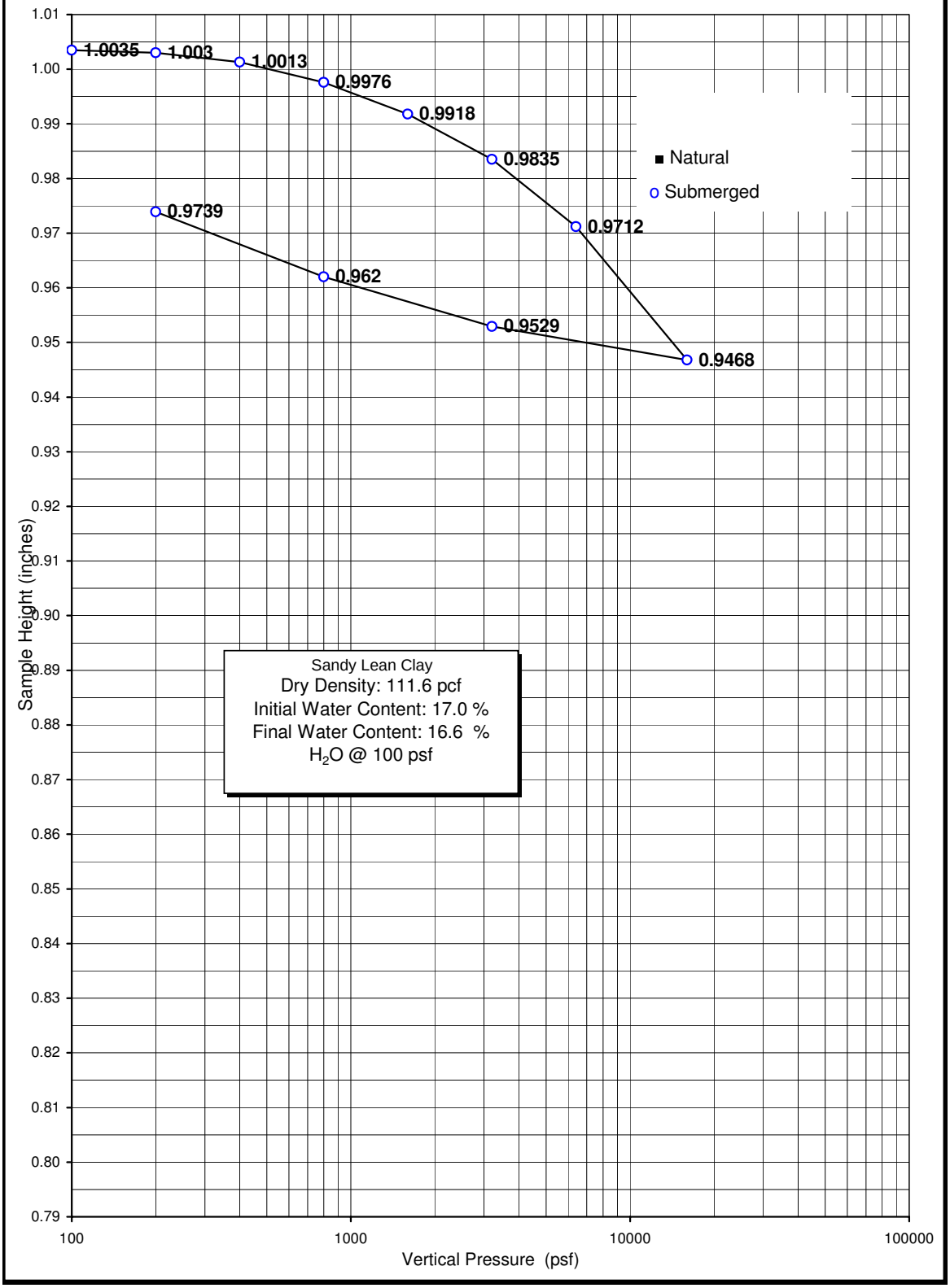


Figure No. B-4a

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-011	Depth:	20' - 21.5'	Date	05-13-08

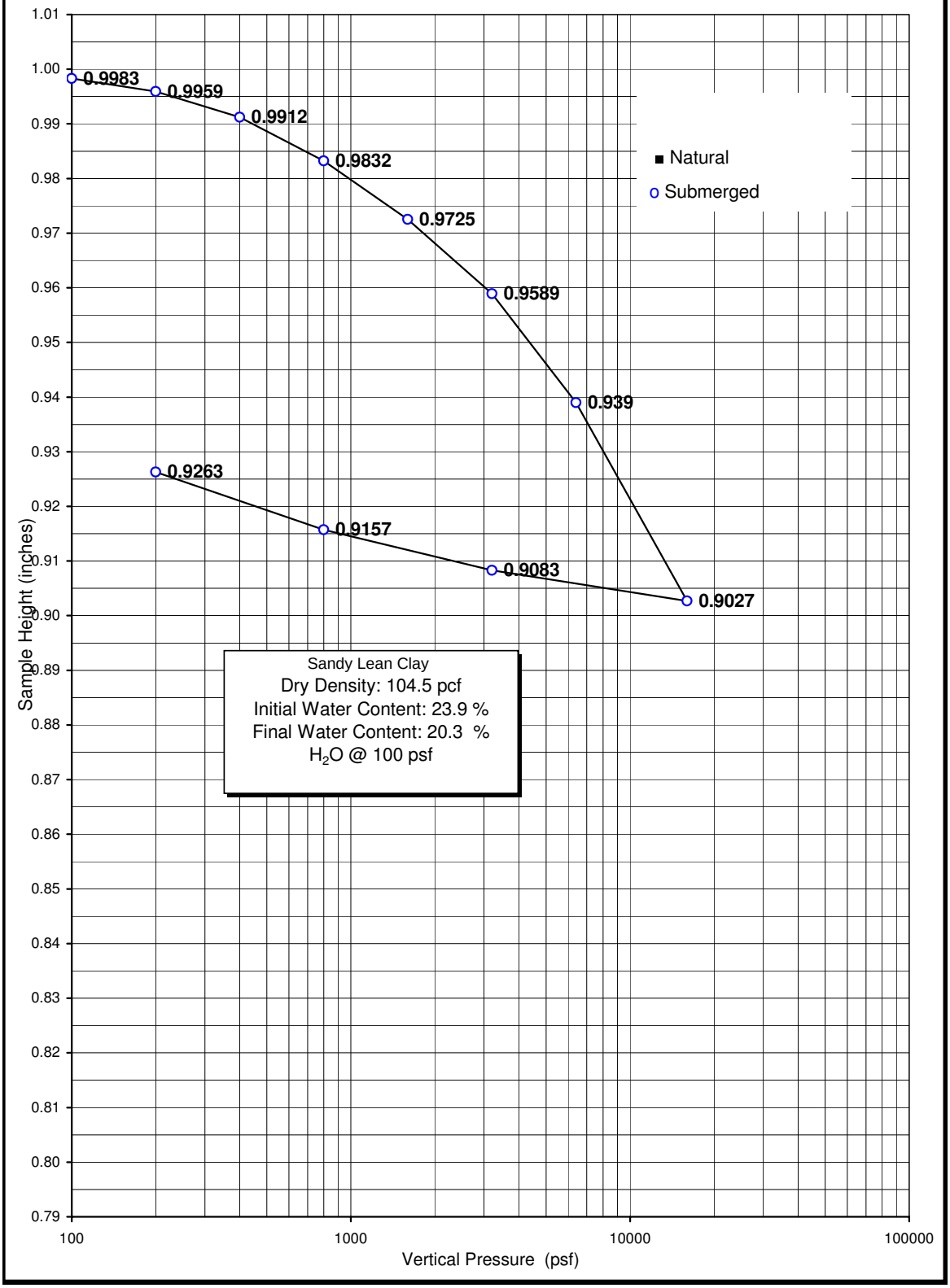


Figure No. B-4b

Boring / Sample No.	R-08-017	Depth:	40' - 41.5'	Date	05-13-08

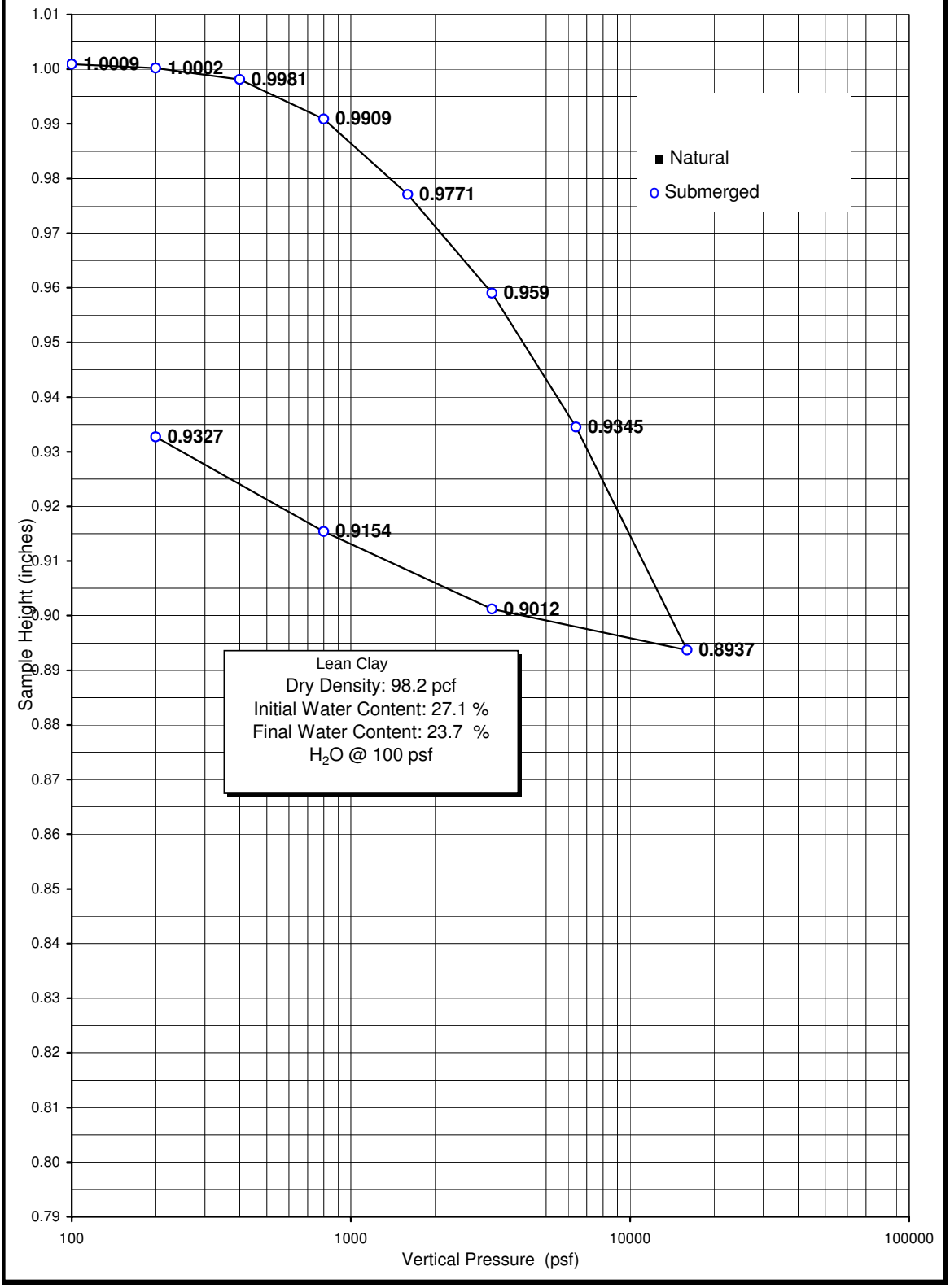


Figure No. B-4c

APPENDIX C
SELECTED AS-BUILT DRAWINGS

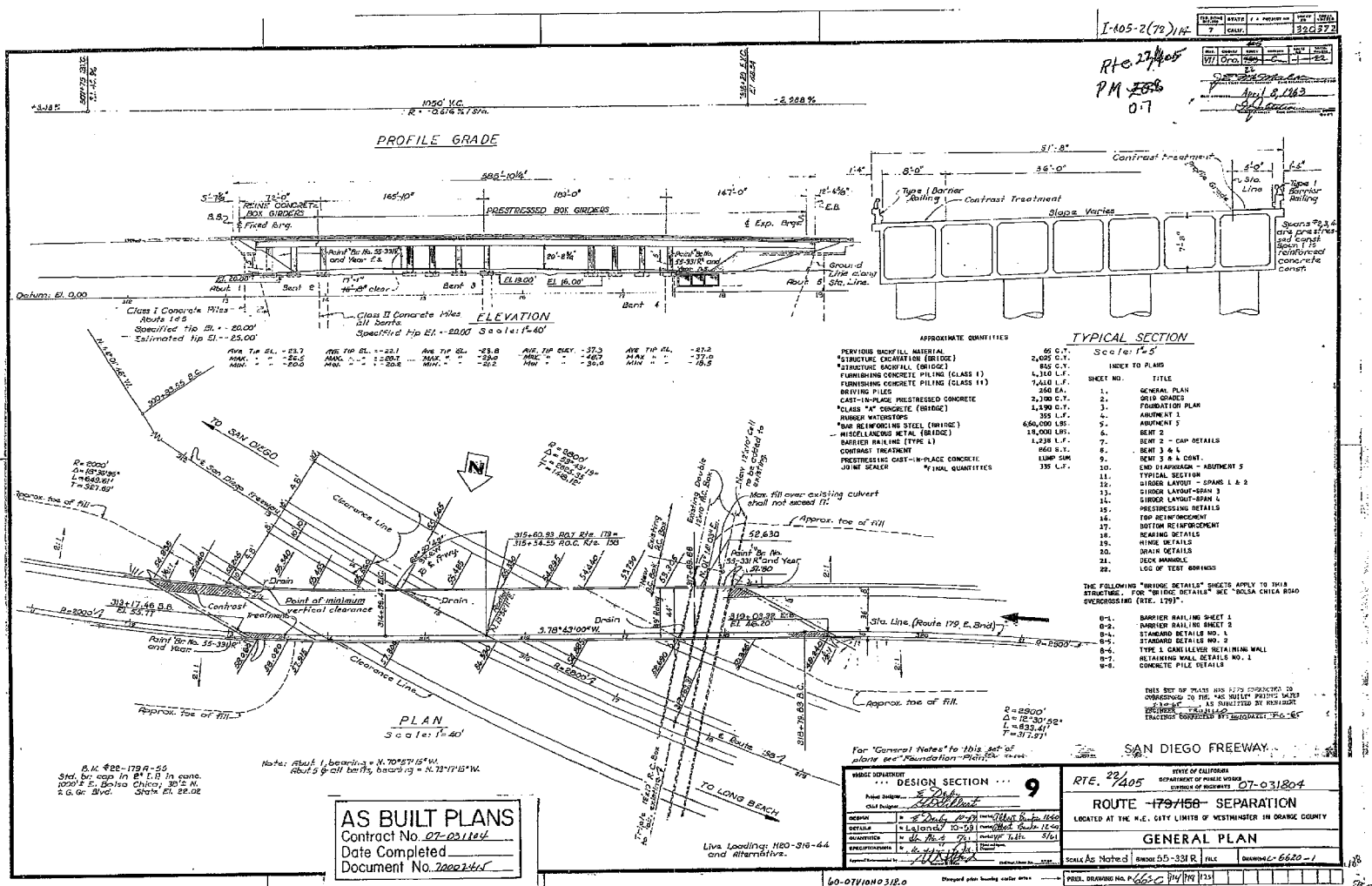
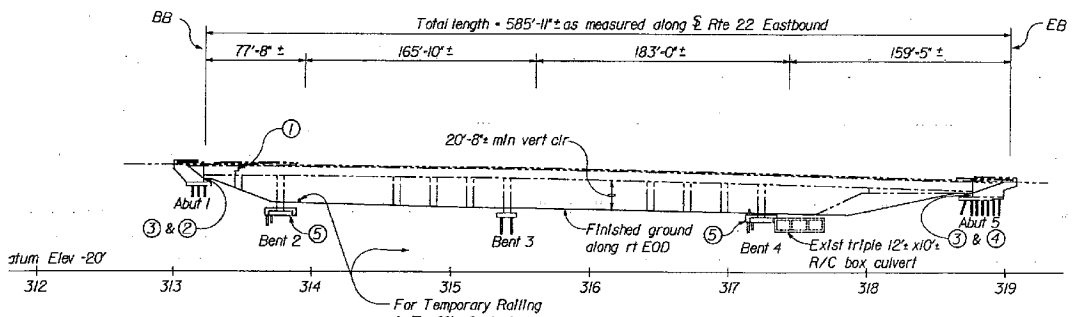

PROFILE GRADE
ELEVATION
PRESTRESSED BOX GIRDERS
TYPICAL SECTION
PLAN
TO SAN DIEGO
TO LONG BEACH
SAN DIEGO FREEWAY
AS BUILT PLANS
Contract No. 07-031804
Date Completed
Document No. 20002465
DESIGN SECTION 9
RTE. 22/405
ROUTE 179/158 SEPARATION
GENERAL PLAN
07-031804

Figure C-1



ELEVATION
1"=40'

RETROFIT LEGEND

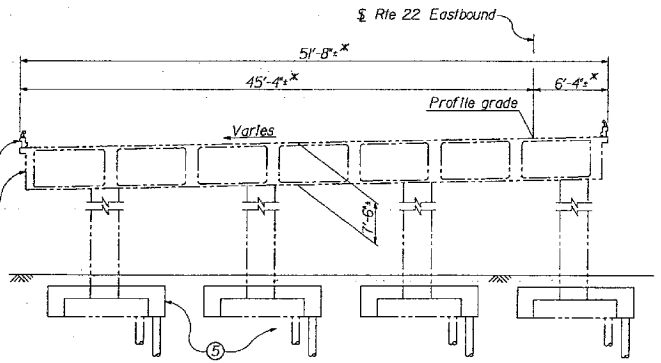
1. Hinge joint pipe restrainers
2. Abutment timber bumpers
3. Abutment concrete catchers
4. Abutment concrete bumpers
5. Footing retrofit

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	Ora	22, 405, 605	Var	67	94

Nader Tamannaie
REGISTERED CIVIL ENGINEER
5-23-94
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — N. TAMANNAIE — No. 37289 — Exp. 5-30-96 — CIVIL — STATE OF CALIFORNIA

Dokken Engineering
5221 Ramos Circle
Sacramento, CA 95827 · (916) 361-3111



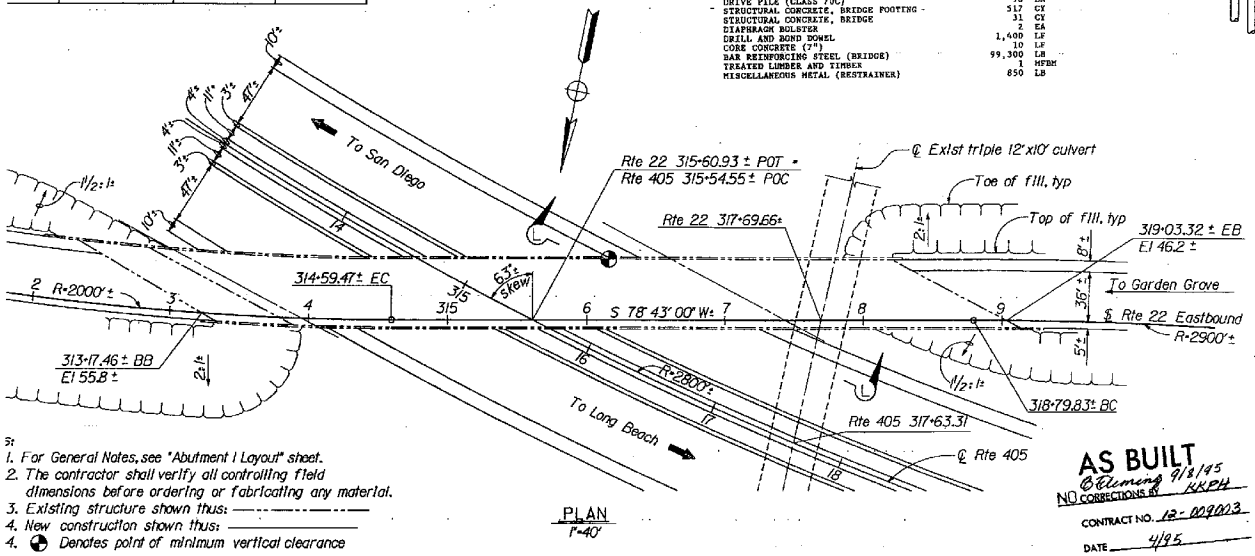
SECTION L-L
1" = 10'
*Normal to ℄ Rte 22

PILE DATA-CLASS 70C PILES

cation	Design loading (Service Load)	Specified Tip Elevation	Probable Tip Elevation
ent 2	70 tons	-32.0	-37.0
ent 4	70 tons	-42.0	-47.0

QUANTITIES

ACCESS OPENING, SOFFIT	2	EA
BRIDGE REMOVAL (PORTION)	LUMP	SUM
STRUCTURE EXCAVATION (TYPE M)	1,050	CY
STRUCTURE BACKFILL (BRIDGE)	550	CY
FURNISH PILING (CLASS 70C)	5,432	LF
DRIVE PILE (CLASS 70C)	98	EA
STRUCTURAL CONCRETE, BRIDGE FOOTING	517	CY
STRUCTURAL CONCRETE, BRIDGE	31	CY
DIAPHRAGM BOLSTER	2	EA
DRILL AND BOND DOWEL	1,400	LF
CORE CONCRETE (7")	10	LF
BAR REINFORCING STEEL (BRIDGE)	99,300	LB
TREATED LUMBER AND TIMBER	1	MFBM
MISCELLANEOUS METAL (RESTRAINER)	850	LB



PLAN
1"=40'

INDEX TO PLANS

Sheet No.	Title
1	General Plan
2	Abutment 1 Layout
3	Abutment 1 Retrofit Details
4	Abutment 5 Layout
5	Abutment 5 Retrofit Details
6	Bents 2 & 4 Retrofit Details
7	Excavation & Backfill Limits
8	Hinge Retrofit Details
9	Deck & Soffit Openings
10	As-Built Log of Test Borings

STANDARD PLANS DATED JULY 1992

SHEET NO.	TITLE
A10-A	Abbreviations
A10-B	Symbols
A62-C	Limits of Payment for Excavation & Backfill Bridge
B0-1	Bridge Details
B2-8	Pile Details - Class 45C & Class 70C

Standard plan sheet No.
Detail no.

AS BUILT
Contractor 9/8/95
NO CORRECTIONS BY HKPH
CONTRACT NO. 12-009003
DATE 4/95

5:
1. For General Notes, see "Abutment 1 Layout" sheet.
2. The contractor shall verify all controlling field dimensions before ordering or fabricating any material.
3. Existing structure shown thus: ———————
4. New construction shown thus: ———
4. Denotes point of minimum vertical clearance

DESIGN	BY N. Tamannaie	CHECKED W. Kwan	LOAD FACTOR DESIGN				
DETAILS	BY G. Bangs	CHECKED W. Kwan	LAYOUT	BY Y. HU	CHECKED W. Kwan		
QUANTITIES	BY Y. Hu	CHECKED B. Meyer	SPECIFICATIONS	BY J. Maniscalco	PLANS AND SPECS COMPARED N. Tamannaie		

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Nader Tamannaie
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES
FOR REDUCED PLANS 0 1 2 3

CU 12
EA 009001
591763-7

BRIDGE NO. 55-331R
POST MILE 07

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 1 OF 10

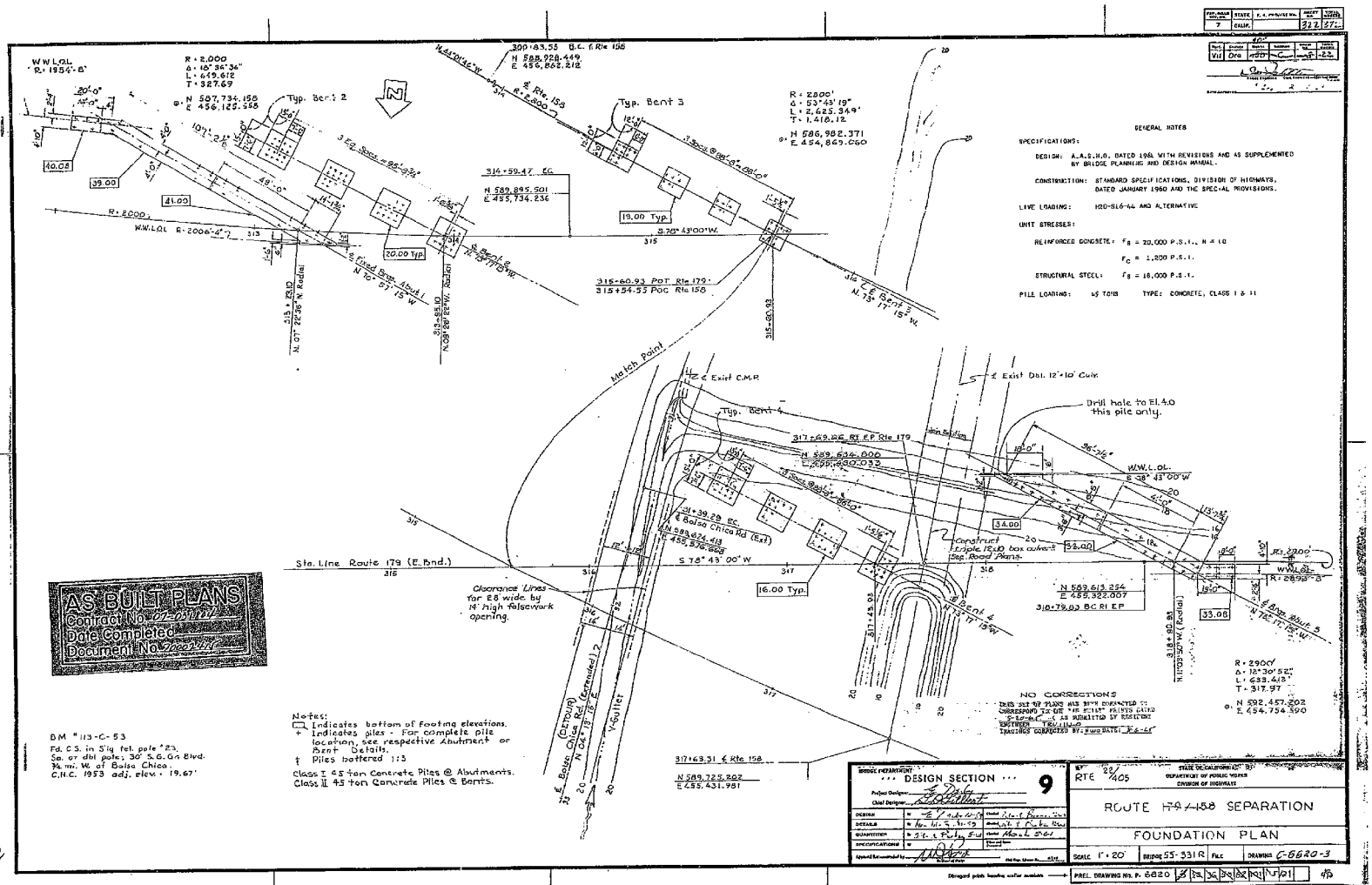
EARTHQUAKE RETROFIT PROJECT NO. 124
ROUTE 22/405 SEPARATION
GENERAL PLAN

BRIDGE NO. 55-331R

BRFTGPGN REV 6 KD 12/22/93

CutePDF - www.cutepdf.com

Figure C-2



I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND DOWNLOADED THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 2-10-77 SIGNATURE [signature] TITLE SR ENG

Figure C-3

ClibPDF - www.fastio.com

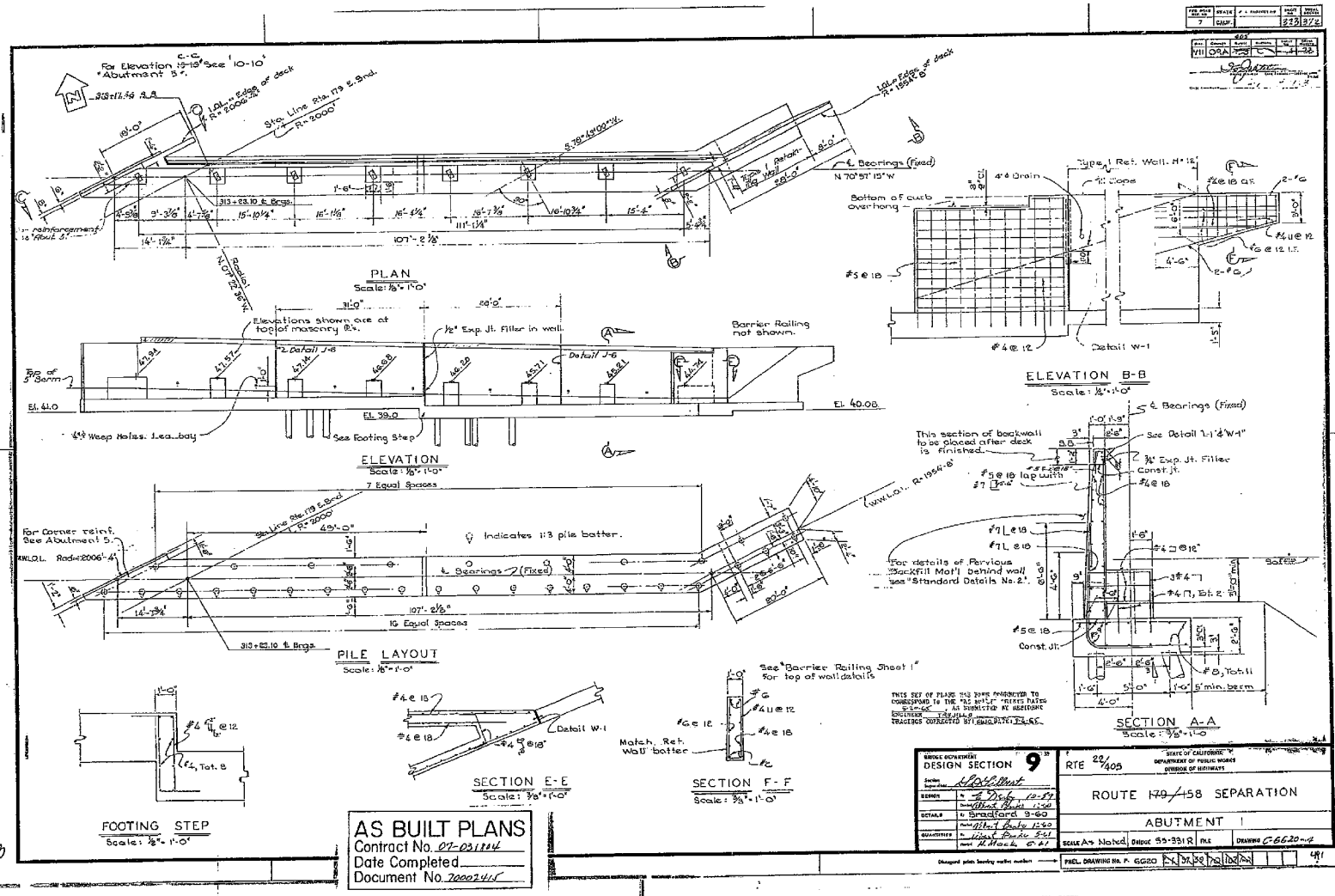
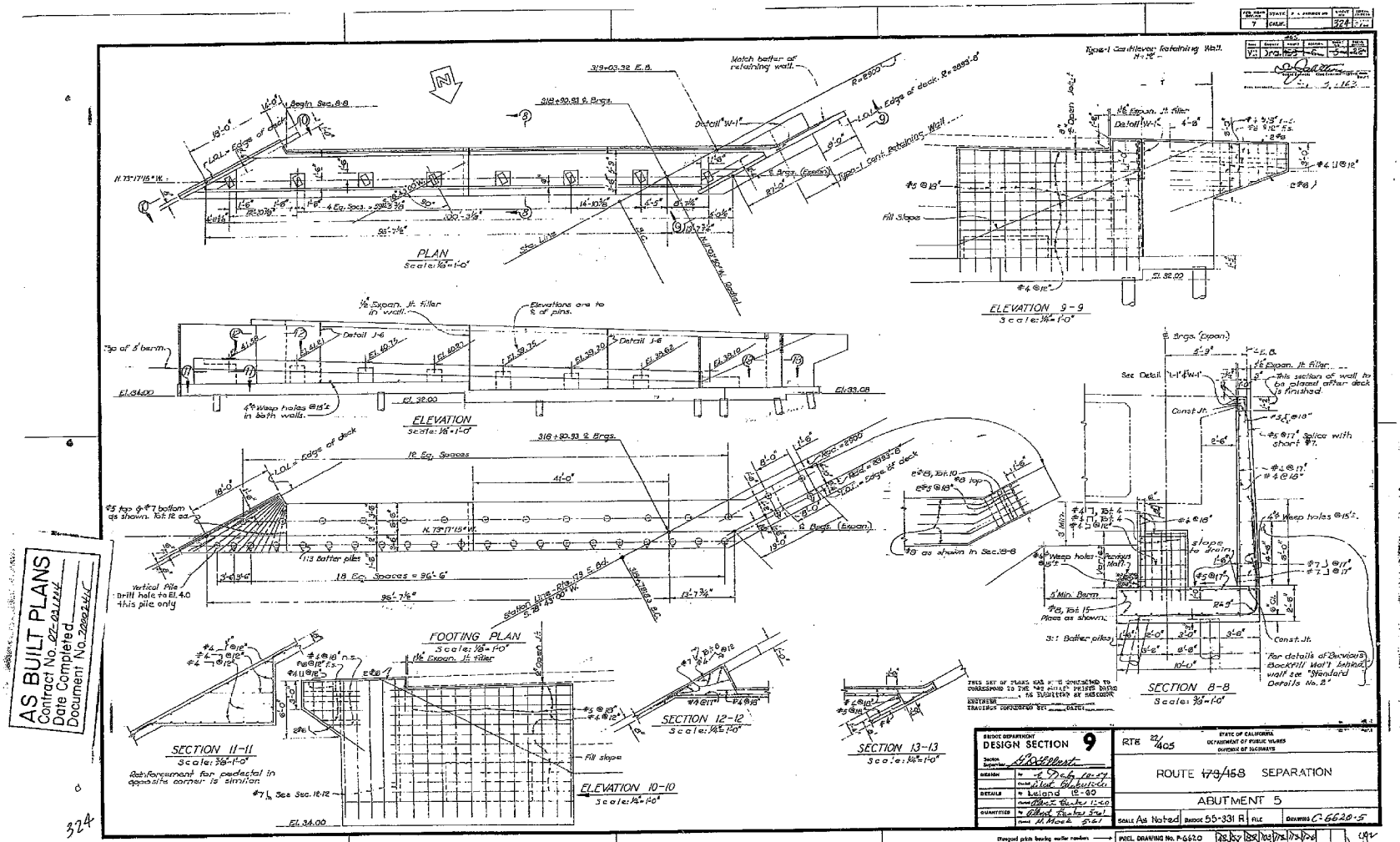

PLAN
Scale: 1/8"=1'-0"
ELEVATION
Scale: 1/8"=1'-0"
PILE LAYOUT
Scale: 1/8"=1'-0"
ELEVATION B-B
Scale: 1/2"=1'-0"
SECTION A-A
Scale: 1/2"=1'-0"
SECTION E-E
Scale: 3/8"=1'-0"
SECTION F-F
Scale: 3/8"=1'-0"
FOOTING STEP
Scale: 1/8"=1'-0"
Detail W-1
Type 1 Ret. Wall. H=12'
Barrier Railing not shown.
Elevations shown are at top of masonry ℄'s.
Indicates 1:3 pile batter.
℄ Bearings (Fixed)
313+83.10 ℄ Brgs.
Const. Jt.
Weep Holes. 1 ea. bay
See Footing Step
See Detail J-6
See Detail 1-1 & W-1
See Barrier Railing Sheet 1 for top of wall details
For details of Pervious Backfill Mat'l behind wall see "Standard Details No. 2".
This section of backwall to be placed after deck is finished.
Match. Ret. Wall batter
AS BUILT PLANS
Contract No. 07-051104
Date Completed
Document No. 7000245
DESIGN SECTION 9
RTE 22/405
ROUTE 179/458 SEPARATION
ABUTMENT 1
SCALE As Noted
DRAWING C-6620-4

Figure C-4



I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CHECKED ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 2-10-22 SIGNATURE _____ TITLE "A" Level

ClibPDF - www.fastio.com

Figure C-5

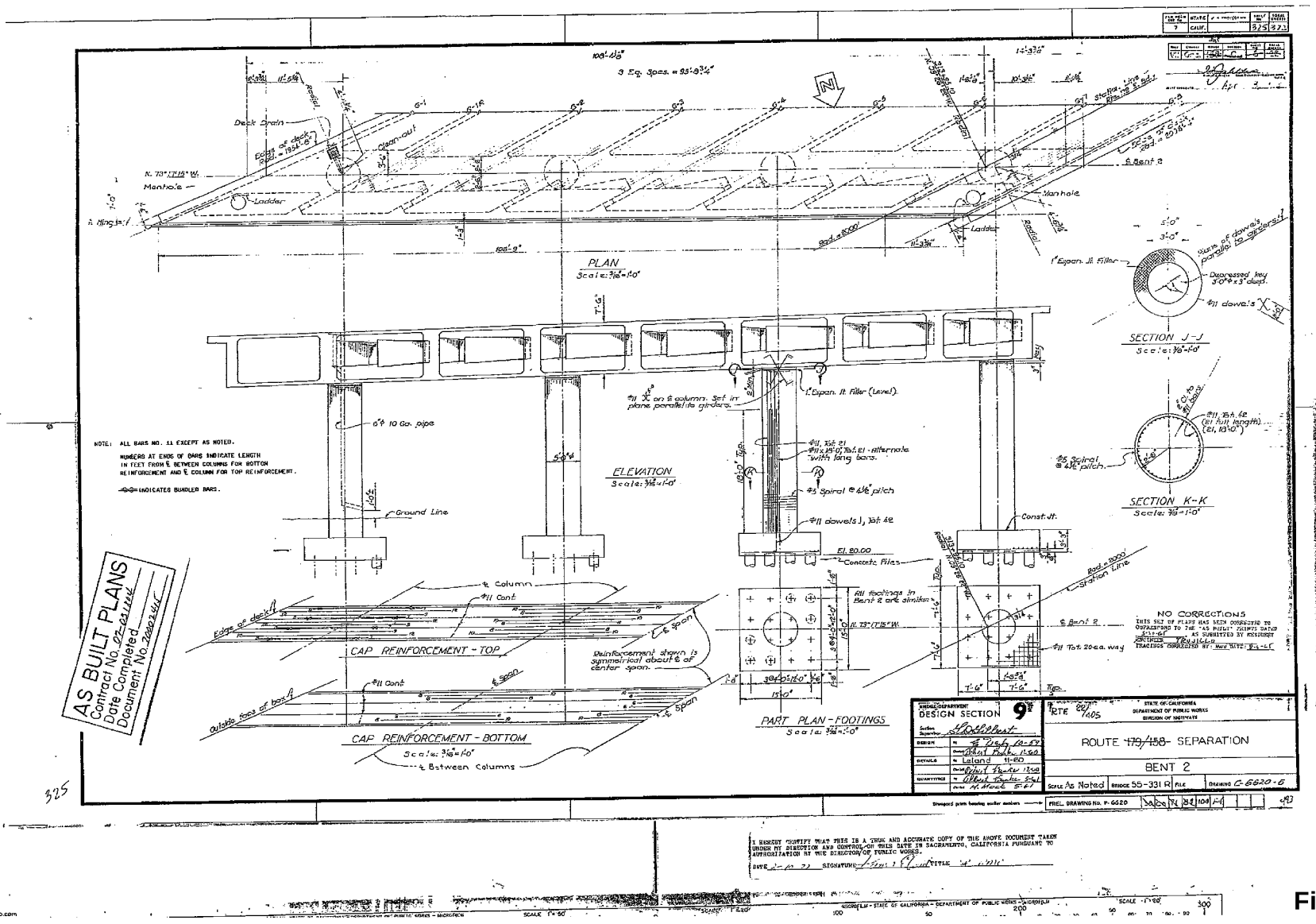
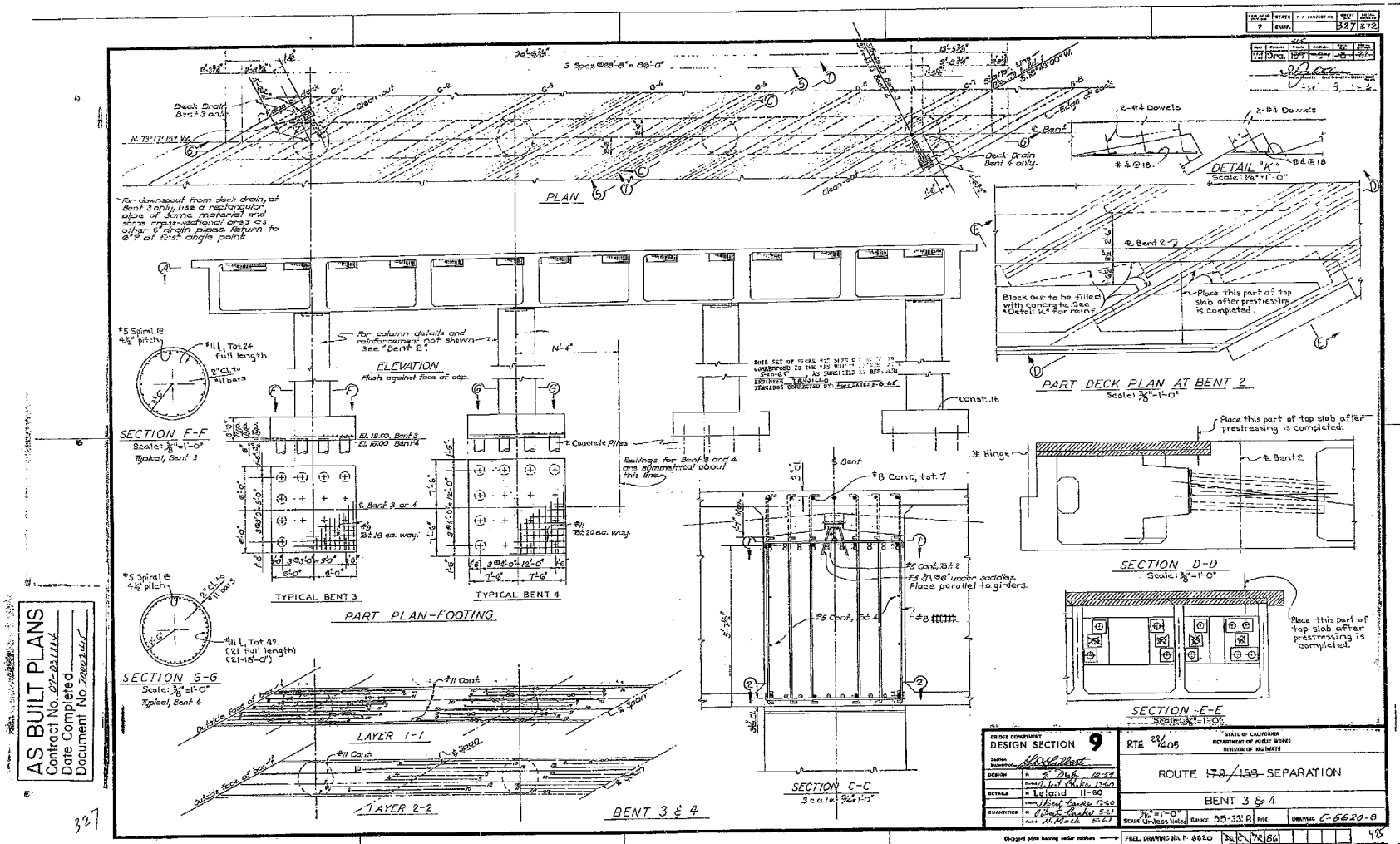

PLAN
Scale: 3/16"=1'-0"
ELEVATION
Scale: 3/16"=1'-0"
CAP REINFORCEMENT - TOP
CAP REINFORCEMENT - BOTTOM
Scale: 3/16"=1'-0"
PART PLAN - FOOTINGS
Scale: 3/16"=1'-0"
SECTION J-J
Scale: 3/8"=1'-0"
SECTION K-K
Scale: 3/8"=1'-0"
NOTE: ALL BARS NO. 11 EXCEPT AS NOTED.
NUMBERS AT ENDS OF BARS INDICATE LENGTH IN FEET FROM ℄ BETWEEN COLUMNS FOR BOTTOM REINFORCEMENT AND ℄ COLUMN FOR TOP REINFORCEMENT.
INDICATES BUNDLED BARS.
AS BUILT PLANS
Contract No. 07-0J1U4
Date Completed
Document No. 2002-Jul-
NO CORRECTIONS
DESIGN SECTION 9
ROUTE 170/158 SEPARATION
BENT 2
Scale As Noted
Bridge 55-331 R
Drawing C-6620-6
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

Figure C-6



AS BUILT PLANS
Contract No. 07-03 1446
Date Completed
Document No. 2000134

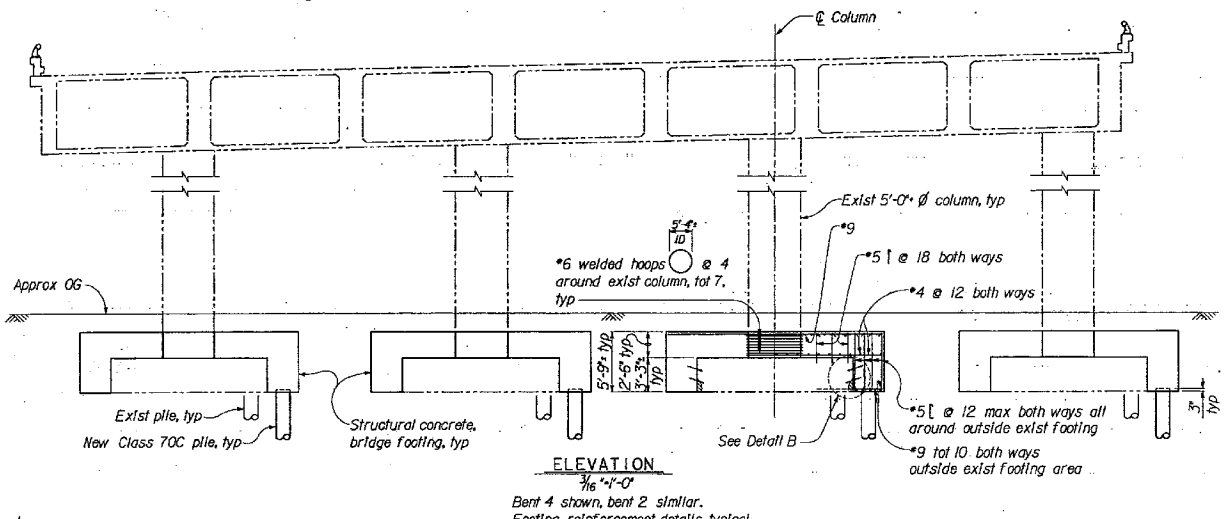
327

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 2-10-22 SIGNATURE [illegible] TITLE "A" Level

ClibPDF - www.fastio.com

Figure C-7



ELEVATION

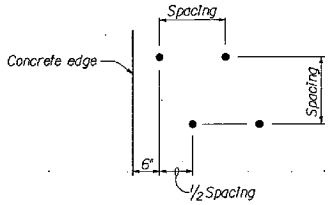
3/16"=1'-0"

Bent 4 shown, bent 2 similar.
Footing reinforcement details typical

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	Ora	22,405, 605	Var	72	94

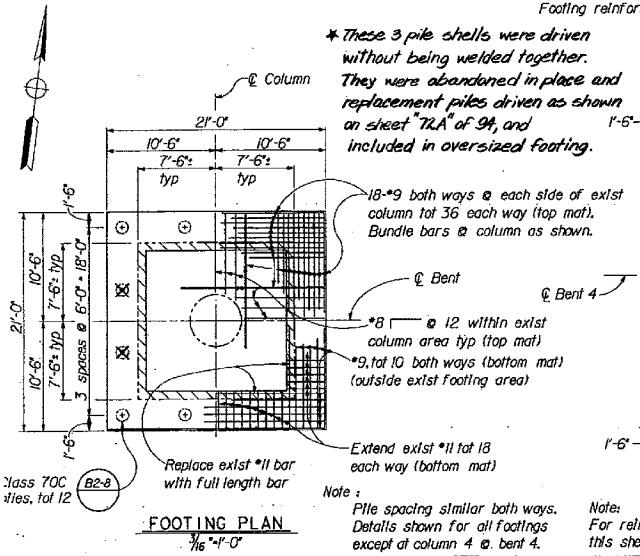
Nader Tamannaie
REGISTERED CIVIL ENGINEER
N. TAMANNAIE No. 37269 Exp. 6-30-96 CIVIL STATE OF CALIFORNIA
5-23-94
PLANS APPROVAL DATE

Dokken Engineering
3221 Ramos Circle
Sacramento, CA 95827 · (916) 361-3111



STAGGERED HOLE PATTERN

No Scale

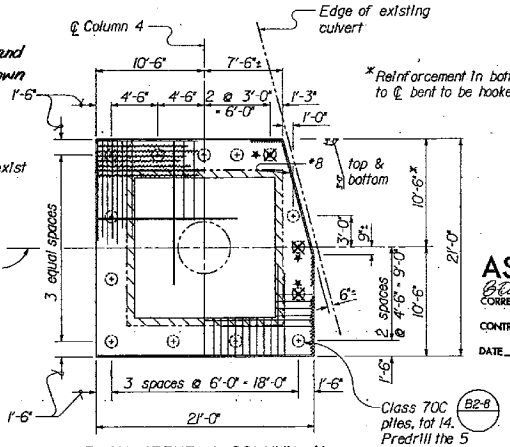


FOOTING PLAN

3/16"=1'-0"

Note:
Pile spacing similar both ways.
Details shown for all footings except at column 4 @ bent 4.

*These 3 pile shells were driven without being welded together. They were abandoned in place and replacement piles driven as shown on sheet "72A" of 94, and included in oversized footing.

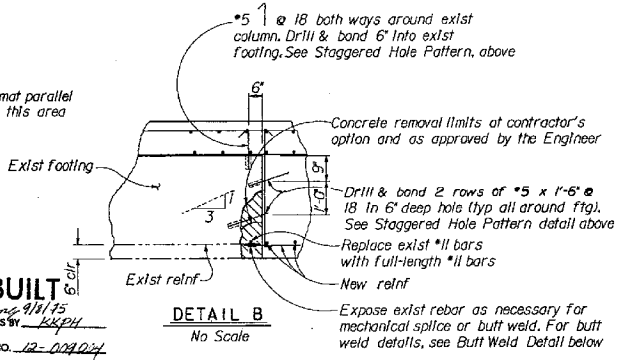


PLAN (BENT 4-COLUMN 4)

3/16"=1'-0"

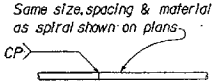
Note:
For reinforcement details not called out, see "Footing Plan" & "Elevation" on this sheet. Columns numbered left to right looking ahead on station

AS BUILT
Bfleming 9/8/95
CORRECTIONS BY KKPH
CONTRACT NO. 12-009014
DATE 4/95



DETAIL B

No Scale



BUTT WELD DETAIL

No Scale

Notes:
1. ▨ Denotes concrete removal
2. ⊃ Denotes bundled bars.
3. The contractor shall verify all controlling field dimensions before ordering or fabricating any material.
4. Existing structure shown thus: ——— ——— ———
5. New construction shown thus: ———

EARTHQUAKE RETROFIT PROJECT NO. 124

ROUTE 22/405 SEPARATION

BENTS 2 & 4 RETROFIT DETAILS

Moe Amini			
DESIGN OVERSIGHT			
COMPT DATE 5/94			
DESIGN	BY N. Tamannaie	CHECKED W. Kwan	
DETAILS	BY B. Waldrop	CHECKED W. Kwan	
QUANTITIES	BY Y. Hu	CHECKED B. Meyer	
PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION			
Nader Tamannaie PROJECT ENGINEER			
CU 12 EA 409001			

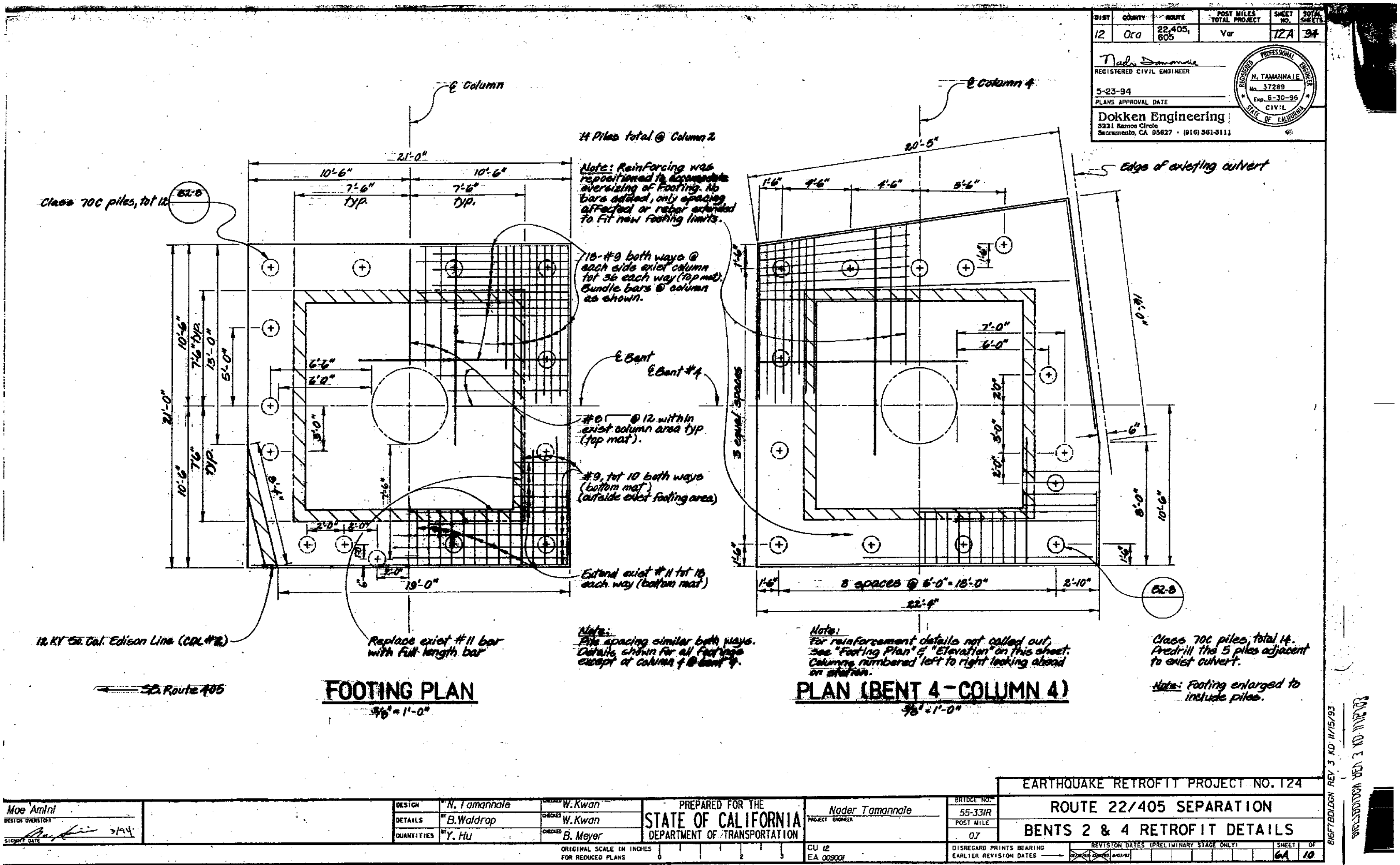
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.	55-331R
POST MILE	0.7
DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET	6
OF	10

816FTBDLGN REV 3 KD 11/15/93

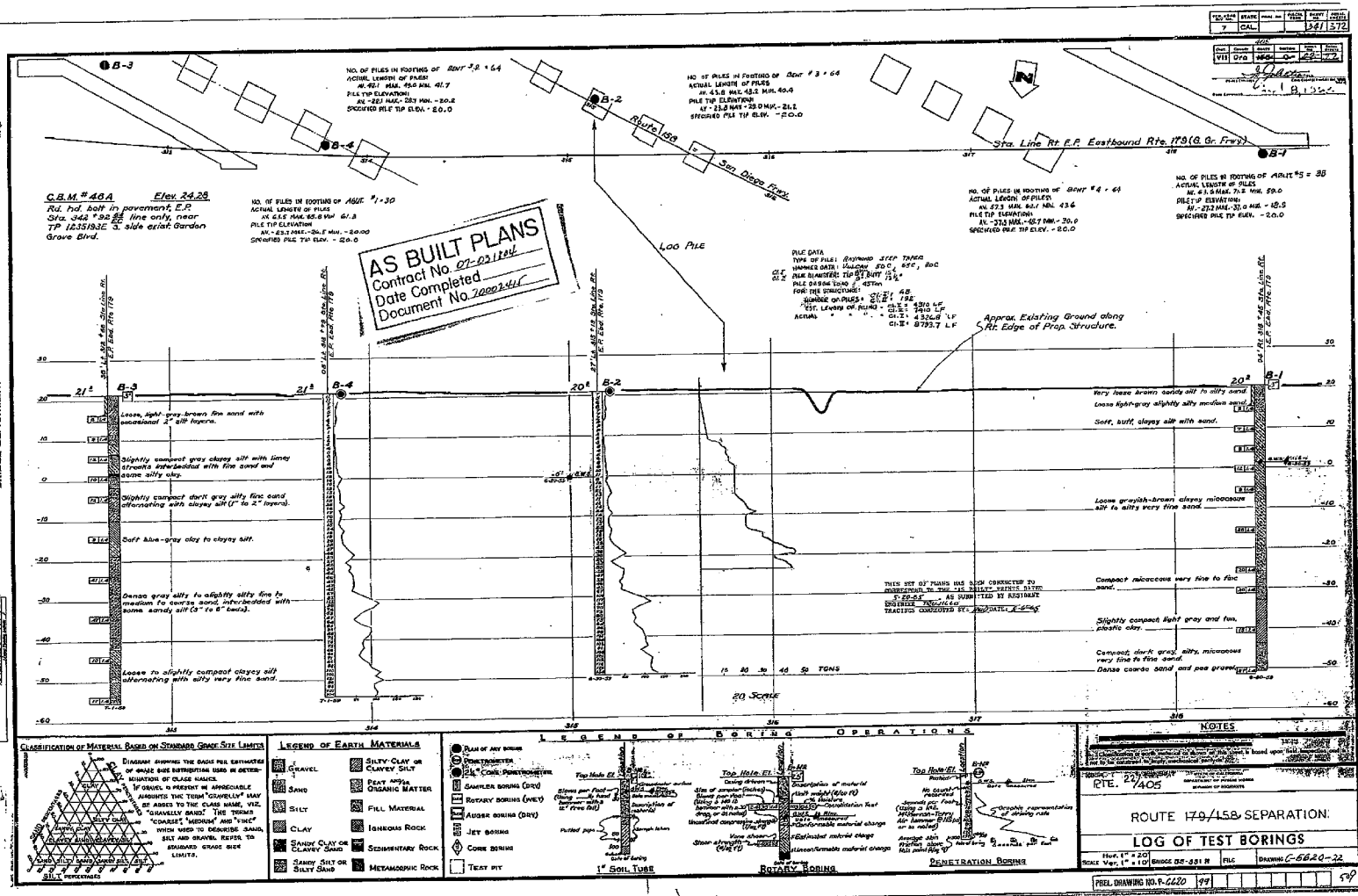
CTBMPDF - www.ctsiip.com

Figure C-8



FOOTING PLAN
3/16" = 1'-0"
PLAN (BENT 4 - COLUMN 4)
3/16" = 1'-0"
14 Piles total @ Column 2
Note: Reinforcing was repositioned to accommodate oversizing of footing. No bars added, only spacing affected or rebar extended to fit new footing limits.
18-#9 both ways @ each side exist column tot 36 each way (top mat). Bundle bars @ column as shown.
#9, tot 10 both ways (bottom mat) (outside exist footing area)
Extend exist #11 tot 18 each way (bottom mat)
Replace exist #11 bar with full length bar
Class 70C piles, tot 12
12 KV So. Cal. Edison Line
SB Route 405
Note: Pile spacing similar both ways. Details shown for all footings except at column 4 @ bent 4.
Note: For reinforcement details not called out, see "Footing Plan" & "Elevation" on this sheet. Columns numbered left to right looking ahead on station.
Class 70C piles, total 14. Predrill the 5 piles adjacent to exist culvert.
Note: Footing enlarged to include piles.
Edge of existing culvert
8 spaces @ 6'-0" = 18'-0"
3 equal spaces
EARTHQUAKE RETROFIT PROJECT NO. 124
ROUTE 22/405 SEPARATION
BENTS 2 & 4 RETROFIT DETAILS
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
Dokken Engineering
3221 Ramos Circle
Sacramento, CA 95827 · (916) 361-3111
N. TAMANNAIE
No. 37289
Exp. 6-30-96
CIVIL
Design N. Tamannaie
Details B. Waldrop
Quantities Y. Hu
W. Kwan
W. Kwan
B. Meyer
Nader Tamannaie
Moe Amini
55-33IR
5-23-94

Figure C-9



I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION OF THE DIRECTOR OF PUBLIC WORKS.

DATE 2-10-22 SIGNATURE [signature] TITLE SR DRAFTSMAN

Figure C-10

APPENDIX D
CALTRANS FOUNDATION REVIEW – SEISMIC DESIGN CRITERIA

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)

FAX: (916) 227- 9765

DATE: December 11, 2007

FILE: 12 (District) ORA (County) 22 (Route) (Post Mile)

MEMO BY: Group Delta Consultants DATED: 11/14/2007

SR-22 Phase 2 project: Valley View UC, S405/E22 Connector OC, New SR22/I-405 HOV Connector
Structure Name

GENERAL PLAN DATED: N/A FDN PLAN DATED: N/A

12-071630 (EA Number) 55-var (Bridge Number)

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4Th [ ] Other: _____

The following are our review comments on the memorandum you forwarded with the subject titled "**Seismic Design Criteria for Bridges** (SR 22 Valley View OC Replacement. S405/E-22 Connector OC Replacement, New SR-22/I-405 HOV Connector)", dated November 14, 2007, prepared by Group Delta Consultants.

1. The design ARS for all structures located within the identified limits of the project should be developed based on a design PBA of 0.5g and Maximum Credible Earthquake (MCE) magnitude of 7.0 associated with the Newport-Inglewood fault. This is because, except at very low periods, spectral accelerations for this ARS should be higher than those for the ARS corresponding to a PBA=0.6g and MCE magnitude of 6.0 associated with the Los Alamitos fault. The design ARS shall include modifications due to near-fault effects as specified in the Caltrans Seismic Design Criteria (SDC).
2. The Table 2 in the report should also include estimated median Peak Ground Acceleration (PGA) using Sadigh et al (1997) attenuation relationships. Geotechnical analysis such as liquefaction may need to be performed for more than one fault or combination of PGA and MCE magnitude to determine the controlling case.
3. The "Rated Magnitude" in Table 1 should be replaced with "Maximum Credible Earthquake or MCE Magnitude". The MCE magnitude for the Puente Hills Blind Thrust fault should be 7.25.
4. When available, only the "EQFAULT Fault to Site Distance (km)" in Table 2, which in fact is the closest distance to the fault rupture surface, should be used when using Sadigh et al (1997) attenuation relationships.
5. Due to the limited scope of the memo, the title should be changed from "Seismic Design Criteria for Bridges ", to "Design Ground Motion Criteria for Bridges".
6. "Caltrans seismology department" should be replaced with "Caltrans Geotechnical Services".

Reviewed By: Mohammed Islam, Ph.D., G.E., Senior Transportation Engineer/Seismic Specialist

Tel. 916-983-3328

Geotechnical Design South-1

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)

FAX: (916) 227- 8683

DATE: January 11, 2008

FILE: 12 (District) ORA (County) 405 (Route) (Post Mile)

MEMO BY: Group Delta Consultants (GDC)

DATED: 12/19/2007

SR-22 Phase 2 project: Valley View UC, S405/E22 Connector OC, New SR22/I-405 HOV Connector
Structure Name

GENERAL PLAN DATED: N/A

FDN PLAN DATED: N/A

12-071631
EA Number

405-var
Bridge Number

Submittal (*Check One*): [ ] 1st [x] 2nd [ ] 3rd [ ] 4Th [ ] Other: _____

The following are our review comments on the memorandum with the subject title "**Seismic Memorandum No. 2 – ARS Curves for Bridges Design Criteria for Bridges** (SR 22 Valley View OC Replacement. S405/E-22 Connector OC Replacement, New SR-22/I-405 HOV Connector), to be used in conjunction with our memorandum dated 11-14-07 previous submitted addressing PBA.

1. The report presents two ARS curves in Figure 2. It does not identify the recommended ARS curve. Furthermore, any recommended ARS curve at this time should be identified as preliminary.
2. The suggested design PBA of 0.6g in the memorandum dated 11-14-07 was based on a MCE magnitude M= 6.0. However, the modified ARS curves for PBA=0.6g presented in the subject memorandum for PBA=0.6g were developed based on the standard SDC curve for M=6.5±0.25. There are no standard SDC curves for M=6.0
3. A modified Type E ARS curve for PBA=0.5g and M=7.0 should be recommended as the preliminary design ARS curve for this project.
4. If, after completion of the geotechnical exploration, the soil profile at the site is categorized as Type F due to liquefaction, two different ARS curves, one without liquefaction and the other considering liquefaction should be recommended for structure design. Soil or foundation design parameters used in the structural analysis should correspond to the conditions appropriate for the ARS under consideration.
5. Please see our "Foundation Review" document, dated December 11, 2007 for comments on the GDC memorandum dated 11-14-2007.

Reviewed By:	Mohammed Islam, Ph.D., G.E., Senior Transportation Engineer/Seismic Specialist		
	Geotechnical Design South-1 5900 Folsom Blvd Sacramento, CA 95630		Tel. 916-983-3328; email: mislam@dot.ca.gov

APPENDIX E
ANALYSES AND CALCULATIONS

(submitted as a separate package)

APPENDIX F
CALTRANS COMMENTS AND RESPONSES

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

April 9, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments dated March 26, 2009**
(2nd Submittal)
405-22 HOV Connector Separation
BRIDGE NO. 55-1103E
12-ORA-405-PM 20.66, CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 23, 2008 (revised February 17, 2009)
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Is LRFD Design Guidelines 4th Edition, dated 2007 used for design? If not, explain.

Yes, geotechnical design is in general accordance. Please refer to the General Notes and Index to Plans for design criteria for structures (more detail in response to Bolsa Chica Road OC).

2. Figure 3 is incorrectly titled "Layout" and should be revised as a Boring/CPT Sounding Location Map…Revise accordingly.

The requested change has been made in the revised report.

3. LOTB must have the name of Caltrans OSFP liaison engineer …… .

The requested change has been made in the revised logs. The space will be left blank for Caltrans to insert electronic signature.

4. LOTBs must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to ……).

The requested change has been made in the revised logs.

5. Include in Tabular form in the Appendix, a summary of laboratory test results ……..

The requested summary is provided in Table B-1 through B-4 in Appendix B.

6. Table 1 summarizes the recommended design properties. Explain in section 3.3.3 of the subject submittal, how strength parameters (both drained and undrained) and internal friction angle were evaluated.

Drained shear strength parameters are primarily obtained from the Consolidated Drained (CD, slow) direct shear test results using peak and ultimate values of cohesion intercept and friction angle. Undrained shear strengths were obtained from the interpreted CPT data which uses $S_u = Q_c / N_k$ in which:

S_u = undrained shear strength, ksf
Q_c = cone tip resistance, tsf, and
N_k = 15.

Interpreted S_u values are shown in the interpreted CPT data in Appendix A. Penetration resistance and pocket penetrometer / torvane data were used to confirm reasonableness of CPT S_u data. Discussion has been added to Section 3.3.3.

7. Are the consolidation coefficients found based on Consolidation tests (direct method) or by correlation (indirect method)? Explain.

C_c and C_r were obtained from consolidation tests (direct method) applying Schmertmann's correction; Cr was approximated by C_e (unloading). C_v, coefficient of consolidation, was based on correlations (Navfac, 1987) Figure 3-6, 7-3-15.

8. Explain why no Triaxial tests were performed to assess the strength of the soils. Please refer to 2007 LRFD Design specification Guidelines, Section 10.4.6.2.2.

The local Southern California practice is to use pocket penetrometer and interpreted CPT data for undrained shear strength. A conservative interpretation of the CPT interpreted undrained shear strength is used in the design. Where very soft cohesive soils are present, such as Bay Mud, triaxial tests or vane shear tests may be warranted. However, in our 20 years of experience on Caltrans projects and 38 years experience using CPT data on local generally medium stiff to stiff cohesive soils, no triaxial tests have conventionally been performed.

9. What does Method 2 refer to in the CPT liquefaction calculations? Explain.

Method 2 refers to triggering analysis based on CPT data and settlement calculations based on equivalent SPT blow count. Method 1 refers to triggering analysis and settlement calculations based on equivalent SPT values.

10. Are there any facilities nearby the pile driving activities and if so what is impact of the pile driving vibration on these facilities, both airborne and in ground? Explain.

The closest pile driving operations are about 120 ft from Bent 4 of the new bridge to the housing north of the site. Based on published data (Theissen and Wood, 1982), at a distance of 100 ft, peak particle velocities for impact pile driving at firm or soft soil sites are less than 0.5 inches per second, and the safe limit for residential structures is 2 inches per second (see Attachment 2). Therefore, no significant vibration or damage from pile driving is anticipated. Noise will be an issue; however, existing soundwalls are present and will mitigate the sound effects to some extent.

11. Table 3B, there is no footnote shown for "Number of Piles per Support" column, reconcile.

The footnote stating "Bents 3L, 3R, 4L, 4R refer to individual footings at outrigger bents" has been added.

12. How the nominal driving resistance was arrived at?

Factored loads were provided by the Structural Engineer and nominal resistance was obtained by dividing the sum of factored loads by resistance factor. As per Caltrans requirements, a resistance factor of 0.7 was used for strength limit state and 1.0 was used for extreme limit state.

Nominal Resistance = Sum of the Factored Loads / Resistance factor

13. Revise and update Section 4.4.5.5 of the subject report with respect to the pile load test program.

The report has been modified as requested.

14. Explain how you are planning to drive the concrete piles through the extremely high blow count material, if piles do not punch through these very dense layers? Elaborate.

It is true that there are zones of high blow count above the specified pile tips. However, CPT data show the sand layers near the tip may be quite erratic and variable and may or may not be present under the entire foundation. An indicator pile program is proposed and pile lengths will be adjusted, if refusal is obtained at shorter penetrations.

15. It is not clear to the reviewer how the settlement was calculated for the piles? Provide calculation and elaborate.

Vesic' (1977) states that "Modern research on pile behavior has established that full mobilization of skin resistance requires a relative displacement between the pile shaft and surrounding soil of 0.25 to 0.4 inches (6 to 10 mm)." Ultimate end bearing was assumed to occur at a movement of 10% of the pile diameter. Based on this, we conservatively assumed a value of 0.4 inch for mobilization of ultimate frictional capacity, and determined mobilized end bearing at that deflection. The pile load vs deflection curve for deflections less than 0.4 inches is generally a straight line. Based on the average pile load for dead plus live load, we calculated the movement required for supporting the pile load by linear interpolation as:

Settlement (inches) = Average pile load *0.4" / Ultimate capacity

Once the settlement under a single pile was estimated, we obtained a group factor using the formula by Vesic' (1977) as follows:

Equivalent Group Width = B = (length x width)$^{1/2}$

Group Factor = (B/b) $^{1/2}$

In which B = equivalent group width and b = pile width.

The appropriate calculations are shown in Attachment E-7 (See Figure 1).

16. Is live load used for pile settlement calculation? If so, explain. Note that LRFD guidelines do not include live load for assessment of consolidation settlement.

We used dead plus live load, since the settlements of the stiff supporting soils are not consolidation / time dependent settlements.

17. Explain how the value of 1 ksf was arrived at for the lateral pressure exerted on the RCB from the subject bridge footing?

Maximum soil reaction on the piles was determined from Rankine theory on the pile cap and LPILE for the piles and assumed to spread out on a 2:1 to the box. The recommended design pressure exceeds this amount.

18. LPILE graphic representation does not correspond to the specified pile tip elevation and hence pile depth depicted in Table 3D. Explain and reconcile.

Pile lengths for Abutments 1 and 6 for 14-in. square pre-cast pre-stressed piles are 69 feet, and analyses used a pile length of 66 feet. A critical length analysis (pile length versus top deflection in LPILE) indicates that there is no effect of pile length on deflection beyond a length of about 20 feet (See Figure 2). Therefore for piles longer than about 20 feet, there is no effect on the lateral capacity of the pile.

Pile lengths for Bents 2 and 5 are 75 feet, and for Bents 3 and 4 are 100 feet, for 48-in. diameter pipe piles. A review of the lateral deflection, shear force, and bending moment vs depth plots (see Appendix E-5), indicate that pile length of 101 ft was used for the analysis. A critical length analysis for these piles indicates that there is no effect of pile length on deflection for a length of more than about 50 feet (See Figure 3). Therefore for piles longer than about 50 feet, there is no effect on lateral capacity of the pile. A length of 1.2 times critical length was used for lateral tip elevation.

19. Foundation recommendations for abutment piles Tables 3C and 3E show only the design tip elevations for compression for Abutments 1 and 4 and is missing the design tip elevations for settlement and lateral load. Calculate the later and revise tables accordingly.

In Table 3C, it is stated as per Caltrans Design Memo, the design tip elevation for lateral is typically provided by the Structural Designer (see Note 4 on Table 3C). For abutment piles, based on the data shown in Figure 2, a pile length of 1.25 times the critical length or about 25 ft is appropriate for lateral load (design pile tip elevation of El. +16 ft for Abut 1 and El. -6 ft for Abut. 6. For settlement, the specified design tip provides as settlement of less than 1 inch as per note 1. A revised Table 3C is included as Figure 4, and Table 3E is shown as Figure 5.

20. Explain how design tips were calculated for lateral load and elaborate on the apparent inconsistencies between design pile tip elevations and actual calculations.

See response to questions 18 and 19.

21. Confirm where in the SSP the required Pile Load Test for the CISS piles are referred to.

SSP 49-230 provides requirements for Load Test Piles, Dynamic Monitoring, and Wave Equation.

SSP 49HAMR provides Driving System Submittal, including driveability analysis, requirements.

All of these sections follow SSP 49-200, PILING.

REFERENCES

Caltrans, Research Notes, The GeoReserach Group, May 2003, GRG Vol.1, No.6, "Lateral Load Tests Of Pile Groups Lead to Improved Design Recommendations."

Theissen, J. R. and Wood W. C., "Vibrations in Structures Adjacent to Pile Driving," Engineering Bulletin 60, Dames and Moore, Los Angeles, July 1982.

Vesic', A. S., "Design of Pile Foundations, National Cooperative Highway Research Program, Highway Synthesis of Highway Practice, 42," Transportation Research Board, National Research Council, Washington, D.C., 1977.

The following are attached and completes our response:

Figure 1	Settlement Calculations (from Attachment E-7)
Figure 2	Critical Length for Lateral Deflection, Abutment Piles
Figure 3	Critical Length for Lateral Deflection, Bent Piles
Figure 4	Revised Table 3C.
Figure 5	Revised Table 3E

Attachment 1	Caltrans Comments dated March 31, 2009
Attachment 2	Vibrations from Pile Driving (Theissen & Wood, 1982)

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

FIGURES

APPENDIX E-7

405-22 HOV CONNECTOR SEPARATION
PILE SETTLEMENT CALCULATIONS

① Abutments Pile length = 69'

Ult. Capacity = 280 × 2 = 560 K

Single Pile Settlement = 0.4" (100% friction + mobilized end-bearing)

Ult. Cap @ 0.4" = $144 \times 2 + 141 \times 2 \left(\frac{0.4"}{0.1 \times 14"}\right) = 369$ K @ Abut 1

$= 186 \times 2 + 94 \times 2 \left(\frac{0.4"}{1.4"}\right) = 426$ K @ Abut 6

DL + LL = 3268 K / 23 piles = 142 K/pile @ Abut 1

= 4612 K / 32 piles = 144 K/pile @ Abut 6

Settlement under DL + LL

$\frac{142 K}{369 K}(0.4") = 0.15"$ @ Abut 1

$\frac{144 K}{426 K}(0.4") = 0.14"$ @ Abut 6

Group Size = 10' × 61' @ Abut 1 $B_{eq} = \sqrt{10 \times 61'} = 25'$

= 14' × 61' @ Abut 6 $B_{eq} = \sqrt{14 \times 61'} = 29'$

Group Factor (Vesic, 1977) $\varphi_g = \sqrt{\frac{B_{eq}}{b}} = \sqrt{\frac{25}{1.17}} = 4.6$ @ Abut 1

$= \sqrt{\frac{29}{1.17}} = 5.0$ @ Abut 6

Group Settlement = 4.6 × 0.15" = 0.69" < 1" @ Abut 1 OK

= 5.0 × 0.14" = 0.70" < 1" @ Abut 6 OK

② Bents 2+5 Pile Length = 75'

DL + LL = 9965 K / 18 piles = 554 K/pile

Ult. Cap. @ 0.4" Settlement = 1150 K (ignore end-bearing)

Settlement Single Pile DL+LL = 554/1150 (0.4") = 0.19"

$B_{eq} = \sqrt{32 \times 68'} = 46.6$, $\varphi_g = \sqrt{46.6/4} = 3.4$, b = 4'

Group Settlement = 3.4 × 0.19" = 0.65" < 1" OK

PROJECT NAME: 405-22 HOV Conn. Sep.		DRAWN BY: GJ	
		CHECKED BY: Kul	
PROJECT NUMBER: I-436	DATE: 2/13/09	PAGE: 1	OF 2

FIGURE 1 (SHEET 1 OF 2)

(3) Bents 3+4 Pile Length = 100'

DL+LL = $\frac{7434K}{9 piles}$ = 826 K/pile

Ult Cap.
@ 0.4" = 1800K (ignore end-bearing)
Settlement

Settlement Single Pile @ DL+LL = $\frac{826}{1800}(0.4") = 0.18"$

Group Size = $32' \times 32' = \frac{\pi}{4} B_{eq}^2$

$B_{eq} = \sqrt{\frac{4}{\pi}(32)^2} = 36'$

$\rho_g = \sqrt{\frac{36}{4}} = 3.0$

Group Settlement = $3.0 \times 0.18 = 0.54" < 1"$ OK

GROUP DELTA CONSULTANTS

PROJECT NAME: 405-22 HOV Conn. Sep.
PROJECT NUMBER: I-436
DATE: 2/13/09
DRAWN BY: CJ
CHECKED BY: Kml
PAGE: 2 OF 2

FIGURE 1 (SHEET 2 OF 2)

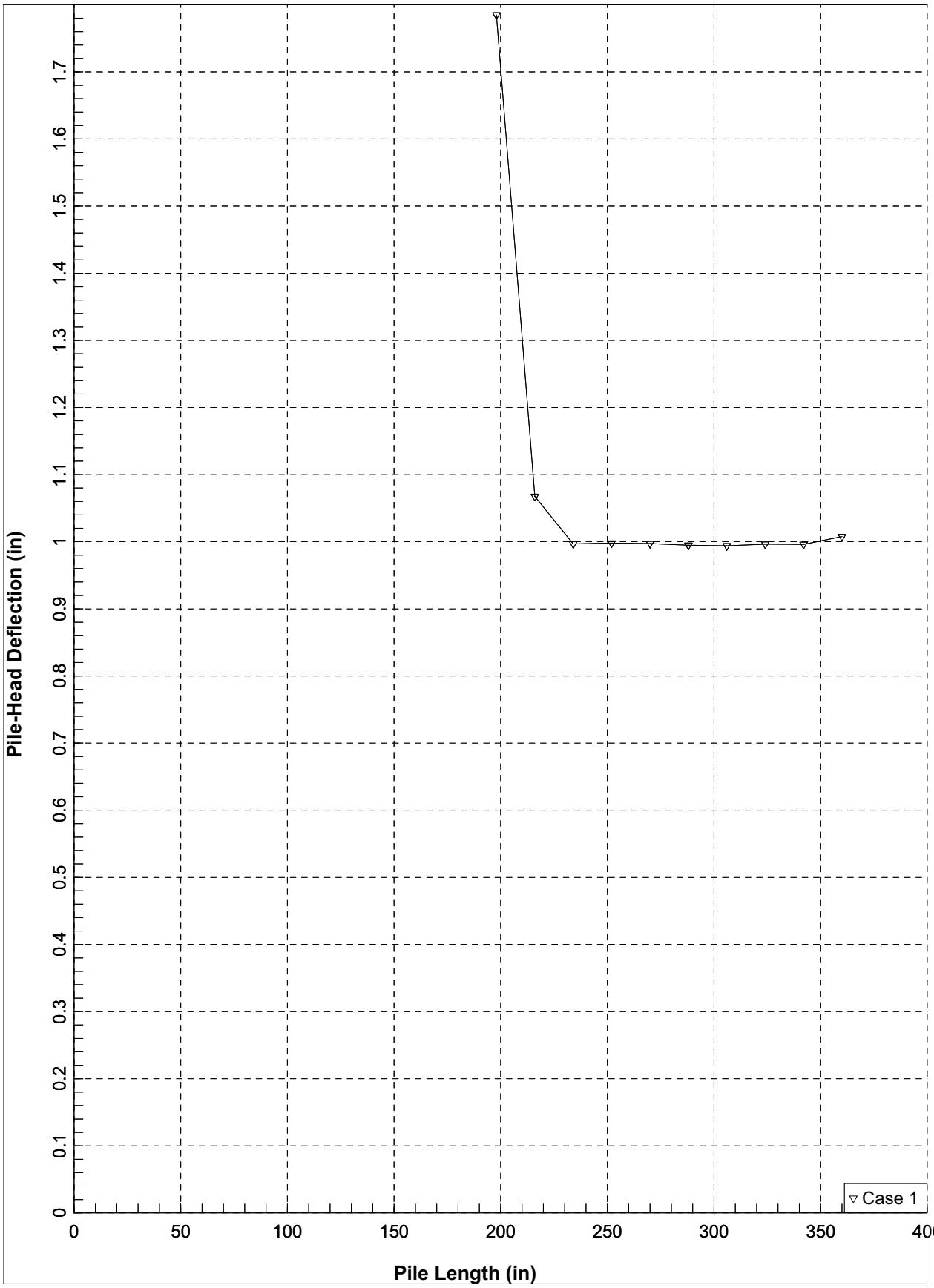

Pile-Head Deflection (in)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
0
50
100
150
200
250
300
350
400
Pile Length (in)
Case 1

FIGURE 2

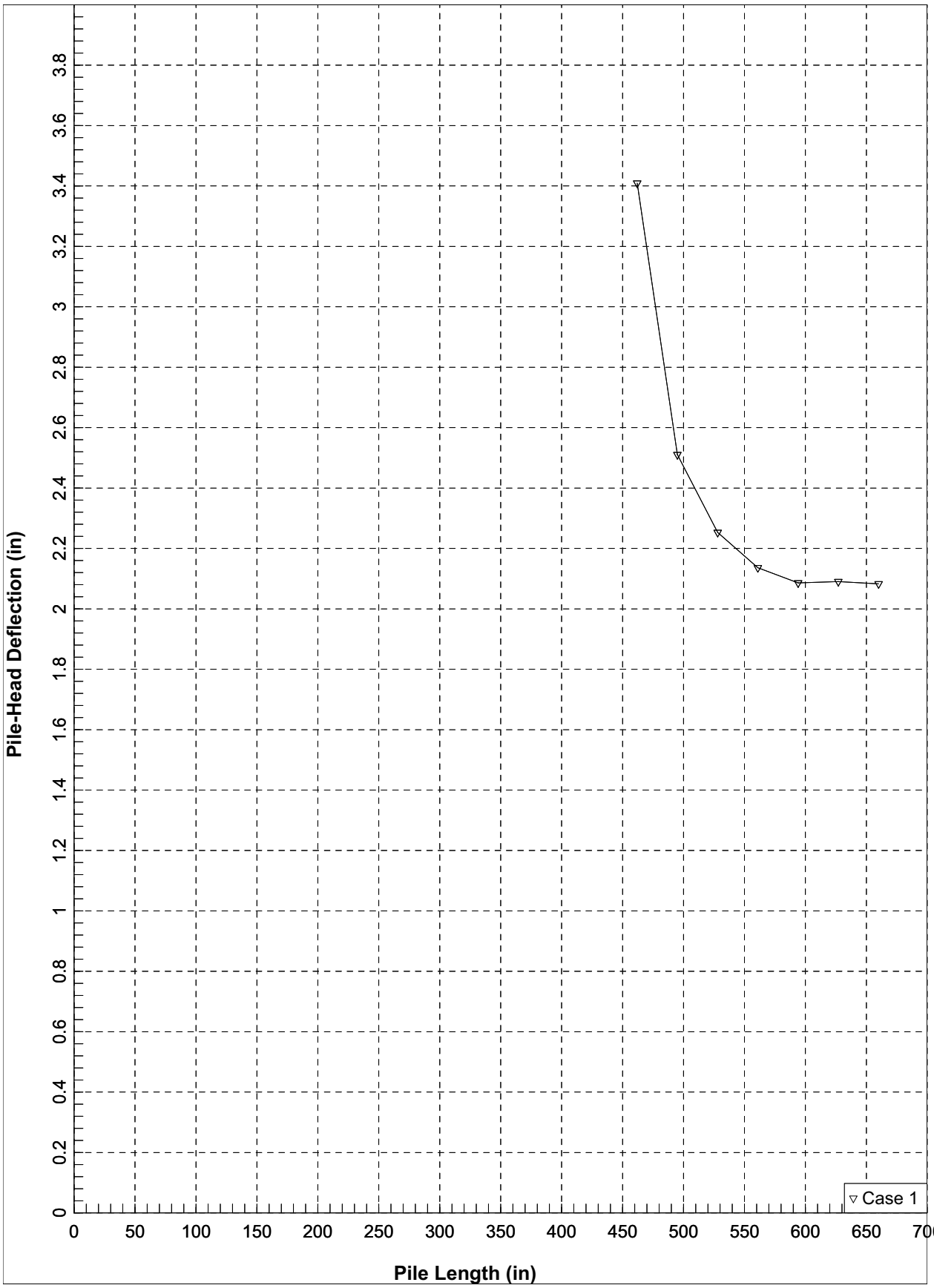

Pile-Head Deflection (in)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
Pile Length (in)
Case 1

FIGURE 3

Table 3C. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations										
Support	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
				Total	Perma-nent					
Abut 1	Class 200 Alt. "X"	41.0	41.5	3270	2890	200	400	-28 (a), +16 (d)	-28	400
Abut 6	Class 200 Alt. "X"	19.0	19.5	4615	4230	200	400	-50 (a), -6 (d)	-50	400

Notes:
1. Design tip elevations are controlled by: a) compression, (c) settlement, (d) lateral load, respectively. Settlement of piles driven to nominal load is less than 1 inch.
2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load.
4. Design tip elevation for Lateral Load is typically provided by SD.

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FIGURE 4

Table 3E

Pile Data Table						
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 200 Alt. "X"	400	0	-28 (a), +16 (d)	-28	400
Bent2	CISS NPS 48 x 0.75"	1150	0	-59.5 (a); -44.5 (d)	-59.5	1150
Bent 3L	CISS NPS 48 x 0.75"	1800	0	-85.5(a); -44.5 (d)	-84.5	1800
Bent 3R	CISS NPS 48 x 0.75"	1800	0	-85.5(a); -45.5 (d)	-85.5	1800
Bent 4L	CISS NPS 48 x 0.75"	1800	0	-83.5(a); -43.5 (d)	-83.5	1800
Bent 4R	CISS NPS 48 x 0.75"	1800	0	-82.5(a); -42.5 (d)	-82.5	1800
Bent 5	CISS NPS 48 x 0.75"	1150	0	-63(a); -48.0 (d)	-63	1150
Abut 6	Class 200 Alt. "X"	400	0	-50 (a), -6 (d)	-50	400

Notes:

*1. Design tip elevations for **Abutments** are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load. Settlement of piles driven to nominal load is less than 1 inch.*

*2. Design tip elevations for **Bents** are controlled by: (a) Compression, (b) Tension, (c) Settlement, (d) Lateral Load. Settlement of piles driven to nominal load is less than 1 inch.*

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FIGURE 5

ATTACHMENT 1
CALTRANS COMMENTS DATED March 26, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 20.66
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc

DATED: February 17, 2009 405-22 HOV Connector Sep (New)
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: February 23, 2009 12-071621 55-1103E
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Foundation Report, 405-22 HOV Connector Separation, Bridge No. 55-1103E, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 17, 2009 and submitted to our office on February 26, 2009. In our review, we made reference to the following:

- "Structure Foundation Report, 405-22 HOV Connector Separation, Bridge No. 55-1103E, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 23, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 16, 2009."

We have the following comments:

1. Is LRFD Design Guidelines 4th edition, dated 2007 used for design? If not, explain.
2. Figure 3 is incorrectly tilted "Layout" and should be titled as a Boring/CPT Sounding Location Map accompanied with Company Logo. Revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
3. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
4. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).
5. Include in tabulated form in the Appendix a summary of the laboratory tests results, tables should include Boring number, sample number, depth, soil type, Moisture content, dry density, grain size distribution (Gravel Sand, Fine %), Atterberg Limit. A Separate Table for the Strength tests, including boring number, sample type, depth, soil type, strength. Finally a table for consolidation test results that includes boring number, sample number, depth, soil type, t50, t90, Cc, Cr, Ccε, Crε,e0 and σ'p.
6. Table 1 summarizes the recommended design properties. Explain in section 3.3.3 of the subject submittal, how the strength parameters (both drained and undrained) and internal friction angles were evaluated.
7. Are the consolidation coefficients found based on Consolidation tests (direct method) or by correlation (indirect method)? Explain.

8. Explain why no Triaxial tests were performed to assess the strength of the soil. Please refer to 2007 LRFD Design Specification Guidelines, Section 10.4.6.2.2.
9. What does *Method 2* refer to in the CPT liquefaction calculations? Explain.
10. Are there any facilities nearby the pile driving activities and if so, what is the impact of the pile driving vibration on these facilities, both airborne and in ground? Explain.
11. Table 3B, there is no footnote shown for "Number of piles per support" column, reconcile.
12. How the Nominal Driving Resistance was arrived at?
13. Revise and update Section 4.4.5.5 of the subject report with reference to the Pile Load Test Program.
14. Explain how you are planning to drive the concrete piles through the extremely high blow count material, if the piles do not punch through these very dense soil layers? Elaborate.
15. It is not clear to the reviewer how the settlement was calculated for the piles. Provide calculation and elaborate.
16. Is live load used for pile settlement calculation? If so, explain. Note that LRFD guidelines do not include live load for assessment of consolidation settlement.
17. Explain how the value of 1 ksf was arrived at for the lateral pressure exerted on the RCB from the subject bridge footing?
18. LPILE graphic representation does not correspond to the specified tip elevation and hence the pile depth depicted in table 3D. Explain and reconcile.
19. Foundation recommendation for abutment piles, Tables 3C and 3E show only the design tip elevation for compression for Abutments 1 and 6 and is missing the design tip elevations for settlement and lateral load. Calculate the latter and revise the Tables accordingly.
20. Explain how the pile tip elevations were calculated for the lateral load and elaborate on the apparent inconsistencies between the design pile tip elevations and the actual calculations.
21. Confirm where in the SSP the required Pile Load Test for the CISS piles are referred to.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

ATTACHMENT 2
VIBRATIONS FROM PILE DRIVING (THEISSEN & WOOD, 1982)

SCAN + SAVE IN:
N:\ADMIN\Resources\Vibrations in Structures Adjacent to Pile Driving (Thiessen+Wood,1982).pdf

Toms. 818-996-9738

PDF I-39 Return to Karl

01 Return to my desk. Karl

Vibrations in Structures Adjacent to Pile Driving

Comparison of 10 case histories provides guidelines for gauging potential effects of various pile hammers on soft and firm soil sites.

By John R. Theissen and William C. Wood

INTRODUCTION

The effect of construction activities at a given property on adjacent properties is a significant consideration of environmental impact statements used to obtain construction permits from local governments and agencies. Disruption of business and trade, blocked access, dust and dirt are typical problems associated with construction. In addition, a significant number of large construction projects also involve pile driving, resulting in noise and vibrations. Such vibrations may cause architectural or structural distress to adjacent structures, damage to building contents, and may also result in the densification of cohesionless soils with ompanying settlement of building otings, floor slabs and walls.

This paper provides a discussion of the authors' experience in monitoring construction vibrations adjacent to pile-driving projects in San Francisco and provides a comparison of the data obtained from these projects with published vibration attenuation and damage criteria. The case studies discussed in this article encompass 10 projects for which vibration levels were measured in buried structures, buildings supported on piles and spread footings, and on the ground or pavement at some of the sites. The data obtained are principally for impact pile drivers and concrete piles, but some data for sheet piles driven with vibratory hammers are included.

In each of the 10 case histories, the purpose of vibration monitoring was to assess vibration levels, usually within a structure, and to gauge the potential for damage or distress in adjacent structures or facilities. Most of the structures monitored were supported on piles or on footings on very dense soils and thus were not subject to settlements resulting from soil densification. Therefore, it was assumed that any damage produced during pile driving was probably due to construction vibrations rather than associated settlements.

CASE STUDIES

The 10 projects studied are all located in the City of San Francisco as indicated in Figure 1. Six of the projects are in the downtown area near Market Street, an area of major high-rise construc-

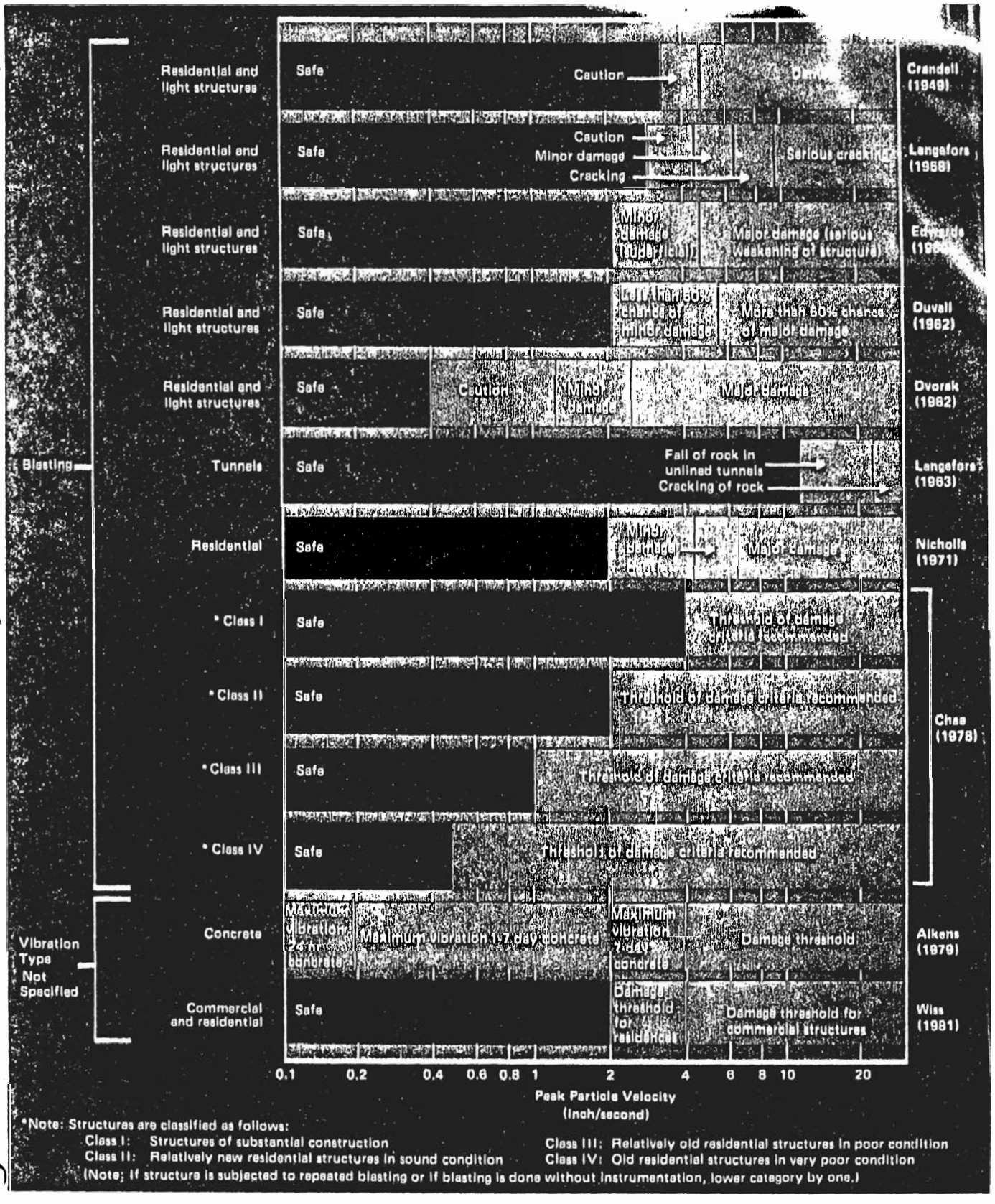


Figure 5. Observed or anticipated damage thresholds.

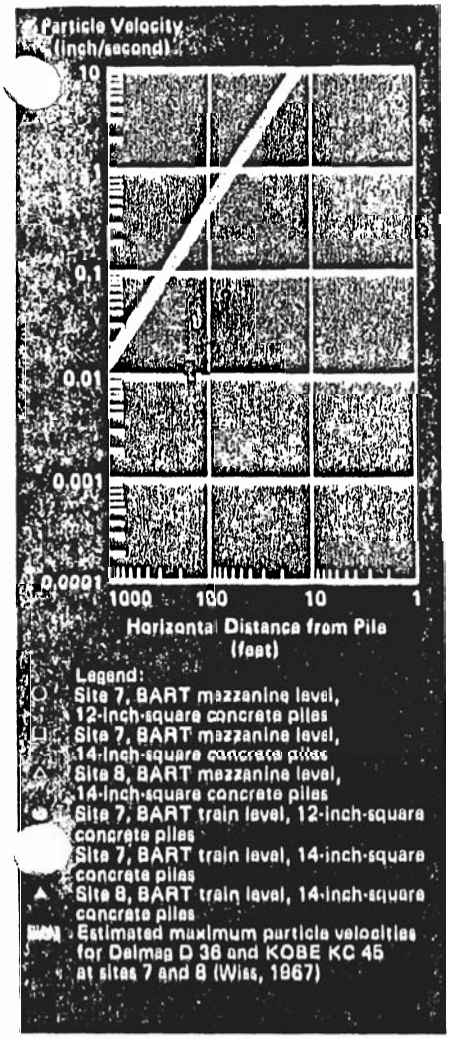


Figure 9. Observed particle velocities in underground structures at soft soil sites, using impact pile drivers.

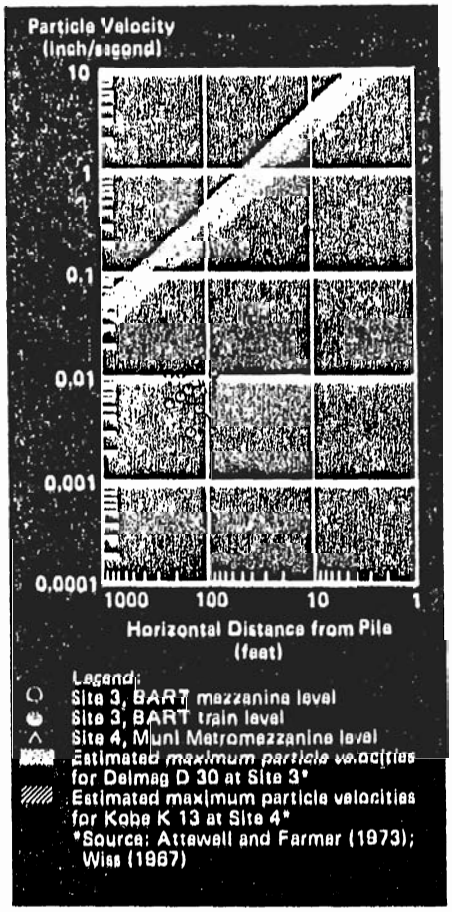


Figure 10. Observed particle velocities in underground structures at firm soil sites, using impact pile drivers.

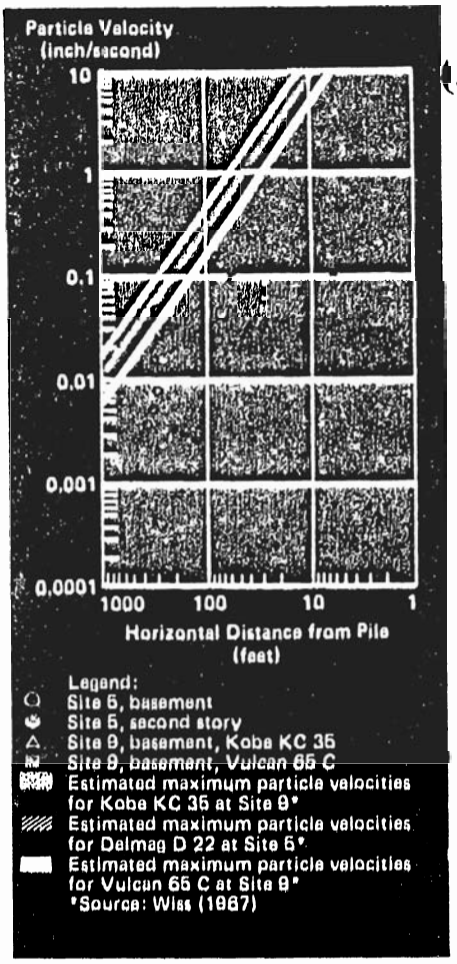


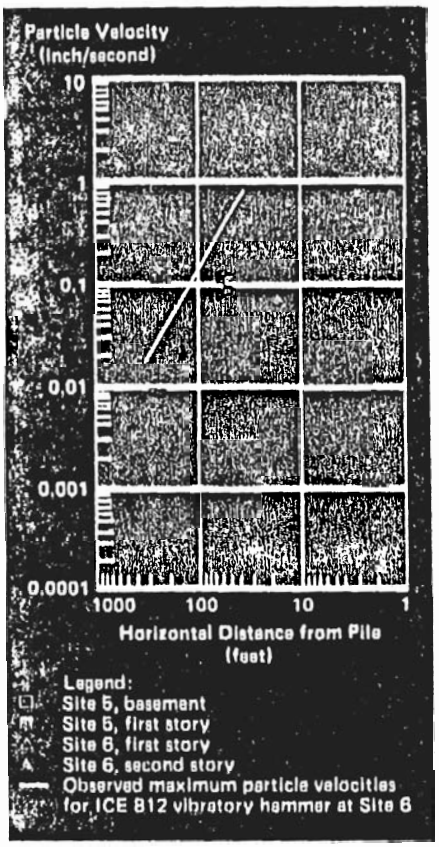
Figure 11. Observed particle velocities in buildings at soft soil sites, using impact pile drivers.

of the observed peak particle velocities may be approximated by a geometrical-damping coefficient having a value of about 0.9. This corresponds with the general attenuation relationship given by Wiss (1967) for dry or wet sands and the damping coefficient of 1 presented by Attewell and Farmer (1973) for firm soil sites. It thus appears that a geometrical-damping coefficient on the order of about 1 would be suitable to model vibration attenuation at similar firm soil sites.

In observing vibrations in relatively massive underground structures, such as BART and Muni-Metro stations, some observations may be made regarding anticipated and observed peak particle velocities. Measured maximum peak particle velocities for underground structures at two soft soil sites are presented in Figure 9. Also shown in this figure are estimated maximum surface particle velocities developed from curves for clays presented by Wiss (1967). Figure 10 presents the peak vibration velocities measured in similar underground structures adjacent to two firm soil sites as well as estimated curves for maximum particle velocities at ground surface developed from information for dry sand presented by Attewell and Farmer (1973) and Wiss (1967).

Comparison of the measured velocity data and predicted particle velocities indicates that use of published velocity/attenuation curves to predict particle velocities in such massive underground facilities may result in an over estimation of velocities by about a factor of 10. Causes for such differences in vibration levels could not be ascertained from the limited data available, but it is suspected that the differences were due to a combination of structural damping and attenuation of the wave energy below ground surface. It should be noted that observed particle velocities in the structures were well below 2 inches per second, and no damage was observed at the monitored locations.

In observing peak particle velocities in commercial structures of varied construction, similar reductions in peak particle velocities were noted. Figures 11 and 12 present observed particle velocities in pile-supported buildings on soft soil sites where impact and vibratory hammers were used, respectively. As with Figures 9 and 10, estimated maximum particle velocities for impact pile drivers have been superimposed on Figure 11, and the velocity attenuation curve for the



gure 12. Observed particle velocities in buildings at soft soil sites, using vibratory pile drivers.

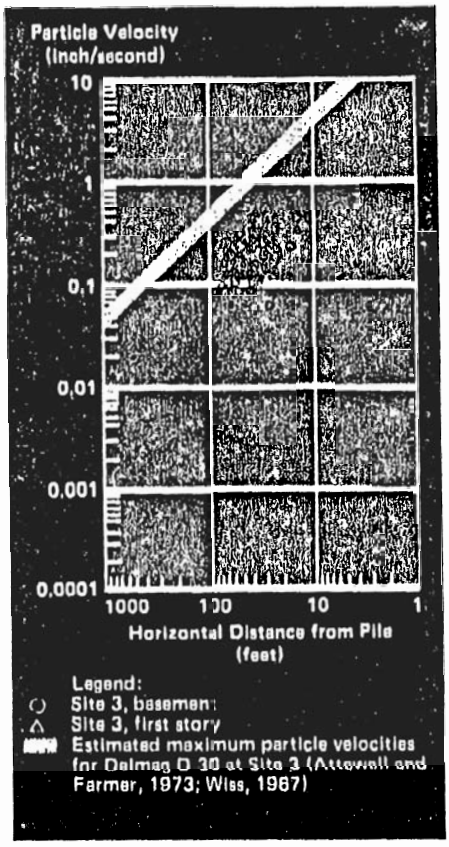


Figure 13. Observed particle velocities in buildings at firm soil sites, using impact pile drivers.

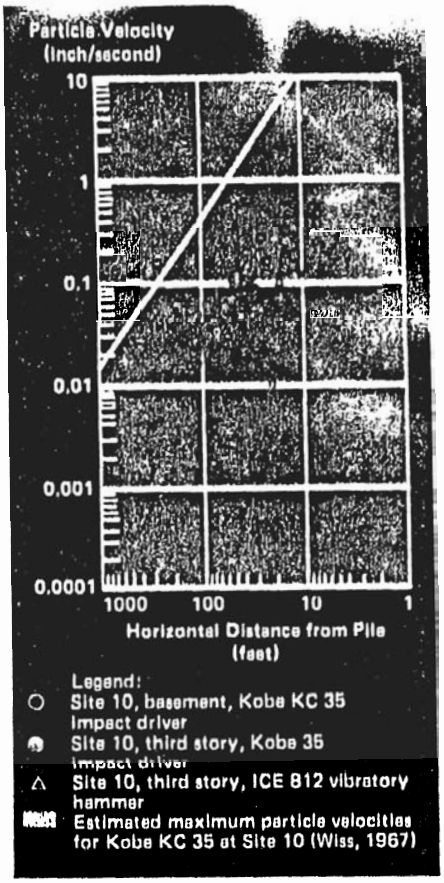


Figure 14. Observed particle velocities in buildings at soft soil sites, using impact and vibratory pile drivers.

ICE 812 Hammer from Figure 7 has been superimposed on Figure 12. Comparison of the observed structural vibrations and observed or estimated ground motions indicates that vibration levels within such substantial buildings may be only one-half of or less than those on surrounding ground surfaces. A similar relationship for such structures located on firm soil sites is shown in Figure 13.

Figure 14 presents observed peak velocities in a reinforced concrete building at Site 10 (a soft soil site), where the greatest number of measurements were obtained. An estimate of maximum peak ground surface accelerations, developed from information presented by Wiss (1967), is also shown for the Kobe KC 35 pile driver used at the site. Figure 14 illustrates the same trends of structure-attenuated velocities as shown in Figures 11, 12, and 13. In addition, there are sufficient data to indicate a rate of attenuation similar to that expected at ground surface. Comparison of vibration data from basement and third-story monitoring locations indicates little discernable difference in vibration levels; this trend is similar to that observed in comparing vibration levels in the basement and first-floor levels in the structure at Site 3.

In addition to the recorded observations, some general observations have also been made during these studies. While general vibration levels did not vary significantly from floor to floor in the monitored structures, as noted previously, significant variations in vibration levels did occur, depending on whether the sensors were placed next to columns or walls. Maximum vibrations were usually observed in the middle of column bays probably due to resonant vibration of the floor slab.

In addition, vibration levels from sheet pile driving were at least as severe as driving of bearing piles with impact hammers and, in some cases, such vibrations were significantly more severe. Due to the continuous nature of such vibrations, they were typically more objectionable to building occupants. Generally, the authors found that vibrations from driving sheet piles could be significantly reduced by driving only one sheet pile at a time or by substituting an impact hammer for a vibratory hammer.

In general, measured vibration levels in these studies were much lower than those predicted for damage, primarily due to the distance from the pile driving to the buildings. At only two sites (Sites 9 and 10) was pile driving sufficiently close to the structure to expect that vibration levels would reach 2 inches per second at the building wall. At Site 9 some damage was observed in the light, reinforced concrete structure, which was noted as being in poor condition initially; however, such damage was relatively minor, consisting of a cracked mirror and tilted door frame. At Site 10, the substantial concrete structure did not suffer any noticeable damage, although paint flaking and some slight cracking of an associated

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Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

February 11, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments**
Structure Foundation Report
405-22 HOV Connector Separation (NEW)
BRIDGE NO. 55-1103E
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 23, 2008
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Revise the title in the subject report: "Structure Foundation Report…" to "Foundation Report …"

The requested change has been made in the revised report.

2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.

The requested change has been made in the revised report.

3. Section 1.1.5 Design Foundation Sizes and Loads. No need for inclusion of this subsection and Table in the section.

We have deleted this section and the table.

4. Include a Figure describing Site Location Map in Section 1.

The site vicinity map (Figure 1) is included in Figures at the end of report, and is referenced in Section 1.0.

5. Revise section 2 title "Field and Laboratory Investigations" to "Field Investigation and Laboratory Testing"

The requested change has been made in the revised report.

6. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).

The requested table is included in Appendix A, Table A-1. We have added a sentence in the revised report directing the reader to this table.

7. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).

We have modified the Table in Section 2.2. A complete description of the tests, their purpose, and ASTM / CT test numbers are included in Appendix B. The reader is also referred to Appendix B in Section 2.2.

8. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.

The Exploration Location Plan (Figure 3) is included in Figures at the end of report, and is referenced in Section 2.1.

9. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.

The borings and CPTs were surveyed and the locations and elevations have been updated in Appendix A and in the LOTB in the revised report and plans.

10. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per comment No.10.

Refer to our response to Comment 9.

11. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

The requested change has been made in the revised report.

12. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

The requested information is included in Section 3.3.2.2. The high historical groundwater contour map is included in Figure 6 at the end of the report, and is consistent with our recent data at the site. The text of the report has been changed to Reference CDC.

13. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion, and friction angle.

The tabulated idealized soil profile containing the requested information is included in Table 1 at the end of the report, and is referenced in Section 3.3.3.

14. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.

The graphic soil profile is included in Figure 5 at 11x17" size at the end of the report and is referenced in Section 3.3.3.

15. There is no reference to LRFD and WSD design methods in calculating the Bent and abutment piles respectively, in the subject report, explain.

This was indicated (but not explicitly stated) in the table in Section 1.1.5 (now deleted per Comment 3). We have added a statement clarifying this fact in Section 4.4.1, Foundation Type.

16. Refer to 2008 Caltrans Memo to Designers for the LRFD design of piles. The latter information was emailed by Caltrans OGDS-1 to the respective consultant designers and was also discussed during the geotechnical focus and PDT meetings.

At the time of our report this section of MTD had not been updated on the website. We have revised the report to follow the 2008 MTD (Figures 3A through 3E).

17. Include tables for the Foundation Design Data Sheet, Foundation Design Loads, Foundation Recommendations and Pile Data Sheet, per 2008 LRFD Caltrans Memo to Designers.

Refer to our response to Comment 16.

18. Include the Nominal Driving Resistance in the appropriate section of the tables cited above and explain how it was arrived at.

The requested change has been made in the revised report (Table 3E).

19. Concrete class 200C is recommended in the subject report: Class C piles are no longer part of Caltrans Standard Plans. Project Standard Special Provisions need to discuss the corrosion remediation for the piles.

The reference has been corrected in the revised report. We will coordinate with Parsons to address in the SSPs.

20. Include a section on static settlement criteria during construction and BEFORE commencement of pile driving, where appropriate.

This information was included in the paragraph 2 for Abutment 1 and Paragraph 3 for Abutment 6 of Section 4.5, Approach Fill Earthwork.

21. Settlement monitoring for the embankment should be discussed and included in the construction consideration.

Appropriate fill, settlement, monitoring, and waiting period has been added to the Construction Considerations section.

22. Include backup data for the Corrosion in the Appendix.

Corrosion test results are presented in Section B.7 of Appendix B (Table B-2).

23. Discuss the settlement of piles and explain how they were arrived at.

We have added a discussion of pile settlement as Section 4.4.4, and changed Pile Installation to Section 4.4.5 in the revised report. Calculations are provided in Appendix E-7 of the calculation package.

24. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the

calculations shown in the spread sheets in the subject report. Included in the CD should also be the input files and output files for LPILE software lateral pile capacity.

The requested items are submitted along with the revised report.

25. Why LPILE version 5 (latest) was not used for the lateral pile capacity calculations and an outdated LPILE 4 is used.

The sand and clay p-y curves and the finite difference beam on elastic foundation model and p-y curve methodology have not changed since the original version of LPILE, so use of Version 4.0 is does not affect the result unless some specific new features of the program are used. We have not used any such features in our runs. This was confirmed by a sample calculation using both Version 4.0 and 5.0.

26. Provide the slope stability using SLIDE program, provide the input and output files.

GDC does not currently possess the SLIDE software. We have used PCSTABL5M, which is well documented and widely used software for slope stability analysis. We have ordered the SLIDE program for future projects, to meet Caltrans requirements.

27. Provide axial pile capacity by sample hand calculation verification or a sample spreadsheet where it can be verified by Caltrans OGDS-1.

The requested information is included in the revised report.

28. The data for the GRLWEAP is not referenced and/or is not made available for our review, include the latter and a complete feasibility study for the pile load static and/or PDA testing for the 48-inch CISS piles in a separate report.

The GRLWEAP analysis for an assumed Delmag D36-32 hammer is included with the revised report. Production driving criteria will be developed from the indicator program, using the actual driving equipment selected by the contractor, Pile Driving Analyzer (PDA) measurements, CASE method, and CAPWAP method. A separate pile driveability and load test report was prepared and submitted on February 5, 2009 as required by Caltrans.

29. Elaborate and expand on drivability of the recommended piles, based on the recommendations of the report cited in comment No. 29.

The requested information is included in a separate pile driveability and load test report dated February 5, 2009.

The following is attached and completes our response:

Attachment 1 Caltrans Comments dated January 16, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

ATTACHMENT 1
CALTRANS COMMENTS DATED JANUARY 16, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 16, 2009

FILE: 12 ORA 22 20.66
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: October 23, 2008 405-22 HOV Connector Sep (New)
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 55-1103E
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Structure Foundation Report, 405-22 HOV Connector Separation, Bridge No. 55-1103E, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 23, 2008 and submitted to our office on December 9th, 2008.

We have the following comments:

1. Revise the title in the subject report: "Structure Foundation Report…" to "Foundation Report …"
2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.
3. Section 1.1.5 Design Foundation Sizes and Loads. No need for inclusion of this subsection and Table in the section.
4. Include a Figure describing Site Location Map in Section 1.
5. Revise section 2 title " Field and Laboratory Investigations" to " Field Investigation and Laboratory Testing"
6. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).
7. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).
8. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.
9. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.
10. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per comment No.10.
11. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

12. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?
13. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion and friction angle.
14. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.
15. There is no reference to LRFD and WSD design methods in calculating the Bent and abutment piles respectively, in the subject report, explain.
16. Refer to 2008 Caltrans Memo to Designers for the LRFD design of piles. The latter information was emailed by Caltrans OGDS-1 to the respective consultant designers and was also discussed during the geotechnical focus and PDT meetings.
17. Include tables for the Foundation Design Data Sheet, Foundation Design Loads, Foundation Recommendations and Pile Data Sheet, per 2008 LRFD Caltrans Memo to Designers.
18. Include the Nominal Driving Resistance in the appropriate section of the tables cited above and explain how it was arrived at.
19. Concrete class 200C is recommended in the subject report: Class C piles are no longer part of Caltrans Standard Plans. Project Standard Special Provisions need to discuss the corrosion remediation for the piles.
20. Include a section on static settlement criteria during construction and BEFORE commencement of pile driving, where appropriate.
21. Settlement monitoring for the embankment should be discussed and included in the construction consideration.
22. Include backup data for the Corrosion in the Appendix.
23. Discuss the settlement of piles and explain how they were arrived at.
24. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report. Included in the CD should also be the actual graph developed for API pile capacity, the input files and output files for LPILE software lateral pile capacity.
25. Why LPILE version 5 (latest) was not used for the lateral pile capacity calculations and an outdated LPILE 4 is used.
26. Provide the slope stability using SLIDE program.
27. Provide axial pile capacity by sample hand calculation verification or a sample spreadsheet where it can be verified by Caltrans OGDS-1.
28. The data for the GRLWEAP is not referenced and/or is not made available for our review, include the latter and a complete feasibility study for the pile load static and/or PDA testing for the 48 inch CISS piles in a separate report.
29. Elaborate and expand on drivability of the recommended piles, based on the recommendations of the report cited in comment No.28.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

FOUNDATION REPORT
S405-E22 CONNECTOR SEPARATION
BRIDGE NO. 55-1101F
12-ORA-22,405-PM20.75, CU12235, EA 071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr., # 200
Irvine, CA 92612

Prepared By:

Group Delta Consultants, Inc.
32 Mauchly, Suite B
Irvine, CA 92618

GDC Project No. I-436
October 21, 2008
Revised February 17, 2009
Revised April 10, 2009

GROUP DELTA CONSULTANTS

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Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

October 21, 2008
Revised February 17, 2009
Revised April 10, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: Foundation Report
S405-E22 CONNECTOR SEPARATION
BRIDGE NO. 55-1101F
12-ORA-22,405-PM20.75, CU 12235, EA 071621
ORANGE COUNTY, CALIFORNIA
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our Structure Foundation Report (SFR) for the replacement of S405-E22 Connector Separation bridge in Orange County, California. This report presents the results of our field and laboratory investigations, and provides recommendations for the foundation design of the proposed bridge replacement. This report has been revised to incorporate the 2nd round of comments from Caltrans dated March 26, 2009.

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 450-2100.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
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FOUNDATION REPORT
S405-E22 CONNECTOR SEPARATION
BRIDGE NO. 55-1101F
12-ORA-22,405-PM20.75, CU, 12235, EA 071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The proposed project has been divided into 2 segments, and the overall project name is "West County Connector Project." The easterly segment is named "I-405/SR-22 HOV Connector Segment," which extends from Valley View Street to just east of Seal Beach Boulevard, and the westerly segment is named "I-405/I-605 HOV Connector Segment," which extends from just east of Seal Beach Boulevard to the I-605 interchange. The S405-E22 Connector Separation is part of the easterly segment. The site location is shown in Figure 1, Vicinity Map.

1.1 Project Description

The length of main portion of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405, from just east of Valley View Street to just east of Seal Beach Boulevard (see Figure 1). In addition, from just east of Valley View Street to just east of Springdale Street, several signs are proposed which are outside the main project area. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges (Bolsa Chica Road OC over SR-22 and 22/405 Connector Separation [to be renamed S405-E22 Connector Separation]), and construct a new HOV Connector bridge (405-22 HOV Connector Separation);
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls (RW3311+3312 at east abutment of S405-E22 HOV Connector Separation);
- Pre-cast Lightweight Fill (PCLW) Retaining Walls (RW1325+1326 at west abutment of 405-22 HOV Connector Separation, RW1299+1300 at east abutment of 405-22 HOV Connector Separation, and RW3319+3320 at west abutment of S405-E22 HOV Connector Separation);

- Drainage improvements; and
- Lighting, roadside signs, and overhead signs.

This report presents the S405-E22 Connector Separation (Replace) foundation recommendations.

1.1.1 Location

The site of the proposed bridge replacement is located between SR-22/Valley View intersection and Garden Grove Freeway SR-22 and San Diego Freeway (I-405) Junction, Orange County, California as shown in Figure 1. The bridge site latitude and longitude are approximately as follows:

- Latitude: 33.7744^{O}
- Longitude: -118.0417^{O}

1.1.2 Datum Shift

We understand that the datum (El. 0) for the as-built plans is 2.3 feet higher than the datum used for the current plans. ***All as-built logs of test borings and plans must be adjusted to the current datum by adding 2.3 feet to the as-built elevations.*** Elevations mentioned in this report have been adjusted and refer to the current datum.

1.1.3 Existing Bridge

The existing bridge is a 4-span structure supported on driven concrete-filled mandrel driven steel shell piles (Raymond Step-Taper piles) that will be demolished and replaced as part of this project. Details of the existing bridge foundations are presented in Table C-1, Appendix C. Bolsa Chica Channel) passes under the freeway between existing Bent 4 and Abutment 5. As-built plans are attached in Appendix C.

1.1.4 Proposed Replacement Bridge

The replacement structure will be located south of the existing structure (Figure 1), and will be a 3 span cast-in-place pre-stressed concrete box girder. Span lengths are 249 feet between Abutment 1 and Bent 2, 300 feet from Bent 2 to Bent 3, and 210 feet from Bent 3 to Abutment 4. Bridge width is 59 feet. Proposed abutments are high seat type, and Bents 2 and 3 are each a continuous footing with 2 columns each. Existing Bolsa Chica Channel Box Culvert and Existing Garden Grove Storm

Channel RC Pipe will pass between Bent 3 and Abutment 4 and between Bents 2 and 3, respectively. The preliminary General Plan, Foundation Plan, Details and Layout Plans are shown in Figures 2A through 2F.

1.2 Scope of Work

Our scope of work for this project included the following:

- Review existing data;
- Perform subsurface investigation along the bridge replacement alignment;
- Perform laboratory testing on selected samples of the subsurface soils;
- Develop geologic profiles and engineering parameters for foundation design;
- Perform geotechnical analyses;
- Develop geotechnical recommendations for design and construction of the bridge foundations; and
- Present the results of our investigations and our recommendations in this report.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

The subsurface conditions at the subject bridge were investigated by Group Delta Consultants, Inc. (GDC) by performing four (4) soil borings and seven (7) Cone Penetration Tests (CPTs) during the period of March 27th to April 24th, 2008. The borings were performed to depths of 61.5 feet to 121.5 feet below ground surface (bgs) and the CPTs were performed to depths of 61 feet to 150.3 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed along the bridge alignment. Locations of the borings and CPTs are presented in Figures 3A and 3B. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1 of Appendix A. The Log of Test Borings sheets are provided as Plates 1 through 7.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, engineering, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

Test	ASTM Designation	Purpose
• Moisture Content and Dry Density	ASTM D 2216	Soil Classification
• Grain Size Distribution (Sieve Analysis)	ASTM D 422	Soil Classification
• Percent Passing #200 Sieve	ASTM D 1140	Soil Classification
• Atterberg Limits	ASTM D 4318	Soil Classification
• Direct Shear	ASTM D 3080	Shear Strength
• Pocket Penetrometer		Undrained Shear Strength
• Soil Corrosivity (pH, sulfate, and chloride)	CT 422. 443 417, and 643	Corrosion Potential
• Consolidation	ASTM D 2435	Compressibility

Moisture content, dry density, percentage passing a No. 200 sieve, and the pocket penetrometer readings are shown on the boring logs in Appendix A. Detailed descriptions of the other tests performed and their results are presented in Appendix B.

2.3 Existing Data

In 1959 Caltrans performed two rotary soil borings and three penetration borings. The approximate locations of the Caltrans 1959 borings are shown on the current site plan in Figures 3A & 3B. The as-built Log of Test Borings (LOTB) sheet is presented in Figure 4. No laboratory data from the original investigation are available.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The original site grade in the area of the bridge was about El. 23 feet. Approach fills were placed to raise SR-22 above the I-405 freeway at the location of the Separation abutments. The fills have a maximum height of about 30 feet, and are inclined at 1.5H: 1V below the abutments. Side slopes generally range from 1.5H: 1V to 2H: 1V. Connector ramp elevation is near El. 56 feet at Abutment 1 and near El. 49 feet at Abutment 5. Freeway elevation below the separation is between El. 24 and 30 feet.

3.2 Geologic Conditions

3.2.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange County coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

3.2.2 Stratigraphy

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County coastal plain of the southern portion of the Central Block of the Los Angeles Basin. The basin is in filled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of

poorly consolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Stratigraphy consists of alternating layers of sands, silts, and clays (Figure 5B). Shallow compacted roadway fills and abutment approach fills up to about 30 feet high have been placed in the area over the natural alluvial deposits. Relative density and stiffness of the alluvial soils generally increases with depth.

3.2.3 Geologic Structure

Since the bedrock is more than 4,000 ft deep, geologic structure at the site is not a design issue.

3.2.4 Geologic Hazards

Geologic hazards include landslides, expansive or collapsible soils, and seismic hazards include liquefaction, lateral spreading, seismic slope stability, fault rupture, tsunamis, and seismic shaking. The site is not located in landslide prone area and no natural slopes are present. Expansive soils are present and recommendations regarding expansive soils with 4 ft of the finished grade are provided in the GDR and in expansive soil exclusion zone are provided in Section 4.5 of this report.

3.3 Subsurface Conditions

3.3.1 Generalized Soil Profile

Based on borings / CPTs from our current investigation, we developed Geotechnical Cross-sections and engineering characteristics of the soils along the bridge, as shown in Figures 5A and 5B. The soil conditions are generally consistent with those disclosed by the as-built LOTB in Figure 4. The soil profile is divided into 5 general layers. Layer descriptions and approximate layer boundary elevations are described below, and engineering properties for design are presented in Section 3.3.3.

3.3.1.1 Layer 1 – Fill and Stiff Native (El. 18 ft+)

Road fill and abutment approach fill is present above about El. +23 feet. The upper native alluvial material above El. 18 feet is similar to the compacted fill. Fill and stiff native alluvial soils encountered in the test borings and CPTs consist primarily of very stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent layers of medium dense silty sands (SM) and clayey sands (SC).

3.3.1.2 Layer 2 – Firm to Stiff CL (El. +18 ft to + 2 ft)

This layer is mostly below the water table, and is present throughout the project area. It is typically about 10 to 15 feet thick, and classifies as locally firm but predominantly stiff lean clay or lean sandy clay (CL) with typical undrained shear strengths of 1.0 to 1.4 ksf based on CPT correlations and pocket penetrometer readings. Thin seams of sand to silty sand to sandy silt are present in this layer (see Figure 5A and 5B). Layer 2 is generally overconsolidated with respect to the freeway grades, but is close to normally consolidated where present under the 20 to 30 feet of abutment fill. Since it is fairly shallow below the freeway grades and is generally the weakest and most compressible layer at the site, it typically controls the magnitude and time rate of settlement and global stability of slopes at the site.

3.3.1.3 Layer 3 – Very Stiff CL, ML (El. +2 ft to -14 ft)

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with thin interbeds of medium dense to dense silty sands (SM) and sandy silts (ML). Pocket penetrometer readings in the fine grained materials generally range from 2.0 to 4.5 ksf, and CPT correlations indicate average undrained shear strengths in this layer generally more than 3.0 ksf. These clays are overconsolidated.

3.3.1.4 Layer 4–Dense SM w/ V. Stiff CL (El. -14 ft to -28 ft)

Layer 4 is a predominantly granular layer about 14 feet thick. The sandy materials are interbedded with very stiff to hard clayey silt and clay (ML, CL). The sandy layers are primarily dense to very dense sand (SP), sand with silt (SM-SM, SW-SM), and silty sand to sandy silt (SM, ML). CPT tip resistance is generally between 150 and 450 tsf, and Standard Penetration Test (SPT) blowcounts of 35 to more than 50 blows per foot. Based on CPT correlations and pocket penetrometer readings, the clayey interbeds have undrained shear strength of 3 to more than 4 ksf. The layer appears to have thicker sand layers on the east end (near Abutment 1), becoming increasingly interbedded with clay layers moving toward the west.

3.3.1.5 Layer 5 – V. Dense SP & Hard CL/ML (below El. -28 ft)

This layer is composed of alternating beds of dense to very dense sands and very stiff to hard clays and silts. The sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 600 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf. The layer appears to have somewhat thicker more continuous sand layers on the east

end (near Abutment 1), becoming increasingly interbedded with clay layers moving toward the west.

3.3.2 Surface Water and Groundwater

3.3.2.1 Surface Water

Surface water generally consists of sheet flow to existing storm drainage facilities. A existing box culvert (Bolsa Chica Channel) is present between Bent 3 and Abutment 4 (see Figure 2C).

3.3.2.2 Groundwater

In the Caltrans 1959 As-Built LOTB, groundwater was reported near El. +7 feet. Groundwater was measured in Boring R-08-012 near El. +16 feet. Based on California Geological Survey (CGS) (previously known as California Department of Conservation (CDC) Division of Mines and Geology) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater is at a depth of about 10 to 20 feet. The reference elevation is not known. If the 10 foot depth is taken below freeway grade (El. 26 ft) then the groundwater would be near El. 16 feet, which is consistent with our investigation data. Based on the above data, we selected a design groundwater elevation of 16 feet for analysis.

3.3.3 Engineering Parameters

Recommended design engineering properties for the soil layers shown in Figures 5A and 5B were developed from the field and laboratory data from our investigation, and are summarized in Table 1. Index properties of soils were based on testing for natural moisture content and dry density, percent passing No. 200 sieve, grain size distribution, and Atterberg Limits. Drained strength parameters for c-ϕ soils were taken from results of direct shear tests. Undrained shear strengths of clays were taken from conservative interpretation of CPT test results, pocket penetrometer readings, and torvane readings. Friction angles of sandy soils below the water table were based on CPT and SPT penetration resistance correlations. Consolidation parameters for poorly consolidated clays were developed based on consolidation testing in combination with correlations of natural moisture content, ratio of undrained shear strength to effective overburden stress, and Atterberg Limits. Compressibility of sands and very stiff overconsolidated clays were based on published CPT and SPT penetration resistance correlations.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Seismic Evaluation

4.1.1 Potential Seismic Hazards

The project is located in a seismically active area. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding. The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 7. A summary of the nearby fault data is provided below:

Fault Name	Fault Type	MCE Magnitude	Closest Distance (km)	
			1996 Map[6]	EQFAULT[7]
Los Alamitos[1,4]	Reverse-Oblique[5]	6.0[6]	1.7	N/A
Newport-Inglewood / Rose Canyon East[1,2]	Strike-Slip[6]	7.0[6]	Use EQFAULT	5.2
San Joaquin Hills[2,3]	Blind-Thrust[7]	7.0[8]	N/A	13.5
Puente Hills[2,3]	Blind-Thrust[7]	7.25[7]	N/A	18.2

Footnotes:
1. Included on Caltrans 1996 Map
2. Included in CGS 2002 Fault Data (EQFAULT)
3. Not included in Caltrans 1996 Map
4. Not included in CGS 2002 Fault Data (EQFAULT)
5. Unclassified in Caltrans 1996 Report, classified by others as Reverse-Oblique
6. From Caltrans 1996 Map and Report
7. From CGS 2002 Fault Data, except M=7.25 for Puente Hills per Caltrans
8. Listed as 6.6 in CGS 2002, revised to 7.0 by Caltrans (SR-22 Phase 1)

4.1.2 Ground Surface Rupture

The site is not located in the Alquist-Priolo Earthquake Fault Zone, and the closest known active fault is the Los Alamitos Fault at a distance of about 1.7 km. Due to the distance from the closest faults ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed.

4.1.3 Ground Motion

The bridge site latitude and longitude are approximately as follows:

- Latitude: 33.7744^{O}
- Longitude: -118.0417^{O}

GDC performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base, as well as seismic data from the Caltrans 1996 map (see Figure 7). Los Alamitos is not in the EQFAULT CGS 2002 data base, and the closest mapped fault to the site according to EQFAULT is the Newport / Inglewood Strike-Slip Fault at a distance of 5.2 km, with a rated maximum credible magnitude of M=7.0. The bridge site is located between the 0.4 and 0.5g contours, which would indicate a rounded up design PBA of 0.5g. For EQFAULT analysis and the Los Alamitos Fault we used the attenuation relationships presented by Sadigh et. al. (1997). EQFAULT output and deterministic analyses using Sadigh relationships are presented in Appendix E-1. A summary of Peak Ground Acceleration (PGA) from Sadigh 1997 – Soil and PBA from Sadigh 1997 - Rock, and PBA per Caltrans Map, for the bridge is presented in the following table:

Fault	Caltrans 1996 Map Fault to Site Distance (km)	EQFAULT Fault to Site Distance (km)	Rounded-up Caltrans 1996 Map PBA (g's)	Sadigh 1997 Rock PBA (g's)	Sadigh 1997 Soil PGA (g's)
Los Alamitos M=6.0	1.7	N/A	0.5	0.59	0.50
Newport-Inglewood M=7.0	Use EQFAULT	5.2	0.5	0.51	0.42
San Joaquin Hills M=7.0	N/A	13.5	N/A	0.36	0.35
Puente Hills M=7.25	N/A	18.2	N/A	0.32	0.32

The PBA for a magnitude 6.0 earthquake on Los Alamitos Fault is 0.6g and for a magnitude 7.0 earthquake on Newport-Inglewood is 0.5g. Peak Ground Acceleration (PGA) may be taken as 0.50g for M_w=6.0 and 0.42g for M_w=7.0. For seismic slope stability evaluation, we recommend using a horizontal acceleration coefficient of Kh=0.17 or 1/3 of the maximum PGA for the Mw=7.0 event.

4.1.4 ARS Curve

Per Caltrans Foundation Reviews dated 12-11-07 and 01-11-08 (See Appendix D) ARS curves for the project may be taken as Seismic Design Criteria (SDC) ARS curves for PBA of 0.5g and MCE magnitude of 7.25+/-0.25 for SR-22 / I-405 Separation (Replace) bridge. Based on CPT data, boring data, and our liquefaction assessment at the site, the soil profile classifies as Type D in accordance with Caltrans SDC (see Appendix E-2). To account for near-source effect (site less than 15 km from fault), the following adjustments on the spectral acceleration values are recommended on the Caltrans SDC response spectra:

- 20% increase for periods equal to or greater than 1.0 second.
- No changes for periods less than 0.5 second.
- Linear interpolation for periods between 0.5 second and 1.0 second.

The recommended ARS curve is shown in Figure 8.

4.1.5 Liquefaction Evalauation

The site is located within a State Liquefaction Hazard Zone (CDMG, 1999). Highest historical groundwater in this area based on Figure 6 is between the 10 and 20 foot depth contours. Groundwater was encountered at El. 16 feet in boring R-08-012, which is about 10 feet below lowest freeway grades. Sediments below the groundwater at the site are primarily stiff to very stiff clays and dense to very dense sands, but contain localized thin interbeds of loose to medium dense sands, silty sands, and silts that may be prone to liquefaction.

We performed liquefaction calculations for CPT-08-006, 08-008, 08-013, 08-014, 08-014B, 08-016, and 08-018 using a groundwater elevation of El. +16 feet (see Appendix E-3). Triggering evaluation was based on the CPT method from the NCEER 1996/1998 Workshops (Youd and Idriss, 2001). Settlements were calculated using the method of Tokimatsu and Seed (1987), and residual strengths were based on the method of Seed and Harder (1990). Calculations were carried to a depth of 60 feet below existing grades. We determined that use of Magnitude 7.0 and PGA of 0.45g was more critical than using Magnitude 6.0 and PGA of 0.5g, and therefore used the higher magnitude case in our analyses.

The resulting analyses show that limited 1 to 4 foot thick layers of silty and sandy soils below El. +16 feet may liquefy in the design earthquake. Potentially liquefiable layers are shown on Figure 5A and 5B. Estimated liquefaction-induced ground settlements for all CPTs range between 0 and 0.8 inches with an average value of

0.30 inch. Only one of the seven values is greater than ½ inch. A summary of the liquefaction settlements is included in Table 2, and calculations are in Appendix E-3. Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1,500 psf. The N1-60cs for liquefiable layers adjusted in accordance with Seed and Harder (1990) range from 17 to more than 30 blows per foot (average 27), and estimated residual shear strengths range from a minimum of 875 psf up to a limiting value of 1,500 psf (average 1400 psf).

Due to the relatively isolated thin liquefied layers, depth of liquefiable layers, small ground settlements, and relatively high residual shear strengths, it is our conclusion that liquefaction does not have a significant impact on the design of piles or stability of the slopes at the site.

4.1.6 Other Seismic Hazards

The site has no known history of subsidence. The site is generally level except for engineered embankment fill slopes, liquefiable soil layers are relatively deep, thin, and isolated, and residual undrained shear strengths are generally higher than the undrained shear strength of Layer 2 clays. Therefore, the impact of liquefaction on seismic slope stability is not significant; instead the slope stability is generally controlled by the Layer 2 clays. Static and seismic stability of abutment slopes is evaluated quantitatively later in this report.

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the 100-yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

4.2 Soil Corrosivity

Caltrans Corrosion Guidelines (2003) define a corrosive area as “an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates or has a pH of less than 5.5.”

Representative samples of the abutment fills and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests performed are summarized as:

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
R-08-004	B-1	1.5-3.5	SP	1350	9.1	465	604
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20 - 21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35 - 36.5	ML	NA	8.8	576	255

Based on these test data the site soils classify as corrosive due to high chlorides in accordance with Caltrans Corrosion Guidelines (2003). Based on testing elsewhere in the overall site, high sulfates (between 2,000 and 15,000 ppm) are also present locally in the site area.

4.2.1 Corrosion Mitigation for Reinforced Concrete

Design of reinforced concrete in contact with native soils should consider the site corrosion potential in accordance with Bridge Design Specifications (BDS) Section 8.22 (July 2000):

- For 500 to 5000 ppm Chlorides in soil the minimum concrete cover and mix design for protection of reinforcement against corrosion due to chlorides shall be as provided in BDS Table 8.22.1:
  - The maximum water to cementitious material ratio shall not exceed 0.40;
  - Minimum concrete cover for footings and pile caps is 3 inches;
  - Minimum concrete cover for walls and columns is 3 inches;
  - Minimum concrete cover for precast piles is 2 inches, and Mineral admixtures conforming to ASTM Designation C1240 and/or ASTM Designation C618 Type F and/or N, may be required.;
- For 2000 to 15,000 ppm Sulfates in soil the minimum requirements for protection of concrete against sulfate exposure shall conform to the requirements in BDS Table 8.22.2:
  - Cement shall be Type II modified or Type V;

  - The minimum cementitious material content shall be 658 pounds per cubic yard with a 25% mineral admixture replacement by weight. Maximum water to cementitious material ratio shall not exceed 0.40.
- Concrete abutment piles shall be class 200

We understand that the design concrete cover for the bridge columns and walls is 2 inches, which is not adequate to resist corrosion from native soils. To avoid contact between native soils and concrete columns and walls, the special provisions should require that all backfill within 2.5 ft of the column or wall concrete be non-corrosive imported structural backfill with pH >5.5, sulfates < 2000 ppm and chlorides <500 ppm.

4.2.2 Corrosion Mitigation for Steel Pipe Piles

Steel piles in a corrosive environment must consider a sacrificial corrosion rate of 0.001 inches per year for 75 years, or 0.075 inches off all outside exposed surfaces of steel pipe piles in accordance with Memo to Designers 3-1(July, 2008). This only applies to a depth of 3 feet below the water table, which is only 3 feet below the pile cap for our CISS piles. So ultimate design wall thickness in this zone is 0.75 inch – 0.075 inch = 0.675 inch, and design pile diameter in this zone will be reduced by 0.15 inches. This corrosion loss was considered in the pile moment of inertia for lateral pile calculations.

4.3 Scour Potential

The proposed bridge is not located in a flood/drainage or river channel. Therefore, scour potential is not an issue for this bridge.

4.4 Foundation Recommendations

4.4.1 Existing Structure Foundations

Since the existing structure will be demolished and replaced, an as-built assessment of the capacities of existing bridge foundations was not necessary. A brief summary of the existing bridge is presented below:

- The bridge structure is a four-span cast-in-place concrete box girder built in 1965 and retrofitted in 1994;
- Approximate total bridge length is 586 feet and width is 52 feet.
- Existing Abutments 1 and 5 are supported on 45-ton Class I driven Raymond Step Taper Piles. Bottom of footing elevations are 39.0 to 41.0 feet at Abutment

1 and 32.0 to 34.0 feet at Abutment 5. The average tip elevation at Abutment 1 is El.-23.7 feet and it ranges between El.-20.0 to El.-26.5 feet. At Abutment 5 the average tip elevation is El.-27.2 feet and it ranges between El.-18.5 to El. -37.0 feet. Specified tip elevation was El.-20.0 feet.

- Existing Bents 2, 3 and 4 are supported on 45-ton Class II driven Raymond Step Taper Piles. Bottom of footing elevations are El. 20.0, 19.0 and 16.0 at Bents 2, 3, and 4, respectively. The average tip elevation at Bent 2 is El.-22.1 feet and it ranges between El.-20.2 to El.-28.7 feet. At Bent 3, the average tip elevation is El.-23.8 feet and it ranges between El.-21.2 to El.-29.0 feet. The average tip elevation at Bent 4 is at El.-37.9 feet and it ranges between El.-30.0 to El.-48.7 feet. Specified tip elevation was El.-20.0 feet.

- In 1994 the structure was retrofitted for design PBA of 0.5g by adding concrete catchers and treated timber bumpers to Abutments 1 and 5 and retrofitting footings for Bents 2 & 4 by enlarging the footings and adding Class 70C concrete piles around the perimeter of the original footings. Specified tip elevation for the Class 70C piles was El. -40 at Bent 2 and El. -40 at Bent 4.

Locations of new foundation will not conflict with existing abandoned foundations. Selected as-built plans for the existing bridge are presented in Appendix C for reference.

4.4.2 New Foundations

4.4.2.1 Foundation Type

We recommend pre-cast pre-stressed reinforced concrete piles at Abutments 1 and 4 since they are generally the most economical. Due to high axial and lateral demand and shallow groundwater, large diameter piles are desirable, but Cast-In-Drilled-Hole (CIDH) piles are not recommended due to constructability below groundwater. Therefore, we recommend ¾ inch wall 48-in. outside diameter steel CISS piles (NPS 48" x ¾") for the bents.

The Abutment Piles are designed in accordance with WSD design method bent piles are designed in accordance with LRFD. In accordance with LRFD Memo to Designers 3-1, (July 2008), pile Loads are summarized in Table 3A. Pile details, design method, bottom of footing elevation, pile cut off elevation, pile cap size, allowable settlement, and number of piles per support are shown in Table 3B.

4.4.2.2 Axial Capacity

4.4.2.2.1 Abutment Piles

Driven prestressed concrete piles will derive their capacity by a combination of skin friction on the sides of the piles and from end bearing at the pile tip. We computed axial friction and end bearing capacities using the method of Meyerhof for sands, and we used the α-method for skin friction in clays, and we used 9 times undrained shear strength for end bearing in clays. Allowable axial pile capacities versus depth for abutment piles are shown in Figures 9A & 9B, and calculations are presented in Appendix E-4.

Layers of dense sand (Layer No. 4) are present between El. -14 and -30 feet, however these layers are generally thin and interbedded with clays. While the sands have high end bearing, the piles may punch through where the sand layers are thin without developing full end bearing, and thus end bearing may not be reliable in this layer. For pile length estimates, we assumed that piles will punch through these sand layers and not achieve full end-bearing capacity. If a consistent thick layer of dense sand is present, it will be detected in the indicator pile program and it may be possible to raise the tip elevations and found the piles in the higher sand layer.

For static loading conditions with a design load of 200 kips and nominal capacity of 400 kips, specified tip elevation at Abutment-1 is El. -44.0 feet, and is El. -49 ft at Abutment 4. Abutment pile lengths range from about 68 feet at Abutment 1 to about 65 feet at Abutment 4. The axial capacities and tip elevations are summarized in the Foundation Recommendations for Abutments, Table 3C, and Pile Data Table, Table 3E.

Ground settlements at the site are generally less than ½ inch due to liquefaction, with a maximum estimated value of 0.8 inches. To ensure that dynamic settlement of piles due to liquefaction is not more than ½ inch, we conservatively used the worst case CPT (CPT-13 with 0.8 inch total settlement) and assumed a downdrag load (negative skin friction) can develop from settling soils on the pile shaft above a point defined as the "Neutral Plane," or the point below which liquefaction settlement is less than ½ inch. The neutral plane was estimated at El. -6 feet. Abutment 1 was selected as more critical for downdrag, due to longer pile length above the neutral plane.

Downdrag load or skin friction above the neutral plane is estimated as 60 kips (50% of the skin friction), skin friction below the neutral plane is 242 kips, end bearing is 38 kips, and dead load is 115 kips. The pile capacity below the neutral plane, under

dead plus seismic load (including downdrag) must have a factor of safety of greater than 1, or:

$$\frac{(\text{Skin Friction} + \text{End Bearing})_{\text{below NP}}}{(\text{Dead Load} + \text{Downdrag})} = \frac{242+38}{115+60} = 1.6 > 1 \text{ (OK)}$$

Therefore, we conclude that piles have adequate capacity to resist downdrag, and that settlement due to liquefaction and downdrag will be less than ½ inch.

We recommend that all the piles be installed at a minimum spacing of 3 pile diameters or 3.5 feet center-to-center. Piles with this minimum spacing will not require a reduction in vertical capacity for group action.

4.4.2.2.2 Bent Piles

Driven 48-in. diameter steel pipe piles with top portion filled with concrete (CISS) are proposed for the bents. Nominal axial pile capacity of 2,000 kips is required for the bent piles. We calculated the capacity of open ended pipe piles using the procedure recommended in API RP 2A (1991). The pile capacity at any depth is taken as the lower of the following two values:

(1) Outside friction + inside friction + end bearing on steel area
(2) Outside friction + end bearing on the gross cross-section of the pile

During driving as long as the inside friction is less than the end bearing on the soil plug area, the soil plug keeps moving up and equation (1) controls the pile capacity. When the inside friction becomes greater than the end bearing on the soil plug, the pile behaves as "plugged" and equation (2) controls the pile capacity. The pile may act as plugged where end bearing is in clay and then again act as unplugged if high end bearing in sand is encountered. In addition, the friction during continuous driving in clay may be 25% to 50% of the long-term friction and a pile may act as unplugged during driving but may act as plugged after setup. Due to increased time for pore pressure dissipation, we assumed that the inside friction may only be 50% of the outside friction. After the pile is partially drilled and filled with concrete, it will ultimately behave as a plugged or end bearing pile. Due to the assumptions (1) and (2) above, the capacity after filling with concrete will meet or exceed the capacity reached during driving.

For supporting the static and seismic loads from the bridge superstructure, the calculated ultimate capacity of the piles (including setup, or increase in friction after initial driving) is shown in Figures 9C & 9D with depth. Pile tips were also selected

to have minimum 5 to 10 foot embedment into the primary bearing layer. The recommended specified tip elevations range from El. -83.8 ft at Bent 2 to El. -86.5 ft at Bent 3 for a nominal capacity of 1,800 kips. Due to the uncertainty regarding the plugging and end bearing, only outside friction plus end bearing on steel area were considered in selecting the specified tip elevation. The axial capacities and tip elevations are summarized in the Foundation Recommendations for Bents, Table 3D, and Pile Data Table, Table 3E.

Ground settlements at the site are generally less than ½ inch due to liquefaction, with a maximum estimated value of 0.8 inches. To ensure that dynamic settlement of piles due to liquefaction is not more than ½ inch, we conservatively used the worst case CPT (CPT-13 with 0.8 inch total settlement) and assumed a downdrag load (negative skin friction) can develop from settling soils on the pile shaft above a point defined as the "Neutral Plane," or the point below which liquefaction settlement is less than ½ inch. The neutral plane was estimated at El. -6 feet. Bent 2 was selected as more critical for downdrag, due to longer pile length above the neutral plane. Downdrag load or outside skin friction above the neutral plane is estimated as 150 kips (using 50% ultimate friction above neutral plane), outside skin friction below the neutral plane is at least 1870 kips, end bearing (assuming plugged condition after filling pile with concrete and using lower clay end-bearing) is at least 320 kips, and dead load plus seismic compression is 1710 kips. The pile capacity below the neutral plane, under dead plus seismic load (including downdrag) must have a factor of safety of greater than 1, or:

$$\frac{(\text{Skin Friction}+\text{End Bearing})_{\text{below NP}}}{(\text{Dead Load}+\text{Seismic}+\text{Downdrag})} = \frac{1870+320}{1710+150} = 1.17 > 1 \text{ (OK)}$$

Therefore, we conclude that the piles have adequate capacity to resist downdrag, and that settlement due to liquefaction and downdrag will be less than ½ inch.

The piles should be installed to the specified tip elevations of El. -83.8 ft and El. -86.3 ft (100 ft pile length) for Bents 2 and 3, respectively. The required nominal capacity of the piles should be 1800 kips.

We recommend that all the piles be installed at a minimum spacing of 3 pile diameters or 12 feet center-to-center. Piles with this minimum spacing will not require a reduction in vertical capacity for group action.

It should be noted that capacity during initial driving will be less, and that substantial increase of friction will occur with set-up over time. The required capacity will likely not be achieved at end of initial driving, but will require consideration of set-up. The set-up will be measured in the indicator PDA plus load test programs, and included

in the final driving criteria. The load test must be performed after at least 15 days of initial pile driving, drilling out the soil plug and placing a 5-ft concrete plug as recommended in the Pile Driveability and Load Test Report dated February 5, 2009. The load test should verify the nominal capacities of 1,800 kips for the Bents 2 and 3, respectively.

4.4.2.3 Lateral Capacity

Lateral capacity of pile groups includes the passive resistance on the pile cap and lateral resistance of the piles.

Estimates of lateral pile capacity of Abutment and Bent piles were made using the computer program LPILE Plus 4.0 (Ensoft, 2000) and soils data from our investigation. For the piles spaced at 3 diameters on centers we used an average group p-multiplier of 0.5 to model reduction due to group effects. Maximum bending moments were estimated utilizing the higher p-multiplier of 0.75 for the leading row piles, which generates higher bending moments. The structural engineer is using a pinned connection at both abutments and fixed connection at the bents; therefore analyses were performed for free-head conditions at the abutments and fixed head conditions at the bents. For abutment batter piles, the horizontal component of axial capacity may be added to the lateral capacity. The results are summarized in Tables 4A & 4B. Computer outputs are presented in Appendix E-5.

At the request of Caltrans, a comparison run was made by using both version 4.0 and 5.0 to verify that no significant difference in results is present between the two versions for the cases analyzed. The comparison is shown in Appendix E-9.

We computed passive resistance on the Bent pile cap using Rankine theory and an undrained shear strength of 1.5 ksf for the stiff native clays for Bent 2 and 1.0 ksf for the stiff native clays for Bent 3 at the pile cap level. The recommended passive resistance versus deflection for each bent is shown in Figures 10A & 10B. Calculations are included in Appendix E-6.

Due to thin, isolated, and deep liquefiable layers with relatively high residual strength, liquefaction will not affect the lateral capacity of the foundations.

4.4.2.4 Pile Group Settlement

We used dead plus 50% live load for estimating settlements of the pile groups. Dead plus 50% live load for abutment piles is 89 kips per pile. Ultimate load per pile

at the abutment for 0.4 inch settlement is 404 kips. Assuming a maximum settlement of 0.4 inches to mobilize the ultimate load, we calculated settlement to mobilize design loads of 89 kips as about 0.09 inches. The group factor was calculated as $\zeta = (B/b)^{1/2}$ in which b = width of the pile and B is the equivalent width of the group (Vesic', 1977). Using this formula, the calculated settlement of the groups is less than 1 inch.

For Bents 2 and 3 piles the dead plus live load is 627 kip per pile. For Bents 2 and 3, the ultimate capacity for 0.4 inch settlement is 1,800 kips. For a dead plus live load of 627 kips, the settlement is about 0.12 inch. The group factor was calculated as□□□= (B/b)1/2 in which b = width of the pile and B is the equivalent width of the group (Vesic', 1977). Using this formula, the calculated settlement of the groups is less than 1 inch. Calculations for the settlement are shown in Appendix E-7.

4.4.2.5 Pile Installation

Detailed pile driveability and load test recommendations for 48-in. diameter CISS piles are provided in a separate report titled, "Pile Driveability Studies and Load Test," dated February 5, 2009.

4.4.2.5.1 Hard Driving

While the clays should be fairly easily penetrated, layers of dense sand are present locally above the specified tip elevations. Due to presence of these zones with higher end bearing, hard driving for several feet at these depths should be anticipated, especially in the concrete abutment piles, although the layers are thin enough that the piles are likely to punch through. The possibility of reaching capacity in the higher sand layers for the concrete piles will be addressed in the indicator program. The steel pipe piles can more readily cut through these layers, but may experience increased driving resistance.

4.4.2.5.2 Hammer Selection

We recommend that the concrete piles be driven with a hammer with rated capacity of at least 90,000 ft lbs. per blow (such as a Delmag D-36/32). For 48-in. diameter pipe piles, a minimum D-80 or D-100 or equivalent hammer should be used.

4.4.2.5.3 Blowcount Criteria

We performed driveability analysis and developed blowcount criteria for the piles using the computer program GRLWEAP. Concrete piles driven with a Delmag D36-

32 should be driven to a minimum blowcount of 25 blows per foot assuming a setup of 80 kips. For the 48-in. diameter pipe piles, the resistance during continuous driving may be 50% or less of the ultimate capacity. Detailed pile driveability and load test recommendations for 48-in. diameter CISS piles are provided in a separate report titled, "Pile Driveability Studies and Load Test," dated February 5, 2009.

4.4.2.5.4 Pre-Drilling

We recommend that piles be driven without pre-drilling. If excessively difficult driving is encountered during construction, use of undersized pre-drilling can be considered with the written approval of Group Delta. Undersized pre-drilling should be done with a maximum 12-inch auger for 14-inch piles. Although not anticipated, drilling the plug may be needed for some bent piles to reach the specified tip.

4.4.2.5.5 Indicator Pile Program

We recommend that an indicator pile program be performed with Pile Driving Analyzer (PDA) measurements. The benefits of the PDA measurements include:

- monitor hammer efficiency by measuring the energy delivered to the pile
- monitor compressive stresses at the end of pile driving to determine refusal blow count and compressive stress damage
- monitor tensile stresses during soft driving and to assess the potential for tensile stress damage
- confirm the ultimate dynamic friction and end bearing capacity
- determine setup so that long term frictional uplift and downdrag capacity can be verified
- optimize the blow count criteria
- optimize the production pile lengths

The indicator program should consist of driving a minimum of 22 test piles (18 prestressed concrete piles at abutments and 4 steel pipe piles at bents), which is about 10% of the production piles. The length of the test piles should be at least 10 ft longer than the lengths based on the recommended pile tip elevations in Table 3. Final pile driving criteria and production pile lengths should be defined after the results of the indicator pile program and load test program are available. The suggested PDA test pile locations are shown in Figures 2A through 2F. Detailed pile driveability and load test recommendations for 48-in. diameter CISS piles are provided in a separate report titled, "Pile Driveability Studies and Load Test," dated February 5, 2009.

4.4.2.5.6 Drilling of the CISS Soil Plug

The soil plug within the CISS piles will be partially drilled out and filled with concrete and re-bar. We understand that the concrete and steel will extend to a depth of 44 ft below the pile cap, leaving at least a 56 ft soil plug for the 100-ft long Bent 2 and 3 piles. This length of plug is expected to be stable and not to blow out under the hydrostatic uplift pressures.

4.5 Approach Fill Earthwork

Existing 1.5H:1V and 2.H:1V abutment fills were constructed during the original project grading. The abutments for the proposed separation replacement will be full height cantilever abutments. Both abutment footings will be in cut areas, as the existing abutment slopes will be cut back to create a longer new bridge, and to allow for future I-405 travel lanes at Abutment 1 and passage of Bolsa Chica Road off-ramp below Abutment 4. Additional new fills will be placed behind the abutments and on the approaches. Abutment 1 will use conventional soil embankment approaches and soil backfill, and Abutment 4 will have lightweight cellular concrete on the approaches and behind the abutment wall.

A temporary soil surcharge is recommended at Abutment 1 to mitigate post construction settlements at the abutment and side wing walls. Consolidation settlements will occur under the soil surcharge. The soil surcharge should be left in place until settlements are sufficiently complete that no significant post-construction settlements will occur at the abutment or wing walls. Since the surcharge grades are well above finished grades, the waiting period can be reduced from the 1 to 2 year time frame required for filling to finish grade. The surcharge fills should be placed as soon as possible in Stage 1 construction, and left in place for 6 to 8 month waiting period. Settlements should be monitored during fill placement and during the waiting period. After completion of the surcharge (at the discretion of GDC), the abutment may be excavated and piles driven, and wing retaining walls (RW3311 and RW3312, Type 1) may be excavated to foundation level and constructed. Details of the surcharge program and Abutment 1 retaining walls are presented in the project Geotechnical Design Report.

Precast walls with lightweight cellular concrete backfill are recommended on the Abutment 4 approach and wing walls (RW3319 and RW3320). The lightweight cellular concrete will be used for the entire abutment approach fill, and will be excavated into the existing embankment such that no new load is applied (removal of soil and replacement with lightweight fill will be performed so that the net loading

is equal to the weight of fill removed). Therefore, no significant long term settlement will occur, and no waiting period is required prior to abutment construction. Details of the retaining walls and approach fills are provided in the RW3319 and RW3320 Foundation Report. The abutment will be backfilled with cellular concrete. Structural backfill will be used only behind the abutment backwall for passive resistance. Assuming structural backfill with 34 degrees friction angle, the passive wedge behind the backwall may be assumed inclined at an angle of 28 degrees to the horizontal.

All earthwork and grading shall comply with Section 19 of the Standard Specifications. The entire footprint of areas to receive new fill shall be cleared and grubbed of any vegetation, and the subgrade shall be proof-rolled using loaded heavy equipment under observation of GDC. Any soft, loose, wet, pumping, organic, or other unsuitable materials shall be removed to the depth and limits recommended by GDC in the field, and replaced with engineered fill. After successfully proof-rolling or stabilizing the subgrade, the surface shall be scarified and recompacted. Abutment wall backfill shall conform to Caltrans Standard Specifications for structural fill. All new fill placed within 150 feet of the abutment should have an expansion index (EI) of less than 50. Positive surface drainage away from foundation areas should be maintained. The required expansive soil exclusion zone in a bridge abutment is illustrated in Figure 11.

4.6 Slope Stability

Abutment slopes are very stiff to hard compacted clayey fills, were engineered during original grading of the project, and based on our visual observations the slopes have performed well. The fill and upper stiff native alluvium are underlain by a weaker firm to stiff clay layer. We performed slope stability analyses for the proposed abutment and new fill slopes, with a maximum inclination of 2h: 1v and maximum height of about 32 feet. General soil layering and shear strengths used in our analyses are shown in Table 1. For static analyses, we used ultimate (post-peak) drained shear strengths for clayey fills, and undrained shear strengths for Layer 2 (which is more critical than the drained condition). For seismic analyses, we used peak drained strengths for the fill and undrained shear strength for Layer 2. Since residual undrained shear strengths of any liquefied layers present are generally greater than the undrained shear strength of Layer 2, their presence need not be considered in the calculations.

The stability analyses show that the stability of the slopes is controlled by deeper surfaces passing into Layer 2. Analyses for static conditions indicate factors of safety in excess of 1.5, and for pseudo-static analyses using Kh=0.17 indicate

factors of safety in excess of 1.1, and therefore meet Caltrans requirements for static and seismic stability. Calculations are included in Appendix E-8.

4.7 Earth Pressures

4.7.1 Active Pressures

Static and seismic (if required) earth pressures for abutment walls with level backfill designed in accordance with Caltrans standards may be taken as:

- Unit Weight, γ = 120 pcf
- Active Earth Pressure Coefficient, K_a = 0.30
- Lateral earth pressure = 36 pcf
- Horizontal pressure due to areal surcharge loads = K_a x vertical pressure
- Additional Seismic earth pressure = 15 pcf as inverted triangular pressure

Note that where lightweight cellular concrete fill is used, it is placed in 2 ft to 3 ft lifts then allowed to set. The lateral pressures exerted on the walls while the concrete is liquid are equivalent to a fluid with the specified unit weight of the cellular concrete materials. After the cellular concrete has set, it exerts no lateral pressures.

4.7.2 Passive Resistance of Abutments

The ultimate lateral capacity of an abutment wall backfilled with structure backfill is a function of the height of the abutment wall that is acted on by the passive soil pressure on the backfill. The Caltrans Seismic Design Criteria (SDC), Section 7.8, dated February 2004 recommends a passive pressure of 5 ksf for a wall height of 5.5 feet based on full-scale abutment testing conducted at UC Davis. For wall heights other than 5.5 feet, the passive pressure may be determined by multiplying the 5-ksf value with the ratio (H/5.5) where H is wall height in feet in accordance with SDC. For higher walls the maximum value of the passive resistance should be limited to 7.3 ksf corresponding to an abutment height of 8 feet.

4.8 Temporary Excavation and Shoring

Temporary shoring will likely be required for Bent footings or other project excavations.

Excavations should be readily accomplished with conventional equipment such as backhoes and excavators. Excavation safety is the responsibility of the contractor

and shall comply with all applicable OSHA regulations. The safety of all excavations shall be verified by the designated competent person in the field, and excavation slopes or shoring modified as necessary to maintain a safe and stable excavation. No surcharge loads should be permitted within a horizontal distance of 5 feet or the depth of the shoring, whichever is greater, unless the excavation / shoring has been designed for these loads. In general, temporary excavations above the water table within the very stiff clay existing fills may be made near vertical for cuts up to about 5 feet without shoring. Where not supporting existing improvements, higher temporary cuts above the water table may be made at maximum inclinations of ¾ h: 1v to depths of up to about 20 feet below grade. Vertical cuts higher than 5 feet, or cuts encroaching into a 1:1 plane below the edge of existing infrastructure, or excavations extending below groundwater, should be properly shored. Cantilever shoring may consist of soldier piles and lagging. Tied-back shoring may be required to facilitate construction or limit deflections.

For temporary cantilevered shoring consisting of soldier piles and lagging, lateral earth pressures may be determined based on Figure 5.5.5.6-4 of Bridge Design Specifications (BDS) Section 5.5.5.6 (August 2003), "Simplified Lateral Earth Pressure Distributions for Temporary Non-gravity Cantilevered Walls with Vertical Wall Elements Embedded in Cohesive Soil and Retaining Cohesive Soil." For temporary braced or tied-back shoring, lateral earth pressures may be determined in accordance with BDS Section 5.5.5.7.2. Undrained shear strengths, drained friction angles, unit weights, and elevations of the cohesive soil layers may be determined using Table 1.

4.9 Dewatering

Footings for Bent 2, Bent 3, and Abutment 4 will be excavated to near or slightly below the permanent groundwater table. Perched zones may be encountered at higher elevations. Due to primarily clayey soils at the anticipated excavation levels, groundwater volumes will likely be sufficiently small so that dewatering (if needed) can be accomplished by pumping from sumps. Due to potential for water or wet soils at the bottom of excavations, it may be desirable to place a 1 to 2 ft thick gravel layer to act as a working surface and to allow for easier dewatering.

4.10 Box Culvert

There is an existing triple 12 ft by 10 ft Reinforced Concrete Box (RCB) Culvert (Bolsa Chica Channel) passing below the proposed structure between Bent 3 and Abutment 4 (See Figure 3B). Top and bottom of the RCB are near El. 10.5 ft and 23 ft, respectively. New footings for the bent will encroach slightly into the OCFCD right of way with Bottom of the footing between El. 14.5 ft and 15.5 feet. Clearance

between the new footing and existing box culvert is a minimum of about 22 feet. Future widening of the RCB may reduce culvert clearance to about 8 to 10 feet. Lateral load from the bridge foundation may be exerted on the RCB in an extreme transient seismic event. We evaluated passive pressure on the side of the pile cap using Rankine theory, and on the side of piles from the calculated soil reaction from LPILE analysis. The actual soil cover over the RCB at the footing location is only about 4 feet. Based on the lateral loads from pile cap and pile, we recommend that the new box walls be designed for lateral and vertical earth pressure of 140 pcf equivalent fluid (based on Bridge Design Practice, Section 6, December 1992) assuming a minimum of 15 ft of soil cover over the top of the box. This will provide adequate reserve structural capacity to accommodate the temporary lateral pressures from the pile cap and piles in an extreme seismic event. Calculations and supporting data are provided in the attachment to comment responses in Appendix F.

When the future RCB is installed, we recommend maintaining a clear distance of at least 8 feet (2 pile diameters) between the piles and RCB exterior wall. At this distance, the installation of the box will not adversely impact the frictional capacity of the piles.

4.11 Construction Considerations

The following construction considerations should be taken into account by bidders and contractors:

- SR-22 and I-405 have daily commuter traffic, and construction will need to be carefully planned to minimize impacts to traffic;
- Stage construction, surcharging at Abutment 1, and other construction activities should be considered and coordinated in construction planning;
- Work at freeway level will require traffic control and/or lane closure;
- Construction staging areas are limited;
- Buried utilities are present and may cause construction conflicts;
- The surrounding area contains residential development and noise from pile driving may be an issue;
- The surcharge fills for Abutment 1 should be placed as soon as possible in Stage 1 construction, and left in place for 6 to 8 month waiting period. Settlements should be monitored during fill placement and during the waiting period;

- Localized zones of hard driving may be encountered above the tip elevations, undersized pre-drilling will only be allowed if necessary with written approval of Group Delta Consultants;
- The pile caps will require temporary excavations, and deeper excavations may encounter groundwater and wet soils. Excavations may require temporary shoring to support existing improvements. The contractor should submit temporary excavation and shoring shop drawings for the engineer's approval prior to excavation. Water pumped from excavations should be properly stored and disposed of as necessary.
- Our subsurface characterization is based on the borings performed at the locations shown in Figures 3A & 3B. Subsurface conditions between borings and CPTs are based on extrapolation between these points. Therefore, if conditions different than those assumed in the design are encountered during construction, excavation, or pile driving, we should be notified immediately so that we can assess the impact to our current recommendations and make appropriate modifications, if required.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report, or portions of this report, are provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report.

6.0 REFERENCES

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TABLES

TABLE 1
SUMMARY OF ENGINEERING PROPERTIES
S405-E22 CONNECTOR SEPARATION

Layer No.	Soil Type	El. (feet)	Index Properties*	SPT N-Value (blow/ft)	Drained Shear Strength Parameters				Undrained Shear Strength (psf)	Compressibility Parameters				
					Peak Cohesion c' (psf)	Peak Friction Angle ϕ' (deg)	Ultimate Cohesion c' (psf)	Ultimate Friction Angle ϕ' (deg)		Modulus E (ksf)	$Cc/(1+e_0)$	$Cr/(1+e_0)$	OCR	Cv (ft^2/day)
1	Very Stiff to Hard Sandy Clay / Silt (CL, ML)	+52 to +18	**(-)#200**=47 to 82% (avg 65%) **LL**=34 to 47 (avg 41) **PL**=20 (avg 20) **PI**=14 to 27 (avg 21) ω_N=15 to 32% (avg 22%) γ=125 pcf (average)	**Borings:** 17 to 40 (avg 26)	400	30	250	30	3,000	-	-	0.018	7	**Over Consolidated:** 2.3
2	Firm to Stiff Sandy Clay (CL)	+18 to +2	**(-)#200**=26 to 86% (avg 58%) **LL**=33 to 39 (avg 36) **PL**=19 to 21 (avg 20) **PI**=12 to 19 (avg 16) ω_N=23 to 34% (avg 28%) γ=120 pcf (average)	**Borings:** 10 to 17 (avg 14) **CPT:** 5 to 20 (avg 10)#	250	28	100	28	1,000	-	0.17	0.016	2.5 at Freeway 1.0 below Abuts	**Normally Consolidated:** 0.33 **Over Consolidated:** 2.1
3	Very Stiff Clay, Sandy Clay, Silty Clay and Sandy to Clayey Silt (CL, ML)	+2 to -14	**(-)#200**=68 to 82% (avg 78%) **LL**=29 **PL**=19 **PI**=10 ω_N=25 to 35% (avg 30%) γ=120 pcf (average)	**Borings:** 17 to 50 (avg 32) **CPT:** 12 to 50 (avg 23)#	-	-	-	-	2,500	-	-	0.019	>3	**Over Consolidated:** 3.3
4	Dense to Very dense Silty Sand, Sandy Silt, Sand and Stiff to Hard Clayey Silt and Clay (SM, ML, SP & CL, ML)	-14 to -28	**(-)#200**=2 to 86% (avg 35%) ω_N=15 to 40% (avg 25%) γ=125 pcf (average)	**Borings:** 27 to 50+ (avg 38) **CPT:** 18 to 50+ (avg 36)#	-	-	-	-	-	1,000	-	-	-	-
5 clay	Very Stiff to Hard Clay and Silt (CL, ML)	-28 to -100	**(–200)**=27 to 96% (avg 60%) **LL**=31 **PL**=15 **PI**=16 ω_N=17 to 45% (avg 28%) γ=125 pcf (average)	**CPT:** 8-50+ (avg 26)#	-	-	-	-	3,000	-	-	0.017	>2	**Over Consolidated:** 3.3
5 sand	Dense to Very Dense Sand and Silty Sand (SP, SM)			**CPT:** 38-50+ (avg 50+)#	0	38	-	-	-	3,000	-	-	-	-

* Where data not present average values from the overall project were used

CPT N-Values are based on available correlations (Robertson et al., 1983) -see Appendix A

TABLE 2
SUMMARY OF LIQUEFACTION ANALYSES
S405-E22 CONNECTOR SEPARATION

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Thickness of Liqufiable Layer (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-006	2	0.00	0.00	0.00
CPT-08-008	6	0.03	0.00	0.03
CPT-08-014	12	0.31	0.02	0.33
CPT-08-014B	13	0.07	0.01	0.08
CPT-08-013	20	1.00	0.00	1.00
CPT-08-016	19	0.62	0.00	0.62
CPT-08-018	12	0.40	0.04	0.44

Table 3A Foundation Design Loads

S405-E22 Connector Separation (Replace)											
Support No.	Service-I Limit State			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. per Pile	Per Support	Per Support	Max. per Pile	Per Support	Max. per Pile	Per Support	Max. per Pile	Per Support	Max. per Pile
Abut 1	11400	157	10750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent2	11950	N/A	10610	15480	1140	-	-	10950	1604	-	427
Bent 3	11740	N/A	10400	15200	1150	-	-	10730	1707	-	552
Abut 4	11200	149	10550	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 3B. Foundation Design Data Sheet

S405-E22 Connector Separation (Replace)									
Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Bottom of Footing Elevation (ft)	Cut-Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)*	Number of Piles per Support
						B	L		
Abut 1	WSD	Class 200	**30.0**	24.0	24.5	20	100	1	125
Bent2	LRFD	CISS NPS 48 x 0.75"	28.0	16.2	16.7	34	68	1	18
Bent 3	LRFD	CISS NPS 48 x 0.75"	**22.0**	13.5	14.0	32	68	1	18
Abut 4	WSD	Class 200	**22.0**	16.0	16.5	20	104	1	130

*Based on CALTRANS' current practice, the total permissible settlement is one inch for multi-span structures with continuous spans or multi-column bents, one inch for singe span structures with diaphragm abutments, and two inches for single span structures with seat abutments. Different permissible settlement under service loads may be allowed if a structural analysis verifies that required level of serviceability is met.

Table 3C. Foundation Recommendations for Abutments

S405-E22 Connector Separation (Replace)										
Support	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
				Total	Perma-nent					
Abut 1	Class 200	24.0	24.5	11400	10750	157	400	-44.0 (a), -1.0 (d)	-44	400
Abut 4	Class 200	16.0	16.5	11200	10550	149	400	-49.0 (a), -9.0 (d)	-49	400

Notes:
1. Design tip elevations are controlled by: a) compression, (c) settlement, (d) lateral load, respectively. Settlement for piles driven to the nominal capacity is less than 1 inch.
2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load.
4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3D. Foundation Recommendations for Bents

S405-E22 Conncetor Separation (Replace)												
Support Location	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
						Strength Limit		Extreme Event				
						Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)			
Bent2	CISS NPS 48 x 0.75"	16.2	16.7	11950	1	1630	0	1610	430	-83.8(a-I), -30 (b-II), -40 (d)	-83.8	1800
Bent 3	CISS NPS 48 x 0.75"	13.5	14.0	11740	1	1650	0	1710	560	-86.5(a-II), -30 (b-II), -42(d)	-86.5	1800

Notes:
1. Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) settlement, (d) lateral load. Settlement at the specified tip is less than 1 inch.
2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load.
4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3E. Pile Data Table

S405-E22 Connector Separation (Replace)						
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 200, Alt X	400	0	-44.0 (a)	-44.0	400
Bent2	CISS NPS 48 x 0.75"	1800	900	-83.8(a), -69 (b), -40 (d)	-83.8	1800
Bent 3	CISS NPS 48 x 0.75"	1800	900	-86.5(a), -72 (b), -42 (d)	-86.5	1800
Abut 4	Class 200, Alt X	400	0	-49.0 (a)	-49.0	400

Notes:

*1. Design tip elevations for **Abutments** are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load. Settlement for piles driven to the nominal capacity is less than 1 inch.*

*2. Design tip elevations for **Bents** are controlled by: (a) Compression, (b) Tension, (c) Settlement, (d) Lateral Load. Settlement for piles driven to the nominal capacity is less than 1 inch.*

TABLE 4A
SUMMARY OF LATERAL CAPACITY OF PROPOSED PILES

I-436 West County Connectors Project - 405/22 HOV Segment
S405-E22 Connector Separation
Abutments 1 and 4

Pile Type	Location	Head Condition	Top Deflection (inches)	Top Shear (kips)	Maximum Bending Moment (foot-kips)	Depth to Maximum Bending Moment (feet)
Class 200 14" Square Pre-Cast Pre-Stressed Concrete Pile	Abutment 1	Free / Pinned	0.25	20	55	4.0
			0.5	26	83	4.5
			1.0	34	124	5.5
	Abutment 4	Free / Pinned	0.25	9	38	5.5
			0.5	13	61	6.5
			1.0	18	98	7.0

Notes: 1) The horizonal component of axial load in batter piles may be added to the capacities above.

2) The above lateral capacity values use a group average p-multiplier of 0.5 to account for lateral load group effects.

3) Maximum bending moments were computed using the higher p-multiplier of 0.75 for leading row piles.

4) Structural capacity of piles shall be checked by the structural engineer.

TABLE 4
SUMMARY OF LATERAL CAPACITY OF PROPOSED PILES

I-436 West County Connectors Project - 405/22 HOV Segment

S405-E22 Connector Separation

Bents 2 and 3

Pile Type	Free or Fixed Head	Top Deflection (inches)	Top Shear (kips)	Maximum Bending Moment (foot-kips)	Depth to Maximum Moment (feet)
4 ft Diameter CISS Pile (Bent 2 & 3)	Free	0.25	65	608	13
		0.5	92	998	15
		1.0	131	1638	16
		2.0	187	2686	18
	Fixed	0.25	139	1526	0
		0.5	202	2488	0
		1.0	290	4039	0
		2.0	427	6591	0

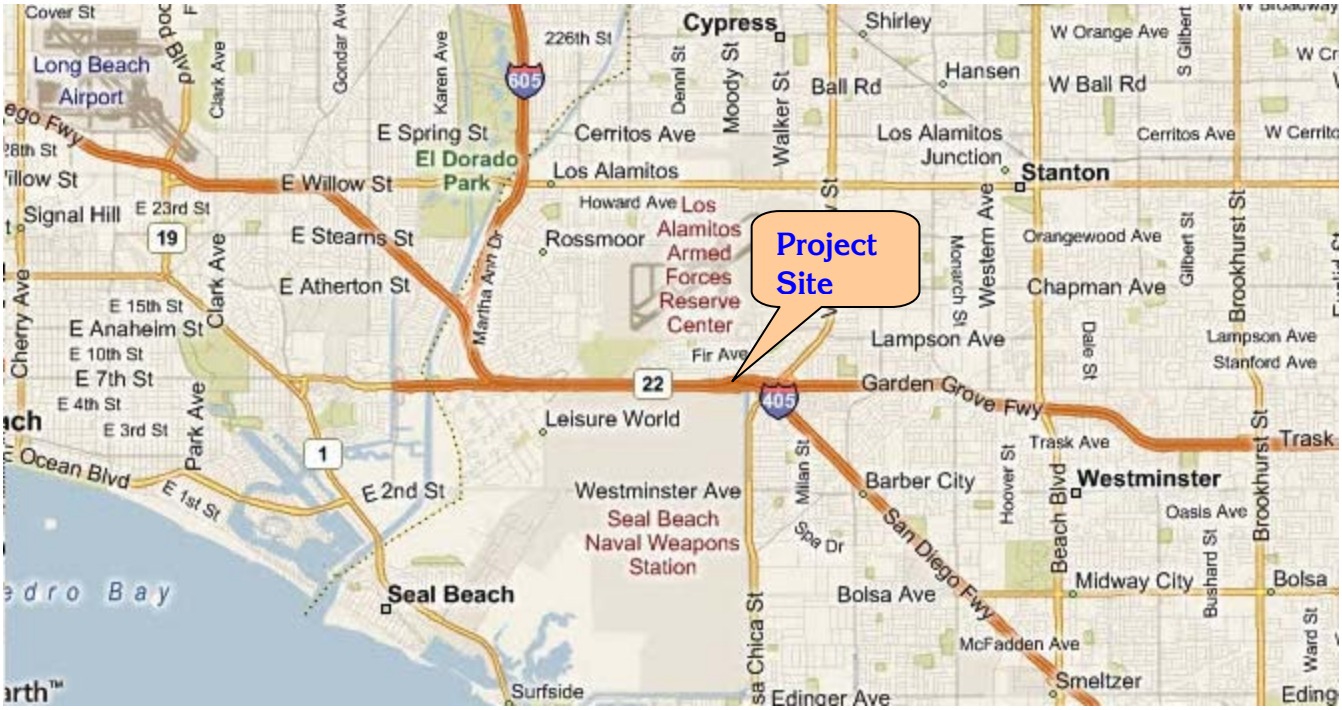
Notes: 1) The above lateral capacity values use a group average p-multiplier of 0.5 to account for lateral load group effects.

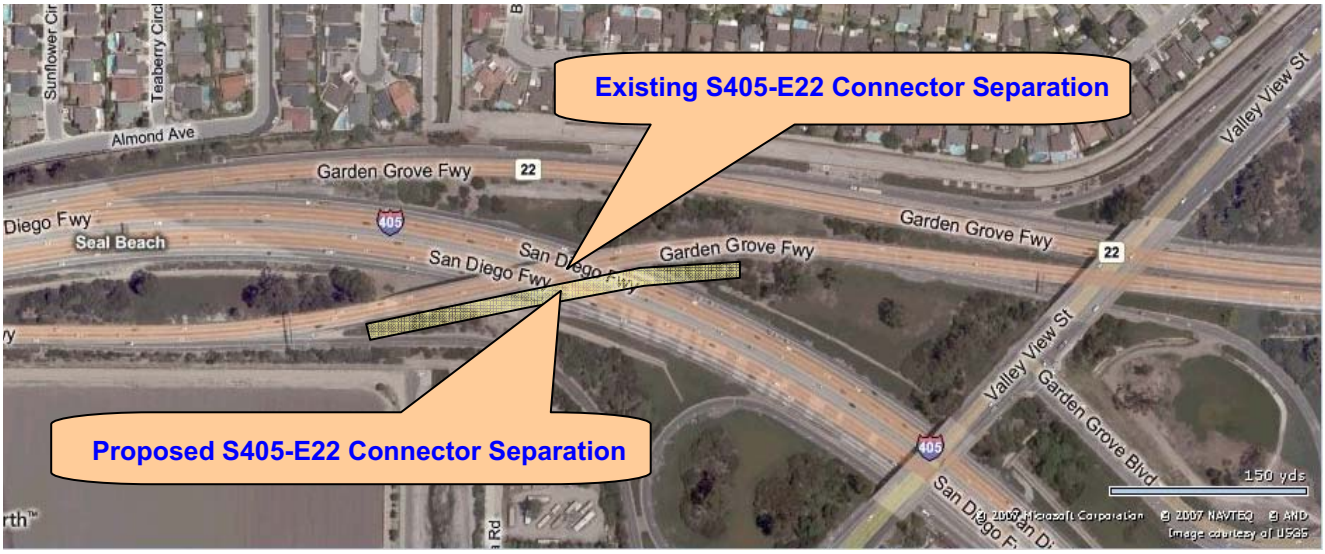
2) Maximum bending moments were computed using the higher p-multiplier of 0.75 for leading row piles.

3) Corroded section used for upper 3 feet of pile section (0.001 inches per year for 75 years)

4) Structural capacity of piles shall be checked by the structural engineer.

FIGURES





The base maps are from Microsoft Virtual Earth

GROUP DELTA CONSULTANTS

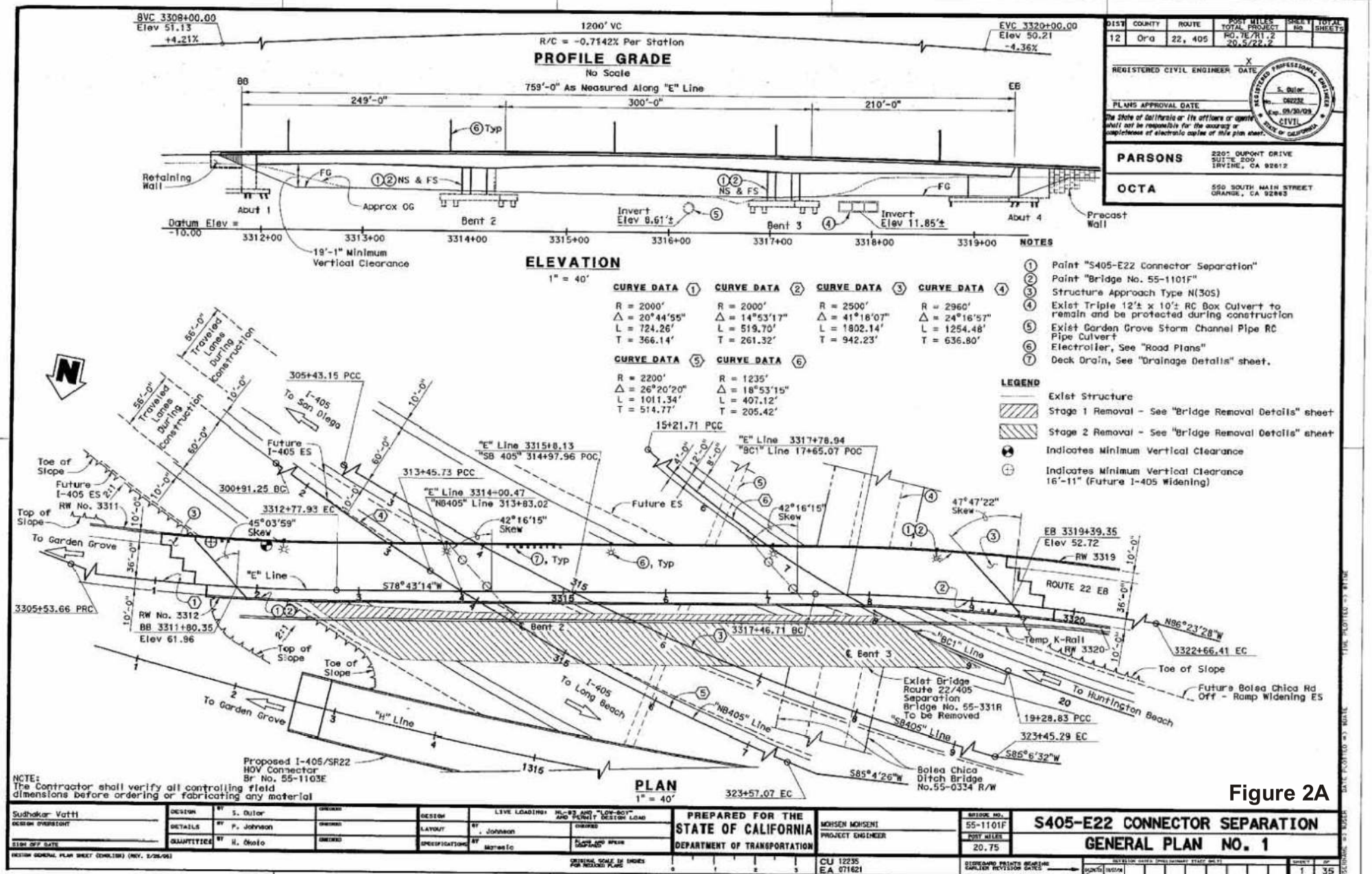
GDC Project No. I-436

S405-E22 Connector Separation

Seal Beach, CA

VICINITY MAP

Figure 1


PROFILE GRADE
No Scale
759'-0" As Measured Along "E" Line
249'-0"
300'-0"
210'-0"
ELEVATION
1" = 40'
PLAN
1" = 40'
NOTES
1 Paint "S405-E22 Connector Separation"
2 Paint "Bridge No. 55-1101F"
3 Structure Approach Type N(30S)
4 Exist Triple 12'± x 10'± RC Box Culvert to remain and be protected during construction
5 Exist Garden Grove Storm Channel Pipe RC Pipe Culvert
6 Electrolier, See "Road Plans"
7 Deck Drain, See "Drainage Details" sheet.
LEGEND
Exist Structure
Stage 1 Removal - See "Bridge Removal Details" sheet
Stage 2 Removal - See "Bridge Removal Details" sheet
Indicates Minimum Vertical Clearance
Indicates Minimum Vertical Clearance 16'-11" (Future I-405 Widening)
CURVE DATA 1 R = 2000' Δ = 20°44'55" L = 724.26' T = 366.14'
CURVE DATA 2 R = 2000' Δ = 14°53'17" L = 519.70' T = 261.32'
CURVE DATA 3 R = 2500' Δ = 41°18'07" L = 1802.14' T = 942.23'
CURVE DATA 4 R = 2960' Δ = 24°16'57" L = 1254.48' T = 636.80'
CURVE DATA 5 R = 2200' Δ = 26°20'20" L = 1011.34' T = 514.77'
CURVE DATA 6 R = 1235' Δ = 18°53'15" L = 407.12' T = 205.42'
NCTE: The Contractor shall verify all controlling field dimensions before ordering or fabricating any material
Figure 2A
S405-E22 CONNECTOR SEPARATION
GENERAL PLAN NO. 1
PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
PARSONS 220 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863
CU 12235 EA 071621
BRIDGE NO. 55-1101F
POST MILES 20.75
SHEET 1 OF 35

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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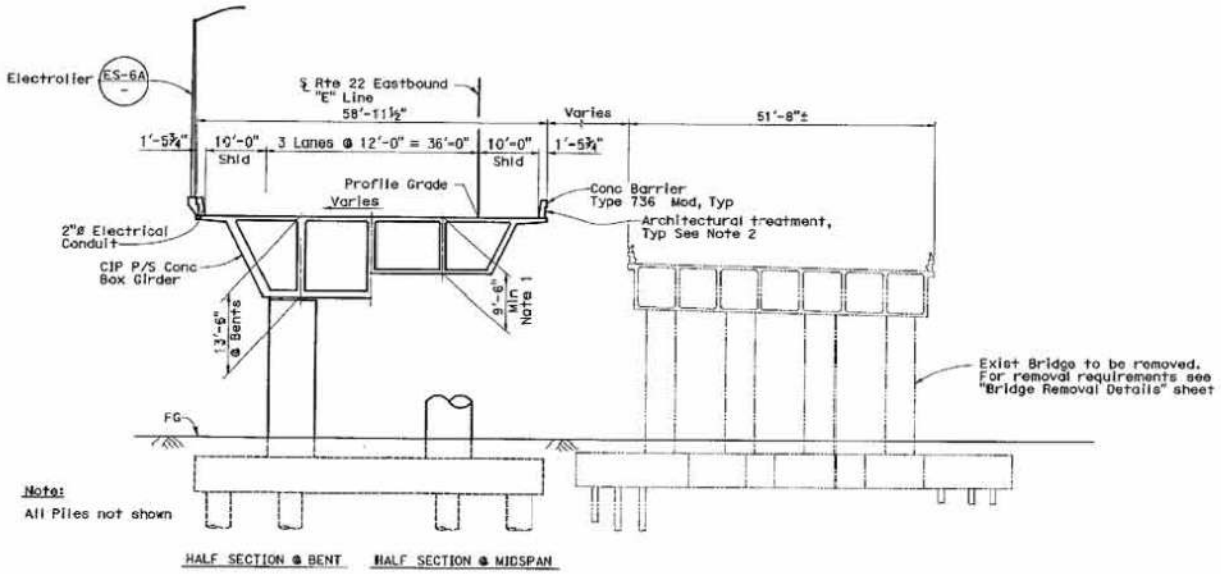
REGISTERED PROFESSIONAL ENGINEER — S. Dulor — No. 062232 — Exp. 09/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863



TYPICAL SECTION

1" = 10'

Notes:

1. For Bridge Superstructure depth & geometry, see "Girder Haunch Geometry" sheet.
2. For Barrier Architectural Feature Details, see "Abutment Architectural Details No. 2" sheet.

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Sudhakar Vatti DESIGN OVERSIGHT X SIGN OFF DATE	DESIGN	BY S. Dulor	CHECKED X	LOAD FACTOR DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1101F POST MILES 20.75	S405-E22 CONNECTOR SEPARATION GENERAL PLAN NO. 2
	DETAILS	BY P. Johnson	CHECKED X	LAYOUT	BY P. Johnson	CHECKED X				
	QUANTITIES	BY H. Okolo	CHECKED X	SPECIFICATIONS	BY G. Matsolo	CHECKED / DATE APPROVED X		CU 12235 EA 071621	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	SHEET 2 OF 35

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/05)

DRAWING SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

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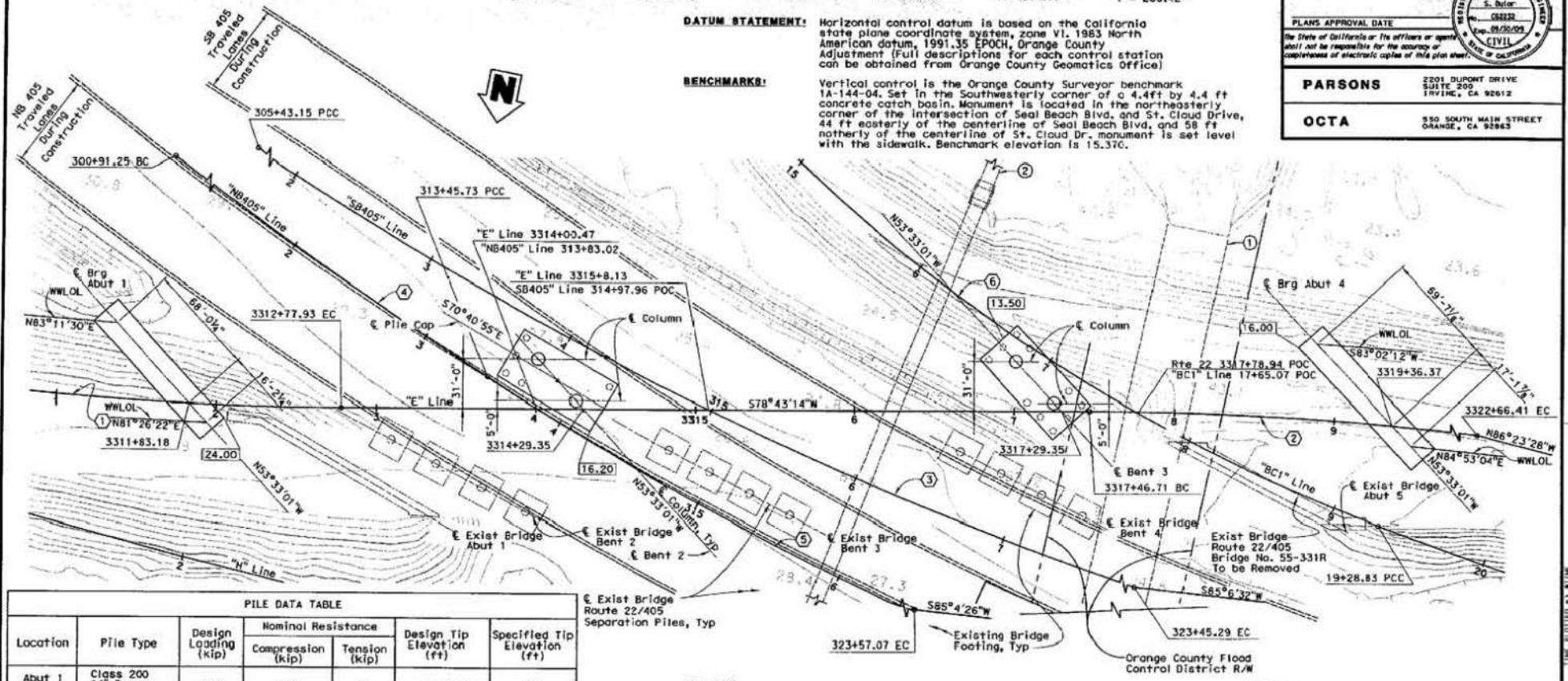
Figure 2B



PLAN
1" = 30'

PILE DATA TABLE

Location	Pile Type	Design Loading (kip)	Nominal Resistance Compression (kip)	Nominal Resistance Tension (kip)	Design Tip Elevation (ft)	Specified Tip Elevation (ft)
Abut 1	Class 200 14" Square PS Conc	200	400	0	-44.0(1)	-44.0
Bent 2	CISS NPS48"x¾"	N/A	2000	560	-88.8(1), -30(2), -40(3)	-88.8
Bent 3	CISS NPS48"x¾"	N/A	2000	560	-86.5(1), -30(2), -42(3)	-86.5
Abut 4	Class 200 14" Square PS Conc	200	400	0	-49.0(1)	-49.0

Design Tip Elevation is controlled by the following demands: (1) Compression, (2) Tension, (3) Lateral Loads

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Note: PDA Test Pie Locations shown on Abutment and Bent Details on Figures 2D - 2F

LEGEND
——— Exist Structure
○ 48" ø Cast-in-Shell Steel
XX.XX Indicates Bottom of Footing Elevation

NOTES
1. Contours shown represent existing approximate ground
2. All piles not shown

Figure 2C

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE
PLANS APPROVAL DATE
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

Sudhakar Vatti	SCALE: 1"=30'	VERT.DATUM NAV 1988	HORIZ.DATUM NAD 1983	DESIGN BY S. Butor	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
DESIGN OVERSIGHT X	PHOTOGRAMMETRY AS OF: 01/08	ALIGNMENT FILES		DETAILS BY P. Johnson	MOHSEN MOHSENI PROJECT ENGINEER
SIGN OFF DATE	SURVEYED BY PSOMAS	DRAFTED BY PSOMAS		QUANTITIES BY H. Okolo	
FOUNDATION PLAN SHEET (ENGLISH) (REV. 2-23-05)	FIELD CHECKED BY PSOMAS	CHECKED BY PSOMAS		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3	CU 12235 EA 071621

BRIDGE NO.	S405-E22 CONNECTOR SEPARATION
55-1101F	FOUNDATION PLAN
POST MILE 20.75	

SHEET 5 OF 35

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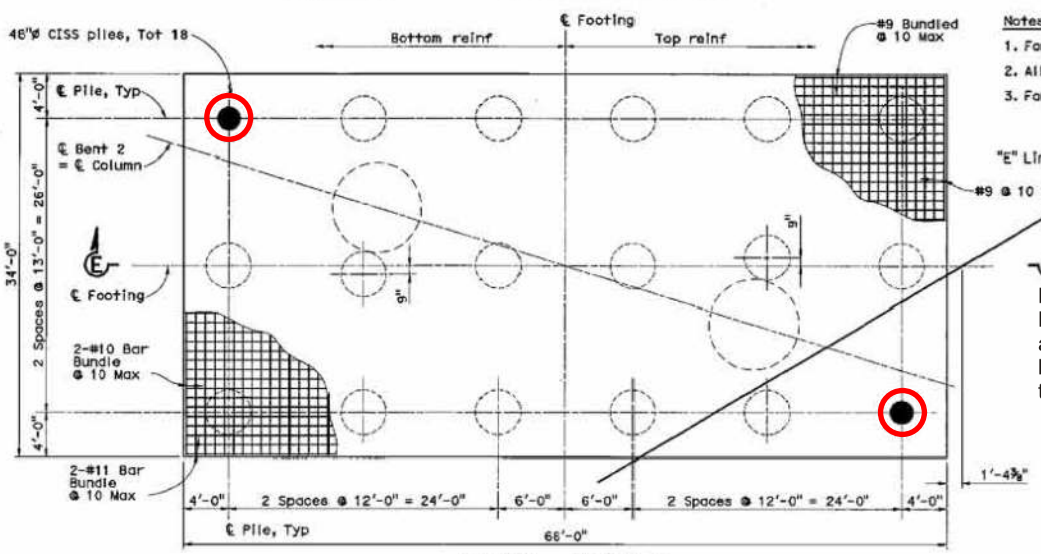
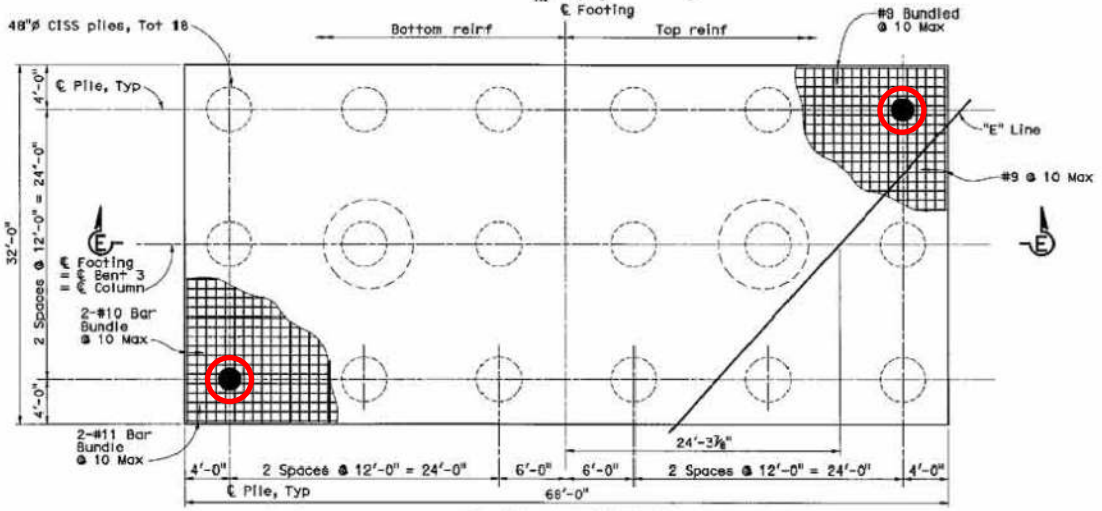
DATE PLOTTED => $TIME
USERNAME => $USER



PLAN - BENT 2
⅜" = 1'-0"



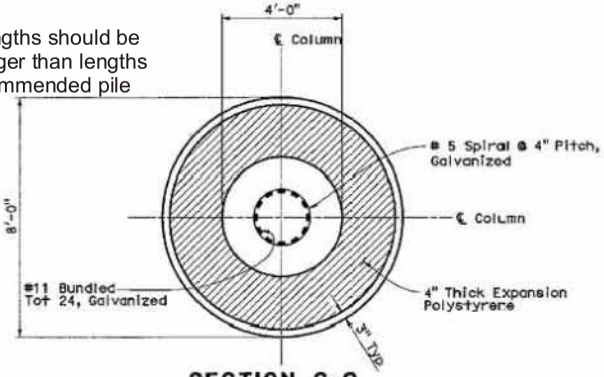
PLAN - BENT 3
⅜" = 1'-0"

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

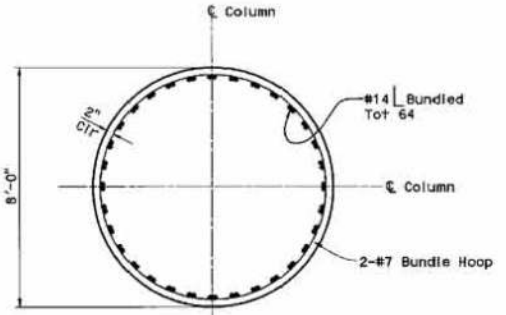
Notes:
1. For Sections E-E, see "Bent Details No. 2" sheet.
2. All dimensions are in inches unless otherwise shown.
3. For CISS Pile Details, see "48" Dia CISS Pile Details" sheet.

Legend:
Indicates PDA Test Pile Location. PDA Test Piles should be at least 10'-0" longer than lengths based upon specified pile tip elevations.

PDA Notes:
PDA Test Pile lengths should be at least 10 ft. longer than lengths based upon recommended pile tip elevations



SECTION C-C
½" = 1'-0"



SECTION D-D
½" = 1'-0"

Indicates Suggested PDA Test Pile Location

Figure 2D

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER X DATE
PLANS APPROVAL DATE
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S. Dulor No. 062232 Exp. 06/30/09 CIVIL

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

Sudhakar Vatti
DESIGN OVERSIGHT
X
SIGN OFF DATE

	BY	CHECKED
DESIGN	S. Dulor/M. Sarraf	X
DETAILS	A. Segura	X
QUANTITIES	H. Okolo	X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

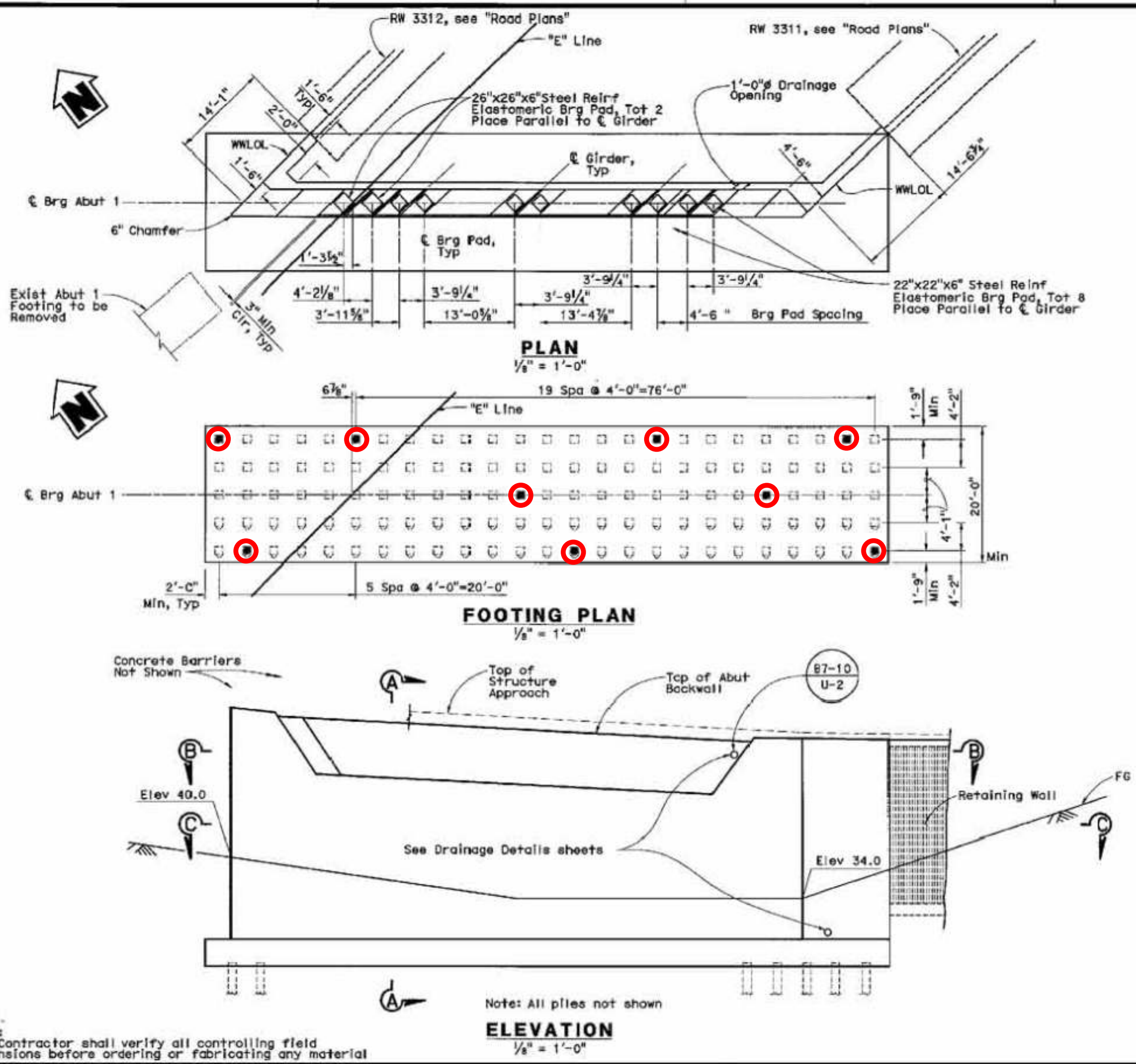
MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	POST MILE
55-1101F	20.75

CU 12235
EA 07162I

S405-E22 CONNECTOR SEPARATION
BENT DETAILS NO. 1

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/28/08)
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
DISREGARD PRINTS BEARING EARLIER REVISION DATES
STATION UNITS PRELIMINARY STAGE SHEET
SHEET 12 OF 35
FILE =>H:\446929_OCTA 1405-SR22 HOV Connector Project\SRT\STRUCTURES\405 Separation\55-331F-M-D01Det01.dgn



NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

PDA Notes:
PDA Test Pile lengths should be at least 10 ft. longer than lengths based upon recommended pile tip elevations

○ Indicates Suggested PDA Test Pile Location

Notes:

1. For Section A-A, See "Abutment Details No. 1" sheet.
2. For Part Sections B-B & C-C, see "Abutment Deatils No. 2" sheet.

Legend:

- ☐ Denotes Class 200 vertical pile
- ☐ Denotes Class 200 battered pile (3:1)
- ■,■ Indicates PDA Test Pile Location. PDA Test Piles should be at least 10'-0" longer than lengths based upon specified pile tip elevations.

Figure 2E

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	RO.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE X
PLANS APPROVAL DATE
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.
S. Dulor No. C62232 Exp. 06/30/09 CIVIL

PARSONS — 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA — 550 SOUTH MAIN STREET ORANGE, CA 92863

Sudhakar Vatti
DESIGN OVERSIGHT
X
SIGN OFF DATE

DESIGN BY S. Dulor — CHECKED X
DETAILS BY A. Segura — CHECKED X
QUANTITIES BY H. Okolo — CHECKED X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

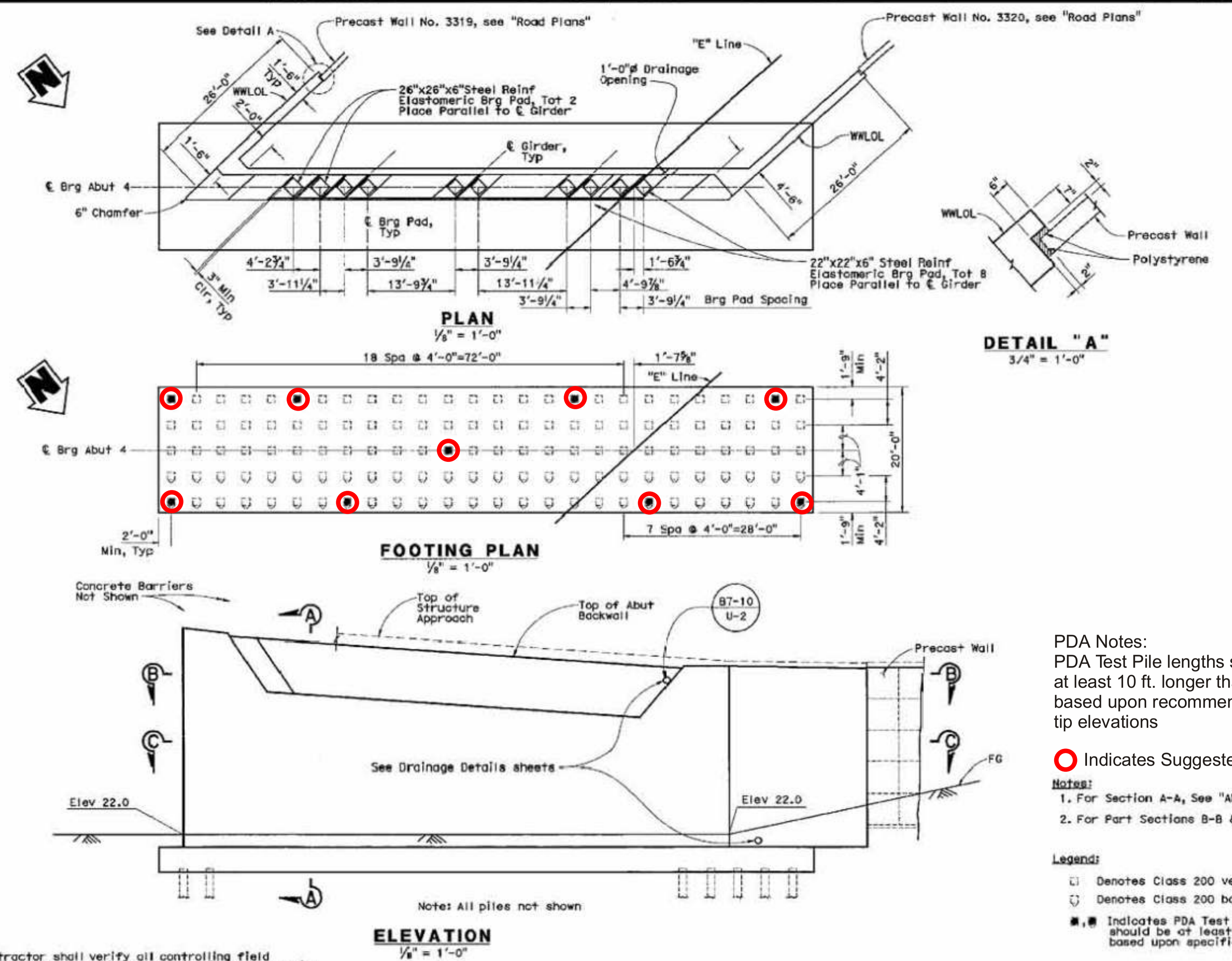
BRIDGE NO. 55-1101F
POST MILE 20.75

S405-E22 CONNECTOR SEPARATION
ABUTMENT 1 LAYOUT

CU 12235
EA 071621

SHEET 6 OF 35

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/26/08)
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
DISREGARD PRINTS BEARING EARLIER REVISION DATES
FILE => H:\646929_OCTA 1405-SR22 HOV Connector Project\SHT\STRUCTURES\405 Separation\55-331r-f-a01_ic01.dgn



PDA Notes:
PDA Test Pile lengths should be at least 10 ft. longer than lengths based upon recommended pile tip elevations

○ Indicates Suggested PDA Test Pile Location

Notes:

1. For Section A-A, See "Abutment Details No. 1" sheet.
2. For Part Sections B-B & C-C, see "Abutment Details No. 2" sheet.

Legend:

- ☐ Denotes Class 200 vertical pile
- Denotes Class 200 battered pile (3:1)
- ■,■ Indicates PDA Test Pile Location. PDA Test Piles should be at least 10'-0" longer than lengths based upon specified pile tip elevations.

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Figure 2F

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	PD.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER DATE
PLANS APPROVAL DATE
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

PARSONS — 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA — 550 SOUTH MAIN STREET ORANGE, CA 92863

Sudhakar Vatti — DESIGN OVERSIGHT
SIGN OFF DATE

DESIGN BY S. Dulor — CHECKED X
DETAILS BY A. Segura — CHECKED X
QUANTITIES BY F. Okolo — CHECKED X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI — PROJECT ENGINEER

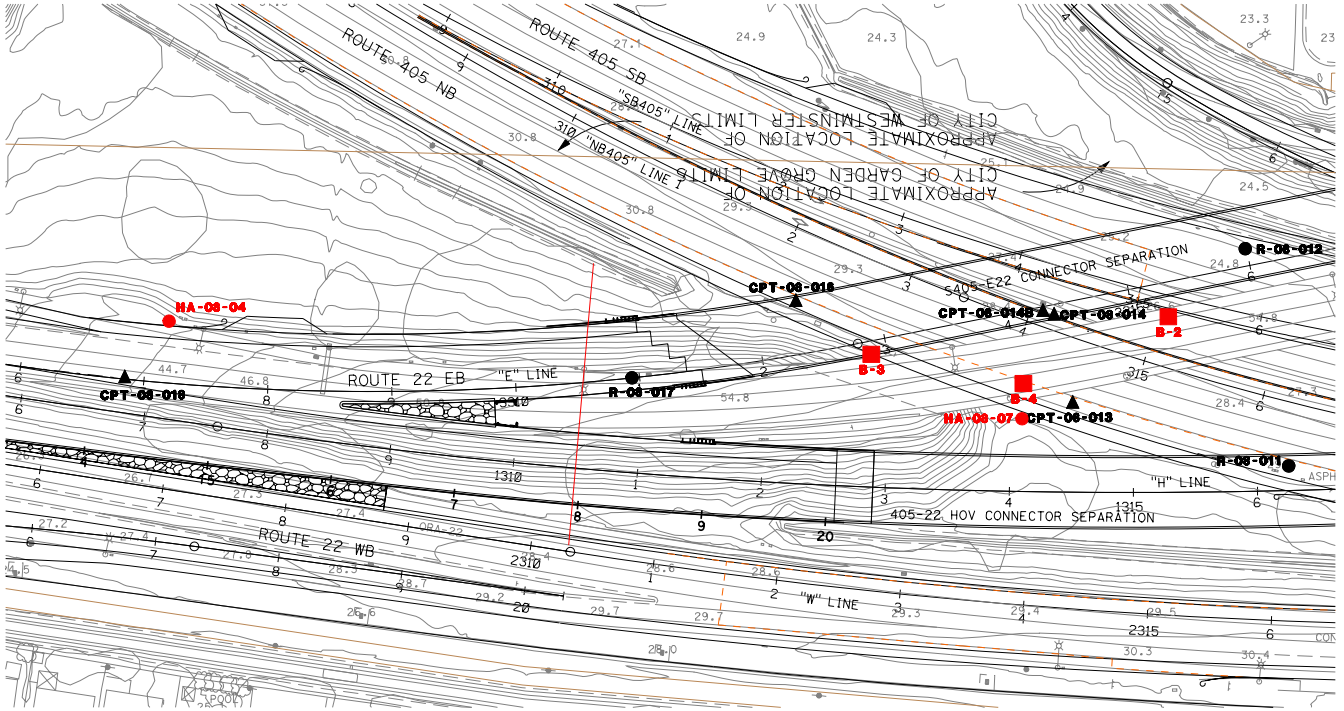
BRIDGE NO. 55-1101F
POST MILE 20.75

S405-E22 CONNECTOR SEPARATION
ABUTMENT 4 LAYOUT

CU 12235
EA 071621

SHEET 7 OF 35

SCALE 1" = 50'



CONTINUED ON FIGURE 3b

LEGEND

- LOCATION OF BORING BY GDC
- LOCATION OF CPT BY GDC
- APPROX. LOCATION OF AS-BUILT BORINGS/CPT

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

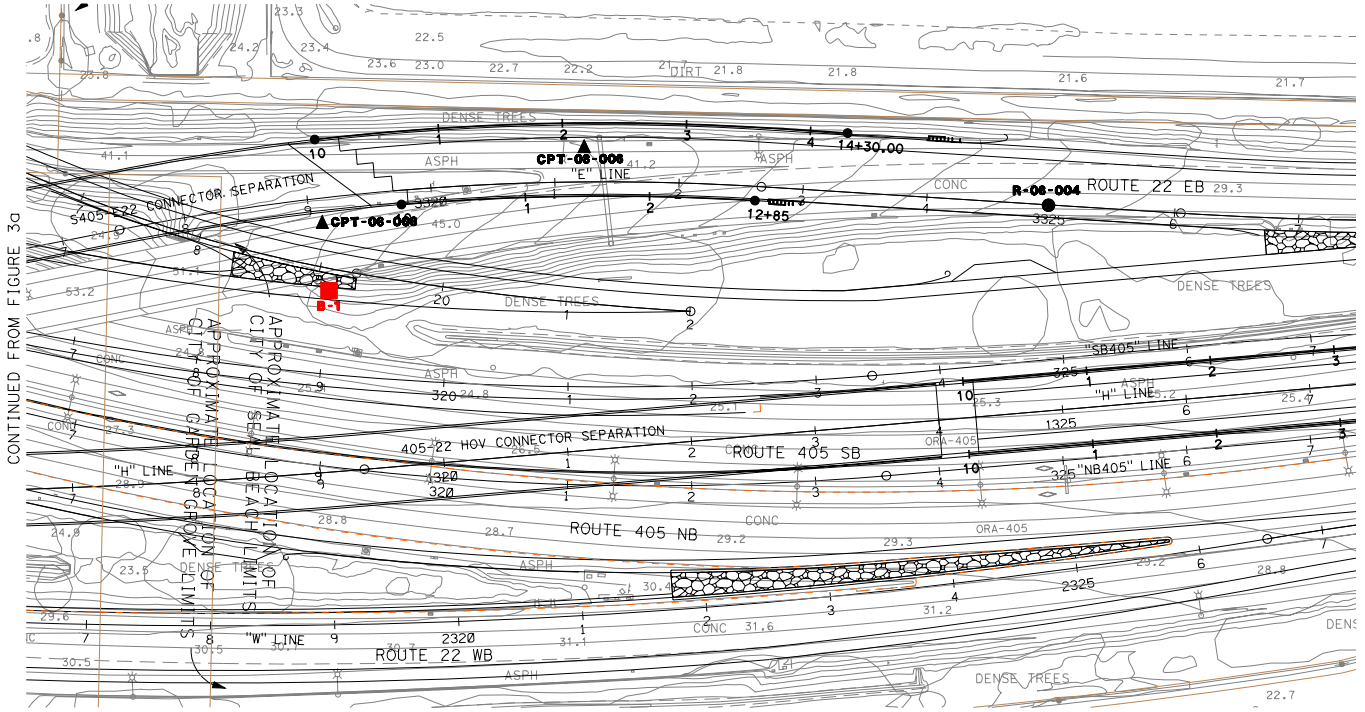
FIGURE NUMBER 3A

PROJECT NAME: S405-E22 CONNECTOR SEPARATION

PROJECT NUMBER: I-438

EXPLORATION LOCATION PLAN

SCALE 1" = 50'



LEGEND

- LOCATION OF BORING BY GDC
- LOCATION OF CPT BY GDC
- APPROX. LOCATION OF AS-BUILT BORINGS/CPT

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER 3B

PROJECT NAME: S405-E22 CONNECTOR SEPARATION

PROJECT NUMBER: I-436

EXPLORATION LOCATION PLAN

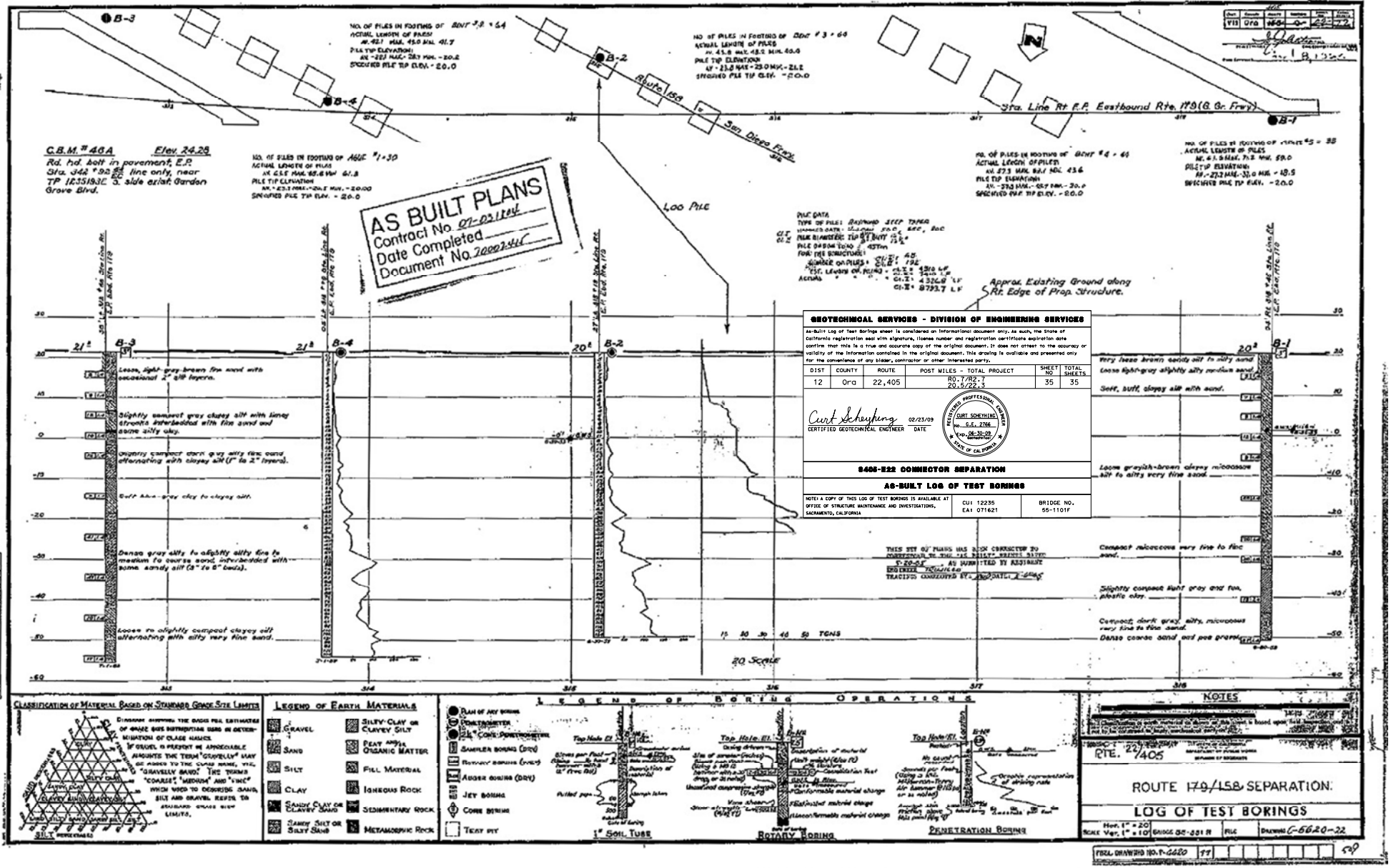

B-3
B-4
B-2
B-1
Route 163
San Diego Fwy.
Sta. Line Rt E.P. Eastbound Rte. 179 (S. Gr. Fwy.)
C.B.M. # 46A Elev. 24.26
Rd. hd. bolt in pavement, E.P. Sta. 342 +92.22 BC line only, near TP 1235193E S. side exist. Garden Grove Blvd.
AS BUILT PLANS
Contract No. 07-051164
Date Completed
Document No. 20002446
LOO PILE
Appox. Existing Ground along Rt. Edge of Prop. Structure.
GEOTECHNICAL SERVICES - DIVISION OF ENGINEERING SERVICES
As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.
DIST | COUNTY | ROUTE | POST MILES - TOTAL PROJECT | SHEET NO | TOTAL SHEETS
12 | Ora | 22,405 | R0.7/R2.7 20.5/22.3 | 35 | 35
Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE
REGISTERED PROFESSIONAL ENGINEER CURT SCHEYHING No. G.E. 2766 EXP. 06-30-09 STATE OF CALIFORNIA
8406-E22 CONNECTOR SEPARATION
AS-BUILT LOG OF TEST BORINGS
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA
CU: 12235 EA: 071621
BRIDGE NO. 55-1101F
THIS SET OF PLANS HAS BEEN CORRECTED TO CONFORM TO THE "AS BUILT" PRINTS DATED 12-20-07, AS SUBMITTED BY KIEWIT PACIFIC CO. TRACINGS CORRECTED BY: DATE:
Loose, light gray-brown fine sand with occasional 2" silt layers.
Slightly compact gray clayey silt with limey streaks interbedded with fine sand and some silty clay.
Slightly compact dark gray silty fine sand alternating with clayey silt (1" to 2" layers).
Stiff blue-gray clay to clayey silt.
Dense gray silty to slightly silty fine to medium to coarse sand, interbedded with some sandy silt (3" to 6" beds).
Loose to slightly compact clayey silt alternating with silty very fine sand.
Very loose brown sandy silt to silty sand
Loose light-gray slightly silty medium sand
Soft, buff, clayey silt with sand.
Loose grayish-brown clayey micaceous silt to silty very fine sand.
Compact micaceous very fine to fine sand.
Slightly compact light gray and tan, plastic clay.
Compact, dark gray, silty, micaceous very fine to fine sand.
Dense coarse sand and pea gravel
20 Scale
CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS
LEGEND OF EARTH MATERIALS
GRAVEL
SAND
SILT
CLAY
SANDY CLAY OR CLAYEY SAND
SANDY SILT OR SILTY SAND
SILTY CLAY OR CLAYEY SILT
PEAT AND ORGANIC MATTER
FILL MATERIAL
IGNEOUS ROCK
SEDIMENTARY ROCK
METAMORPHIC ROCK
LEGEND OF BORING OPERATIONS
PLAN OF JET BORING
PENETROMETER
2½" CONE PENETROMETER
SAMPLER BORING (DRY)
ROTARY BORING (MUD)
AUGER BORING (DRY)
JET BORING
CORE BORING
TEST PIT
1" Soil Tube
Rotary Boring
Penetration Boring
NOTES
RTE. 22/405
ROUTE 179/158 SEPARATION
LOG OF TEST BORINGS
Hor. 1" = 20'
Scale Ver. 1" = 10'
BRIDGE 55-331 R
FILE
DRAWING C-6620-22
FINAL DRAWING NO. T-6620
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND COMPLETED THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.
DATE SIGNATURE TITLE

FIGURE 4

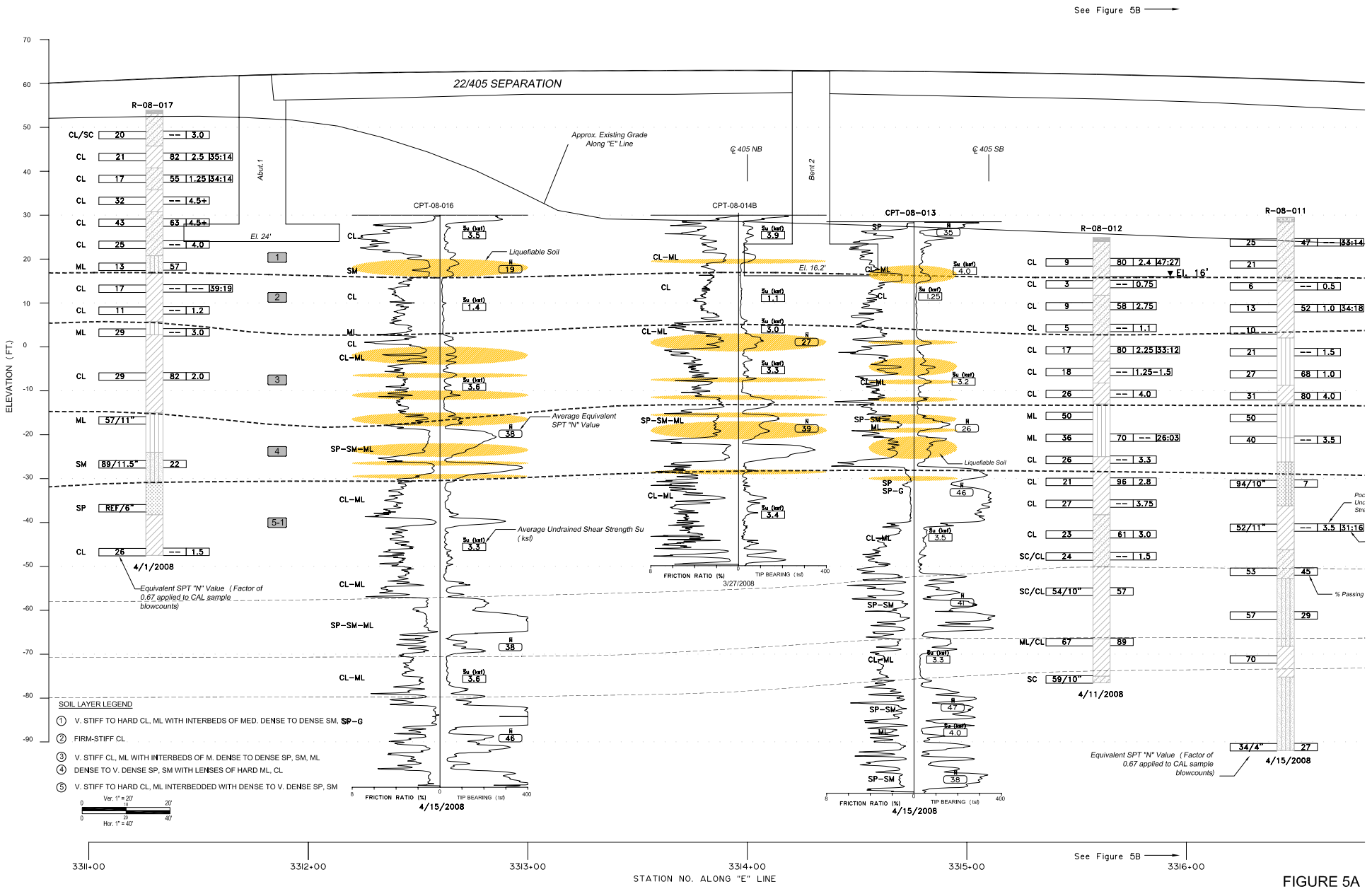


FIGURE 5A
Geotechnical Cross Section

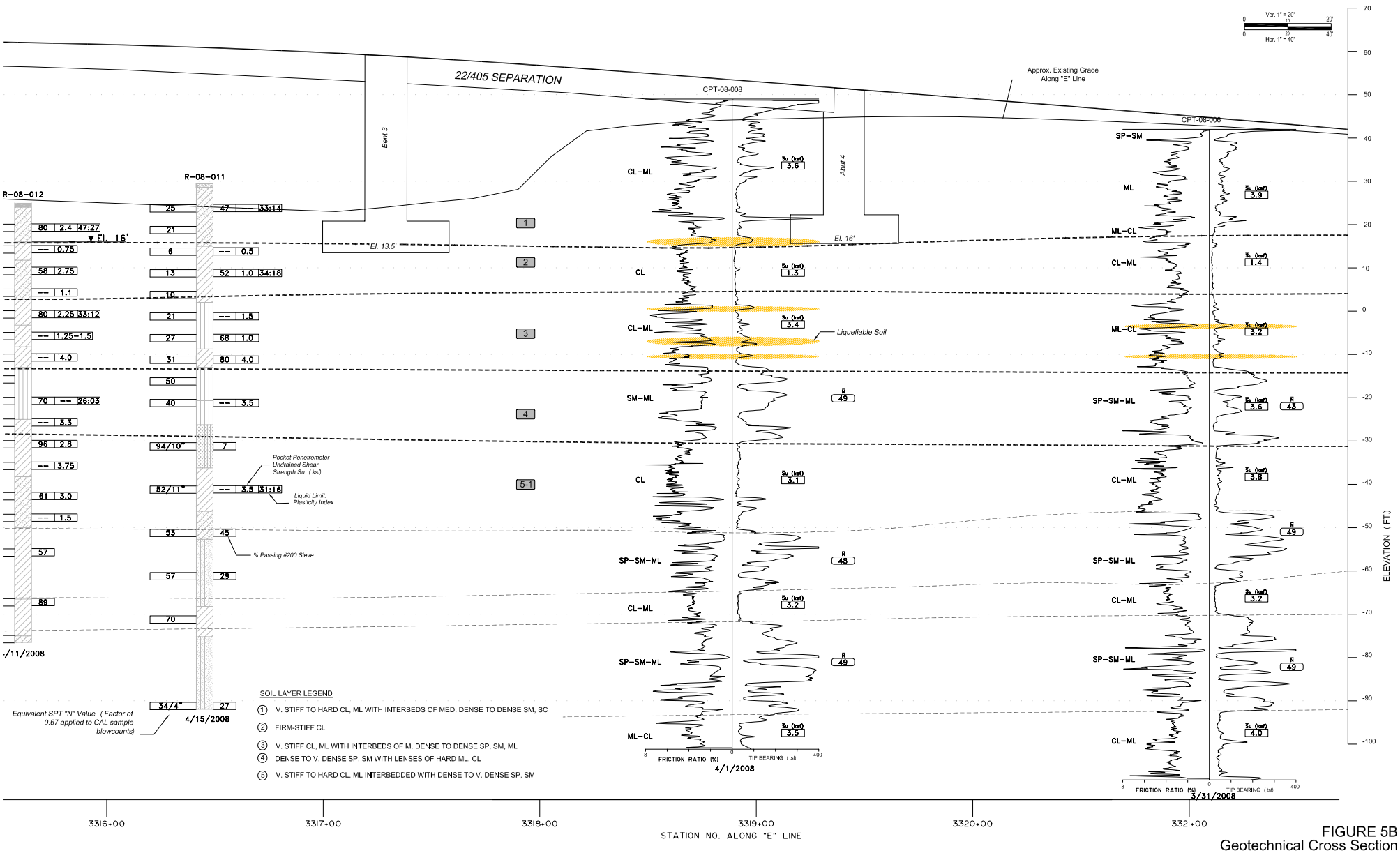
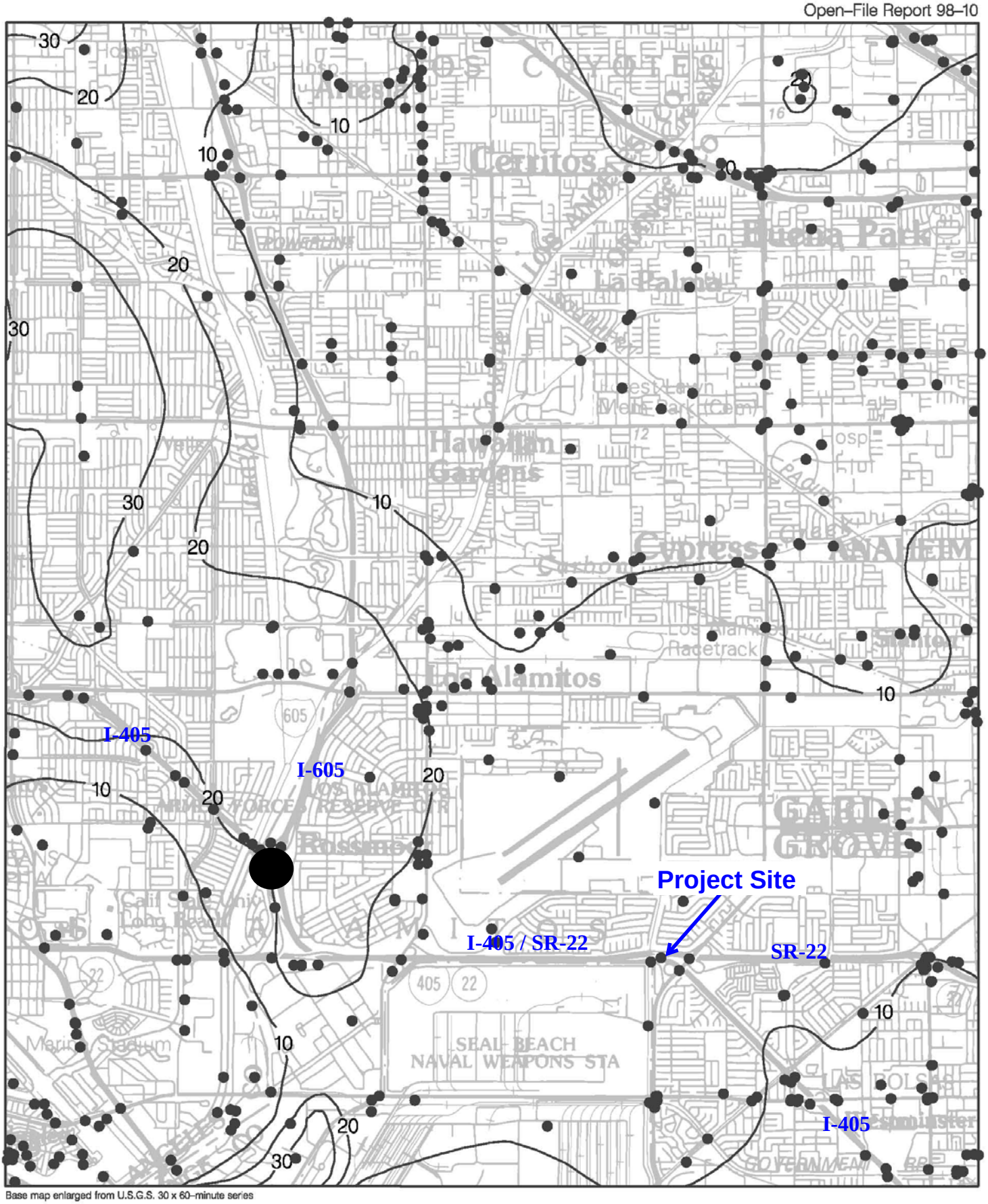


FIGURE 5B
Geotechnical Cross Section



Base map enlarged from U.S.G.S. 30 x 60–minute series

Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

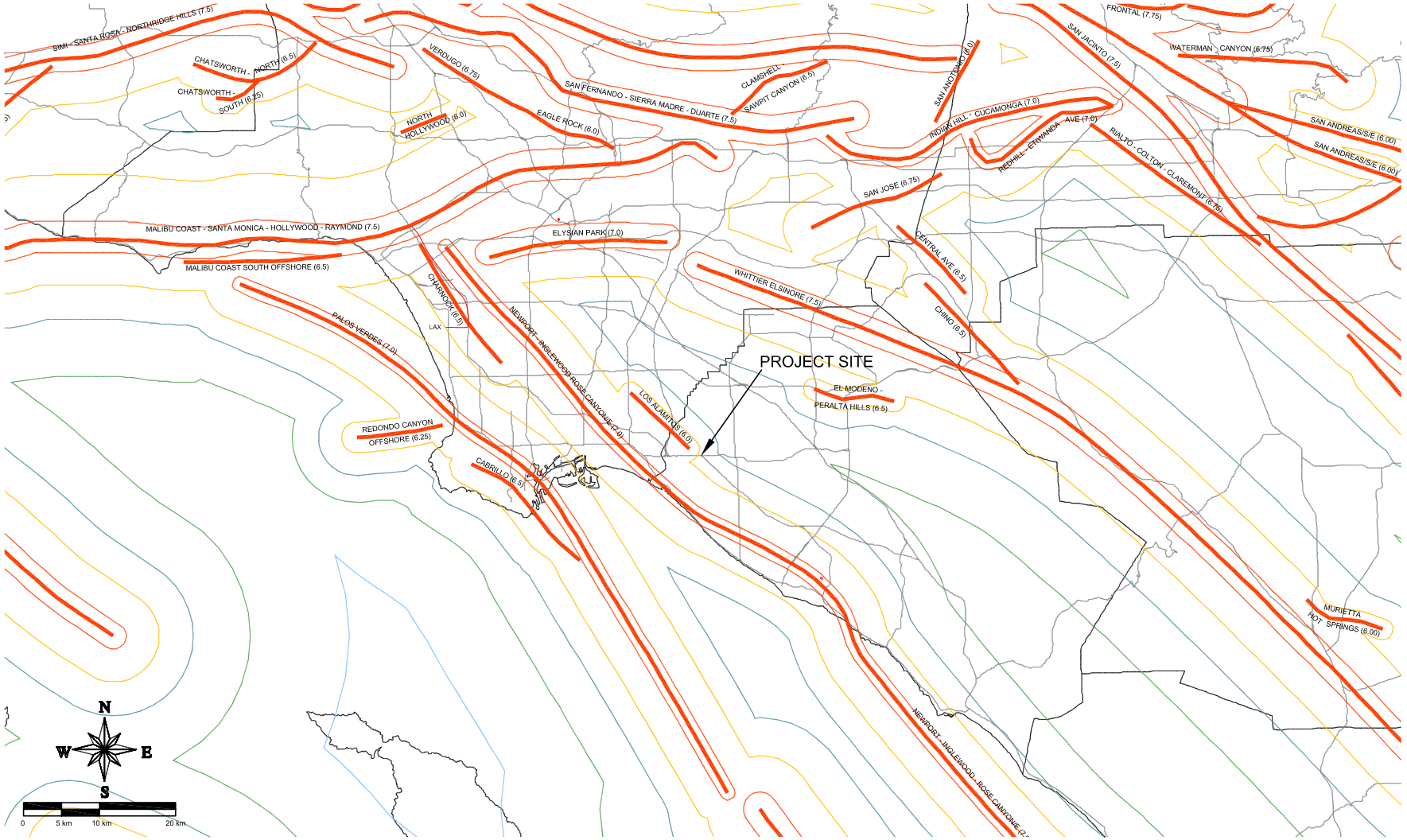
● Borehole Site

30 Depth to ground water in feet

Figure 6: Historically Highest Groundwater Map

ONE MILE

SCALE



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills fault in Orange County is currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

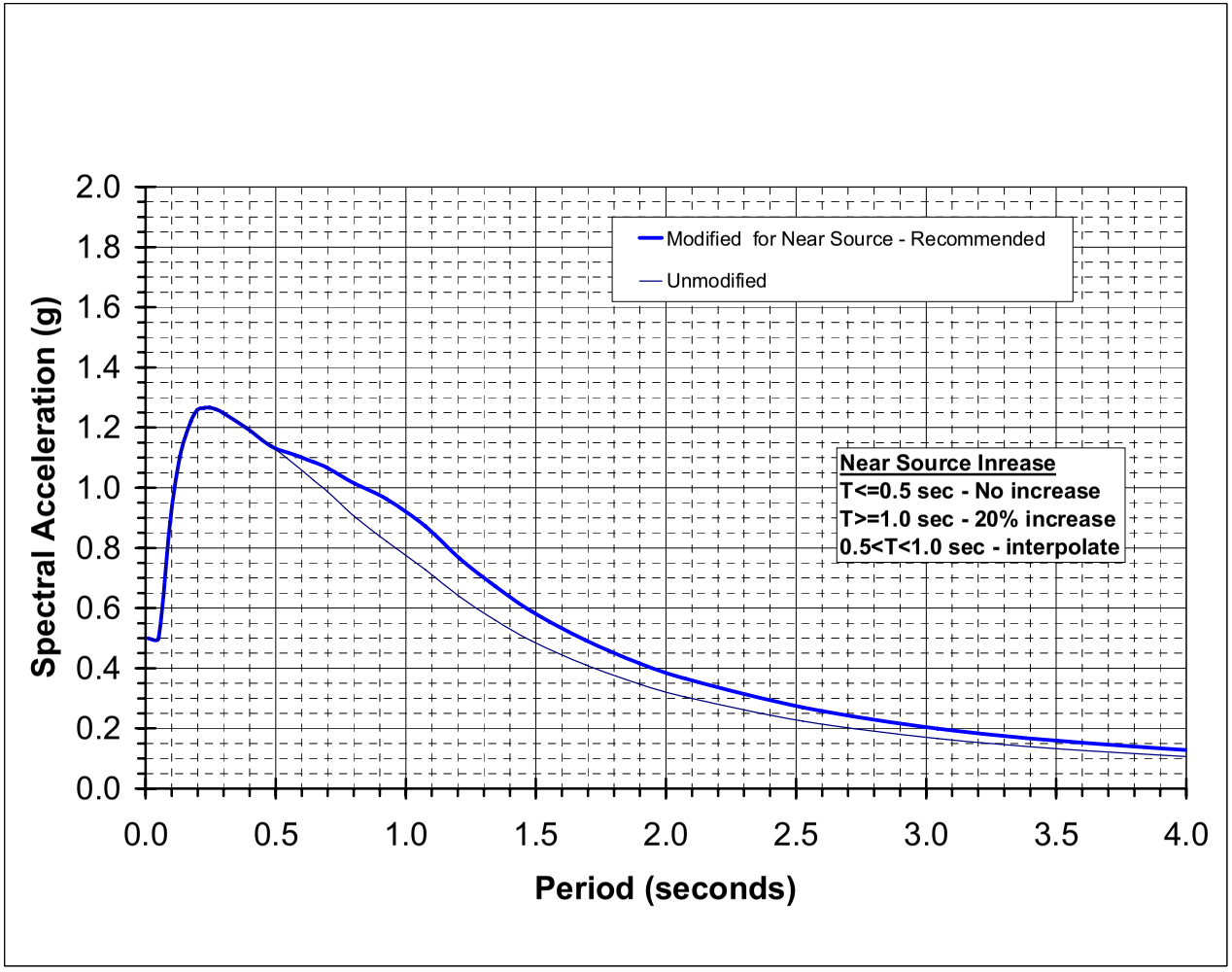
GROUP DELTA

GDC PROJECT NO. I-436

S405-E22 Connector Separation
Seal Beach, CA

Caltrans Fault and PBA Map

Figure 7



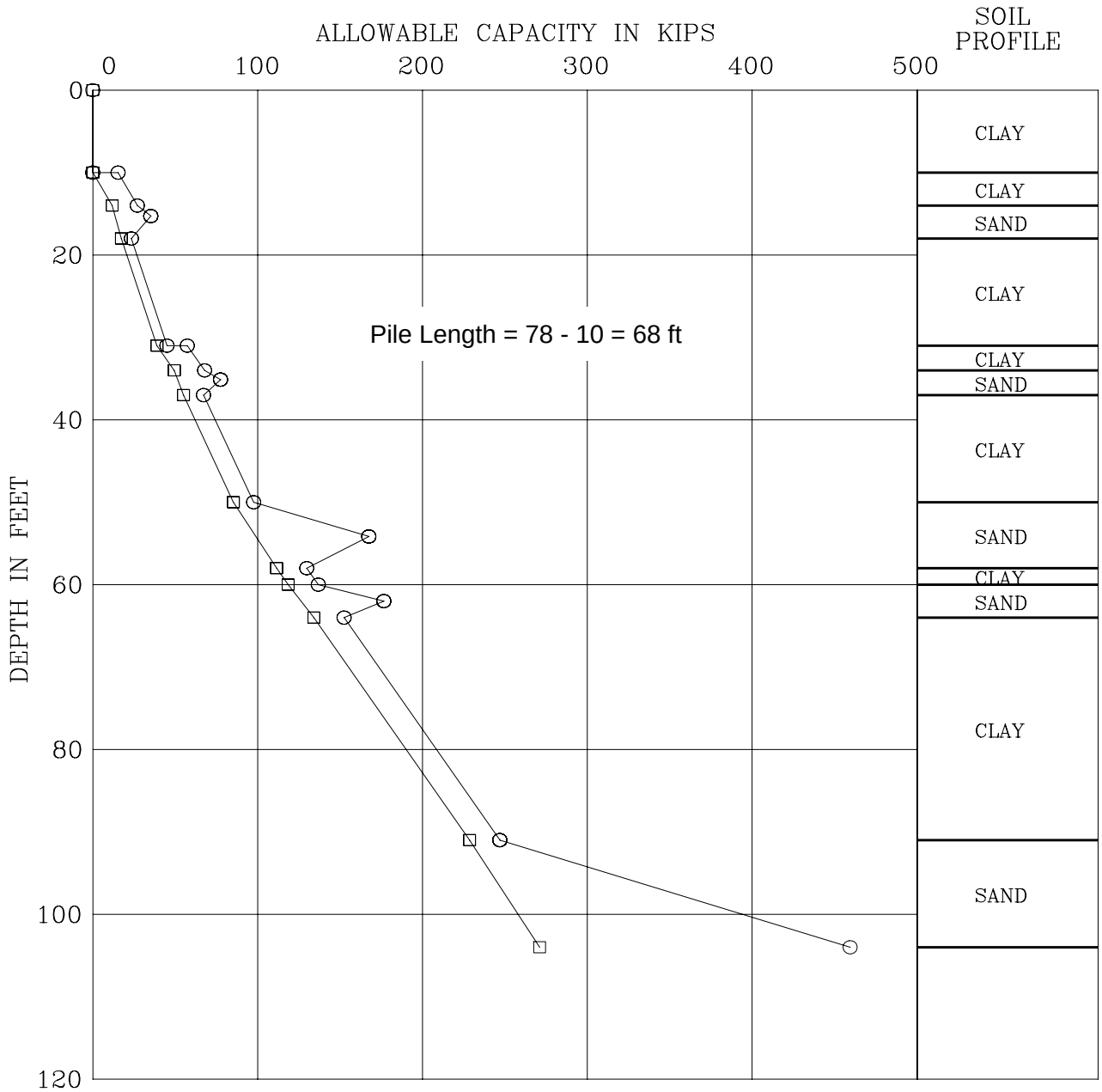
Digitized Spectra
M7_0.5g_Type D

PERIOD (Seconds)	Unmodified ARS-G'S	Near-Source Modified ARS-G'S
0.0100	0.5003	0.5003
0.0500	0.5002	0.5002
0.0946	0.8854	0.8854
0.1322	1.1055	1.1055
0.1748	1.2211	1.2211
0.1985	1.2587	1.2587
0.2252	1.2656	1.2656
0.2462	1.2661	1.2661
0.2687	1.2611	1.2611
0.2968	1.2488	1.2488
0.3880	1.1985	1.1985
0.4833	1.1370	1.1370
0.5719	1.0782	1.1092
0.6448	1.0263	1.0857
0.6980	0.9874	1.0656
0.8042	0.9033	1.0132
0.9257	0.8227	0.9628
1.0764	0.7270	0.8724
1.2056	0.6380	0.7656
1.3462	0.5593	0.6712
1.4843	0.4909	0.5891
1.6922	0.4107	0.4928
1.8989	0.3472	0.4166
2.0738	0.3044	0.3653
2.5266	0.2244	0.2693
3.0435	0.1659	0.1991
3.5058	0.1326	0.1591
4.0000	0.1064	0.1277

GROUP DELTA CONSULTANTS

Caltrans SDC ARS Curves
Soil Type D, M=7.25+/-0.25, PBA=0.5g

Figure 8



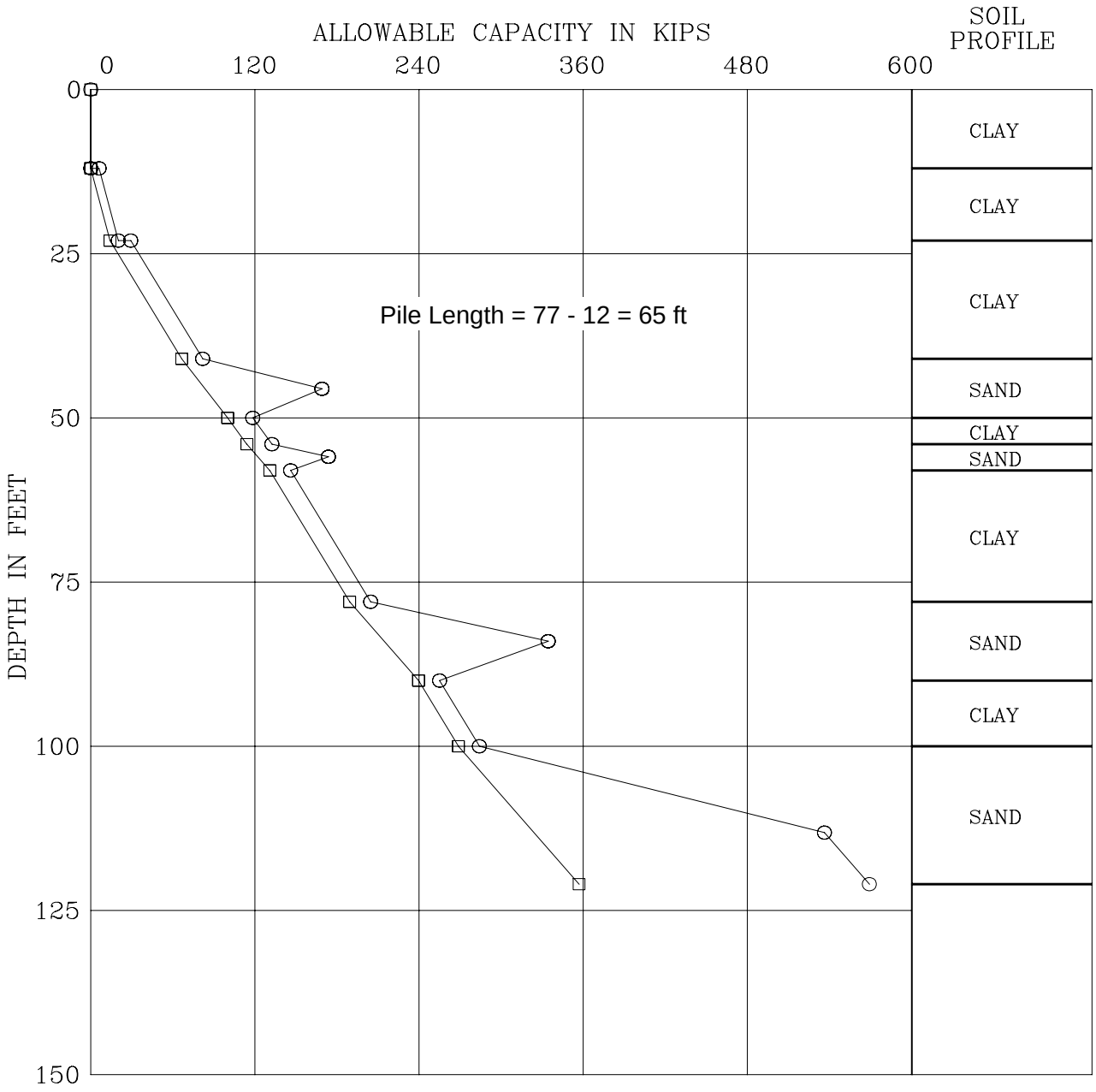
LEGEND

□ SKIN FRICTION
○ TOTAL PILE CAPACITY

PILE DIAMETER	:	1.32 ft.
PILE TYPE	:	DRIVEN,LD
FACTOR OF SAFETY		
END BEARING	:	2.00
SKIN FRICTION	:	2.00

Abut 1	S405-E22 Connector Separation Abut 1
GROUP DELTA CONSULTANTS, INC.	ALLOWABLE PILE CAPACITY

Figure 9A



LEGEND

□ SKIN FRICTION
○ TOTAL PILE CAPACITY

PILE DIAMETER	:	1.32 ft.
PILE TYPE	:	DRIVEN,LD
FACTOR OF SAFETY		
END BEARING	:	2.00
SKIN FRICTION	:	2.00

Abut 4	S405-E22 Connector Separation Abut 4
GROUP DELTA CONSULTANTS, INC.	ALLOWABLE PILE CAPACITY

Figure 9B

API RP2A Capacity for Steel Pipe Piles

4 ft Diameter CISS Piles at Bent 2

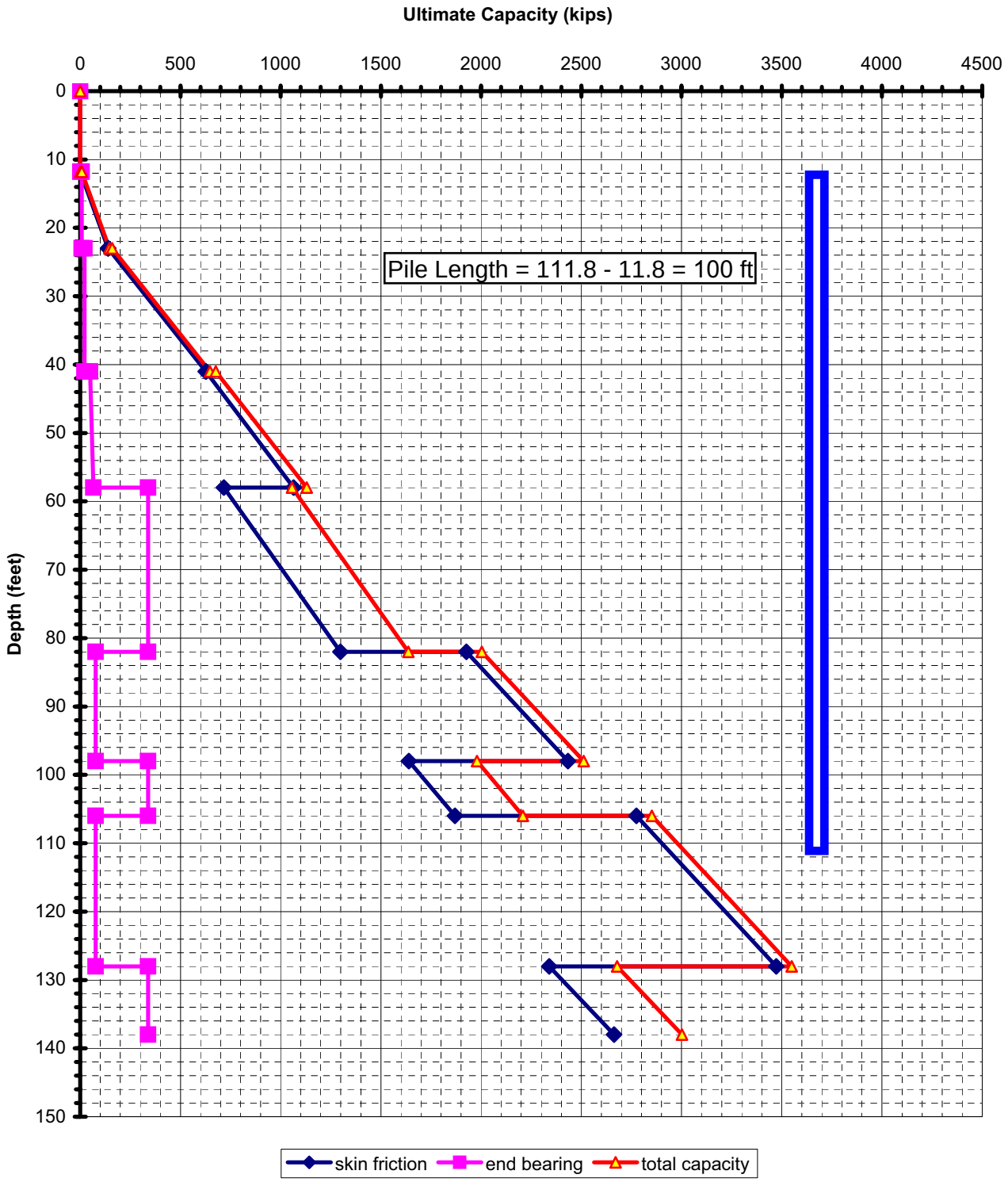


Figure 9C

API RP2A Capacity for Steel Pipe Piles

4 ft Diameter CISS Piles at Bent 3

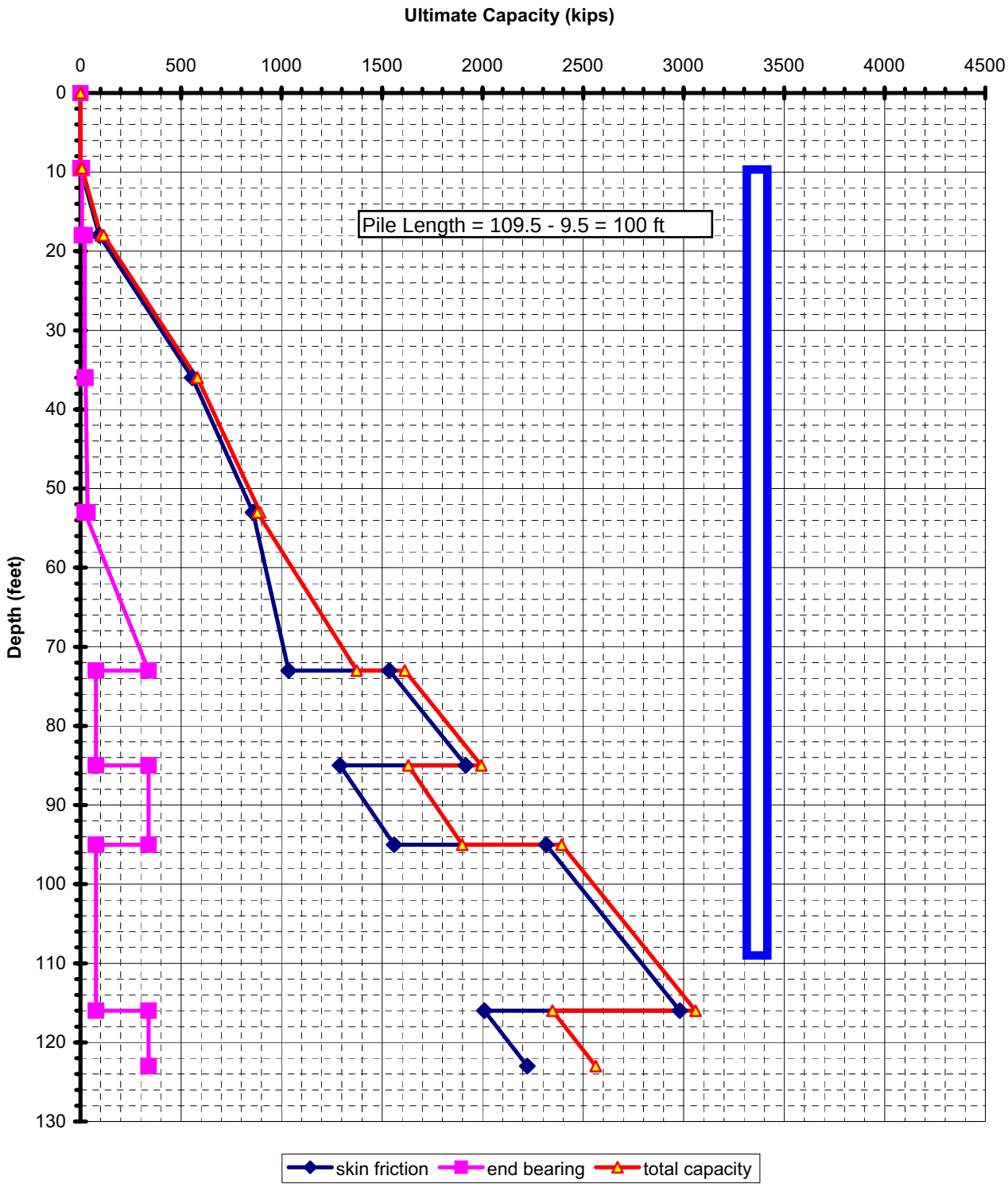


Figure 9D

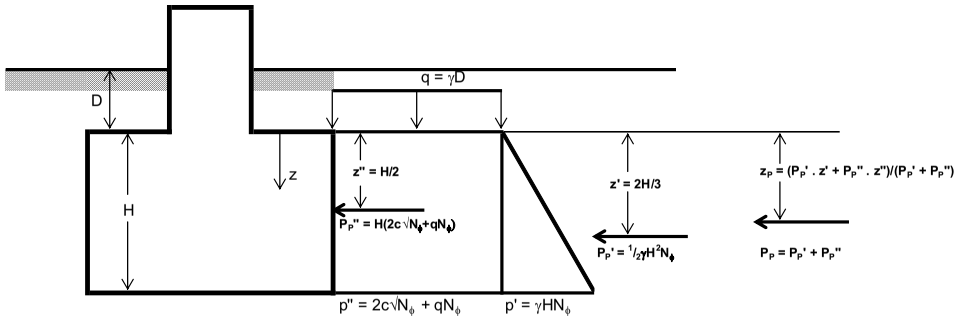
PASSIVE LATERAL RESISTANCE ON AN EMBEDDED FOOTING

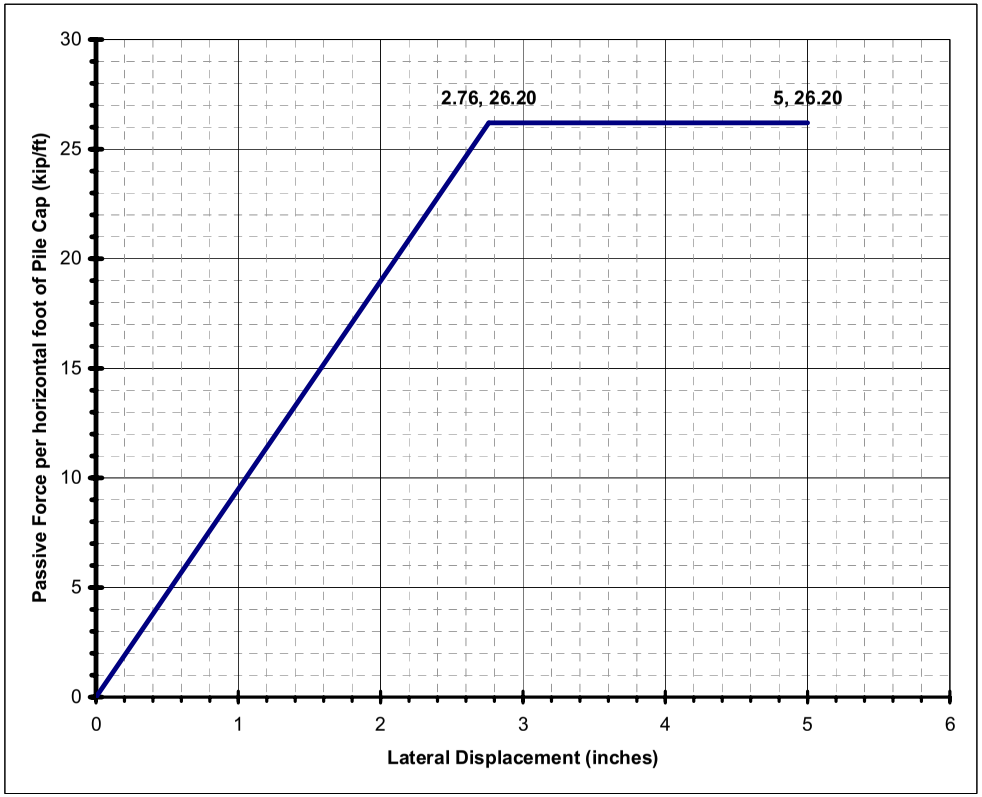
Input	
Sand or Clay (S or C) =	C
Soft, Firm, Stiff (S,F,ST) =	ST
Unit Wt, γ (pcf) =	125.0
Cohesion, c (psf) =	1,500
Friction Angle, ϕ (deg) =	0.00
Soil Cover, D (ft) =	5.00
Footing Thickness, H (feet)=	6.50

Output		
Movement to mobilize full passive, δ_{ult} (inches) =	2.76	
Surcharge above top of footing, q (psf) =	625	= γD
Factor N_ϕ =	1.00	= $\tan^2(45+\phi/2)$
Passive pressure at top of footing, p" (psf) =	3,625	= $2c\sqrt{N_\phi}+qN_\phi$
Increase in passive pressure btwn top and bottom of footing, p' (psf) =	812.5	= γHN_ϕ
Passive pressure at bottom of footing, p" + p' (psf) =	4,437.5	= $2c\sqrt{N_\phi}+qN_\phi+\gamma HN_\phi$
Passive Force from Rectanglar Block, P_P" (lbs/ft) =	23,563	= $H(2c\sqrt{N_\phi}+qN_\phi)$
Depth of P_P" below top of footing, z" (feet) =	3.25	= H/2
Passive Force from Trianglar Block, P_P' (lbs/ft) =	2,641	= $1/2\gamma H^2N_\phi$
Depth of P_P' below top of footing, z' (feet) =	4.33	= 2H/3
Total Ultimate Passive Force, P_P (lbs/ft) =	**26,203**	= P_P" + P_P'
Depth of P_P below top of footing, z_P (feet) =	3.36	= $(P_P" \cdot z" + P_P' \cdot z')/(P_P" + P_P')$

Plot Data

δ (inch)	Pp (kip/ft)
0	0.00
2.76	26.20
5	26.20





DISPLACEMENT REQUIRED FOR FULL PASSIVE AS A FUNCTION OF SOIL TYPE

Soil Type	δ/(H+D) for Full Passive	δ (inch)
Dense Sand	0.002	0.276
Medium Dense Sand	0.004	0.552
Loose Sand	0.006	0.828
Soft Clay	0.040	5.520
Firm Clay	0.030	4.140
Stiff Clay	0.020	2.760

Reference: NAVFAC - DESIGN MANUAL 7.02, "Foundations & Earth Structures," Revalidated by Change September 1, 1986, Section 2, Figure 1, Page 7.2-60.

Reference:
Passive Earth Pressure of Cohessive Soils in Contact with Smooth Vertical Surface, "Soil Mechanics in Engineering Practice", Karl Terzaghi and Ralph B.Peck, 2nd Edition, John Wiley & Sons, New York, 1967

FIGURE 10A
PASSIVE RESISTANCE OF PILE CAP - BENT 2
AGAINST NATIVE STIFF CLAY

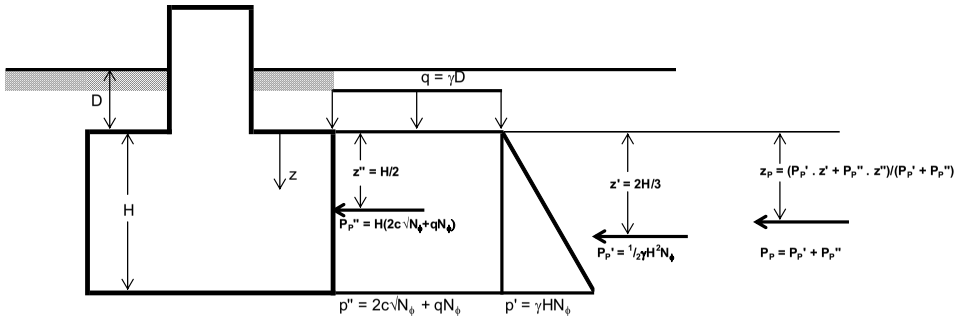
PASSIVE LATERAL RESISTANCE ON AN EMBEDDED FOOTING

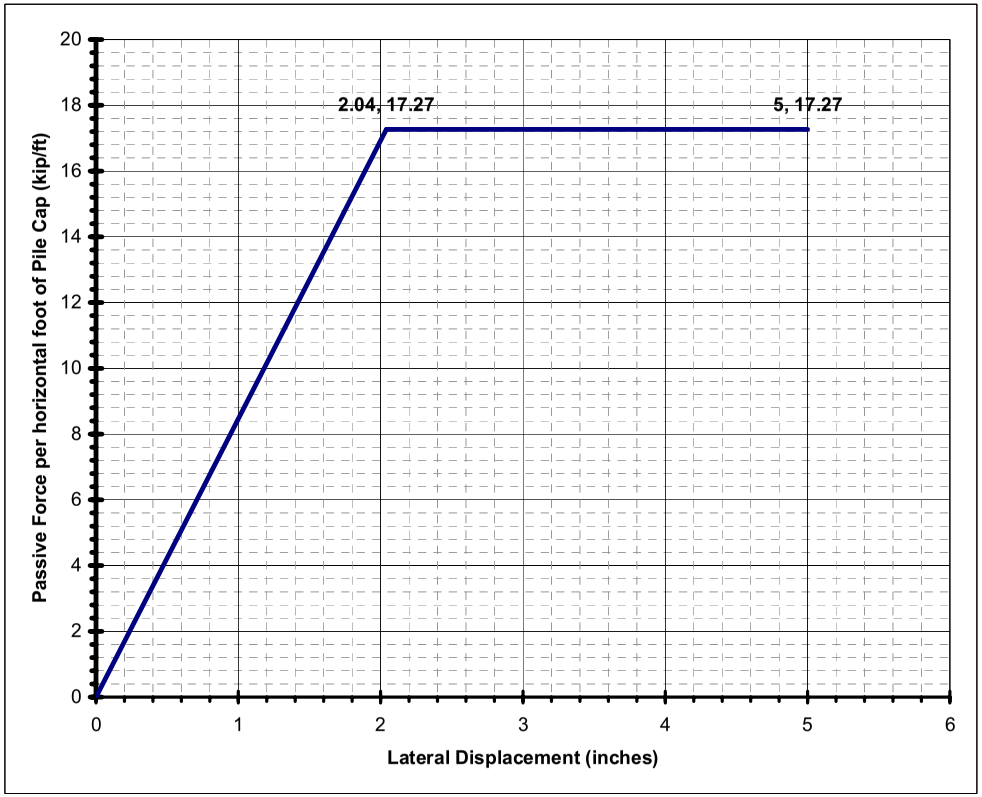
Input	
Sand or Clay (S or C) =	C
Soft, Firm, Stiff (S,F,ST) =	ST
Unit Wt, γ (pcf) =	125.0
Cohesion, c (psf) =	1,000
Friction Angle, ϕ (deg) =	0.00
Soil Cover, D (ft) =	2.00
Footing Thickness, H (feet)=	6.50

Output		
Movement to mobilize full passive, δ_{ult} (inches) =	2.04	
Surcharge above top of footing, q (psf) =	250	= γD
Factor N_ϕ =	1.00	= $\tan^2(45+\phi/2)$
Passive pressure at top of footing, p" (psf) =	2,250	= $2c\sqrt{N_\phi}+qN_\phi$
Increase in passive pressure btwn top and bottom of footing, p' (psf) =	812.5	= γHN_ϕ
Passive pressure at bottom of footing, p" + p' (psf) =	3,062.5	= $2c\sqrt{N_\phi}+qN_\phi + \gamma HN_\phi$
Passive Force from Rectanglar Block, P_P" (lbs/ft) =	14,625	= $H(2c\sqrt{N_\phi}+qN_\phi)$
Depth of P_P" below top of footing, z" (feet) =	3.25	= H/2
Passive Force from Trianglar Block, P_P' (lbs/ft) =	2,641	= $1/2\gamma H^2N_\phi$
Depth of P_P' below top of footing, z' (feet) =	4.33	= 2H/3
Total Ultimate Passive Force, P_P (lbs/ft) =	**17,266**	= P_P" + P_P'
Depth of P_P below top of footing, z_P (feet) =	3.42	= $(P_P" \cdot z" + P_P' \cdot z')/(P_P" + P_P')$

Plot Data

δ (inch)	Pp (kip/ft)
0	0.00
2.04	17.27
5	17.27





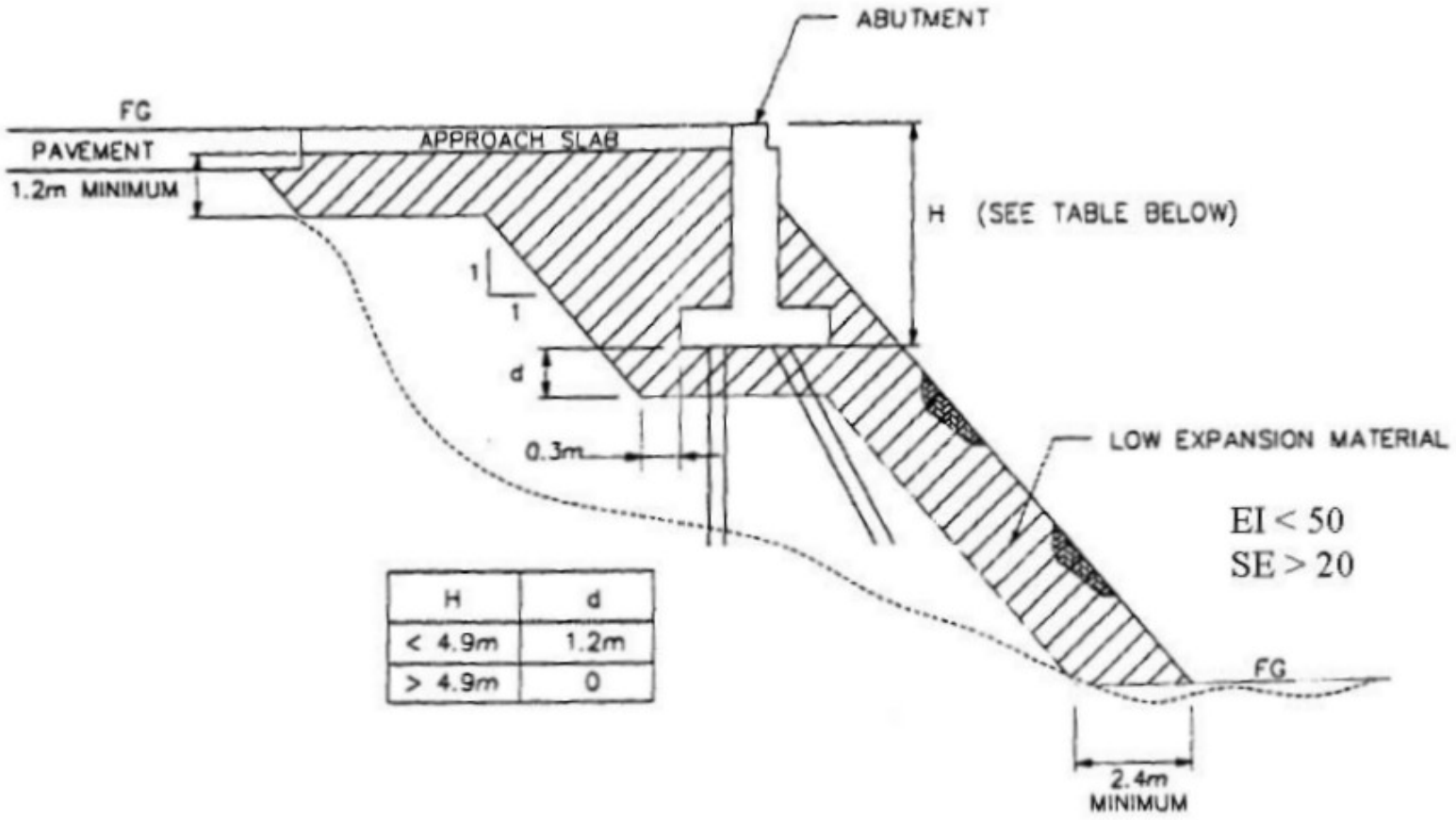
DISPLACEMENT REQUIRED FOR FULL PASSIVE AS A FUNCTION OF SOIL TYPE

Soil Type	δ/(H+D) for Full Passive	δ (inch)
Dense Sand	0.002	0.204
Medium Dense Sand	0.004	0.408
Loose Sand	0.006	0.612
Soft Clay	0.040	4.080
Firm Clay	0.030	3.060
Stiff Clay	0.020	2.040

Reference: NAVFAC - DESIGN MANUAL 7.02, "Foundations & Earth Structures," Revalidated by Change September 1, 1986, Section 2, Figure 1, Page 7.2-60.

Reference:
Passive Earth Pressure of Cohessive Soils in Contact with Smooth Vertical Surface, "Soil Mechanics in Engineering Practice", Karl Terzaghi and Ralph B.Peck, 2nd Edition, John Wiley & Sons, New York, 1967

FIGURE 10B
PASSIVE RESISTANCE OF PILE CAP - BENT 3
AGAINST NATIVE STIFF CLAY



H	d
< 4.9m	1.2m
> 4.9m	0

NOT TO SCALE

GDC Project No. I-436

S405-E22 Connector Separation
Seal Beach, CA

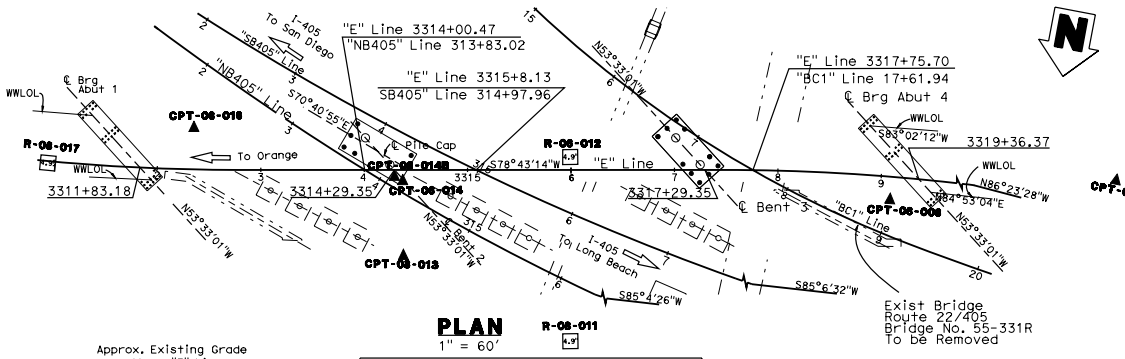
EXPANSIVE SOIL EXCLUSION ZONE

Figure 11

PLATES

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



PLAN
1" = 60'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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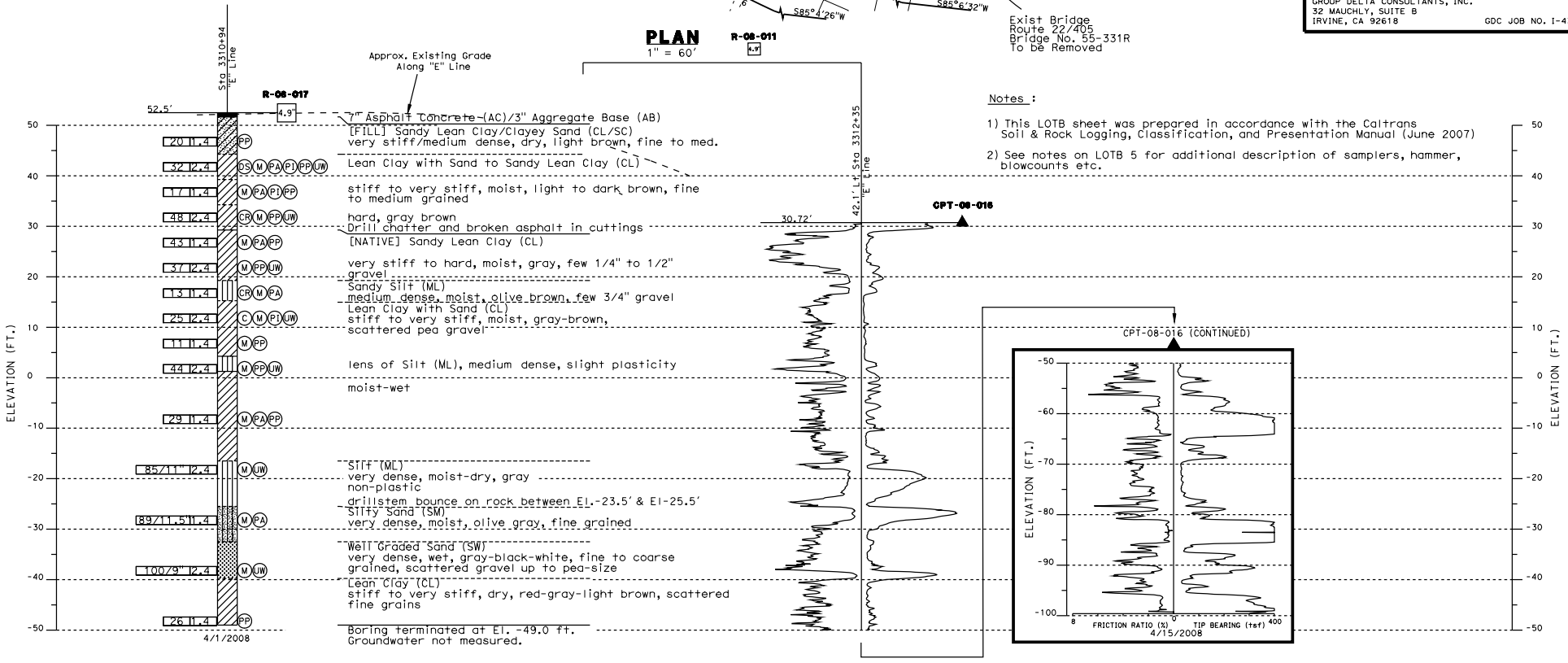
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.

PROFILE
HOR. 1" = 20'
VER. 1" = 10'

3311+00 3312+00
STATION NO. ALONG "E" LINE

See LOTB 2

PLATE 1

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1101F POST MILES 20.75	S405-E22 CONNECTOR SEPARATION LOG OF TEST BORINGS 1 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES REVISION DATES: 10/28/08 02/28/09 05/18/09	SHEET 29 OF 34

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

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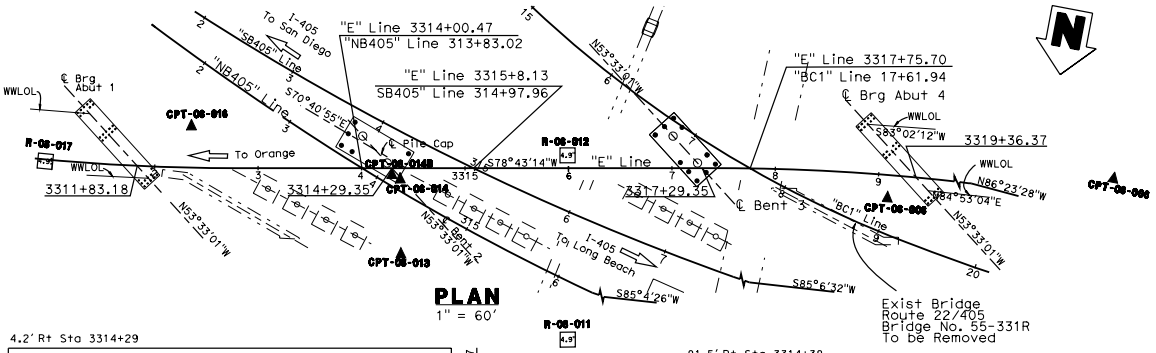

PLAN
1" = 60'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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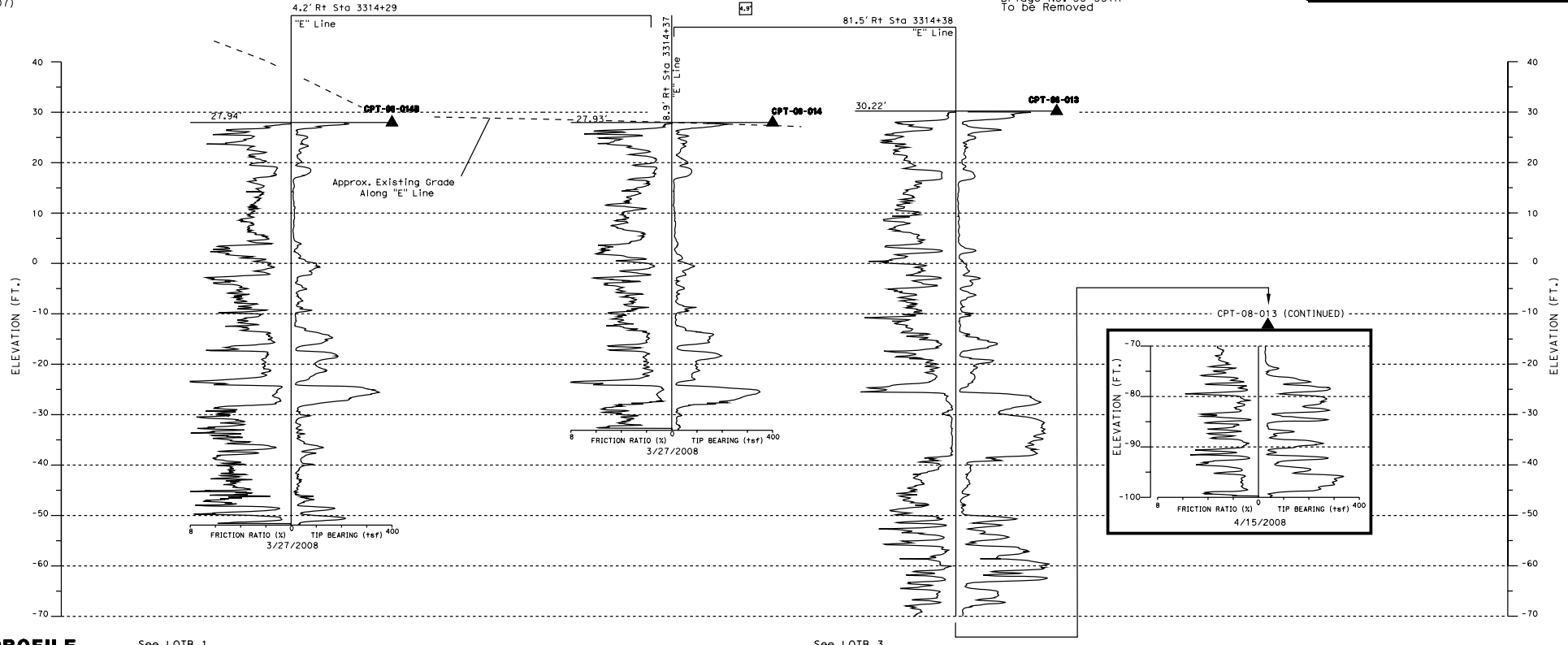
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 1 — See LOTB 3

3313+00 3314+00

STATION NO. ALONG "E" LINE

PLATE 2

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1101F POST MILES 20.75

S405-E22 CONNECTOR SEPARATION

LOG OF TEST BORINGS 2 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/28/08 02/28/09 05/18/09

SHEET 30 OF 34

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
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PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

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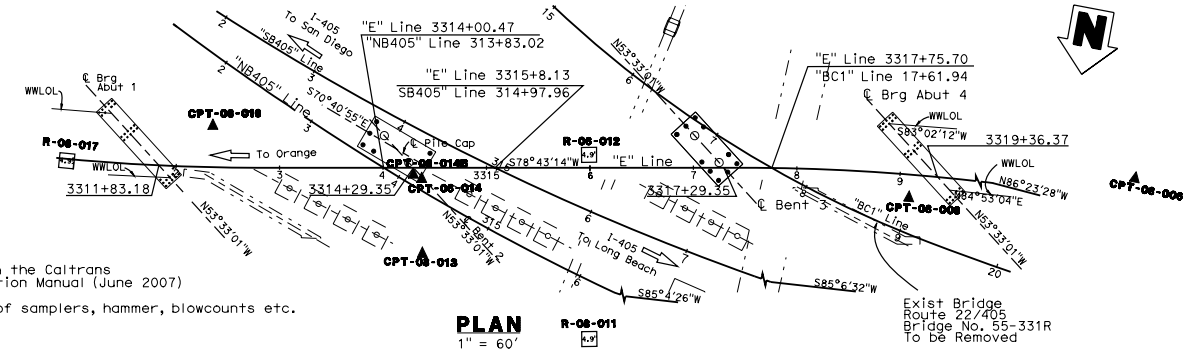
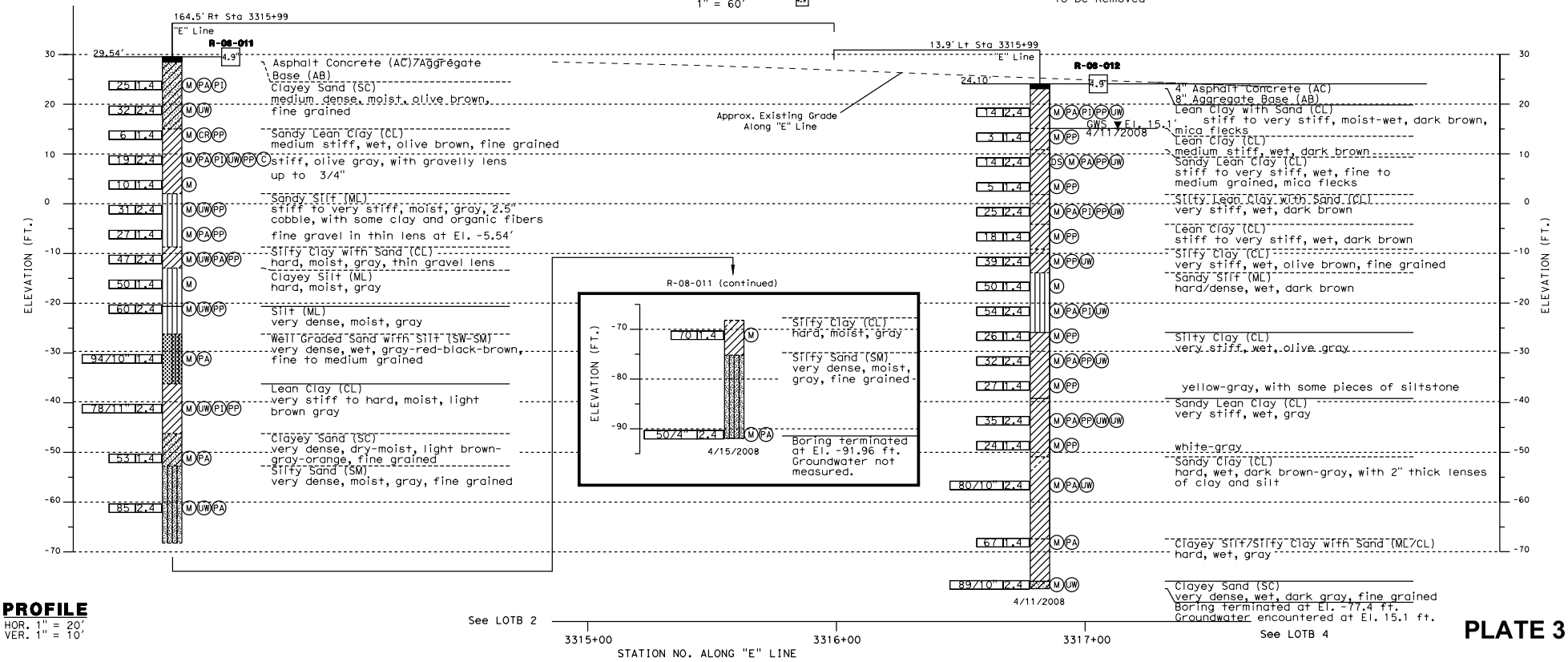
2) See notes on LOTB 5 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 60'



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 3

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1101F POST MILES 20.75

S405-E22 CONNECTOR SEPARATION
LOG OF TEST BORINGS 3 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/28/08 02/28/09 05/18/09

SHEET 31 OF 34

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

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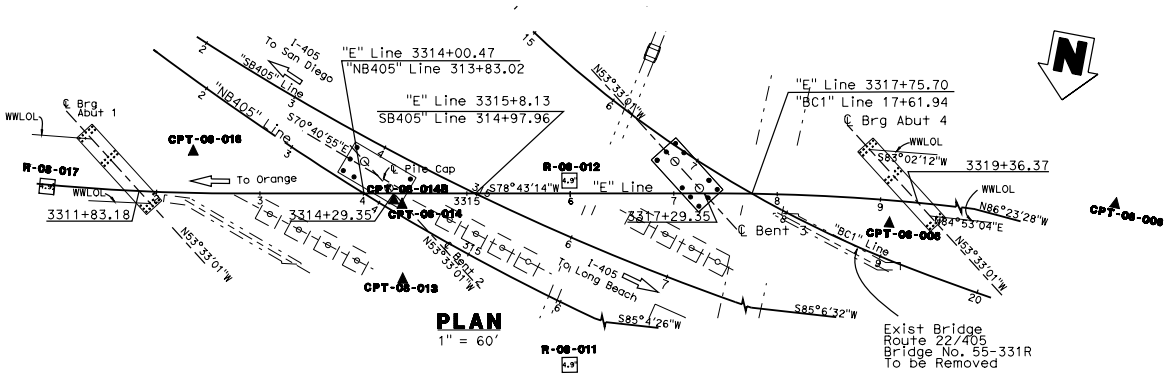

PLAN
1" = 60'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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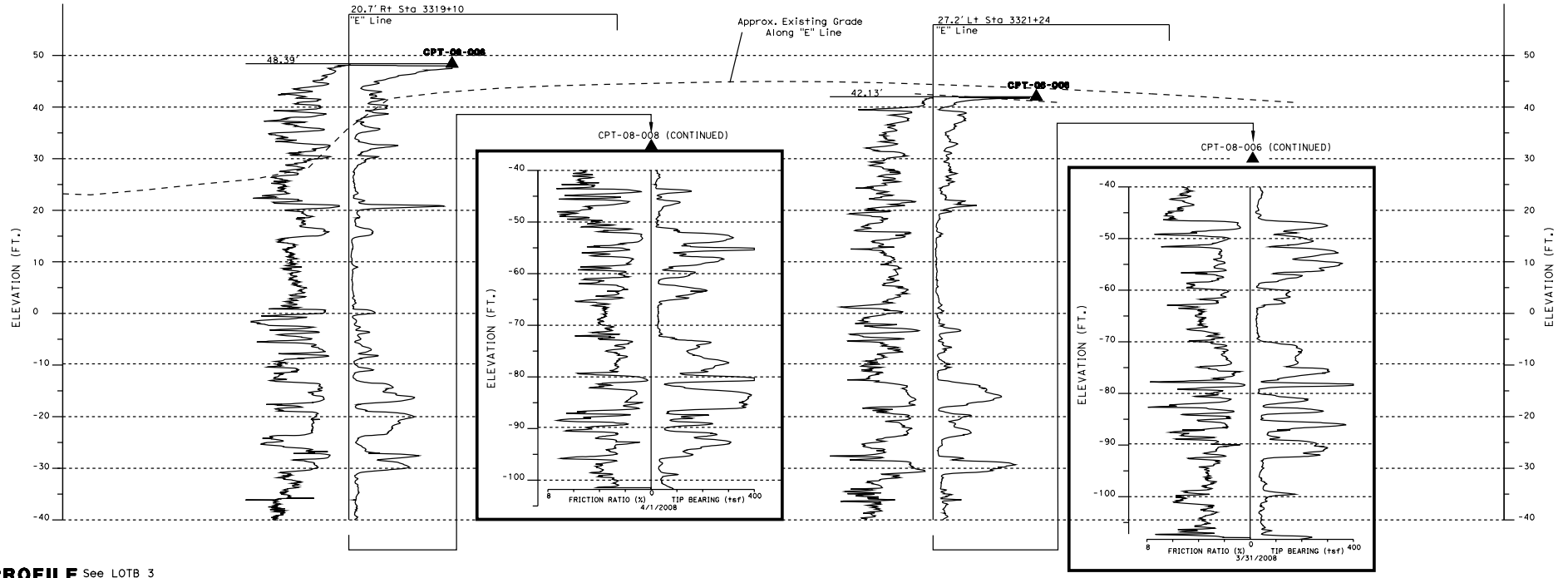
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



PROFILE See LOTB 3
HOR. 1" = 20'
VER. 1" = 10'

3318+00 3319+00 3320+00 3321+00 3322+00
STATION NO. ALONG "E" LINE

PLATE 4

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1101F POST MILES 20.75	S405-E22 CONNECTOR SEPARATION LOG OF TEST BORINGS 4 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES REVISION DATES: 10/28/08 02/20/09 05/18/09	SHEET 32 OF 34

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
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GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

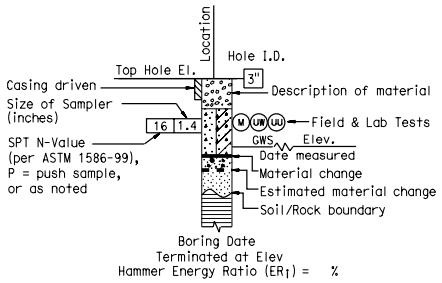
Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

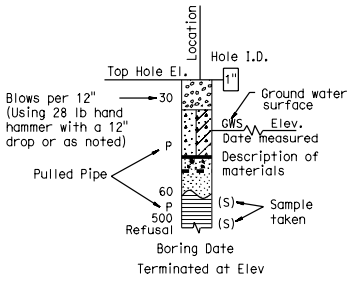
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes :
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.
2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers for rotary borings.
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval

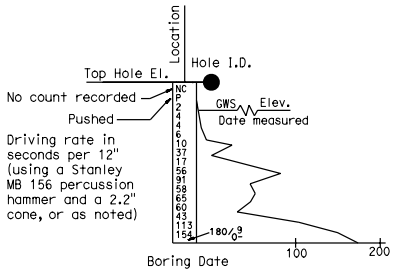
PLATE 5



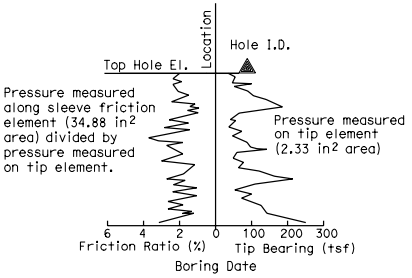
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI / PROJECT ENGINEER	BRIDGE NO. 55-1101F POST MILES 20.75	SOIL LEGEND LOG OF TEST BORINGS 5 OF 6
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		CU 12235 EA 071621	FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES: 10/28/08 02/20/09 05/18/09 — SHEET 33 OF 34

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166)
Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 6

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55-1101F
POST MILES 20.75

SOIL LEGEND
LOG OF TEST BORINGS 6 OF 6

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/28/08 12/28/09 05/18/09

SHEET 35 OF 35

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the subject bridge were investigated by Group Delta Consultants, Inc. (GDC) by performing four (4) soil borings and seven (7) Cone Penetration Tests (CPTs) during the period of March 27th to April 24th, 2008. The borings were performed to depths of 61.5 feet to 121.5 feet below ground surface (bgs) and the CPTs were performed to depths of 61 feet to 150.3 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at the subject overcrossing location. Locations of the borings and CPTs are presented in Figure 3A & 3B of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1 of this appendix.

The borings and CPTs were performed from the freeway lanes and shoulders of SR-22 and I-405 within the Caltrans Right-of-Way (ROW). Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night.

The exploration methods are described in the following sections. Boring and CPT logs from the current exploration program are presented in Figures A-2a through A-5e and A-6a through A-12c, respectively.

A.2 Soil Drilling and Sampling

A total of four (4) soil borings (R-08-004, R-08-011, R-08-012, and R-08-017) were drilled and sampled at the subject bridge using rotary wash method during this project. The borings were advanced to depths ranging from 61.5 to 121.5 feet bgs using a truck-mounted Mayhew 1000 drill rig and a 4.875-inch drill bit in conjunction with bentonite slurry.

C & L Drilling, Inc. of La Habra, California drilled and sampled borings as subcontractor to GDC. All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS). All soils were assigned a group name and group symbol, as described in Caltrans' "Soil and Rock

Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The boring logs are presented in Figures A-2a and A-5e.

Drive samples were generally collected from the borings at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using either a downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured.

The borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with asphalt patch as necessary.

Rotary wash borings drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of seven (7) CPT soundings (CPT-08-006, CPT-08-008, CPT-08-013, CPT-08-014, CPT-08-014b, CPT-08-016, and CPT-08-018) were performed at the subject bridge to depths ranging from 61 feet to 150.3 feet bgs. Kehoe Testing and Engineering, Inc. of Long Beach, California performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D3441 test standard using an electronic cone penetrometer. A 2.32-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in this appendix on Figures A-6a through A-12c. Soil behavior type and other interpretations of the CPT data provided by Kehoe are in our files.

At the completion of each sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned by backfilling bentonite into the hole to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1 Summary of Field Explorations

List of Figures

Figure A-1a Key for Soil Classification
Figure A-1b Boring Legend
Figures A-2a to A-5e Boring Logs
Figures A-6a to A-12c Cone Penetration Test Results

TABLE A-1:
SUMMARY OF TEST EXPLORATIONS
SR-22 WEST ORANGE COUNTY CONNECTORS PROJECT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Plan Figure No.	Appendix Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
R-08-004	1325+03 165L	4/24/2008	Rotary Wash Boring	31.21	61.5	L-7	A-2	NA	NA	
CPT-08-006	1321+35 243 L	3/31/2008	CPT	42.13	150.3	L-6	A-6	Hole obstructed at 20' (dry)	NA	GW is below Elev. 22 feet
CPT-08-008	1319+18 200 L	4/1/2008	CPT	48.39	150.2	L-6	A-7	Hole obstructed at 34' (dry)	NA	GW is below Elev. 15 feet
R-08-011	1316+25 20 L	4/15/2008	R	29.54	121.5	L-6	A-3	NA	NA	-
R-08-012	1315+94 196 L	4/11/2008	Rotary Wash Boring	24.10	101.5	L-6	A-4	9	15.1	-
CPT-08-013	1314+50 71 L	4/15/2008	CPT	30.22	130.3	L-6	A-8	Hole obstructed at 16' (dry)	NA	GW is below Elev. 12.5 feet
CPT-08-014	1314+34 142 L	3/27/2008	CPT	27.93	61.0	L-6	A-9	Hole obstructed at 10' (dry)	NA	Inclination Refusal at 61 ft bgs GW is below Elev. 18.5 feet
CPT-08-014B	1314+25 145 L	3/27/2008	CPT	27.94	79.9	L-6	A-10	Hole obstructed at 7' (dry)	NA	Inclination Refusal at 80 ft bgs GW is below Elev. 21.5 feet
CPT-08-016	1312+20 146 L	4/15/2008	CPT	30.72	130.3	L-6	A-11	Hole obstructed at 15' (dry)	NA	GW is below Elev. 15 feet
R-08-017	1310+93 76 L	4/1/2008	Rotary Wash Boring	52.50	101.5	L-6	A-5	NM	NM	-
CPT-08-018	"W Line" 2306+56 83L	4/24/2008	CPT	43.59	80.1	L-3	A-12	Hole obstructed at 24' (dry)	NA	GW is below Elev. 19.5 feet

Notes:
1. Stationing relative to SR-22 "H" line. Right and left offsets defined by looking along SR-22 centerline in direction of increasing station.
2. Elevations based on survey conducted in January 2009

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

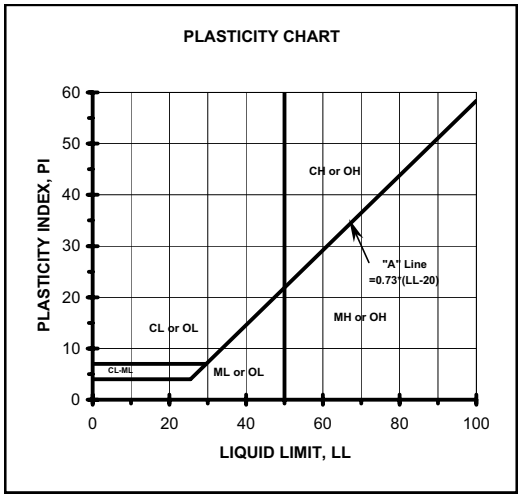
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375 inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	30											**8.25" Concrete Pavement (PCC)** **4.75" Concrete Treated Base** **3" Aggregate Base (AB)**
												9" Poorly Graded Sand (SP) moist, red-yellow, fine grained
			B1			16	CR RV	66	29:12			**Sandy Lean Clay (CL)** firm, moist, dark brown, in chunks up to 1.5"
			R2	13 25 30	117.1	16	DS			4.5+		hard, dry, dark gray, fine grained
5	25											**Sandy Silt (ML)** dense/hard, dry-moist, brown, fine grained, trace of clay
10	20		S3	6 12 18		22		66		4.5+		
												Lean Clay (CL) stiff, moist, olive brown
15	15		R4	5 9 13	100.5	24		27				pocket penetrometer = 1.0-1.25 **Silty Sand (SM)** medium dense, wet, light brown gray, fine grained with occasional coarse grains and few fine gravel, with clay
												Sandy Lean Clay (CL) firm to stiff, wet, olive light brown, very fine grains barely visible with some to trace of silt
20	10		S5	2 3 4		31		66		1.0		
												Lean Clay (CL) stiff, moist, gray olive brown

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FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-004

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	5		R6	5 7 12	91.1	31	DS			1.25-1.5		**Lean Clay (CL)** stiff, moist, gray olive brown, no visible sand grains, with fine to 3/4" angular light gray fine grained sandstone gravel in sampler shoe
												Sandy Lean Clay (CL) stiff, moist, olive gray, trace fine grains, with some silt
30	0		S7	2 5 8		29		55				
35	-5		R8	8 8 14	92.3	30				1.5-2.2		stiff to very stiff, less silt, occasional fine grain
40	-10		S9	2 7 14		32				2.0		
45	-15		R10	20 27 38	105.2	22		51		4.5		**Sandy Silt/Silty Sand (ML/SM)** very dense/hard, gray, trace of clay

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-20		S11	10 8 11		32		86				**Lean Clay with Sand (CL)** very stiff, wet, olive gray, little to no silt, rolls very good thread
55	-25		R12	12 23 25	109.6	19				4.5+		**Silt (ML)** dense/hard, wet, gray,with some fine grains and clay
60	-30		S13	9 13 20		26		56				**Sandy Silt (ML)** dense, wet, gray olive, fine grains barely visible
65	-35											*Boring terminated at 61.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
70	-40											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2 c

LOG OF TEST BORING

PROJECT NAME SR-22 West Orange County Connectors		**PROJECT NUMBER** I-436	**BORING** R-08-011
SITE LOCATION Cities of Seal Beach, Westminster, and Garden Grove, California	**START** 4/15/2008	**FINISH** 4/15/2008	**SHEET NO.** 1 of 5
DRILLING COMPANY C & L Drilling	**DRILLING METHOD** Rotary Wash	**LOGGED BY** A. Tucker	**CHECKED BY** C. Scheyhing
DRILLING EQUIPMENT Mayhew 1000	**BORING DIA. (in)** 4.875	**TOTAL DEPTH (ft)** 121.5	**GROUND ELEV (ft)** 29.54
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** Surveyed 01/09		**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Asphalt Concrete (AC) **Aggregate Base (AB)**
												Clayey Sand (SC) medium dense, moist, olive brown, fine grained, with some silt
5	25		S1	7 12 13		19		47	33:14			
10	20		R2	7 12 20	96.9	19						
15	15		S3	2 2 4		31	CR			0.5		**Sandy Lean Clay (CL)** firm, wet, olive brown, fine grained, scattered few fine gravel, rolls very good thread
20	10		R4	4 8 11	94.6	24	CN	52	34:18	1.0		stiff, olive gray, with gravelly lense at 20' to 20.3' containing sunrounded to angular black and gray with orange limonite stained granite pieces 1/4" to 3/4"
	5											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-011

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	4 5 5		46						**Sandy Lean Clay (CL)** stiff, wet, olive brown, fine grained, with few fine gravel
	0											**Sandy Silt (ML)** stiff to very stiff, moist, gray, single black and white granodiorite cobble 2.5", with some clay and decomposed organic fibers
30			R6	5 13 18	93.2	30				1.5		
	-5											
35			S7	4 11 16		28		68		1.0		with fine angular gravel in thin lense at 35', little to no clay
	-10											**Silty Clay with Sand (CL)** hard, moist, gray, rolls very poor thread, with some gravel in lense at 40'
40			R8	11 15 32	97.9	25		80		4.0		
	-15											
45			S9	10 20 30		33						**Clayey Silt (ML)** hard, moist, gray, no gravel
	-20											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME: SR-22 West Orange County Connectors	PROJECT NUMBER: I-436	BORING: **R-08-011**	
SITE LOCATION: Cities of Seal Beach, Westminster, and Garden Grove, California	START: 4/15/2008	FINISH: 4/15/2008	SHEET NO.: 3 of 5
DRILLING COMPANY: C & L Drilling	DRILLING METHOD: Rotary Wash	LOGGED BY: A. Tucker	CHECKED BY: C. Scheyhing
DRILLING EQUIPMENT: Mayhew 1000	BORING DIA. (in): 4.875	TOTAL DEPTH (ft): 121.5	GROUND ELEV (ft): 29.54
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.	NOTES: Surveyed 01/09		DEPTH/*ELEV.* GROUND WATER (ft): ▼ N/A / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	14 24 36	83.9	35				3.5		**Clayey Silt (ML)** hard, moist, gray, no gravel **Silt (ML)** very dense, moist, gray, trace to no clay
55	-25											
												Well Graded Sand with Silt (SW-SM) very dense, wet, gray-red-black-brown, fine to medium grained
60	-30		S11	26 44 50/4"		15	PA	7				
65	-35											**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains
70	-40		R12	27 28 50/5"	114.8	17			31:16	3.5		
	-45											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-3 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-50		S13	11 21 32		17		45				**Lean Clay (CL)** very stiff to hard, moist, light brown gray, scattered fine grains **Clayey Sand (SC)** very dense, dry-moist, light brown-gray-orange, fine grained
85	-55											**Silty Sand (SM)** very dense, moist, gray, fine grains barely visible, trace to no clay
90	-60		R14	20 37 48	102.4	24		29				
95	-65											**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
	-70											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-3 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-011**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/15/2008	4/15/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	121.5	29.54	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S15	11 22 48		40						**Silty Clay (CL)** hard, moist, gray, some fine grains, rolls poor thread
105	-75											**Silty Sand (SM)** very dense, moist, gray, fine grained
110	-80											
115	-85											
120	-90		R16	40 50/4"		24		27				*Boring terminated at 121.5 feet below ground surface (bgs).* *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-95											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-3 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												4" Asphalt Concrete (AC) **8" Aggregate Base (AB)**
												Lean Clay with Sand (CL) stiff to very stiff, moist-wet, dark brown, fine to medium grained, tiny flecks of mica
5	20		R1	4 5 9	95.8	28		80	47:27	2.4		
												▼
10	15		S2	1 1 2		39				0.75		**Lean Clay (CL)** firm, wet, dark brown
												Sandy Lean Clay (CL) stiff to very stiff, wet, fine to medium grained, tiny flecks of mica
15	10		R3	3 6 8	102.1	24	DS	58		2.75		
20	5		S4	2 2 3		27				1.1		with some fine gravel
												Silty Lean Clay with Sand (CL) very stiff, wet, dark brown, with fine gravel
	0											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-012

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R5	5 10 15	92.7	29		80	33:12	2.25		**Silty Lean Clay with Sand (CL)** very stiff, wet, dark brown, with fine gravel
	-5											**Lean Clay (CL)** stiff to very stiff, wet, dark brown, with some silt
30			S6	2 6 12		34				1.25-1.5		
	-10											**Silty Clay (CL)** very stiff, wet, olive brown, fine grained
35			R7	9 18 21	93.9	30				4.0		
	-15											**Sandy Silt (ML)** hard/dense, wet, dark brown
40			S8	7 24 26		28						
	-20											
45			R9	16 20 34	99	26		70	26:03			
	-25											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-012

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S10	7 11 15		38				3.3		**Silty Clay (CL)** very stiff, wet, olive gray, with scattered coarse grains
	-30											
55			R11	7 15 17	88.5	33		96		2.8		
	-35											
60			S12	6 11 16		29				3.75		color changes to yellow-gray, with some pieces of siltstone
	-40											**Sandy Lean Clay (CL)** very stiff, wet, gray
65			R13	10 15 20	107.1	21		61		3.0		with some white clay and some small pieces of claystone gravel
	-45											
70			S14	5 6 18		21				1.5		color changes to white-gray
	-50											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-4 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
80	-55		R15	19 30 50/4"	97.9	31		57				**Sandy Clay (CL)** hard, wet, dark brown-gray, fine grained, with up to 2" thick lenses of clay and silt
85	-60											
90	-65		S16	15 32 38								no recovery (no sand catcher in sampler)
95	-70		S17	15 32 35		31		89				**Clayey Silt/Silty Clay with Sand (ML/CL)** hard, wet, gray
	-75											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-4 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-012**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/11/2008	4/11/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	24.10	▼ 9.0 / *15.1*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R18	14 39 50/4"	134.9	18						**Clayey Sand (SC)** very dense, wet, dark gray, fine grained
												Boring termination at 101.5 feet below ground surface (bgs). *Groundwater encountered at 9.0 feet bgs.* *Borehole backfilled with cement/bentonite grout mix and patched with asphalt.*
	-80											
105												
	-85											
110												
	-90											
115												
	-95											
120												
	-100											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-4 e

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-017

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	1 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												7" Asphalt Concrete (AC) **3" Aggregate Base (AB)** **[FILL]** **Lean Clay with Sand/Clayey Sand (CL/SC)** very stiff/medium dense, dry, light brown, fine to medium grained
5	50		S1	7 10 10						3.0		
	45											**Lean Clay with Sand (CL)** very stiff, moist, dark brown with orange mottling, scattered fine grains
10			R2	6 10 22	89.3	32	DS	82	35:14	2.5		
	40											**Sandy Lean Clay (CL)** stiff to very stiff, light brown, fine to medium grained
15			S3	4 6 11		27		55	34:14	1.25		
	35											**Lean Clay with Sand (CL)** hard, moist, gray brown, fine grained 19' - 19.5' Drill chatter
20			R4	8 23 25	108.8	19	CR			4.5+		at 21' Drill chatter and broken asphalt in cuttings, old asphalt in sampler shoe
	30											**[NATIVE]** **Sandy Lean Clay (CL)** hard, moist, gray, fine grained with scattered coarse grains and few 1/2" claystone gravel

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-017

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	8 20 23		20		63		4.5+		**Sandy Lean Clay (CL)** hard, moist, gray, scattered coarse grains and few 1/2" claystone gravel
	25											
30			R6	5 13 24	109.3	15				4.0		very stiff to hard, with scattered fine grains and few 1/4" gravel of dark purple-gray slate Torvane = 8.0 tsf
	20											
35			S7	5 5 8		34	CR	57				**Sandy Silt (ML)** medium dense, moist, olive brown, scattered coarse grains and few 3/4" pieces of slate, non-plastic
	15											**Lean Clay (CL)** stiff to very stiff, moist, gray-brown, few fine grains and scattered pea-sized slate gravel
40			R8	8 10 15	96.2	28	CN		39:19			
	10											
45			S9	3 4 7		36				1.2		no gravel
	5											
												Silt (ML) medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-5 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-017

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	7 15 29	100.0	25				3.0		**Silt (ML)** medium dense/very stiff, moist, gray brown, scattered fine and coarse grains, little clay, slight plasticity
	0											**Lean Clay with Sand (CL)** very stiff, moist-wet, gray-brown, scattered fine grains and pea-sized gray claystone gravel
55												
	-5											
60			S11	11 15 14		31		82		2.0		becomes gray, no gravel
	-10											
65												
	-15											
70			R12	21 35 50/5"	96.7	27						**Silt (ML)** very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic
	-20											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

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FIGURE A-5 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-017

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	4 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silt (ML) very dense, moist-dry, gray, few fine grains, with trace of clay, non-plastic 76' - 78' drillstem bounce on rock
	-25											
												Silty Sand (SM) very dense, moist, olive gray, fine grained, no gravel
80			S13	35 39 50/5.5"		19		22				
	-30											
85												**Well Graded Sand (SW)** very dense, wet, gray-black-white, fine to coarse grained, with scattered granite gravel up to pea-size, no clay
	-35											
90			R14	50/6" 50/3"	111.4	18						
	-40											**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
95												
	-45											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

GROUP DELTA CONSULTANTS, INC.
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Irvine, CA 92618

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FIGURE A-5 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-017**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	101.5	52.50	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S15	6 9 17						1.5		**Lean Clay (CL)** stiff to very stiff, dry, red-gray-light brown, scattered fine grains
	-50											*Boring termination at 101.5 feet below ground surface (bgs).* *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
105												
	-55											
110												
	-60											
115												
	-65											
120												
	-70											

GDC_LOG_BORING_1A I-436 ROUTE 22_405 SEPARATION BORING LOGS.GPJ GDCLOG.GDT 02/12/09

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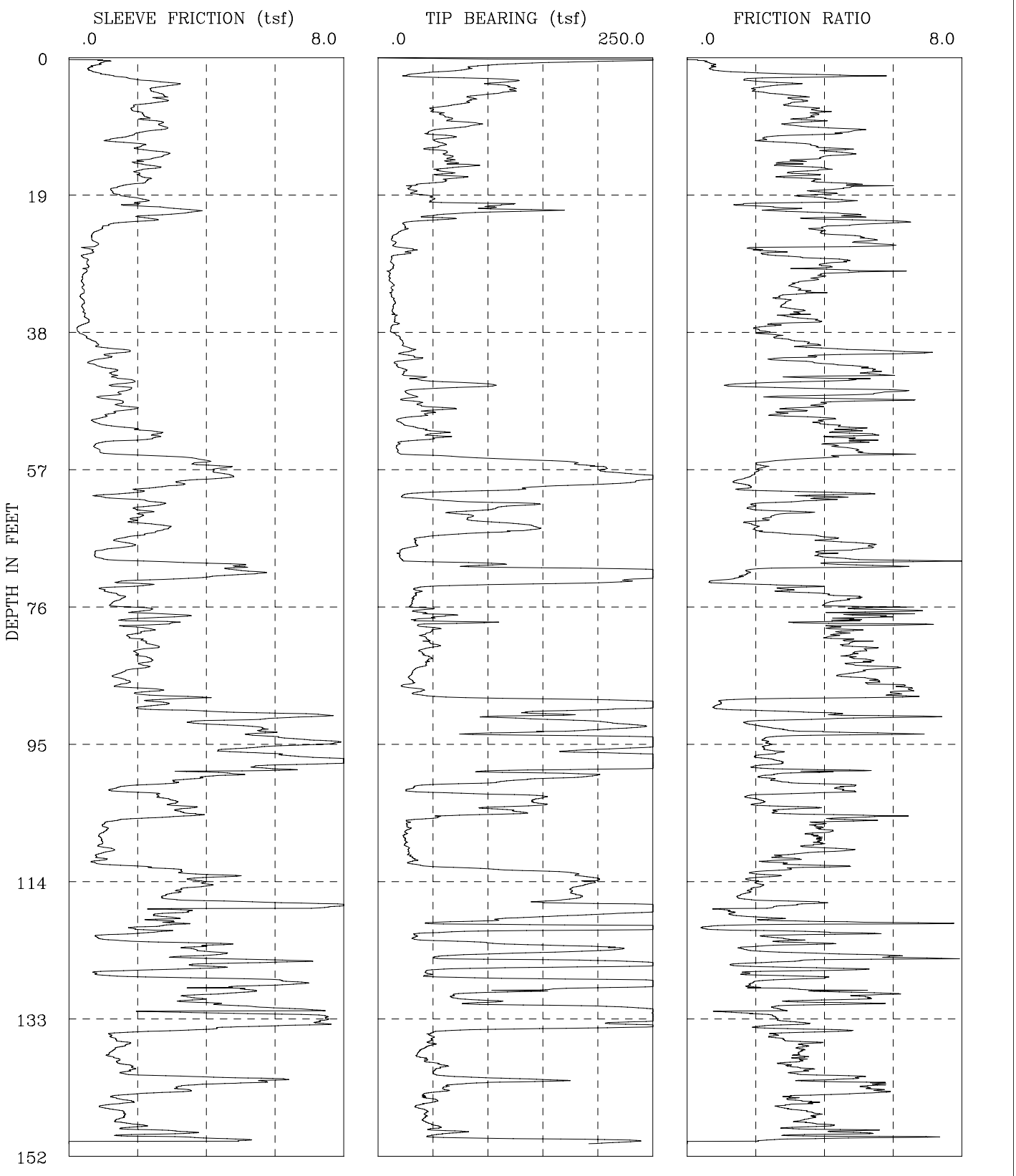
FIGURE A-5 e



I-436 SR-22 Phase 2	CPT-08-006
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-6a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-006
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 23.95013

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	162.45	0.77	0.48	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	76.38	0.63	0.82	0.09	sand to silty sand	>90	>48	18	UNDEFINED
0.95	3	63.52	1.49	2.35	0.15	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
1.25	4	113.90	2.86	2.51	0.22	silty sand to sandy silt	>90	46-48	36	UNDEFINED
1.55	5	115.30	2.51	2.17	0.28	silty sand to sandy silt	80-90	46-48	37	UNDEFINED
1.85	6	84.43	2.76	3.27	0.33	sandy silt to clayey silt	UNDFND	UNDFD	32	5.6
2.15	7	63.54	2.01	3.17	0.39	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
2.45	8	54.73	2.06	3.76	0.45	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
2.75	9	70.87	2.42	3.42	0.51	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
3.05	10	73.38	2.72	3.70	0.57	clayey silt to silty clay	UNDFND	UNDFD	35	4.8
3.35	11	54.98	1.90	3.46	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	56.38	1.52	2.69	0.69	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
3.95	13	53.42	2.17	4.07	0.75	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
4.25	14	63.43	2.72	4.28	0.81	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
4.55	15	73.86	2.10	2.84	0.87	sandy silt to clayey silt	UNDFND	UNDFD	28	4.8
4.85	16	62.42	2.22	3.56	0.93	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
5.15	17	65.35	2.18	3.34	0.98	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
5.45	18	42.04	1.86	4.43	1.04	silty clay to clay	UNDFND	UNDFD	27	2.7
5.75	19	31.71	1.28	4.04	1.10	silty clay to clay	UNDFND	UNDFD	20	2.0
6.05	20	48.78	1.96	4.01	1.16	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
6.40	21	104.43	2.40	2.30	1.23	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
6.70	22	79.82	3.00	3.76	1.29	clayey silt to silty clay	UNDFND	UNDFD	38	5.2
7.00	23	42.95	2.00	4.65	1.35	silty clay to clay	UNDFND	UNDFD	27	2.7
7.35	24	23.52	0.94	3.99	1.41	silty clay to clay	UNDFND	UNDFD	15	1.4
7.65	25	14.30	0.67	4.67	1.46	clay	UNDFND	UNDFD	14	.8
7.95	26	14.61	0.79	5.38	1.48	clay	UNDFND	UNDFD	14	.8
8.25	27	28.39	0.61	2.15	1.51	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
8.55	28	13.67	0.46	3.40	1.54	silty clay to clay	UNDFND	UNDFD	9	.8
8.85	29	13.23	0.54	4.12	1.57	clay	UNDFND	UNDFD	13	.7
9.15	30	10.79	0.47	4.38	1.60	clay	UNDFND	UNDFD	10	.6
9.45	31	10.52	0.39	3.68	1.63	clay	UNDFND	UNDFD	10	.5
9.75	32	13.07	0.41	3.11	1.65	silty clay to clay	UNDFND	UNDFD	8	.7
10.05	33	12.31	0.40	3.24	1.68	silty clay to clay	UNDFND	UNDFD	8	.6
10.35	34	14.68	0.41	2.81	1.71	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.65	35	13.72	0.40	2.95	1.74	silty clay to clay	UNDFND	UNDFD	9	.7
10.95	36	14.96	0.45	3.03	1.77	silty clay to clay	UNDFND	UNDFD	10	.8
11.25	37	16.01	0.53	3.31	1.80	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	11.83	0.26	2.20	1.82	clayey silt to silty clay	UNDFND	UNDFD	6	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.63	0.45	2.55	1.85	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	22.52	0.77	3.43	1.88	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	27.99	1.43	5.13	1.91	clay	UNDFND	UNDFD	27	1.7
12.80	42	29.48	0.96	3.27	1.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	17.73	0.83	4.67	1.97	clay	UNDFND	UNDFD	17	1.0
13.40	44	24.24	1.32	5.42	2.00	clay	UNDFND	UNDFD	23	1.4
13.75	45	55.41	1.62	2.93	2.03	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.05	46	64.79	1.58	2.43	2.06	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
14.35	47	29.69	1.21	4.07	2.09	silty clay to clay	UNDFND	UNDFD	19	1.7
14.65	48	32.38	1.44	4.44	2.12	silty clay to clay	UNDFND	UNDFD	21	1.9
14.95	49	52.70	1.67	3.17	2.14	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
15.25	50	32.61	1.01	3.10	2.17	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
15.55	51	22.71	0.93	4.11	2.20	silty clay to clay	UNDFND	UNDFD	15	1.3
15.85	52	47.86	2.26	4.73	2.23	silty clay to clay	UNDFND	UNDFD	31	2.9
16.15	53	47.63	2.28	4.79	2.26	silty clay to clay	UNDFND	UNDFD	30	2.9
16.45	54	18.02	0.82	4.52	2.29	clay	UNDFND	UNDFD	17	.9
16.75	55	21.24	1.11	5.21	2.31	clay	UNDFND	UNDFD	20	1.1
17.05	56	120.80	3.63	3.01	2.34	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8
17.35	57	195.95	4.16	2.12	2.37	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
17.65	58	227.67	4.46	1.96	2.40	sand to silty sand	70-80	40-42	>50	UNDEFINED
17.95	59	242.58	3.71	1.53	2.43	sand to silty sand	70-80	40-42	>50	UNDEFINED
18.25	60	144.72	2.54	1.75	2.46	sand to silty sand	60-70	38-40	35	UNDEFINED
18.55	61	32.52	1.34	4.12	2.48	silty clay to clay	UNDFND	UNDFD	21	1.9
18.85	62	92.90	2.38	2.56	2.51	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
19.20	63	94.62	2.15	2.27	2.54	silty sand to sandy silt	50-60	36-38	30	UNDEFINED
19.50	64	82.54	2.00	2.42	2.57	sandy silt to clayey silt	UNDFND	UNDFD	32	5.2
19.80	65	126.10	2.42	1.92	2.60	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.15	66	104.68	2.48	2.37	2.63	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.45	67	35.75	1.52	4.24	2.66	silty clay to clay	UNDFND	UNDFD	23	2.1
20.75	68	29.61	1.56	5.27	2.69	clay	UNDFND	UNDFD	28	1.7
21.05	69	19.51	0.76	3.91	2.72	silty clay to clay	UNDFND	UNDFD	12	1.0
21.35	70	51.59	2.44	4.73	2.75	silty clay to clay	UNDFND	UNDFD	33	3.1
21.65	71	183.98	4.92	2.67	2.78	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	284.59	4.66	1.64	2.81	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.25	73	178.65	2.05	1.15	2.83	sand to silty sand	60-70	38-40	43	UNDEFINED
22.55	74	37.16	1.16	3.11	2.86	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
22.85	75	32.94	1.51	4.59	2.89	silty clay to clay	UNDFND	UNDFD	21	1.8
23.15	76	30.33	1.31	4.33	2.92	silty clay to clay	UNDFND	UNDFD	19	1.7
23.45	77	40.64	2.27	5.57	2.95	clay	UNDFND	UNDFD	39	2.4
23.75	78	49.14	2.50	5.08	2.98	clay	UNDFND	UNDFD	47	2.9
24.05	79	58.91	2.43	4.12	3.00	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
24.35	80	46.35	2.11	4.55	3.03	silty clay to clay	UNDFND	UNDFD	30	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	43.88	2.01	4.57	3.06	silty clay to clay	UNDFND	UNDFD	28	2.6
24.95	82	49.09	2.41	4.90	3.09	silty clay to clay	UNDFND	UNDFD	31	2.9
25.25	83	41.14	2.00	4.87	3.12	silty clay to clay	UNDFND	UNDFD	26	2.4
25.60	84	45.40	2.28	5.01	3.15	clay	UNDFND	UNDFD	43	2.6
25.90	85	35.27	1.95	5.52	3.18	clay	UNDFND	UNDFD	34	2.0
26.20	86	29.36	1.41	4.82	3.21	clay	UNDFND	UNDFD	28	1.6
26.55	87	27.94	1.59	5.70	3.24	clay	UNDFND	UNDFD	27	1.5
26.85	88	36.55	2.29	6.28	3.27	clay	UNDFND	UNDFD	35	2.0
27.15	89	144.06	2.95	2.05	3.30	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
27.45	90	276.73	2.43	0.88	3.32	sand	70-80	40-42	>50	UNDEFINED
27.75	91	155.74	5.46	3.51	3.35	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.0
28.05	92	162.70	4.92	3.03	3.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	224.38	5.18	2.31	3.41	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
28.65	94	156.75	5.65	3.60	3.44	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
28.95	95	316.45	7.30	2.31	3.47	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
29.25	96	221.44	5.16	2.33	3.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
29.55	97	292.69	6.53	2.23	3.52	sand to silty sand	70-80	40-42	>50	UNDEFINED
29.85	98	304.81	7.81	2.56	3.55	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
30.15	99	185.34	5.18	2.80	3.58	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	172.86	4.09	2.37	3.61	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.75	101	72.03	2.46	3.42	3.64	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
31.05	102	45.82	1.71	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
31.35	103	145.21	2.81	1.93	3.69	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
31.65	104	129.56	3.25	2.51	3.72	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
32.00	105	106.14	3.35	3.16	3.75	sandy silt to clayey silt	UNDFND	UNDFD	41	6.6
32.30	106	33.99	1.49	4.39	3.78	silty clay to clay	UNDFND	UNDFD	22	1.8
32.60	107	27.13	1.05	3.88	3.81	silty clay to clay	UNDFND	UNDFD	17	1.3
32.95	108	24.39	0.93	3.79	3.84	silty clay to clay	UNDFND	UNDFD	16	1.1
33.25	109	24.87	0.93	3.75	3.87	silty clay to clay	UNDFND	UNDFD	16	1.2
33.55	110	27.90	1.14	4.09	3.90	silty clay to clay	UNDFND	UNDFD	18	1.4
33.85	111	31.44	0.89	2.82	3.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
34.15	112	40.50	1.37	3.38	3.96	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
34.45	113	149.32	3.39	2.27	3.99	silty sand to sandy silt	50-60	36-38	48	UNDEFINED
34.75	114	195.25	4.02	2.06	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	184.39	3.78	2.05	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.35	116	178.86	3.01	1.68	4.07	sand to silty sand	60-70	36-38	43	UNDEFINED
35.65	117	166.93	4.09	2.45	4.10	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	293.52	6.35	2.16	4.13	sand to silty sand	70-80	38-40	>50	UNDEFINED
36.25	119	203.09	2.92	1.44	4.16	sand to silty sand	60-70	36-38	49	UNDEFINED
36.55	120	89.66	2.95	3.29	4.18	sandy silt to clayey silt	UNDFND	UNDFD	34	5.5
36.85	121	284.22	2.34	0.82	4.21	sand	70-80	38-40	>50	UNDEFINED
37.15	122	36.08	1.23	3.42	4.24	clayey silt to silty clay	UNDFND	UNDFD	17	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6d

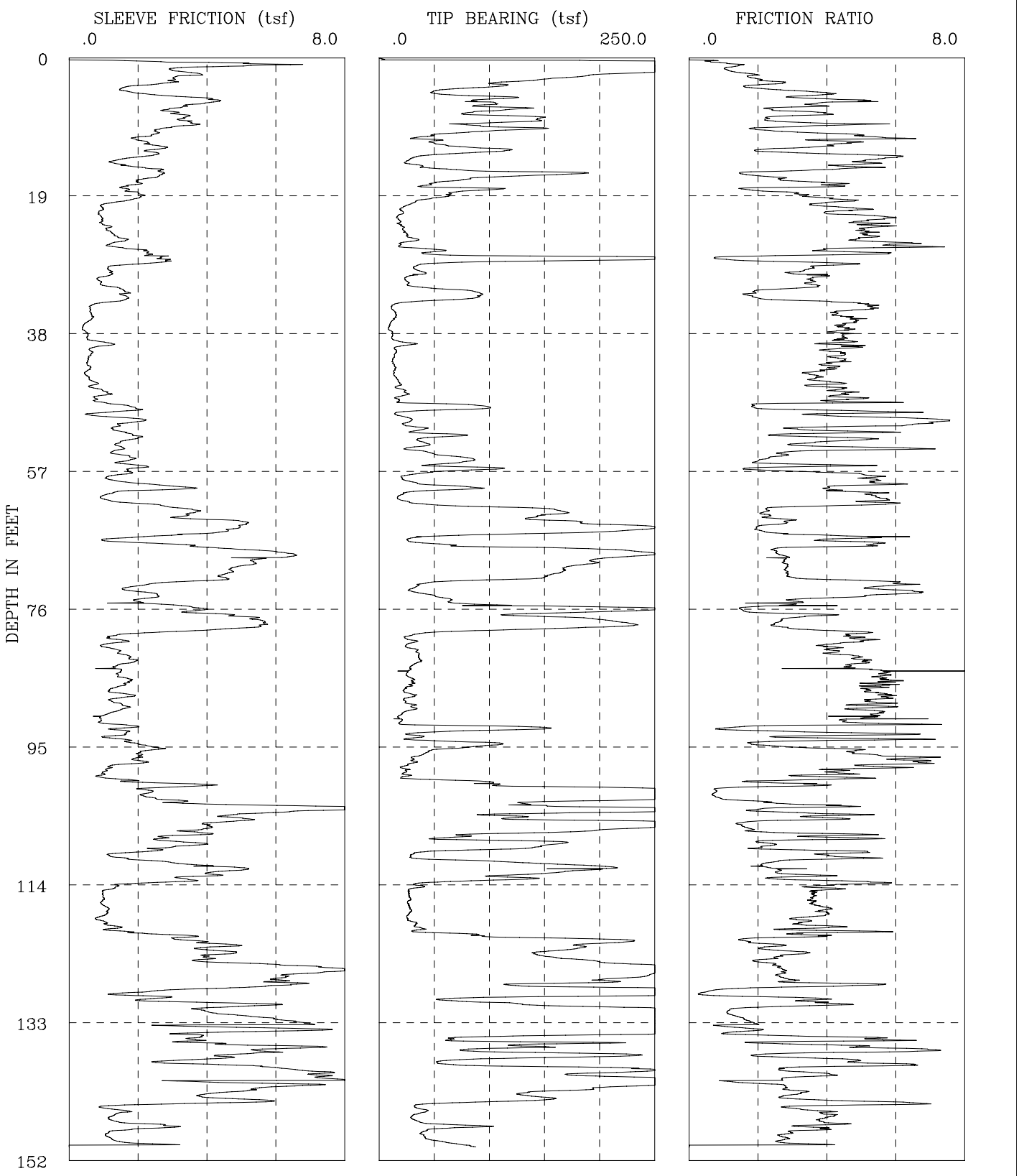
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	101.45	3.10	3.05	4.27	sandy silt to clayey silt	UNDFND	UNDFD	39	6.2
37.75	124	194.66	3.85	1.98	4.30	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.05	125	83.68	4.24	5.07	4.33	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	220.43	4.73	2.14	4.36	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.70	127	46.37	1.29	2.78	4.39	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
39.00	128	205.41	4.99	2.43	4.42	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.35	129	242.22	5.49	2.27	4.45	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
39.65	130	78.54	4.06	5.17	4.48	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	98.93	3.91	3.96	4.50	clayey silt to silty clay	UNDFND	UNDFD	47	6.0
40.25	132	241.09	5.40	2.24	4.53	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
40.55	133	283.46	6.92	2.44	4.56	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.85	134	243.92	6.92	2.84	4.59	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
41.15	135	99.59	2.95	2.96	4.62	sandy silt to clayey silt	UNDFND	UNDFD	38	6.1
41.45	136	48.78	1.29	2.65	4.65	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
41.75	137	46.78	1.61	3.44	4.67	clayey silt to silty clay	UNDFND	UNDFD	22	2.5
42.05	138	37.42	1.22	3.27	4.70	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
42.35	139	41.42	1.36	3.29	4.73	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
42.65	140	56.91	1.74	3.07	4.76	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2
42.95	141	53.32	1.97	3.70	4.79	clayey silt to silty clay	UNDFND	UNDFD	26	2.9
43.25	142	121.91	5.49	4.51	4.82	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	62.84	3.38	5.37	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.85	144	44.82	1.97	4.39	4.87	silty clay to clay	UNDFND	UNDFD	29	2.4
44.15	145	47.98	1.57	3.26	4.90	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
44.45	146	39.48	1.21	3.06	4.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.0
44.80	147	42.47	1.55	3.65	4.96	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
45.10	148	49.22	1.82	3.70	4.99	clayey silt to silty clay	UNDFND	UNDFD	24	2.6
45.40	149	61.08	2.67	4.37	5.02	clayey silt to silty clay	UNDFND	UNDFD	29	3.4
45.75	150	144.76	2.88	1.99	5.05	silty sand to sandy silt	50-60	34-36	46	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-6e



I-436 Sr-22 Phase 2	CPT-08-008
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-7a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-008
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/01/2008
Cone Used : 30 ton
Water table (feet) : 30.83989

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	317.32	3.23	1.02	0.03	sand	>90	UNDFD	>50	UNDEFINED
0.60	2	284.69	3.39	1.19	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	174.65	3.27	1.87	0.15	sand to silty sand	>90	>48	42	UNDEFINED
1.25	4	106.28	2.30	2.16	0.22	silty sand to sandy silt	>90	46-48	34	UNDEFINED
1.55	5	55.47	1.86	3.36	0.28	clayey silt to silty clay	UNDFND	UNDFD	27	3.6
1.85	6	102.04	3.91	3.83	0.33	clayey silt to silty clay	UNDFND	UNDFD	49	6.7
2.15	7	109.15	3.36	3.08	0.39	sandy silt to clayey silt	UNDFND	UNDFD	42	7.2
2.45	8	97.11	3.13	3.22	0.45	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
2.75	9	129.81	3.40	2.62	0.51	silty sand to sandy silt	80-90	44-46	41	UNDEFINED
3.05	10	111.34	2.96	2.66	0.57	sandy silt to clayey silt	UNDFND	UNDFD	43	7.3
3.35	11	55.24	2.33	4.22	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	49.76	2.17	4.35	0.69	silty clay to clay	UNDFND	UNDFD	32	3.2
3.95	13	96.84	2.55	2.63	0.75	sandy silt to clayey silt	UNDFND	UNDFD	37	6.4
4.25	14	43.32	2.14	4.94	0.81	clay	UNDFND	UNDFD	41	2.8
4.55	15	29.77	1.42	4.78	0.87	clay	UNDFND	UNDFD	29	1.9
4.85	16	103.20	2.55	2.47	0.93	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.15	17	104.66	2.36	2.26	0.98	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
5.45	18	50.64	1.80	3.55	1.04	clayey silt to silty clay	UNDFND	UNDFD	24	3.3
5.75	19	79.14	1.87	2.36	1.10	sandy silt to clayey silt	UNDFND	UNDFD	30	5.2
6.05	20	45.48	1.82	4.00	1.16	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.40	21	23.42	0.99	4.22	1.23	silty clay to clay	UNDFND	UNDFD	15	1.4
6.70	22	19.08	0.89	4.66	1.29	clay	UNDFND	UNDFD	18	1.1
7.00	23	18.32	0.95	5.20	1.35	clay	UNDFND	UNDFD	18	1.1
7.35	24	22.28	1.16	5.19	1.41	clay	UNDFND	UNDFD	21	1.3
7.65	25	29.23	1.46	5.01	1.48	clay	UNDFND	UNDFD	28	1.8
7.95	26	21.33	1.29	6.07	1.54	clay	UNDFND	UNDFD	20	1.3
8.25	27	47.64	2.14	4.50	1.59	silty clay to clay	UNDFND	UNDFD	30	3.0
8.55	28	221.16	2.65	1.20	1.65	sand	80-90	42-44	42	UNDEFINED
8.85	29	39.56	1.59	4.02	1.71	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.15	30	35.53	1.19	3.36	1.77	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
9.45	31	24.82	0.88	3.55	1.83	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
9.75	32	42.57	1.26	2.95	1.87	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.05	33	90.03	1.63	1.81	1.90	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
10.35	34	42.78	1.27	2.96	1.93	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
10.65	35	12.07	0.61	5.04	1.95	clay	UNDFND	UNDFD	12	.6
10.95	36	14.80	0.66	4.43	1.98	clay	UNDFND	UNDFD	14	.8
11.25	37	10.69	0.50	4.69	2.01	clay	UNDFND	UNDFD	10	.5
11.55	38	9.83	0.44	4.44	2.04	clay	UNDFND	UNDFD	9	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	12.25	0.54	4.44	2.07	clay	UNDFND	UNDFD	12	.6
12.15	40	22.75	1.01	4.45	2.10	clay	UNDFND	UNDFD	22	1.3
12.45	41	14.68	0.63	4.27	2.12	clay	UNDFND	UNDFD	14	.8
12.80	42	12.86	0.56	4.32	2.15	clay	UNDFND	UNDFD	12	.6
13.10	43	14.12	0.58	4.09	2.19	clay	UNDFND	UNDFD	14	.7
13.40	44	13.63	0.50	3.65	2.21	silty clay to clay	UNDFND	UNDFD	9	.7
13.75	45	17.72	0.69	3.89	2.24	silty clay to clay	UNDFND	UNDFD	11	1.0
14.05	46	19.72	0.86	4.35	2.27	clay	UNDFND	UNDFD	19	1.1
14.35	47	20.11	0.91	4.52	2.30	clay	UNDFND	UNDFD	19	1.1
14.65	48	55.24	1.26	2.28	2.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.4
14.95	49	48.93	1.49	3.04	2.36	sandy silt to clayey silt	UNDFND	UNDFD	19	3.0
15.25	50	24.62	1.53	6.20	2.39	clay	UNDFND	UNDFD	24	1.4
15.55	51	28.65	1.48	5.15	2.42	clay	UNDFND	UNDFD	27	1.7
15.85	52	46.69	1.58	3.39	2.44	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
16.15	53	42.68	1.80	4.21	2.47	silty clay to clay	UNDFND	UNDFD	27	2.6
16.45	54	35.11	1.46	4.17	2.50	silty clay to clay	UNDFND	UNDFD	22	2.1
16.75	55	51.15	1.43	2.79	2.53	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
17.05	56	77.09	1.67	2.16	2.56	silty sand to sandy silt	40-50	34-36	25	UNDEFINED
17.35	57	75.95	1.93	2.54	2.59	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
17.65	58	29.92	1.41	4.70	2.61	clay	UNDFND	UNDFD	29	1.7
17.95	59	33.00	1.79	5.42	2.64	clay	UNDFND	UNDFD	32	1.9
18.25	60	62.66	2.61	4.16	2.67	clayey silt to silty clay	UNDFND	UNDFD	30	3.9
18.55	61	18.58	1.01	5.45	2.70	clay	UNDFND	UNDFD	18	.9
18.85	62	45.21	2.05	4.54	2.73	silty clay to clay	UNDFND	UNDFD	29	2.7
19.20	63	158.20	3.51	2.22	2.76	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
19.50	64	152.38	4.01	2.63	2.79	silty sand to sandy silt	60-70	38-40	49	UNDEFINED
19.80	65	229.45	4.96	2.16	2.82	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
20.15	66	126.43	3.42	2.71	2.85	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.45	67	37.10	1.83	4.94	2.88	clay	UNDFND	UNDFD	36	2.2
20.75	68	171.97	4.77	2.77	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.05	69	229.56	6.06	2.64	2.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
21.35	70	188.98	5.27	2.79	2.96	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.65	71	166.90	4.70	2.81	2.99	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	136.64	4.43	3.25	3.02	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
22.25	73	39.86	2.33	5.84	3.05	clay	UNDFND	UNDFD	38	2.3
22.55	74	34.00	2.05	6.03	3.08	clay	UNDFND	UNDFD	33	1.9
22.85	75	59.66	2.21	3.71	3.11	clayey silt to silty clay	UNDFND	UNDFD	29	3.6
23.15	76	160.88	3.05	1.89	3.13	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.45	77	169.77	4.07	2.40	3.16	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
23.75	78	203.90	5.53	2.71	3.19	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
24.05	79	181.16	5.03	2.77	3.22	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
24.35	80	36.69	1.77	4.82	3.25	clay	UNDFND	UNDFD	35	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	28.63	1.36	4.73	3.28	clay	UNDFND	UNDFD	27	1.5
24.95	82	29.79	1.24	4.16	3.30	silty clay to clay	UNDFND	UNDFD	19	1.6
25.25	83	36.03	1.65	4.58	3.33	silty clay to clay	UNDFND	UNDFD	23	2.0
25.60	84	32.99	1.63	4.93	3.36	clay	UNDFND	UNDFD	32	1.8
25.90	85	26.08	1.38	5.31	3.39	clay	UNDFND	UNDFD	25	1.4
26.20	86	28.70	1.63	5.66	3.42	clay	UNDFND	UNDFD	27	1.5
26.55	87	26.79	1.45	5.41	3.45	clay	UNDFND	UNDFD	26	1.4
26.85	88	27.43	1.55	5.64	3.48	clay	UNDFND	UNDFD	26	1.4
27.15	89	24.58	1.33	5.41	3.51	clay	UNDFND	UNDFD	24	1.2
27.45	90	30.17	1.56	5.19	3.54	clay	UNDFND	UNDFD	29	1.6
27.75	91	19.23	1.02	5.32	3.57	clay	UNDFND	UNDFD	18	.9
28.05	92	29.02	1.14	3.94	3.60	silty clay to clay	UNDFND	UNDFD	19	1.5
28.35	93	105.53	1.62	1.54	3.62	sand to silty sand	40-50	34-36	25	UNDEFINED
28.65	94	30.76	1.39	4.51	3.65	silty clay to clay	UNDFND	UNDFD	20	1.6
28.95	95	91.03	2.02	2.22	3.68	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
29.25	96	49.59	2.27	4.58	3.71	silty clay to clay	UNDFND	UNDFD	32	2.9
29.55	97	32.21	2.01	6.24	3.74	clay	UNDFND	UNDFD	31	1.7
29.85	98	25.46	1.50	5.87	3.77	clay	UNDFND	UNDFD	24	1.3
30.15	99	24.99	1.00	3.98	3.79	silty clay to clay	UNDFND	UNDFD	16	1.2
30.45	100	57.94	1.52	2.63	3.82	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
30.75	101	182.64	3.08	1.69	3.85	sand to silty sand	60-70	36-38	44	UNDEFINED
31.05	102	304.83	2.25	0.74	3.88	sand	70-80	38-40	>50	UNDEFINED
31.35	103	191.91	3.15	1.64	3.91	sand to silty sand	60-70	36-38	46	UNDEFINED
31.65	104	309.81	7.76	2.51	3.94	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
32.00	105	132.49	5.06	3.82	3.97	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
32.30	106	261.51	4.25	1.63	4.00	sand to silty sand	70-80	38-40	>50	UNDEFINED
32.60	107	180.06	3.81	2.11	4.03	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
32.95	108	92.84	2.93	3.15	4.06	sandy silt to clayey silt	UNDFND	UNDFD	36	5.7
33.25	109	143.35	3.24	2.26	4.09	silty sand to sandy silt	50-60	34-36	46	UNDEFINED
33.55	110	37.99	1.65	4.34	4.12	silty clay to clay	UNDFND	UNDFD	24	2.0
33.85	111	84.92	2.33	2.75	4.14	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
34.15	112	195.34	4.57	2.34	4.17	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	134.08	3.88	2.90	4.20	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.4
34.75	114	68.75	2.67	3.89	4.23	clayey silt to silty clay	UNDFND	UNDFD	33	4.1
35.05	115	31.48	1.18	3.75	4.26	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
35.35	116	27.43	0.99	3.61	4.29	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.65	117	26.74	0.97	3.62	4.31	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
35.95	118	28.14	1.12	3.98	4.34	silty clay to clay	UNDFND	UNDFD	18	1.4
36.25	119	25.84	0.90	3.47	4.37	clayey silt to silty clay	UNDFND	UNDFD	12	1.2
36.55	120	33.59	1.22	3.65	4.40	clayey silt to silty clay	UNDFND	UNDFD	16	1.7
36.85	121	53.41	1.86	3.48	4.43	clayey silt to silty clay	UNDFND	UNDFD	26	3.0
37.15	122	177.85	3.50	1.97	4.46	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-7d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	184.03	4.24	2.31	4.48	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.75	124	147.66	4.37	2.96	4.51	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.3
38.05	125	188.81	4.20	2.22	4.54	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.40	126	279.50	7.41	2.65	4.57	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
38.70	127	236.16	6.36	2.69	4.60	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.00	128	165.57	6.23	3.76	4.63	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
39.35	129	372.47	2.81	0.75	4.66	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
39.65	130	109.59	2.43	2.22	4.69	silty sand to sandy silt	40-50	32-34	35	UNDEFINED
39.95	131	181.83	4.81	2.64	4.72	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
40.25	132	367.72	4.34	1.18	4.75	sand	80-90	38-40	>50	UNDEFINED
40.55	133	372.43	6.20	1.66	4.78	sand to silty sand	80-90	38-40	>50	UNDEFINED
40.85	134	356.93	5.62	1.58	4.80	sand to silty sand	80-90	38-40	>50	UNDEFINED
41.15	135	235.11	4.02	1.71	4.83	sand to silty sand	60-70	36-38	>50	UNDEFINED
41.45	136	115.16	3.79	3.29	4.86	sandy silt to clayey silt	UNDFND	UNDFD	44	7.1
41.75	137	106.79	6.18	5.79	4.89	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.05	138	181.15	4.74	2.61	4.92	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.35	139	65.23	3.56	5.45	4.95	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
42.65	140	225.04	6.72	2.99	4.97	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
42.95	141	235.00	7.51	3.20	5.00	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
43.25	142	267.68	5.61	2.10	5.03	sand to silty sand	70-80	36-38	>50	UNDEFINED
43.55	143	155.70	4.77	3.06	5.06	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.8
43.85	144	140.77	4.76	3.38	5.09	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
44.15	145	41.24	2.02	4.89	5.12	clay	UNDFND	UNDFD	40	2.1
44.45	146	37.43	1.46	3.90	5.14	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
44.80	147	36.25	1.47	4.06	5.18	silty clay to clay	UNDFND	UNDFD	23	1.8
45.10	148	65.19	2.24	3.44	5.21	clayey silt to silty clay	UNDFND	UNDFD	31	3.7
45.40	149	40.22	1.12	2.78	5.23	sandy silt to clayey silt	UNDFND	UNDFD	15	2.0
45.75	150	66.48	1.28	1.93	5.27	silty sand to sandy silt	<40	<30	21	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

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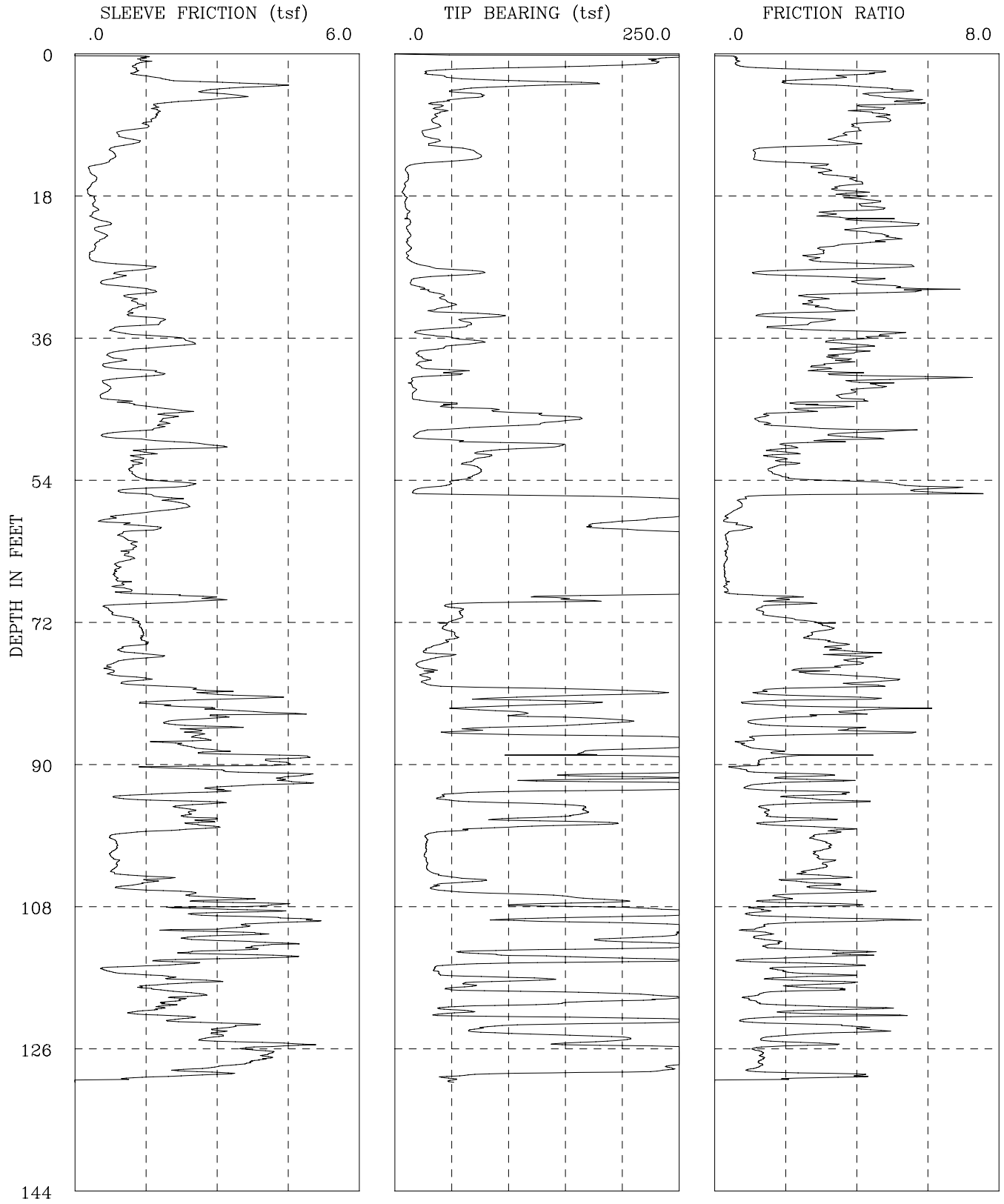
Figure A-7e



CPT-08-013	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-8a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-013
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	221.69	1.21	0.54	0.03	sand	>90	>48	42	UNDEFINED
0.60	2	152.50	1.28	0.84	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	37.31	1.44	3.86	0.15	clayey silt to silty clay	UNDFND	UNDFD	18	2.4
1.25	4	131.37	3.31	2.52	0.22	silty sand to sandy silt	>90	>48	42	UNDEFINED
1.55	5	62.35	2.98	4.78	0.28	silty clay to clay	UNDFND	UNDFD	40	4.1
1.85	6	60.18	3.00	4.98	0.33	silty clay to clay	UNDFND	UNDFD	38	3.9
2.15	7	36.81	1.72	4.67	0.39	silty clay to clay	UNDFND	UNDFD	24	2.4
2.45	8	38.49	1.74	4.51	0.45	silty clay to clay	UNDFND	UNDFD	25	2.5
2.75	9	34.86	1.55	4.44	0.51	silty clay to clay	UNDFND	UNDFD	22	2.2
3.05	10	30.49	1.20	3.93	0.57	silty clay to clay	UNDFND	UNDFD	19	1.9
3.35	11	32.88	1.11	3.38	0.61	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
3.65	12	39.30	0.98	2.48	0.64	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
3.95	13	73.07	0.83	1.13	0.67	silty sand to sandy silt	60-70	40-42	23	UNDEFINED
4.25	14	51.62	0.72	1.39	0.69	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.55	15	10.53	0.32	3.02	0.72	silty clay to clay	UNDFND	UNDFD	7	.6
4.85	16	11.70	0.41	3.51	0.75	silty clay to clay	UNDFND	UNDFD	7	.7
5.15	17	9.41	0.36	3.84	0.78	clay	UNDFND	UNDFD	9	.5
5.45	18	7.53	0.28	3.69	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	9.60	0.41	4.24	0.84	clay	UNDFND	UNDFD	9	.5
6.05	20	10.03	0.43	4.30	0.86	clay	UNDFND	UNDFD	10	.5
6.40	21	11.42	0.39	3.41	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	12.43	0.64	5.13	0.93	clay	UNDFND	UNDFD	12	.7
7.00	23	12.24	0.53	4.32	0.95	clay	UNDFND	UNDFD	12	.7
7.35	24	11.49	0.53	4.62	0.98	clay	UNDFND	UNDFD	11	.6
7.65	25	13.00	0.40	3.09	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	11.21	0.31	2.79	1.04	silty clay to clay	UNDFND	UNDFD	7	.6
8.25	27	22.68	1.08	4.78	1.07	clay	UNDFND	UNDFD	22	1.4
8.55	28	63.75	1.09	1.71	1.10	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
8.85	29	18.14	0.71	3.90	1.13	silty clay to clay	UNDFND	UNDFD	12	1.0
9.15	30	23.23	1.25	5.37	1.16	clay	UNDFND	UNDFD	22	1.4
9.45	31	39.65	1.28	3.22	1.19	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
9.75	32	48.68	1.32	2.71	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	49.00	1.19	2.43	1.24	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.35	34	72.45	1.65	2.28	1.27	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
10.65	35	54.74	1.20	2.19	1.30	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
10.95	36	29.90	1.37	4.59	1.33	silty clay to clay	UNDFND	UNDFD	19	1.8
11.25	37	65.90	2.40	3.64	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.2
11.55	38	31.44	1.21	3.86	1.38	clayey silt to silty clay	UNDFND	UNDFD	15	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	24.01	0.84	3.48	1.41	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
12.15	40	22.03	0.70	3.20	1.44	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	47.99	1.67	3.49	1.47	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
12.80	42	14.78	0.73	4.92	1.50	clay	UNDFND	UNDFD	14	.8
13.10	43	17.07	0.70	4.10	1.53	clay	UNDFND	UNDFD	16	.9
13.40	44	18.06	0.70	3.86	1.56	silty clay to clay	UNDFND	UNDFD	12	1.0
13.75	45	58.87	1.54	2.62	1.59	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.05	46	128.95	2.08	1.61	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	135.90	1.84	1.36	1.65	sand to silty sand	60-70	40-42	33	UNDEFINED
14.65	48	40.11	1.35	3.36	1.68	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.95	49	30.92	1.08	3.50	1.70	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
15.25	50	126.49	2.68	2.12	1.73	silty sand to sandy silt	60-70	38-40	40	UNDEFINED
15.55	51	79.67	1.40	1.76	1.76	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
15.85	52	66.65	1.33	2.00	1.79	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
16.15	53	74.04	1.18	1.60	1.82	silty sand to sandy silt	40-50	36-38	24	UNDEFINED
16.45	54	65.99	1.35	2.05	1.85	silty sand to sandy silt	40-50	34-36	21	UNDEFINED
16.75	55	42.30	2.20	5.20	1.87	clay	UNDFND	UNDFD	41	2.6
17.05	56	42.41	1.22	2.88	1.90	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
17.35	57	270.93	2.05	0.76	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	322.94	2.17	0.67	1.96	sand	>90	42-44	>50	UNDEFINED
17.95	59	271.44	1.00	0.37	1.99	gravelly sand to sand	80-90	42-44	43	UNDEFINED
18.25	60	184.07	1.06	0.57	2.02	sand	70-80	40-42	35	UNDEFINED
18.55	61	240.92	1.31	0.54	2.04	sand	80-90	40-42	46	UNDEFINED
18.85	62	335.61	1.11	0.33	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	343.25	1.19	0.35	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	347.37	1.14	0.33	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	325.24	0.93	0.29	2.16	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.15	66	308.74	0.85	0.27	2.19	gravelly sand to sand	80-90	42-44	49	UNDEFINED
20.45	67	294.69	0.94	0.32	2.22	gravelly sand to sand	80-90	42-44	47	UNDEFINED
20.75	68	312.45	1.05	0.33	2.25	gravelly sand to sand	80-90	42-44	50	UNDEFINED
21.05	69	193.92	2.23	1.15	2.28	sand	70-80	40-42	37	UNDEFINED
21.35	70	85.13	1.54	1.81	2.31	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
21.65	71	57.93	0.75	1.30	2.34	silty sand to sandy silt	<40	32-34	18	UNDEFINED
21.95	72	54.08	1.20	2.22	2.37	sandy silt to clayey silt	UNDFND	UNDFD	21	3.3
22.25	73	43.96	1.39	3.15	2.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.6
22.55	74	53.03	1.43	2.69	2.42	sandy silt to clayey silt	UNDFND	UNDFD	20	3.2
22.85	75	42.52	1.42	3.33	2.45	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
23.15	76	29.27	1.07	3.65	2.48	clayey silt to silty clay	UNDFND	UNDFD	14	1.6
23.45	77	36.28	1.39	3.83	2.51	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
23.75	78	22.25	0.73	3.27	2.54	clayey silt to silty clay	UNDFND	UNDFD	11	1.1
24.05	79	28.59	0.88	3.07	2.56	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.35	80	27.66	1.25	4.53	2.59	clay	UNDFND	UNDFD	26	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-8c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	151.28	2.53	1.67	2.62	sand to silty sand	60-70	38-40	36	UNDEFINED
24.95	82	135.12	3.32	2.46	2.65	silty sand to sandy silt	60-70	36-38	43	UNDEFINED
25.25	83	122.70	1.99	1.62	2.68	sand to silty sand	50-60	36-38	29	UNDEFINED
25.60	84	105.54	3.53	3.34	2.71	sandy silt to clayey silt	UNDFND	UNDFD	40	6.7
25.90	85	187.58	2.18	1.16	2.74	sand	70-80	38-40	36	UNDEFINED
26.20	86	73.92	2.71	3.66	2.77	clayey silt to silty clay	UNDFND	UNDFD	35	4.5
26.55	87	216.57	2.51	1.16	2.80	sand	70-80	38-40	41	UNDEFINED
26.85	88	253.25	2.43	0.96	2.83	sand	70-80	40-42	49	UNDEFINED
27.15	89	193.09	3.70	1.91	2.86	sand to silty sand	70-80	38-40	46	UNDEFINED
27.45	90	336.49	4.31	1.28	2.88	sand	80-90	40-42	>50	UNDEFINED
27.75	91	329.36	2.78	0.84	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	176.66	4.55	2.57	2.94	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.35	93	316.67	3.81	1.20	2.97	sand	80-90	40-42	>50	UNDEFINED
28.65	94	98.30	2.18	2.22	3.00	silty sand to sandy silt	50-60	34-36	31	UNDEFINED
28.95	95	68.39	1.98	2.90	3.03	sandy silt to clayey silt	UNDFND	UNDFD	26	4.1
29.25	96	165.82	2.33	1.41	3.05	sand to silty sand	60-70	38-40	40	UNDEFINED
29.55	97	135.73	2.55	1.88	3.08	silty sand to sandy silt	50-60	36-38	43	UNDEFINED
29.85	98	150.63	2.73	1.81	3.11	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
30.15	99	46.04	1.57	3.41	3.14	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
30.45	100	27.76	0.81	2.91	3.17	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
30.75	101	27.47	0.87	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.05	102	26.69	0.76	2.86	3.22	clayey silt to silty clay	UNDFND	UNDFD	13	1.3
31.35	103	28.13	0.89	3.16	3.25	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
31.65	104	30.83	0.82	2.65	3.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.00	105	58.65	1.60	2.72	3.31	sandy silt to clayey silt	UNDFND	UNDFD	22	3.4
32.30	106	36.49	1.23	3.38	3.34	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
32.60	107	124.23	2.74	2.21	3.37	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.95	108	165.71	3.35	2.02	3.40	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
33.25	109	266.87	3.17	1.19	3.43	sand	70-80	38-40	>50	UNDEFINED
33.55	110	150.47	4.47	2.97	3.46	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.5
33.85	111	260.23	3.10	1.19	3.49	sand	70-80	38-40	50	UNDEFINED
34.15	112	231.12	3.09	1.34	3.52	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.45	113	233.85	3.79	1.62	3.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
34.75	114	119.93	3.08	2.57	3.57	silty sand to sandy silt	50-60	34-36	38	UNDEFINED
35.05	115	193.54	3.19	1.65	3.60	sand to silty sand	60-70	36-38	46	UNDEFINED
35.35	116	48.11	1.36	2.82	3.63	sandy silt to clayey silt	UNDFND	UNDFD	18	2.7
35.65	117	46.39	1.00	2.17	3.66	sandy silt to clayey silt	UNDFND	UNDFD	18	2.6
35.95	118	92.32	2.29	2.48	3.69	sandy silt to clayey silt	UNDFND	UNDFD	35	5.6
36.25	119	91.47	1.84	2.02	3.72	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
36.55	120	229.01	2.35	1.03	3.74	sand	70-80	38-40	44	UNDEFINED
36.85	121	95.88	1.88	1.96	3.77	silty sand to sandy silt	40-50	32-34	31	UNDEFINED
37.15	122	56.55	1.58	2.80	3.80	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

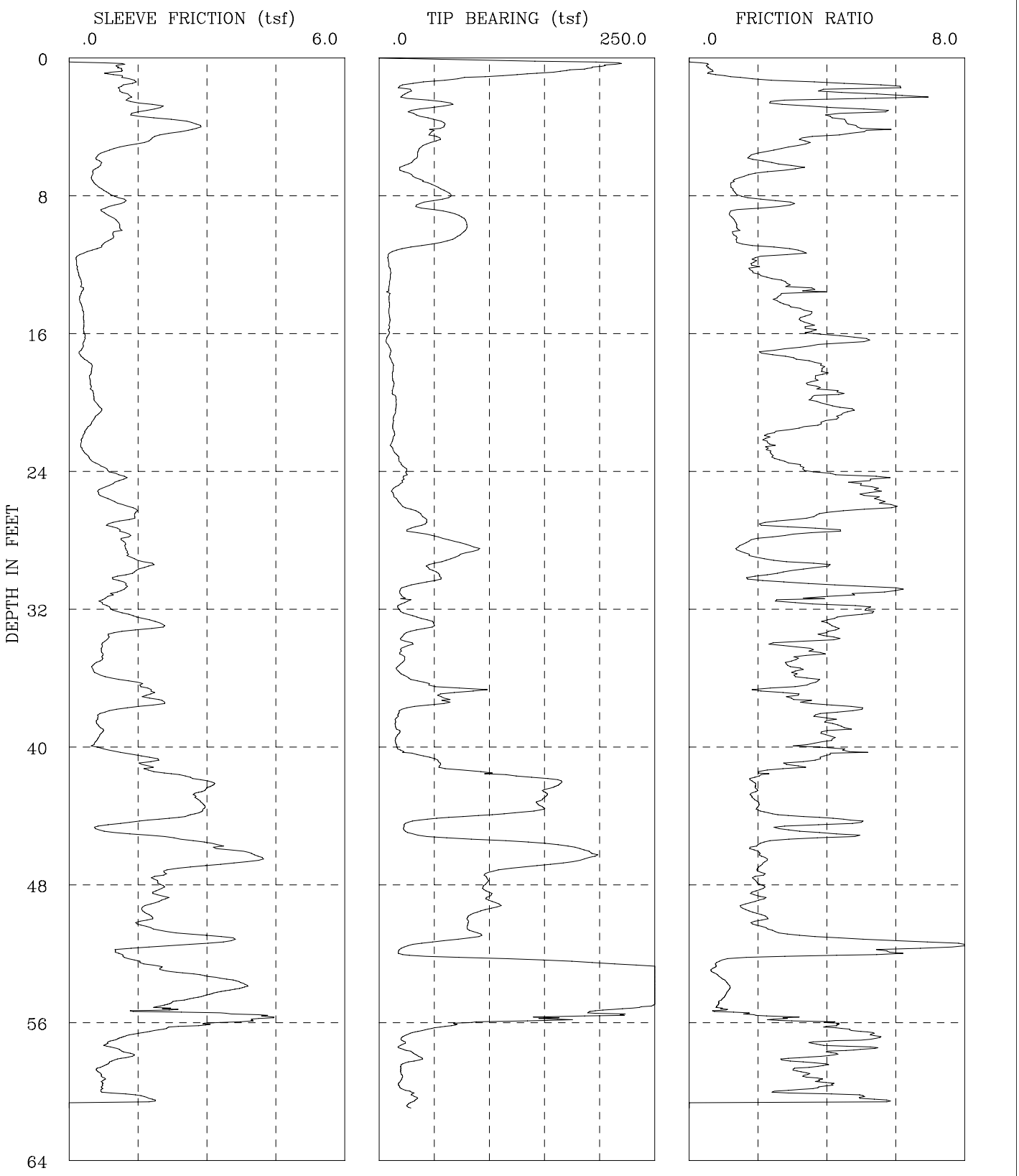
Figure A-8d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	223.82	2.62	1.17	3.83	sand	70-80	38-40	43	UNDEFINED
37.75	124	76.88	3.16	4.11	3.86	clayey silt to silty clay	UNDFND	UNDFD	37	4.6
38.05	125	168.18	2.89	1.72	3.89	sand to silty sand	60-70	36-38	40	UNDEFINED
38.40	126	217.42	3.96	1.82	3.92	sand to silty sand	60-70	38-40	>50	UNDEFINED
38.70	127	313.08	4.04	1.29	3.95	sand	70-80	40-42	>50	UNDEFINED
39.00	128	290.48	3.81	1.31	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	216.19	2.80	1.29	4.01	sand	60-70	38-40	41	UNDEFINED
39.65	130	52.30	1.29	2.48	4.04	sandy silt to clayey silt	UNDFND	UNDFD	20	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-8e



I-436 SR-22 Phase 2	CPT-08-014
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-9a

Engineer : Nava
On Site Loc: CPT-08-014
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/27/2008
Cone Used : 30 ton
Water table (feet) : 9.8

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	168.58	0.88	0.52	0.03	sand	>90	>48	32	UNDEFINED
0.60	2	39.05	1.22	3.14	0.09	clayey silt to silty clay	UNDFND	UNDFD	19	2.5
0.95	3	39.86	1.55	3.89	0.15	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
1.25	4	49.74	2.29	4.61	0.22	silty clay to clay	UNDFND	UNDFD	32	3.3
1.55	5	47.93	1.83	3.81	0.28	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
1.85	6	33.76	0.73	2.16	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.15	7	26.57	0.55	2.06	0.39	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
2.45	8	55.85	0.74	1.33	0.45	silty sand to sandy silt	60-70	40-42	18	UNDEFINED
2.75	9	48.65	0.95	1.95	0.51	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
3.05	10	77.93	1.05	1.35	0.57	silty sand to sandy silt	60-70	42-44	25	UNDEFINED
3.35	11	57.59	0.85	1.47	0.61	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
3.65	12	9.78	0.25	2.51	0.64	silty clay to clay	UNDFND	UNDFD	6	.6
3.95	13	9.94	0.21	2.13	0.67	clayey silt to silty clay	UNDFND	UNDFD	5	.6
4.25	14	8.85	0.26	2.98	0.69	silty clay to clay	UNDFND	UNDFD	6	.5
4.55	15	9.10	0.28	3.09	0.72	silty clay to clay	UNDFND	UNDFD	6	.5
4.85	16	9.33	0.32	3.39	0.75	clay	UNDFND	UNDFD	9	.5
5.15	17	7.99	0.32	3.96	0.78	clay	UNDFND	UNDFD	8	.4
5.45	18	11.10	0.35	3.13	0.81	silty clay to clay	UNDFND	UNDFD	7	.6
5.75	19	12.49	0.47	3.73	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	13.37	0.51	3.82	0.86	silty clay to clay	UNDFND	UNDFD	9	.8
6.40	21	14.44	0.62	4.31	0.89	clay	UNDFND	UNDFD	14	.8
6.70	22	12.95	0.38	2.96	0.93	silty clay to clay	UNDFND	UNDFD	8	.7
7.00	23	12.37	0.29	2.32	0.95	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.35	24	21.10	0.67	3.19	0.98	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
7.65	25	18.30	0.95	5.19	1.02	clay	UNDFND	UNDFD	18	1.1
7.95	26	16.94	0.95	5.60	1.04	clay	UNDFND	UNDFD	16	1.0
8.25	27	38.95	1.27	3.26	1.07	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
8.55	28	44.30	1.16	2.61	1.10	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
8.85	29	78.74	1.27	1.61	1.13	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
9.15	30	50.70	1.53	3.01	1.16	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
9.45	31	33.78	1.13	3.35	1.19	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.75	32	21.10	0.82	3.89	1.21	silty clay to clay	UNDFND	UNDFD	13	1.2
10.05	33	37.77	1.63	4.30	1.24	silty clay to clay	UNDFND	UNDFD	24	2.3
10.35	34	26.68	1.01	3.79	1.27	silty clay to clay	UNDFND	UNDFD	17	1.6
10.65	35	21.80	0.71	3.28	1.30	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
10.95	36	19.61	0.60	3.04	1.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
11.25	37	55.37	1.58	2.85	1.36	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
11.55	38	45.02	1.59	3.53	1.38	clayey silt to silty clay	UNDFND	UNDFD	22	2.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

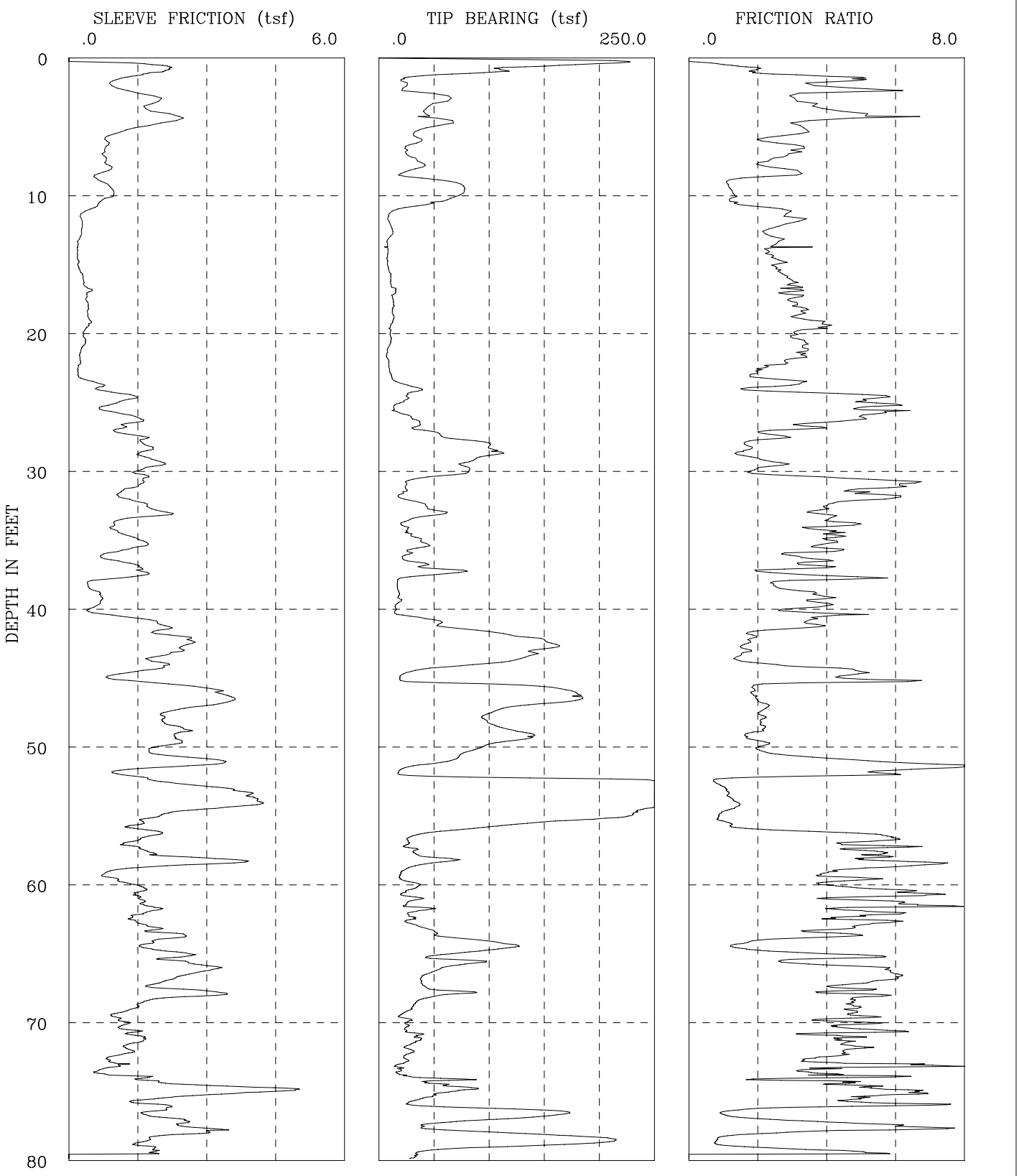
Figure A-9b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	15.69	0.64	4.06	1.41	clay	UNDFND	UNDFD	15	.8
12.15	40	16.39	0.64	3.89	1.44	silty clay to clay	UNDFND	UNDFD	10	.9
12.45	41	35.12	1.34	3.81	1.47	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
12.80	42	104.33	2.21	2.12	1.50	silty sand to sandy silt	60-70	38-40	33	UNDEFINED
13.10	43	153.81	2.91	1.89	1.53	silty sand to sandy silt	70-80	40-42	49	UNDEFINED
13.40	44	133.88	2.85	2.13	1.56	silty sand to sandy silt	60-70	40-42	43	UNDEFINED
13.75	45	30.33	1.23	4.07	1.59	silty clay to clay	UNDFND	UNDFD	19	1.8
14.05	46	146.99	3.11	2.12	1.62	silty sand to sandy silt	70-80	40-42	47	UNDEFINED
14.35	47	164.16	3.49	2.12	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	97.53	1.97	2.02	1.68	silty sand to sandy silt	50-60	38-40	31	UNDEFINED
14.95	49	99.74	1.96	1.96	1.70	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
15.25	50	90.96	1.68	1.85	1.73	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
15.55	51	84.34	2.16	2.56	1.76	sandy silt to clayey silt	UNDFND	UNDFD	32	5.4
15.85	52	32.48	2.10	6.47	1.79	clay	UNDFND	UNDFD	31	1.9
16.15	53	204.31	1.67	0.82	1.82	sand	70-80	40-42	39	UNDEFINED
16.45	54	338.84	3.41	1.01	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	276.06	2.74	0.99	1.87	sand	80-90	42-44	>50	UNDEFINED
17.05	56	177.37	3.19	1.80	1.90	sand to silty sand	70-80	40-42	42	UNDEFINED
17.35	57	39.62	1.84	4.63	1.93	silty clay to clay	UNDFND	UNDFD	25	2.4
17.65	58	24.92	1.06	4.25	1.96	silty clay to clay	UNDFND	UNDFD	16	1.4
17.95	59	24.87	0.80	3.24	1.99	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
18.25	60	19.78	0.72	3.65	2.02	silty clay to clay	UNDFND	UNDFD	13	1.0
18.55	61	29.80	0.97	3.26	2.04	clayey silt to silty clay	UNDFND	UNDFD	14	1.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-9c



I-436 SR-22 Phase 2	CPT-08-014B
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-10a

Engineer : Nava
On Site Loc: CPT-08-014B
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/28/2008
Cone Used : 30 ton
Water table (feet) : 9.84

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	155.39	1.55	1.00	0.03	sand to silty sand	>90	>48	37	UNDEFINED
0.60	2	33.76	1.16	3.44	0.09	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
0.95	3	46.10	1.58	3.44	0.15	clayey silt to silty clay	UNDFND	UNDFD	22	3.0
1.25	4	50.25	1.84	3.66	0.22	clayey silt to silty clay	UNDFND	UNDFD	24	3.3
1.55	5	53.80	2.02	3.76	0.28	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
1.85	6	35.02	0.94	2.69	0.33	sandy silt to clayey silt	UNDFND	UNDFD	13	2.3
2.15	7	26.02	0.79	3.05	0.39	clayey silt to silty clay	UNDFND	UNDFD	12	1.7
2.45	8	36.27	0.85	2.33	0.45	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
2.75	9	37.98	0.67	1.77	0.51	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
3.05	10	75.88	0.94	1.23	0.57	silty sand to sandy silt	60-70	42-44	24	UNDEFINED
3.35	11	42.76	0.64	1.49	0.61	silty sand to sandy silt	40-50	38-40	14	UNDEFINED
3.65	12	9.33	0.28	3.01	0.64	silty clay to clay	UNDFND	UNDFD	6	.5
3.95	13	11.77	0.28	2.38	0.67	clayey silt to silty clay	UNDFND	UNDFD	6	.7
4.25	14	9.14	0.19	2.09	0.69	silty clay to clay	UNDFND	UNDFD	6	.5
4.55	15	7.77	0.19	2.51	0.72	silty clay to clay	UNDFND	UNDFD	5	.4
4.85	16	9.62	0.26	2.67	0.75	silty clay to clay	UNDFND	UNDFD	6	.5
5.15	17	12.33	0.37	3.03	0.78	silty clay to clay	UNDFND	UNDFD	8	.7
5.45	18	13.04	0.39	3.01	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	12.89	0.42	3.23	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	11.24	0.41	3.66	0.86	clay	UNDFND	UNDFD	11	.6
6.40	21	10.24	0.33	3.21	0.89	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	7.75	0.25	3.18	0.93	clay	UNDFND	UNDFD	7	.4
7.00	23	9.58	0.21	2.17	0.95	clayey silt to silty clay	UNDFND	UNDFD	5	.5
7.35	24	23.17	0.53	2.31	0.98	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
7.65	25	24.10	1.20	4.98	1.02	clay	UNDFND	UNDFD	23	1.5
7.95	26	19.25	1.02	5.30	1.04	clay	UNDFND	UNDFD	18	1.1
8.25	27	36.49	1.27	3.48	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
8.55	28	75.00	1.53	2.03	1.10	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
8.85	29	100.38	1.69	1.68	1.13	silty sand to sandy silt	60-70	40-42	32	UNDEFINED
9.15	30	80.43	1.79	2.22	1.16	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
9.45	31	39.41	1.60	4.07	1.19	silty clay to clay	UNDFND	UNDFD	25	2.5
9.75	32	21.67	1.19	5.49	1.21	clay	UNDFND	UNDFD	21	1.3
10.05	33	45.22	1.77	3.92	1.24	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
10.35	34	31.07	1.31	4.23	1.27	silty clay to clay	UNDFND	UNDFD	20	1.9
10.65	35	29.44	1.20	4.08	1.30	silty clay to clay	UNDFND	UNDFD	19	1.8
10.95	36	35.68	1.38	3.85	1.33	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
11.25	37	30.67	1.08	3.52	1.36	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
11.55	38	45.87	1.36	2.96	1.38	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

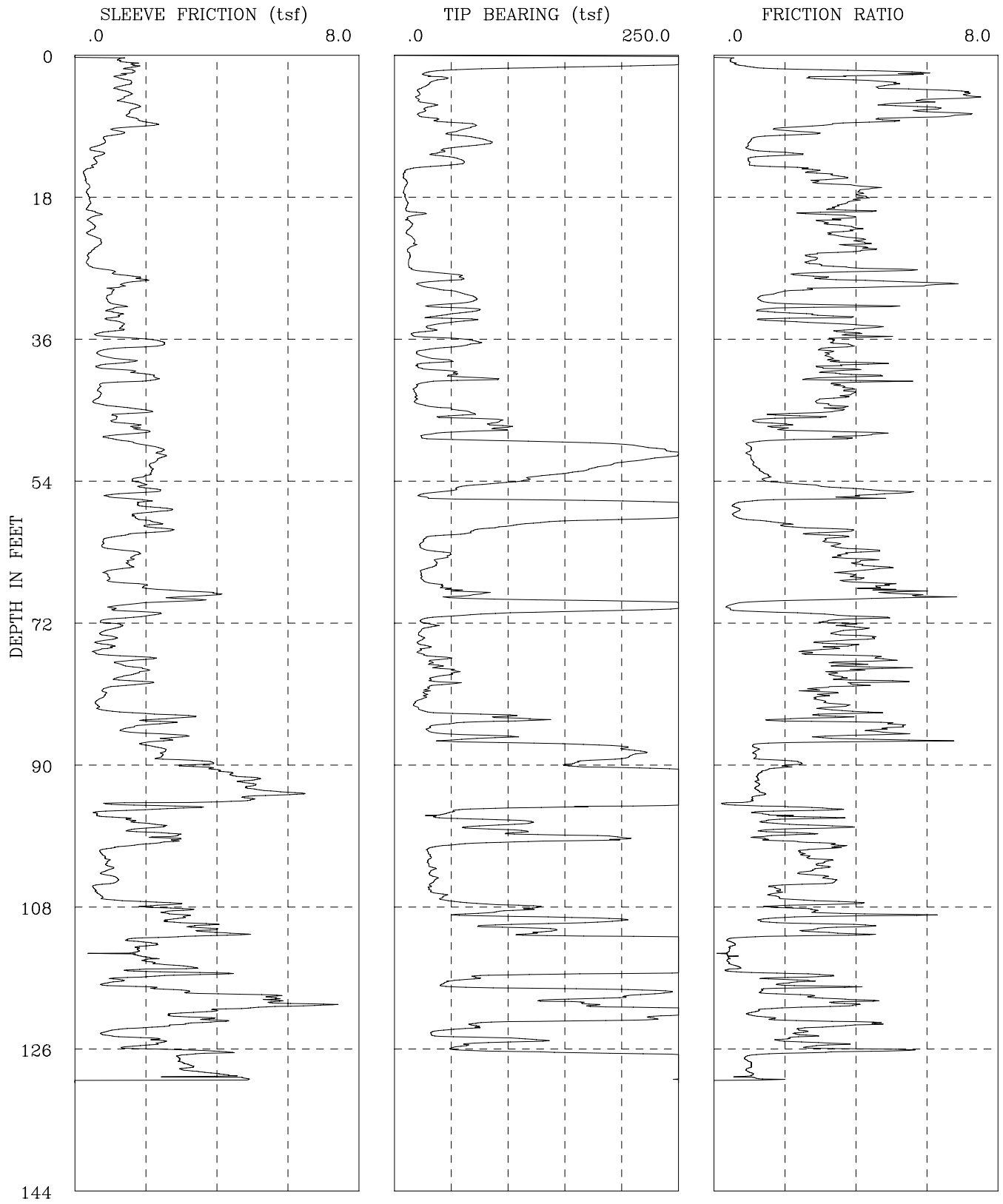
Figure A-10b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.32	0.50	2.91	1.41	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	17.33	0.66	3.82	1.44	silty clay to clay	UNDFND	UNDFD	11	.9
12.45	41	28.89	1.04	3.62	1.47	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
12.80	42	87.66	2.10	2.39	1.50	silty sand to sandy silt	50-60	38-40	28	UNDEFINED
13.10	43	152.52	2.57	1.68	1.53	sand to silty sand	70-80	40-42	37	UNDEFINED
13.40	44	124.83	1.99	1.59	1.56	sand to silty sand	60-70	40-42	30	UNDEFINED
13.75	45	32.74	1.38	4.23	1.59	silty clay to clay	UNDFND	UNDFD	21	2.0
14.05	46	135.20	2.73	2.02	1.62	silty sand to sandy silt	60-70	40-42	43	UNDEFINED
14.35	47	161.62	3.33	2.06	1.65	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
14.65	48	100.03	2.12	2.12	1.68	silty sand to sandy silt	50-60	38-40	32	UNDEFINED
14.95	49	116.57	2.35	2.02	1.70	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
15.25	50	114.64	2.24	1.96	1.73	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
15.55	51	74.27	2.38	3.20	1.76	sandy silt to clayey silt	UNDFND	UNDFD	28	4.7
15.85	52	26.95	1.84	6.81	1.79	clay	UNDFND	UNDFD	26	1.5
16.15	53	247.11	2.35	0.95	1.82	sand	80-90	42-44	47	UNDEFINED
16.45	54	329.94	3.97	1.20	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	246.35	2.93	1.19	1.87	sand	80-90	42-44	47	UNDEFINED
17.05	56	141.72	1.55	1.09	1.90	sand to silty sand	60-70	38-40	34	UNDEFINED
17.35	57	34.72	1.67	4.82	1.93	clay	UNDFND	UNDFD	33	2.0
17.65	58	31.05	1.67	5.37	1.96	clay	UNDFND	UNDFD	30	1.8
17.95	59	44.78	2.60	5.81	1.99	clay	UNDFND	UNDFD	43	2.7
18.25	60	22.70	0.96	4.22	2.02	silty clay to clay	UNDFND	UNDFD	14	1.2
18.55	61	28.73	1.55	5.40	2.04	clay	UNDFND	UNDFD	28	1.6
18.85	62	33.50	1.72	5.13	2.07	clay	UNDFND	UNDFD	32	1.9
19.20	63	29.57	1.51	5.11	2.10	clay	UNDFND	UNDFD	28	1.7
19.50	64	58.38	2.13	3.65	2.13	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
19.80	65	104.00	1.91	1.84	2.16	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.15	66	65.66	2.70	4.11	2.19	clayey silt to silty clay	UNDFND	UNDFD	31	4.1
20.45	67	41.47	2.41	5.81	2.22	clay	UNDFND	UNDFD	40	2.4
20.75	68	55.50	2.59	4.67	2.25	silty clay to clay	UNDFND	UNDFD	35	3.4
21.05	69	33.18	1.58	4.77	2.28	clay	UNDFND	UNDFD	32	1.9
21.35	70	23.43	1.11	4.72	2.31	clay	UNDFND	UNDFD	22	1.2
21.65	71	28.95	1.33	4.60	2.34	clay	UNDFND	UNDFD	28	1.6
21.95	72	30.22	1.40	4.63	2.37	clay	UNDFND	UNDFD	29	1.7
22.25	73	24.36	1.05	4.31	2.39	silty clay to clay	UNDFND	UNDFD	16	1.3
22.55	74	21.57	0.98	4.54	2.42	clay	UNDFND	UNDFD	21	1.1
22.85	75	70.00	3.22	4.60	2.45	silty clay to clay	UNDFND	UNDFD	45	4.3
23.15	76	38.26	2.22	5.80	2.48	clay	UNDFND	UNDFD	37	2.2
23.45	77	134.52	1.96	1.45	2.51	sand to silty sand	60-70	36-38	32	UNDEFINED
23.75	78	61.55	2.77	4.50	2.54	silty clay to clay	UNDFND	UNDFD	39	3.7
24.05	79	182.21	1.80	0.99	2.56	sand	70-80	38-40	35	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-10c



CPT-08-016	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure -11a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-016
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	268.07	1.16	0.43	0.03	gravelly sand to sand	>90	>48	43	UNDEFINED
0.60	2	140.01	1.61	1.15	0.09	sand to silty sand	>90	>48	34	UNDEFINED
0.95	3	34.32	1.38	4.02	0.15	silty clay to clay	UNDFND	UNDFD	22	2.2
1.25	4	29.35	1.43	4.86	0.22	clay	UNDFND	UNDFD	28	1.9
1.55	5	21.46	1.44	6.71	0.28	clay	UNDFND	UNDFD	21	1.4
1.85	6	22.21	1.37	6.18	0.33	clay	UNDFND	UNDFD	21	1.4
2.15	7	30.38	1.70	5.59	0.39	clay	UNDFND	UNDFD	29	1.9
2.45	8	25.84	1.56	6.03	0.45	clay	UNDFND	UNDFD	25	1.6
2.75	9	56.30	2.02	3.59	0.51	clayey silt to silty clay	UNDFND	UNDFD	27	3.7
3.05	10	55.57	1.23	2.21	0.57	sandy silt to clayey silt	UNDFND	UNDFD	21	3.6
3.35	11	74.39	0.86	1.16	0.61	silty sand to sandy silt	60-70	40-42	24	UNDEFINED
3.65	12	61.72	0.59	0.96	0.64	silty sand to sandy silt	50-60	40-42	20	UNDEFINED
3.95	13	41.31	0.69	1.67	0.67	silty sand to sandy silt	40-50	38-40	13	UNDEFINED
4.25	14	57.07	0.57	0.99	0.69	silty sand to sandy silt	50-60	40-42	18	UNDEFINED
4.55	15	14.78	0.34	2.31	0.72	clayey silt to silty clay	UNDFND	UNDFD	7	.9
4.85	16	8.66	0.29	3.34	0.75	clay	UNDFND	UNDFD	8	.5
5.15	17	10.19	0.38	3.72	0.78	clay	UNDFND	UNDFD	10	.6
5.45	18	8.59	0.35	4.13	0.81	clay	UNDFND	UNDFD	8	.5
5.75	19	10.80	0.42	3.92	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	11.29	0.40	3.58	0.86	clay	UNDFND	UNDFD	11	.6
6.40	21	16.38	0.52	3.19	0.89	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
6.70	22	14.72	0.52	3.56	0.93	silty clay to clay	UNDFND	UNDFD	9	.8
7.00	23	11.95	0.42	3.54	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
7.35	24	17.40	0.70	4.05	0.98	silty clay to clay	UNDFND	UNDFD	11	1.0
7.65	25	12.64	0.50	3.95	1.02	clay	UNDFND	UNDFD	12	.7
7.95	26	13.30	0.37	2.76	1.04	clayey silt to silty clay	UNDFND	UNDFD	6	.7
8.25	27	12.92	0.44	3.41	1.07	silty clay to clay	UNDFND	UNDFD	8	.7
8.55	28	41.29	1.24	3.01	1.10	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
8.85	29	40.18	1.68	4.19	1.13	silty clay to clay	UNDFND	UNDFD	26	2.5
9.15	30	38.44	1.13	2.94	1.16	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
9.45	31	67.90	0.94	1.38	1.19	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
9.75	32	49.57	1.13	2.29	1.21	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
10.05	33	61.13	1.13	1.84	1.24	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.35	34	50.48	1.12	2.22	1.27	sandy silt to clayey silt	UNDFND	UNDFD	19	3.2
10.65	35	32.23	1.30	4.03	1.30	silty clay to clay	UNDFND	UNDFD	21	2.0
10.95	36	26.54	0.99	3.74	1.33	silty clay to clay	UNDFND	UNDFD	17	1.6
11.25	37	67.53	2.39	3.54	1.36	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
11.55	38	26.43	0.84	3.17	1.38	clayey silt to silty clay	UNDFND	UNDFD	13	1.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-11b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	36.52	1.22	3.35	1.41	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
12.15	40	23.90	0.90	3.78	1.44	silty clay to clay	UNDFND	UNDFD	15	1.4
12.45	41	54.71	1.98	3.62	1.47	clayey silt to silty clay	UNDFND	UNDFD	26	3.4
12.80	42	40.77	1.36	3.35	1.50	clayey silt to silty clay	UNDFND	UNDFD	20	2.5
13.10	43	17.86	0.69	3.85	1.53	silty clay to clay	UNDFND	UNDFD	11	1.0
13.40	44	18.77	0.61	3.25	1.56	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
13.75	45	39.64	1.37	3.45	1.59	clayey silt to silty clay	UNDFND	UNDFD	19	2.4
14.05	46	60.90	1.33	2.19	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
14.35	47	92.02	1.40	1.52	1.65	silty sand to sandy silt	50-60	38-40	29	UNDEFINED
14.65	48	67.04	1.81	2.69	1.68	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
14.95	49	63.22	1.16	1.83	1.70	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
15.25	50	217.30	2.18	1.00	1.73	sand	80-90	40-42	42	UNDEFINED
15.55	51	246.28	2.44	0.99	1.76	sand	80-90	42-44	47	UNDEFINED
15.85	52	203.65	2.22	1.09	1.79	sand	70-80	40-42	39	UNDEFINED
16.15	53	167.29	2.16	1.29	1.82	sand to silty sand	70-80	40-42	40	UNDEFINED
16.45	54	122.91	1.82	1.48	1.85	sand to silty sand	60-70	38-40	29	UNDEFINED
16.75	55	71.67	1.94	2.71	1.87	sandy silt to clayey silt	UNDFND	UNDFD	27	4.5
17.05	56	33.58	1.60	4.76	1.90	clay	UNDFND	UNDFD	32	2.0
17.35	57	178.75	1.73	0.97	1.93	sand	70-80	40-42	34	UNDEFINED
17.65	58	363.94	2.33	0.64	1.96	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.95	59	268.92	1.73	0.64	1.99	sand	80-90	42-44	>50	UNDEFINED
18.25	60	114.69	2.18	1.90	2.02	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
18.55	61	63.74	2.14	3.36	2.04	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
18.85	62	26.20	0.87	3.34	2.07	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
19.20	63	27.83	1.10	3.94	2.10	silty clay to clay	UNDFND	UNDFD	18	1.6
19.50	64	44.62	1.68	3.76	2.13	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
19.80	65	35.51	1.52	4.29	2.16	silty clay to clay	UNDFND	UNDFD	23	2.1
20.15	66	24.16	0.96	3.98	2.19	silty clay to clay	UNDFND	UNDFD	15	1.3
20.45	67	28.98	1.24	4.27	2.22	silty clay to clay	UNDFND	UNDFD	19	1.6
20.75	68	52.56	2.54	4.82	2.25	silty clay to clay	UNDFND	UNDFD	34	3.2
21.05	69	75.59	3.47	4.59	2.28	undefined	UNDFND	UNDFD	UDF	UNDEFINED
21.35	70	268.94	1.68	0.62	2.31	sand	80-90	40-42	>50	UNDEFINED
21.65	71	137.56	1.82	1.32	2.34	sand to silty sand	60-70	38-40	33	UNDEFINED
21.95	72	27.54	1.08	3.93	2.37	silty clay to clay	UNDFND	UNDFD	18	1.5
22.25	73	29.23	1.12	3.84	2.39	silty clay to clay	UNDFND	UNDFD	19	1.6
22.55	74	23.17	0.92	3.98	2.42	silty clay to clay	UNDFND	UNDFD	15	1.2
22.85	75	24.06	0.83	3.44	2.45	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
23.15	76	23.87	0.69	2.88	2.48	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
23.45	77	37.20	1.65	4.45	2.51	silty clay to clay	UNDFND	UNDFD	24	2.1
23.75	78	39.23	1.61	4.12	2.54	silty clay to clay	UNDFND	UNDFD	25	2.3
24.05	79	46.04	1.59	3.46	2.56	clayey silt to silty clay	UNDFND	UNDFD	22	2.7
24.35	80	39.52	1.64	4.15	2.59	silty clay to clay	UNDFND	UNDFD	25	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-11c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	28.57	0.86	3.01	2.62	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
24.95	82	24.97	0.74	2.98	2.65	clayey silt to silty clay	UNDFND	UNDFD	12	1.3
25.25	83	18.73	0.63	3.34	2.68	clayey silt to silty clay	UNDFND	UNDFD	9	.9
25.60	84	63.24	2.11	3.33	2.71	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
25.90	85	75.66	2.26	2.99	2.74	sandy silt to clayey silt	UNDFND	UNDFD	29	4.7
26.20	86	31.91	1.55	4.87	2.77	clay	UNDFND	UNDFD	31	1.7
26.55	87	72.12	2.64	3.66	2.80	clayey silt to silty clay	UNDFND	UNDFD	35	4.4
26.85	88	188.87	2.23	1.18	2.83	sand	60-70	38-40	36	UNDEFINED
27.15	89	212.18	2.45	1.15	2.86	sand	70-80	38-40	41	UNDEFINED
27.45	90	164.34	3.36	2.04	2.88	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.75	91	268.49	4.04	1.51	2.91	sand to silty sand	70-80	40-42	>50	UNDEFINED
28.05	92	391.31	4.79	1.22	2.94	sand	>90	42-44	>50	UNDEFINED
28.35	93	405.58	4.93	1.22	2.97	sand	>90	42-44	>50	UNDEFINED
28.65	94	436.44	5.63	1.29	3.00	sand	>90	42-44	>50	UNDEFINED
28.95	95	416.18	3.46	0.83	3.03	gravelly sand to sand	>90	42-44	>50	UNDEFINED
29.25	96	106.27	2.09	1.97	3.05	silty sand to sandy silt	50-60	34-36	34	UNDEFINED
29.55	97	52.39	1.03	1.96	3.08	silty sand to sandy silt	<40	30-32	17	UNDEFINED
29.85	98	95.32	2.13	2.23	3.11	silty sand to sandy silt	40-50	34-36	30	UNDEFINED
30.15	99	115.47	2.20	1.90	3.14	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
30.45	100	154.23	2.63	1.70	3.17	sand to silty sand	60-70	36-38	37	UNDEFINED
30.75	101	36.10	1.15	3.17	3.20	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
31.05	102	31.02	0.80	2.58	3.22	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
31.35	103	29.88	0.93	3.11	3.25	clayey silt to silty clay	UNDFND	UNDFD	14	1.5
31.65	104	32.72	0.89	2.72	3.28	sandy silt to clayey silt	UNDFND	UNDFD	13	1.7
32.00	105	34.93	1.14	3.25	3.31	clayey silt to silty clay	UNDFND	UNDFD	17	1.9
32.30	106	30.98	0.56	1.81	3.34	sandy silt to clayey silt	UNDFND	UNDFD	12	1.6
32.60	107	40.82	0.72	1.76	3.37	sandy silt to clayey silt	UNDFND	UNDFD	16	2.2
32.95	108	86.19	2.20	2.55	3.40	sandy silt to clayey silt	UNDFND	UNDFD	33	5.3
33.25	109	85.19	2.90	3.40	3.43	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
33.55	110	173.65	2.94	1.69	3.46	sand to silty sand	60-70	36-38	42	UNDEFINED
33.85	111	113.37	3.65	3.22	3.49	sandy silt to clayey silt	UNDFND	UNDFD	43	7.1
34.15	112	209.04	3.33	1.60	3.52	sand to silty sand	60-70	38-40	>50	UNDEFINED
34.45	113	393.52	1.93	0.49	3.55	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
34.75	114	423.53	1.62	0.38	3.57	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
35.05	115	511.27	2.03	0.40	3.60	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.35	116	478.89	2.65	0.55	3.63	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.65	117	189.30	2.67	1.41	3.66	sand to silty sand	60-70	36-38	45	UNDEFINED
35.95	118	49.08	1.04	2.12	3.69	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
36.25	119	179.02	2.77	1.54	3.72	sand to silty sand	60-70	36-38	43	UNDEFINED
36.55	120	176.85	5.54	3.13	3.74	sandy silt to clayey silt	UNDFND	UNDFD	>50	11.3
36.85	121	201.63	5.74	2.84	3.77	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
37.15	122	284.33	3.20	1.13	3.80	sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

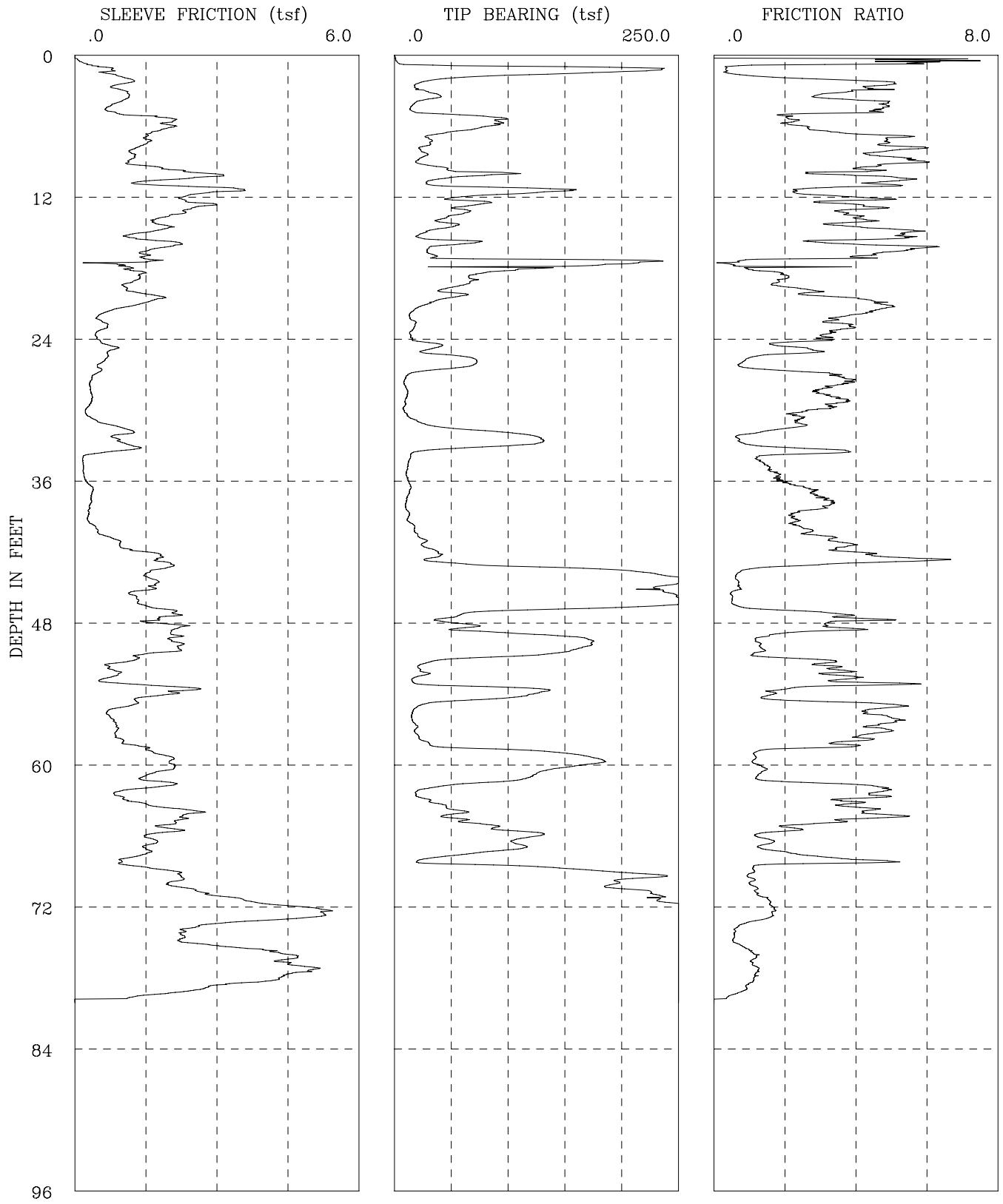
Figure A-11d

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	148.01	3.67	2.48	3.83	silty sand to sandy silt	50-60	36-38	47	UNDEFINED
37.75	124	55.27	1.60	2.90	3.86	sandy silt to clayey silt	UNDFND	UNDFD	21	3.1
38.05	125	68.78	1.45	2.11	3.89	silty sand to sandy silt	<40	30-32	22	UNDEFINED
38.40	126	71.46	2.05	2.87	3.92	sandy silt to clayey silt	UNDFND	UNDFD	27	4.2
38.70	127	197.59	3.52	1.78	3.95	sand to silty sand	60-70	36-38	47	UNDEFINED
39.00	128	312.85	3.01	0.96	3.97	sand	70-80	38-40	>50	UNDEFINED
39.35	129	337.88	3.37	1.00	4.01	sand	80-90	40-42	>50	UNDEFINED
39.65	130	390.21	3.83	0.98	4.04	sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-11e



CPT-08-018	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-12a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-018
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 24.93438

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	34.20	0.21	0.60	0.03	silty sand to sandy silt	80-90	>48	11	UNDEFINED
0.60	2	143.63	0.87	0.60	0.09	sand	>90	>48	28	UNDEFINED
0.95	3	23.57	1.01	4.29	0.15	silty clay to clay	UNDFND	UNDFD	15	1.5
1.25	4	29.47	1.03	3.50	0.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
1.55	5	27.04	0.84	3.10	0.28	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
1.85	6	90.35	2.00	2.21	0.33	silty sand to sandy silt	70-80	44-46	29	UNDEFINED
2.15	7	43.26	1.62	3.75	0.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.8
2.45	8	27.60	1.40	5.08	0.45	clay	UNDFND	UNDFD	26	1.8
2.75	9	24.03	1.20	5.01	0.51	clay	UNDFND	UNDFD	23	1.5
3.05	10	53.84	1.98	3.67	0.57	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
3.35	11	41.97	2.01	4.79	0.63	silty clay to clay	UNDFND	UNDFD	27	2.7
3.65	12	107.15	2.89	2.70	0.69	sandy silt to clayey silt	UNDFND	UNDFD	41	7.0
3.95	13	64.06	2.54	3.96	0.75	clayey silt to silty clay	UNDFND	UNDFD	31	4.2
4.25	14	52.47	2.01	3.82	0.81	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
4.55	15	42.78	1.78	4.17	0.87	silty clay to clay	UNDFND	UNDFD	27	2.7
4.85	16	40.48	1.54	3.81	0.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
5.15	17	32.34	1.67	5.16	0.98	clay	UNDFND	UNDFD	31	2.0
5.45	18	131.32	1.15	0.88	1.04	sand to silty sand	70-80	40-42	31	UNDEFINED
5.75	19	82.62	1.32	1.60	1.10	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
6.05	20	56.77	1.12	1.97	1.16	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
6.40	21	45.10	1.58	3.51	1.23	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.70	22	17.45	0.80	4.59	1.29	clay	UNDFND	UNDFD	17	1.0
7.00	23	16.61	0.59	3.56	1.35	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	15.17	0.49	3.22	1.41	silty clay to clay	UNDFND	UNDFD	10	.9
7.65	25	32.55	0.73	2.23	1.48	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
7.95	26	63.89	0.63	0.99	1.51	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
8.25	27	34.16	0.48	1.41	1.54	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
8.55	28	9.16	0.33	3.60	1.57	clay	UNDFND	UNDFD	9	.5
8.85	29	10.94	0.35	3.16	1.60	silty clay to clay	UNDFND	UNDFD	7	.6
9.15	30	8.79	0.29	3.28	1.63	clay	UNDFND	UNDFD	8	.4
9.45	31	14.47	0.34	2.35	1.66	clayey silt to silty clay	UNDFND	UNDFD	7	.8
9.75	32	63.14	1.01	1.60	1.68	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.05	33	123.84	0.96	0.77	1.71	sand to silty sand	60-70	38-40	30	UNDEFINED
10.35	34	29.30	0.72	2.46	1.74	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
10.65	35	12.23	0.17	1.39	1.77	clayey silt to silty clay	UNDFND	UNDFD	6	.6
10.95	36	10.97	0.19	1.78	1.80	clayey silt to silty clay	UNDFND	UNDFD	5	.5
11.25	37	13.57	0.34	2.48	1.83	clayey silt to silty clay	UNDFND	UNDFD	7	.7
11.55	38	11.15	0.34	3.06	1.85	silty clay to clay	UNDFND	UNDFD	7	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-12b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	11.41	0.30	2.59	1.88	silty clay to clay	UNDFND	UNDFD	7	.6
12.15	40	14.09	0.32	2.30	1.91	clayey silt to silty clay	UNDFND	UNDFD	7	.7
12.45	41	19.93	0.58	2.93	1.94	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
12.80	42	29.89	1.08	3.61	1.97	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	39.71	1.84	4.62	2.00	silty clay to clay	UNDFND	UNDFD	25	2.4
13.40	44	184.43	1.72	0.93	2.03	sand	70-80	40-42	35	UNDEFINED
13.75	45	246.32	1.67	0.68	2.06	sand	80-90	40-42	47	UNDEFINED
14.05	46	248.95	1.27	0.51	2.09	sand	80-90	40-42	48	UNDEFINED
14.35	47	179.26	1.70	0.95	2.12	sand	70-80	40-42	34	UNDEFINED
14.65	48	50.24	1.86	3.70	2.15	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
14.95	49	86.89	2.16	2.48	2.18	sandy silt to clayey silt	UNDFND	UNDFD	33	5.5
15.25	50	170.53	2.13	1.25	2.20	sand to silty sand	70-80	38-40	41	UNDEFINED
15.55	51	120.37	1.66	1.38	2.23	sand to silty sand	60-70	38-40	29	UNDEFINED
15.85	52	25.18	0.84	3.33	2.26	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.15	53	20.83	0.75	3.59	2.29	silty clay to clay	UNDFND	UNDFD	13	1.1
16.45	54	98.30	2.05	2.09	2.32	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
16.75	55	64.17	1.36	2.12	2.35	silty sand to sandy silt	40-50	32-34	20	UNDEFINED
17.05	56	16.41	0.75	4.58	2.37	clay	UNDFND	UNDFD	16	.8
17.35	57	17.88	0.86	4.79	2.40	clay	UNDFND	UNDFD	17	.9
17.65	58	20.50	0.90	4.41	2.43	clay	UNDFND	UNDFD	20	1.1
17.95	59	68.80	1.37	1.99	2.46	silty sand to sandy silt	40-50	34-36	22	UNDEFINED
18.25	60	174.08	1.98	1.14	2.49	sand to silty sand	60-70	38-40	42	UNDEFINED
18.55	61	137.10	1.86	1.36	2.52	sand to silty sand	60-70	38-40	33	UNDEFINED
18.85	62	81.50	1.74	2.13	2.54	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
19.20	63	23.19	1.01	4.34	2.57	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	47.92	1.98	4.12	2.61	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
19.80	65	56.83	2.24	3.93	2.63	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
20.15	66	108.78	1.79	1.64	2.66	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
20.45	67	108.99	1.60	1.46	2.69	sand to silty sand	50-60	36-38	26	UNDEFINED
20.75	68	51.06	1.30	2.55	2.72	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
21.05	69	123.78	1.54	1.24	2.75	sand to silty sand	50-60	36-38	30	UNDEFINED
21.35	70	211.00	2.16	1.02	2.78	sand	70-80	38-40	40	UNDEFINED
21.65	71	212.96	2.55	1.20	2.81	sand	70-80	38-40	41	UNDEFINED
21.95	72	251.25	3.99	1.59	2.84	sand to silty sand	70-80	40-42	>50	UNDEFINED
22.25	73	315.52	5.12	1.62	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.55	74	367.51	2.81	0.77	2.89	sand	80-90	42-44	>50	UNDEFINED
22.85	75	401.60	2.25	0.56	2.92	gravelly sand to sand	>90	42-44	>50	UNDEFINED
23.15	76	395.11	3.65	0.92	2.95	sand	>90	42-44	>50	UNDEFINED
23.45	77	408.09	4.54	1.11	2.98	sand	>90	42-44	>50	UNDEFINED
23.75	78	393.78	4.74	1.20	3.01	sand	>90	42-44	>50	UNDEFINED
24.05	79	337.28	3.40	1.01	3.03	sand	80-90	40-42	>50	UNDEFINED
24.35	80	309.14	1.42	0.46	3.06	gravelly sand to sand	80-90	40-42	49	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-12c

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. These samples were then transported to the laboratory for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of Moisture Content and Dry Unit Weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Consolidation, Soil Corrosivity, and R-Value. A summary of laboratory test results are included in Table B-1. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The USCS soil classifications are presented on key for soil classification and on the boring logs in Figures A-1a to A-5e of Appendix A, and are summarized in Table B-1.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented in Table B-1 and on the boring logs in Figures A-2a to A-5e of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a to A-5e of Appendix A and in Table B-1 and Figures B-1a to B-1b of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided in Figure B-2 and Table B-1 of this appendix. The relative proportion (or percentage) by dry weight of fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a through A-5e of Appendix A.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under additional normal loads for selected samples. The test results are presented in Tables B-2a and B-2b and Figures B-3a to B-3b of this appendix.

B.7 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included soil minimum resistivity and pH (Caltrans method 643), water-soluble chlorides (Caltrans Test method 422), and water-soluble sulfates (Caltrans Test Method 417). The test results are summarized in Table B-3.

B.8 Consolidation Test

One-dimensional consolidation tests were performed on selected undisturbed samples in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation test are graphically shown in Figures B-4a to B-4b and consolidation parameters are summarized in Table B-4 of this appendix.

B.9 R-Value

A Resistance or R-Value test was performed on selected bulk samples of the subgrade soils encountered under proposed pavement locations. The test was conducted in general accordance with CTM 301. The test results are presented in Figure B-5.

B.10 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table B-1 Summary of Index Test Results
Table B-2a Summary of Single Point Direct Shear Test Results
Table B-2b Summary of Direct Shear Test Results
Table B-3 Summary of Corrosion Test Results
Table B-4 Summary of Consolidation Test Results

List of Figures

Figure B-1a, b Atterberg Limits Test Results
Figure B-2 Grain Size Distribution Test Results
Figure B-3a, b Direct Shear Test Results
Figure B-4a, b Consolidation Test Results
Figure B-5 R-Value Test Results

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-004	B-1	1.3-3.5	CL	-	16	-	-	66	29	17	12	-
R-08-004	R-2	3.5	CL	117.1	16	-	-	-	-	-	-	4.5+
R-08-004	S-3	10	ML	-	22	-	-	66	-	-	-	4.5+
R-08-004	R-4	15	SM	100.5	24	-	-	27	-	-	-	-
R-08-004	S-5	20	CL	-	31	-	-	66	-	-	-	1
R-08-004	R-6	25	CL	91.1	31	-	-	-	-	-	-	1.25-1.5
R-08-004	S-7	30	CL	-	29	-	-	55	-	-	-	-
R-08-004	R-8	35	CL	92.3	30	-	-	-	-	-	-	1.5-2.2
R-08-004	S-9	40	CL	-	32	-	-	-	-	-	-	2
R-08-004	R-10	45	SM/ML	105.2	22	-	-	51	-	-	-	4.5
R-08-004	S-11	50	CL	-	32	-	-	86	-	-	-	-
R-08-004	R-12	55	ML	109.6	19	-	-	-	-	-	-	4.5+
R-08-004	S-13	60	ML	-	26	-	-	56	-	-	-	-
R-08-011	S-1	5	SC	-	19	-	-	47	33	19	14	-
R-08-011	R-2	10	SC	96.9	19	-	-	-	-	-	-	-
R-08-011	S-3	15	CL	-	31	-	-	-	-	-	-	0.5
R-08-011	R-4	20	CL	94.6	24	-	-	52	34	16	18	1
R-08-011	S-5	25	CL	-	46	-	-	-	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-011	R-6	30	ML	93.2	30	-	-	-	-	-	-	1.5
R-08-011	S-7	35	ML	-	28	-	-	68	-	-	-	1
R-08-011	R-8	40	CL	97.9	25	-	-	80	-	-	-	4
R-08-011	S-9	45	ML	-	33	-	-	-	-	-	-	-
R-08-011	R-10	50	ML	83.9	35	-	-	-	-	-	-	3.5
R-08-011	S-11	60	SW-SM	-	15	4	89	7	-	-	-	-
R-08-011	R-12	70	CL	114.8	17	-	-	-	31	15	16	3.5
R-08-011	S-13	80	SC	-	17	-	-	45	-	-	-	-
R-08-011	R-14	90	SM	-	24	-	-	29	-	-	-	-
R-08-011	S-15	100	CL	-	40	-	-	-	-	-	-	-
R-08-011	R-16	120	SM	102.4	24	-	-	27	-	-	-	-
R-08-012	R-1	5	CL	95.8	28	-	-	80	47	20	27	2.4
R-08-012	S-2	10	CL	-	39	-	-	-	-	-	-	0.75
R-08-012	R-3	15	CL	102.1	24	-	-	58	-	-	-	2.75
R-08-012	S-4	20	CL	-	27	-	-	-	-	-	-	1.1
R-08-012	R-5	25	CL	92.7	29	-	-	80	33	21	12	2.25
R-08-012	S-6	30	CL	-	34	-	-	-	-	-	-	1.25-1.5
R-08-012	R-7	35	CL	93.9	30	-	-	-	-	-	-	4

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-012	S-8	40	ML	-	28	-	-	-	-	-	-	-
R-08-012	R-9	45	ML	99	26	-	-	70	26	23	3	-
R-08-012	S-10	50	CL	-	38	-	-	-	-	-	-	3.3
R-08-012	R-11	55	CL	88.5	33	-	-	96	-	-	-	2.8
R-08-012	S-12	60	CL	-	29	-	-	-	-	-	-	3.75
R-08-012	R-13	67	CL	107.1	21	-	-	61	-	-	-	3
R-08-012	S-14	72	CL	-	21	-	-	-	-	-	-	1.5
R-08-012	R-15	80	CL	97.9	31	-	-	57	-	-	-	-
R-08-012	S-16	90	No Recovery									
R-08-012	S-17	91.5	ML/CL	-	31	-	-	89	-	-	-	-
R-08-012	R-18	100	SC	134.9	18	-	-	-	-	-	-	-
R-08-017	S-1	5	CL/SC	-	-	-	-	-	-	-	-	3
R-08-017	R-2	10	CL	89.3	32	-	-	82	35	21	14	2.5
R-08-017	S-3	15	CL	-	27	-	-	55	34	20	14	1.25
R-08-017	R-4	20	CL	108.8	19	-	-	-	-	-	-	4.5+
R-08-017	S-5	25	CL	-	20	-	-	63	-	-	-	4.5+
R-08-017	R-6	30	CL	109.3	15	-	-	-	-	-	-	4
R-08-017	S-7	35	ML	-	34	-	-	57	-	-	-	-

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-017	R-8	40	CL	96.2	28	-	-	-	39	20	19	-
R-08-017	S-9	45	CL	-	36	-	-	-	-	-	-	1.2
R-08-017	R-10	50	ML	100	25	-	-	-	-	-	-	3
R-08-017	S-11	60	CL	-	31	-	-	82	-	-	-	2
R-08-017	R-12	70	ML	96.7	27	-	-	-	-	-	-	-
R-08-017	S-13	80	SM	-	19	-	-	22	-	-	-	-
R-08-017	R-14	90	SW	111.4	18	-	-	-	-	-	-	-
R-08-017	S-15	100	CL	-	-	-	-	-	-	-	-	1.5

TABLE B-2a:
SUMMARY OF SINGLE POINT DIRECT SHEAR TEST RESULTS

Boring No.	Sample No.	Sample Depth (ft.)	Description	Shear Rate (in./min.)	Normal Stress (psf)	Peak Shear Stress (psf)	Shear Stress at 0.25 in.(psf)
R-08-004	R-6	25-26.5	Lean Clay (CL)	0.0042	1500	1200 @ 0.095	1100
R-08-012	R-3	15-16.5	Sandy Lean Clay (CL)	0.0042	4000	2540 @ 0.245 in.	2530

TABLE B-2b:
SUMMARY OF DIRECT SHEAR TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Peak		Ultimate	
				Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
R-08-004	R-2	3.5	CL	600	35	150	33
R-08-017	R-2	10	CL	750	24	350	20

TABLE B-3:
SUMMARY OF CORROSION TEST RESULTS

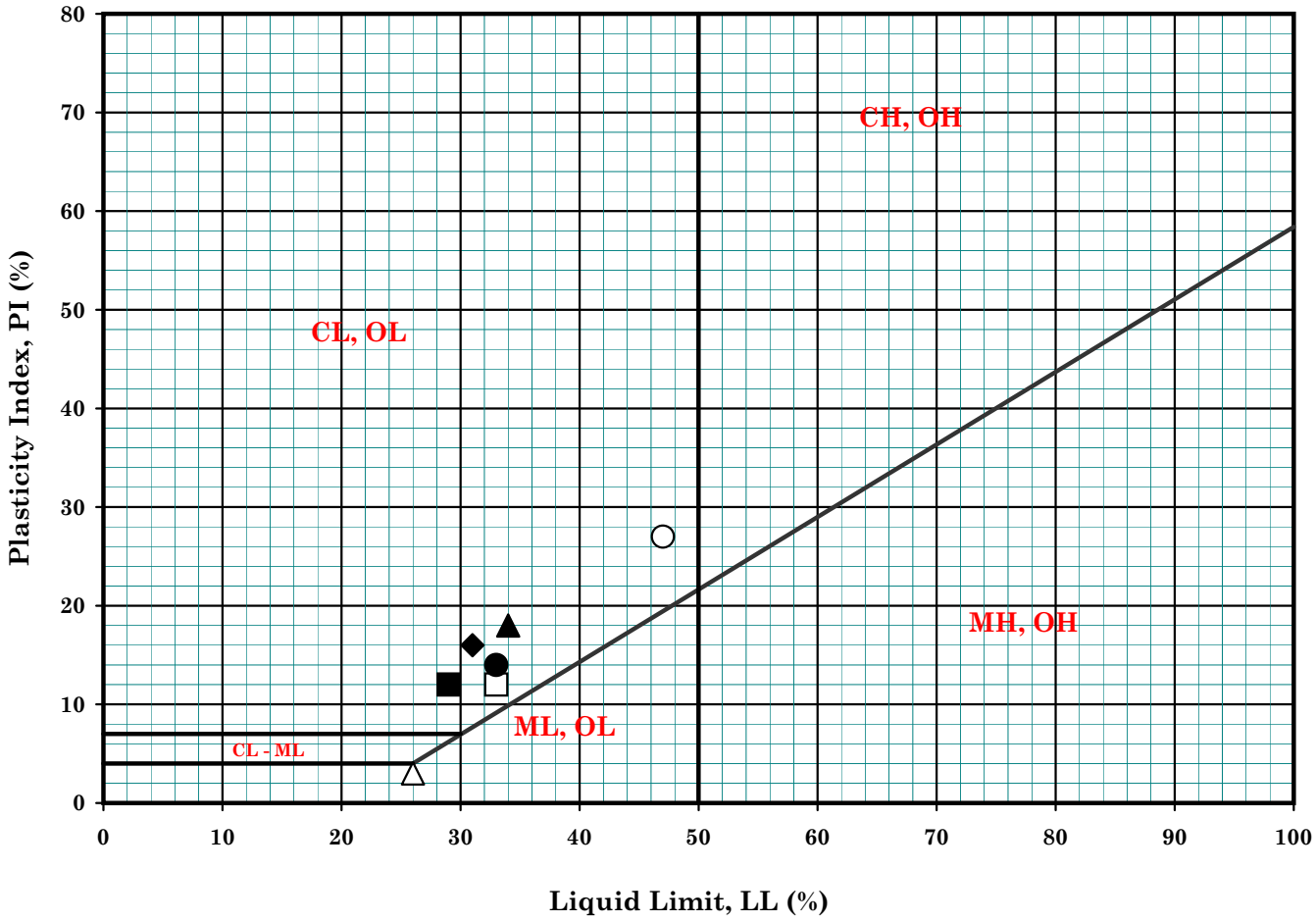
Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
R-08-004	B-1	1.5-3.5	CL	1350	9.1	465	604
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20 - 21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35 - 36.5	ML	NA	8.8	576	255

TABLE B-4:
SUMMARY OF CONSOLIDATION TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Consolidation Parameters					
				Cc	Cr	Ccε	Crε	e_0	σ'_p (psf)
R-08-011	R-4	21	CL	0.228	0.022	0.137	0.013	0.667	3700
R-08-017	R-8	41	CL	0.292	0.036	0.167	0.021	0.744	4800

Note: The values of coefficient of consolidation, Cv were estimated from published correlations.

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
■	R-08-004	B-1	1.3	3.5	0.4	1.1	16	29	17	12	-0.08	Dark Brown Sandy Lean Clay (CL)
●	R-08-011	S-1	5.0	6.5	1.5	2.0	19	33	19	14	0.00	Olive Brown Clayey Sand (SC)
▲	R-08-011	R-4	21.0	21.5	6.4	6.6	24	34	16	18	0.44	Olive Brown Sandy Lean Clay (CL)
◆	R-08-011	R-12	71.0	71.5	21.7	21.8	17	31	15	16	0.13	Light Brown Gray Lean Clay (CL)
○	R-08-012	R-1	6.0	6.5	1.8	2.0	28	47	20	27	0.30	Dark Brown Lean Clay with Sand (CL)
□	R-08-012	R-5	26.0	26.5	7.9	8.1	29	33	21	12	0.67	Dark Brown Lean Clay with Sand (CL)
△	R-08-012	R-9	46.0	46.5	14.0	14.2	26	26	23	3	1.00	Dark Brown Sandy Silt (ML)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 - West County Connectors Segment

Project No. : I-436

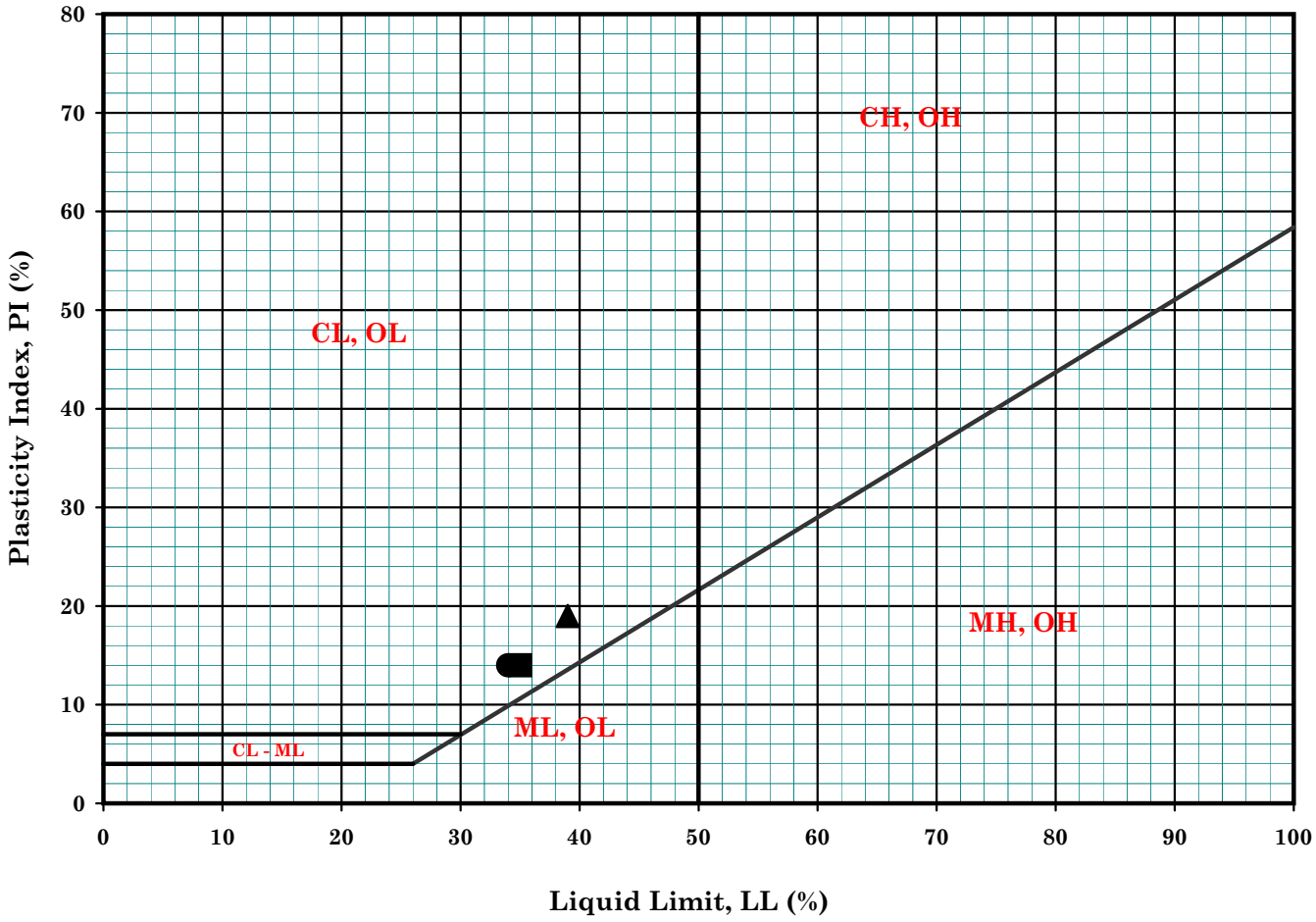
Date : 05/28/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1a

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
■	R-08-017	R-2	11.0	11.5	3.4	3.5	32	35	21	14	0.79	Dark Brown Lean Clay with Sand (CL)
●	R-08-017	S-3	15.0	16.5	4.6	5.0	27	34	20	14	0.50	Light Brown Sandy Lean Clay (CL)
▲	R-08-017	R-8	41.0	41.5	12.5	12.7	28	39	20	19	0.42	Gray Brown Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 - West County Connectors Segment

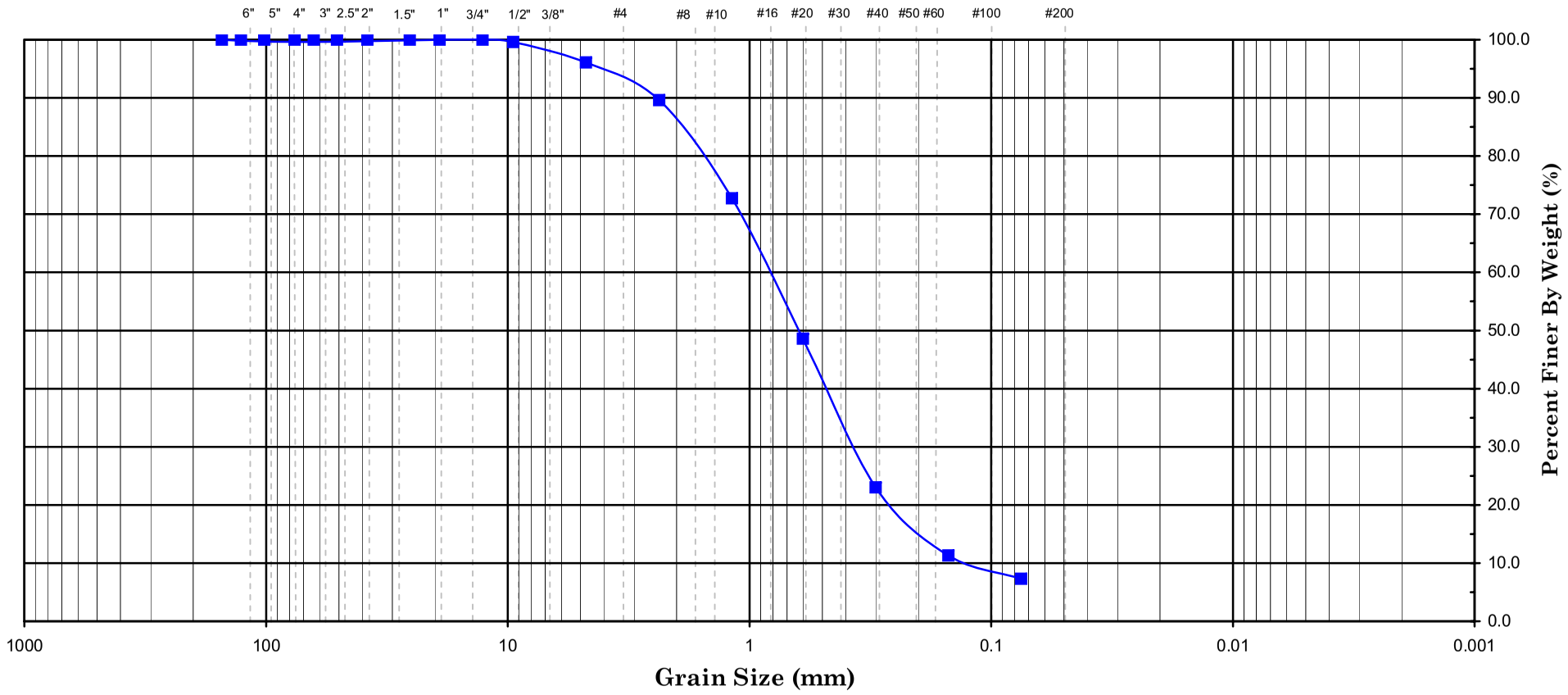
Project No. : I-436

Date : 05/28/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1b



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
■	R-08-011	S-11	60.0	61.3	18.30	18.70	Gray Brown	Well Graded Sand with Silt (SW-SM)	SW-SM

Remark :

GROUP DELTA CONSULTANTS

SR-22

GRAIN SIZE ANALYSIS

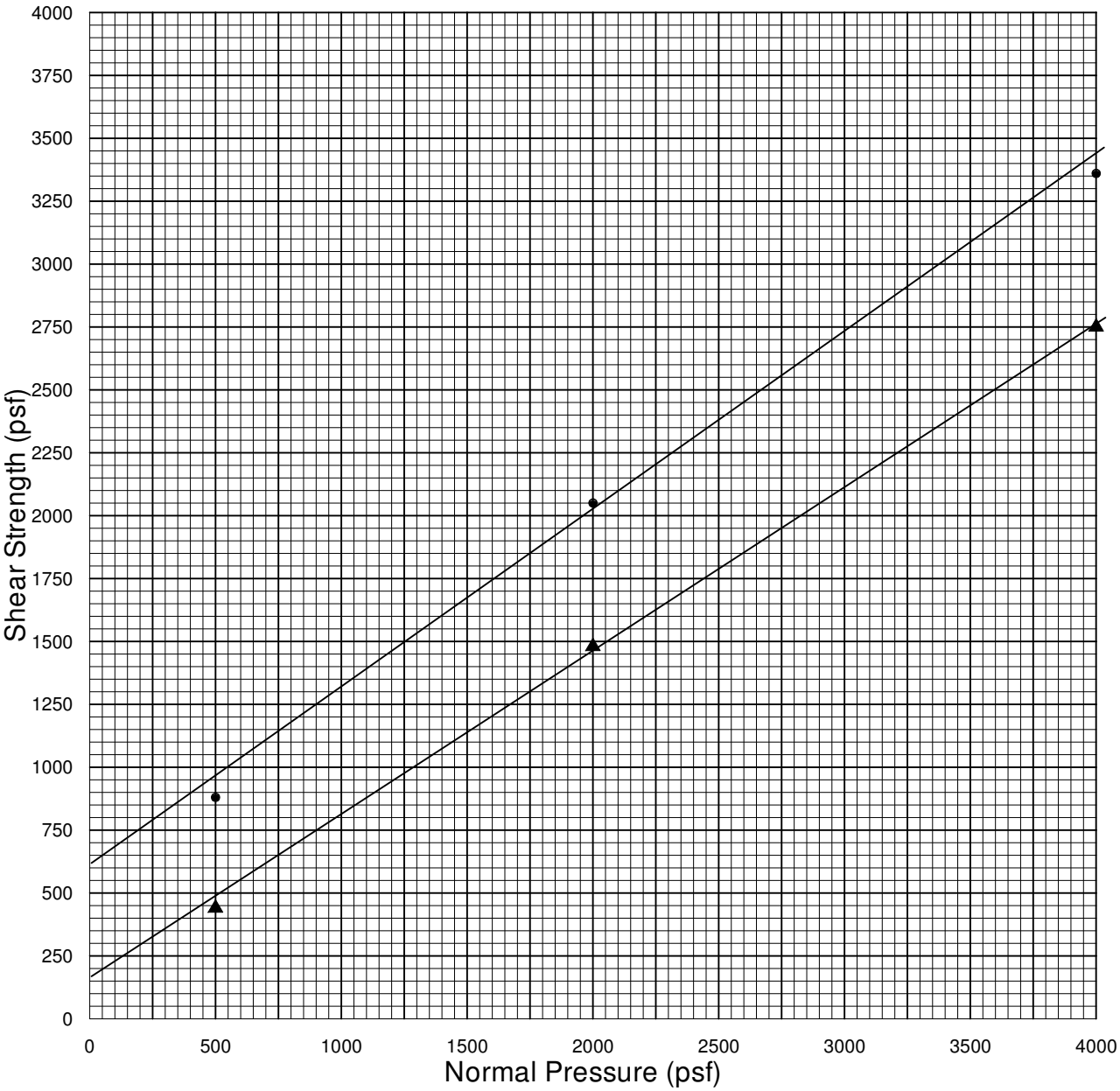
(ASTM D-422-63)

Project No. : I-436

Date : 05/11/08

Figure No. : B-2

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

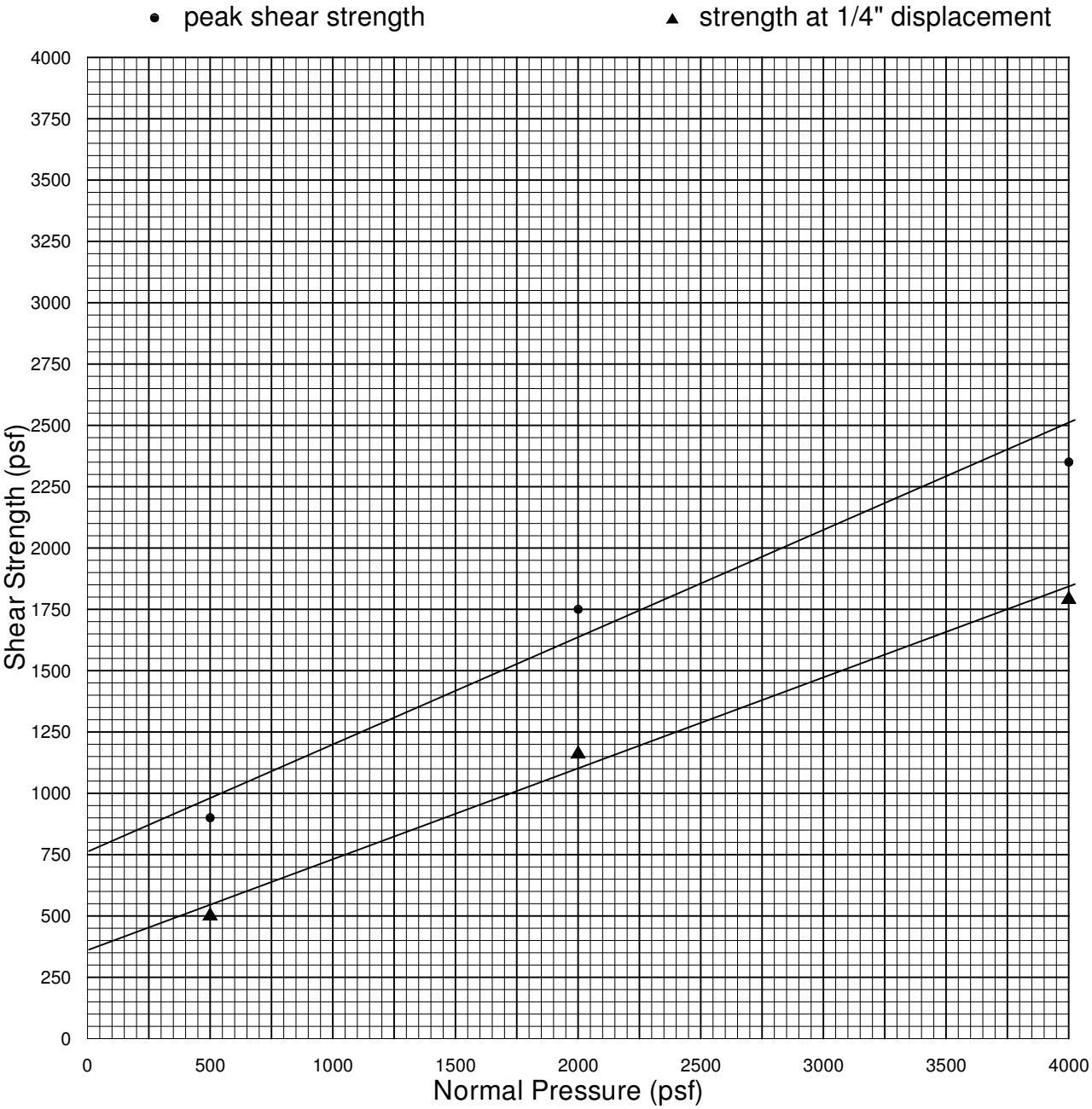
Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-004 @ 3'-5'	Undisturbed & Saturated	Sandy Lean Clay	120.4	10.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	880 @ 0.0750"	440
2000	2050 @ 0.1000"	1480
4000	3360 @ 0.1050"	2750
	C = 600 psf	C = 150 psf
	ϕ = 35 deg.	ϕ = 33 deg.

Figure No. B-3a

Geo**L**ogic **A**ssociates

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-017 @ 10'-11.5'	Undisturbed & Saturated	Lean Clay with Sand	92.4	25.8

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	900 @ 0.0500"	500
2000	1750 @ 0.0550"	1160
4000	2350 @ 0.0650"	1790
	C = 750 psf	C = 350 psf
	ϕ = 24 deg.	ϕ = 20 deg.

Figure No. B-3b

Boring / Sample No.	R-08-011	Depth:	20' - 21.5'	Date	05-13-08

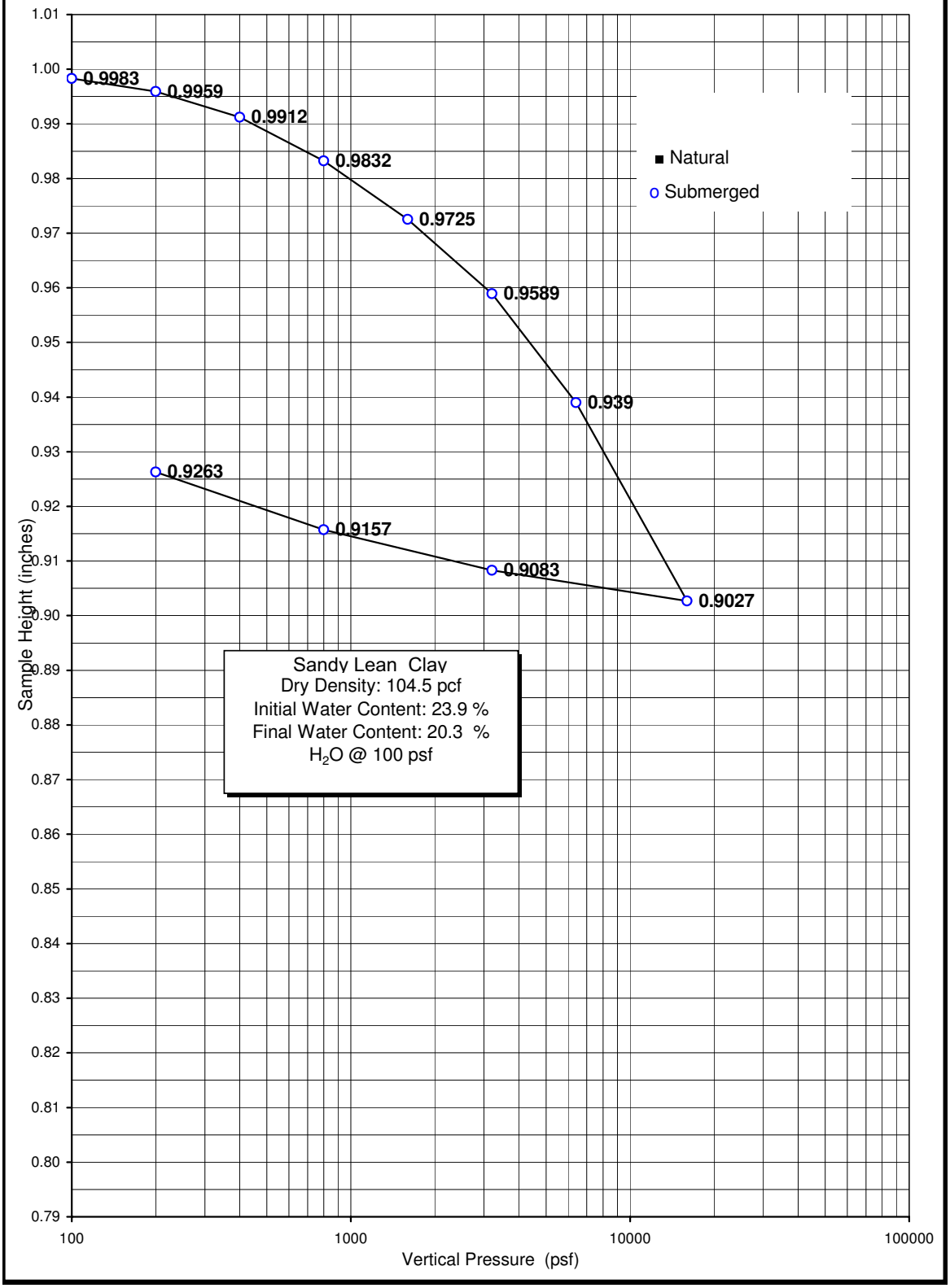


Figure No. B-4a

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-017	Depth:	40' - 41.5'	Date	05-13-08

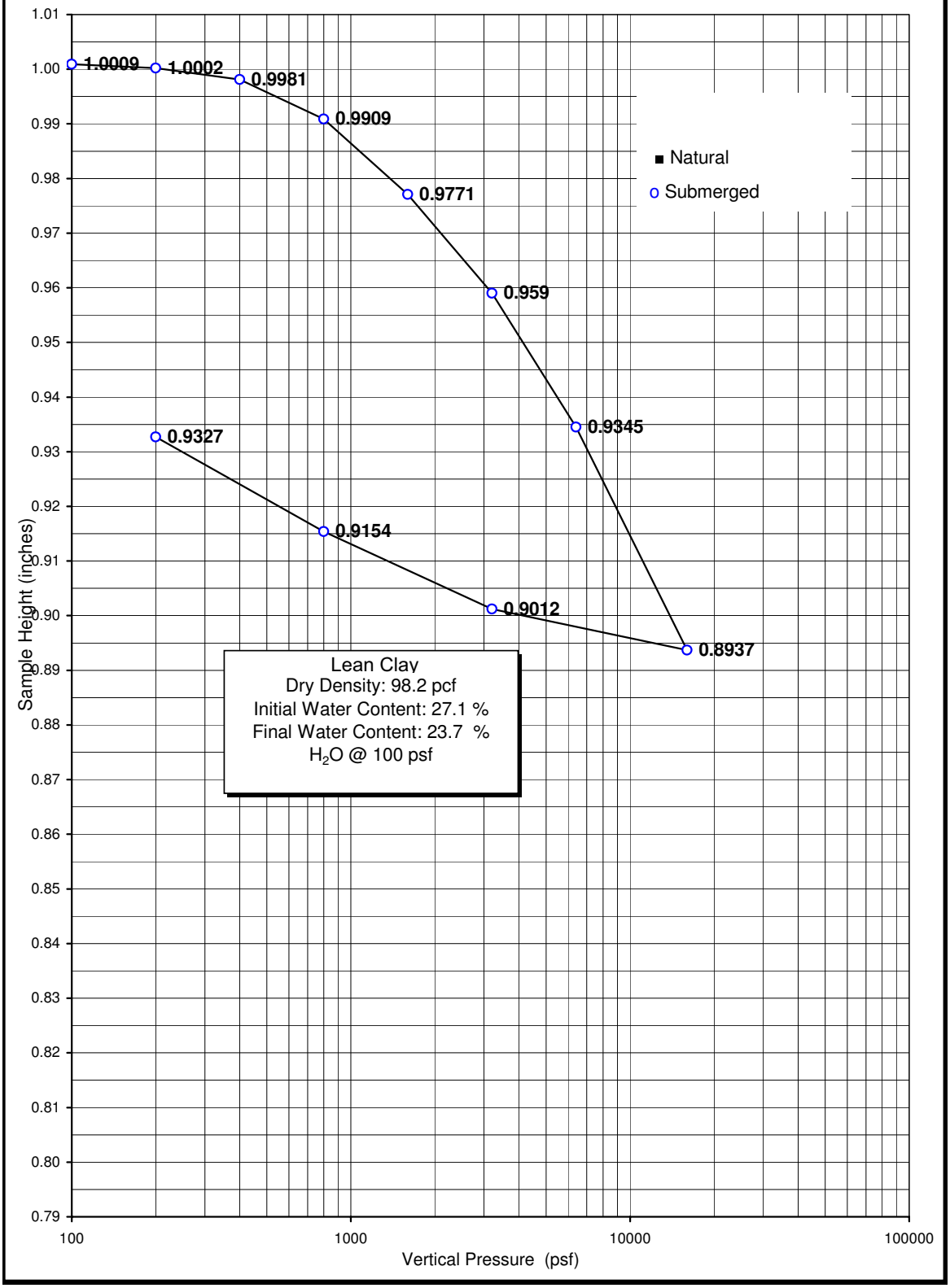


Figure No. B-4b

Geo**L**ogic **A**ssociates

R - VALUE DATA SHEET

P.N. I-436
SR-22

PROJECT NUMBER 35897 BORING NUMBER: R-08-004 @16"-42"

SAMPLE DESCRIPTION: Brown Sandy Clay

Item	SPECIMEN		
	a	b	c
Mold Number	10	11	12
Water added, grams	140	120	105
Initial Test Water, %	14.0	12.3	11.1
Compact Gage Pressure,psi	55	125	195
Exudation Pressure, psi	249	361	646
Height Sample, Inches	2.57	2.59	2.55
Gross Weight Mold, grams	3073	3112	3100
Tare Weight Mold, grams	1959	1965	1963
Sample Wet Weight, grams	1114	1147	1137
Expansion, Inches x 10exp-4	0	34	35
Stability 2,000 lbs (160psi)	43 / 100	29 / 63	27 / 58
Turns Displacement	4.87	4.59	4.30
R-Value Uncorrected	24	46	51
R-Value Corrected	25	48	51
Dry Density, pcf	115.2	119.4	121.6
	DESIGN CALCULATION DATA		
Traffic Index Assumed:	4.0	4.0	4.0
G.E. by Stability	0.77	0.53	0.50
G. E. by Expansion	0.00	1.13	1.17

Equilibrium R-Value **39** by EXPANSION

Examined & Checked: 10 /14/ 08

REMARKS:
Gf = 1.25
0.0% Retained on the 3/4" Sieve.

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle • Marvin

Figure No. B-5

APPENDIX C
SELECTED AS-BUILT DRAWINGS

TABLES

TABLE C-1: SUMMARY OF AS-BUILT FOUNDATION CHARACTERISTICS
S405 / E22 Separation OC, Bridge No. 55-0331R

Support Location	Foundation Type/Size	Number of Piles			Capacity			Average Bottom of Pile Cap Elevation	Pile Tip Elevation			Pile Penetration Length		
					Design Compression	Ultimate Compressive	Ultimate Uplift		Max	Min	Avg	Max	Min	Avg
		Batter	Vertical	Total	Kips	Kips	Kips	ft	ft	ft	ft	ft	ft	ft
Abut. 1	Class I Raymond Step Taper Piles	20	10	30	90.0	180.0	90.0	40.0	-26.5	-20.0	-23.7	63.5	61.3	65.8
Bent 2 Original	Class II Raymond Step Taper Piles	24	40	64	90.0	180.0	90.0	20.0	-28.7	-20.2	-22.1	49.0	41.7	42.1
Bent 2 Retrofit	Class 70C Piles	0	50	50	140.0	280.0	140.0	20.0	-	-	-37.3	-	-	57.3
Bent 3	Class II Raymond Step Taper Piles	0	64	64	90.0	180.0	90.0	19.0	-29.0	-21.2	-23.8	48.2	40.4	43.8
Bent 4 Original	Class II Raymond Step Taper Piles	0	64	64	90.0	180.0	90.0	16.0	-48.7	-30.0	-37.9	62.1	43.6	57.3
Bent 4 Retrofit	Class 70C Piles	0	52	52	140.0	280.0	140.0	16.0	-	-	-47.0	-	-	63.0
Abut. 5	Class I Raymond Step Taper Piles	23	15	38	90.0	180.0	90.0	33.0	-37.0	-18.5	-27.2	71.2	59.0	63.6

Notes:

1. Reference: As-built Plans (Figure 2 ans 3) and as-built LOTB (Figure 4)
2. 1994 Retrofit for design PBA = 0.5g included (1) adding concrete catchers and treated timber bumpers to abutments 1 & 5; (2) reinforcement of bents 2 & 4 by extending rebar to 14 new Class II 70 ton pile footing limits at bent 2 & 4 column 2, and bent 4 column 4; (3) reinforcement of bents 2 & 4 by extending rebar to 12 new Class 70C concrete pile footing limits at bent 2 & 4 columns 1 and 3, and bent 2 column 4.
3. Recommended axial pile load capacity values for seismic design assuming the piles are in good condition and the connection can transmit the uplift loads. The recommended values are limited to twice the reported design values.
4. Specified tip elevation at all supports is El.-20 feet.
5. Batter piles are 1:3 batter

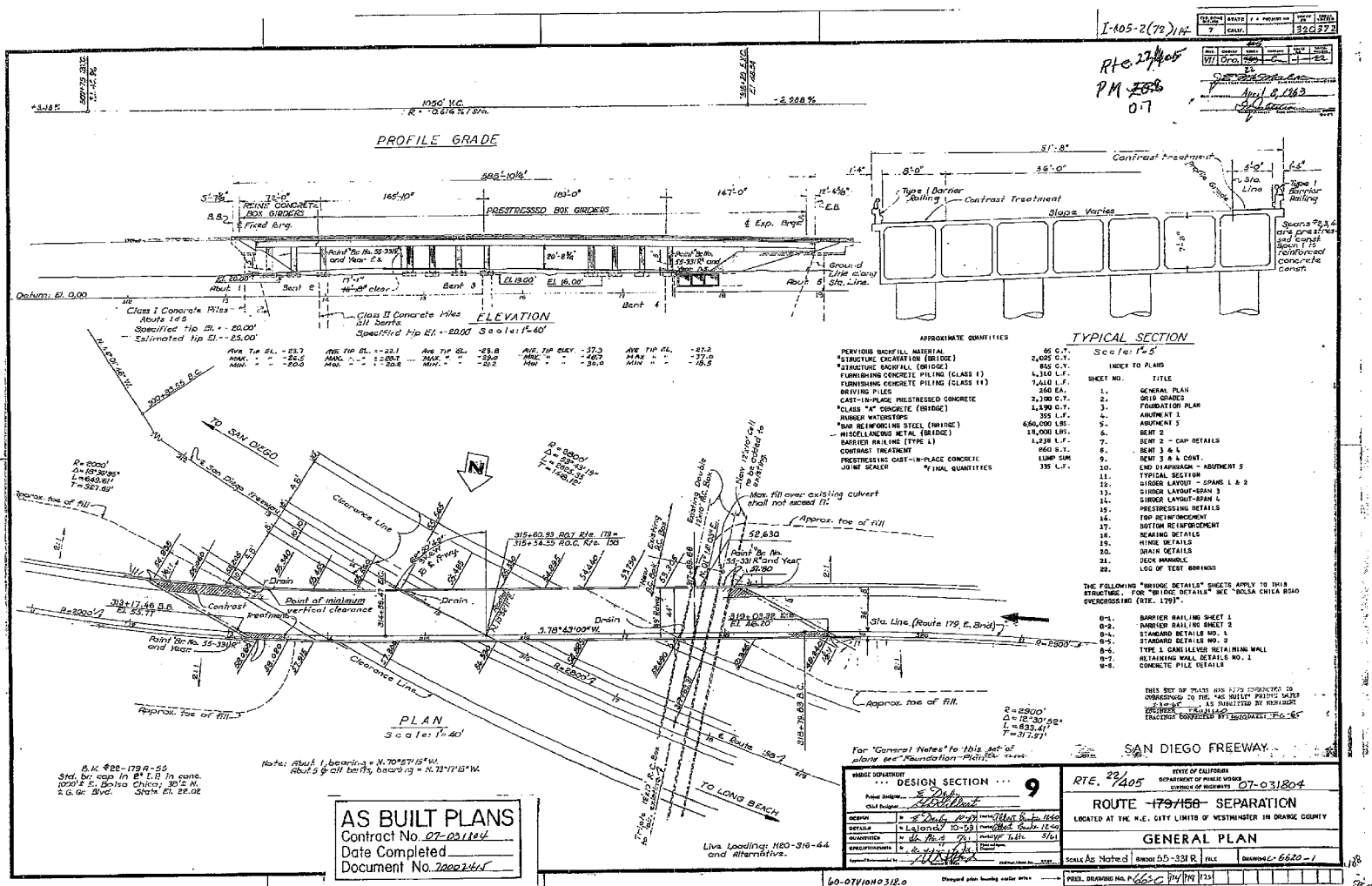
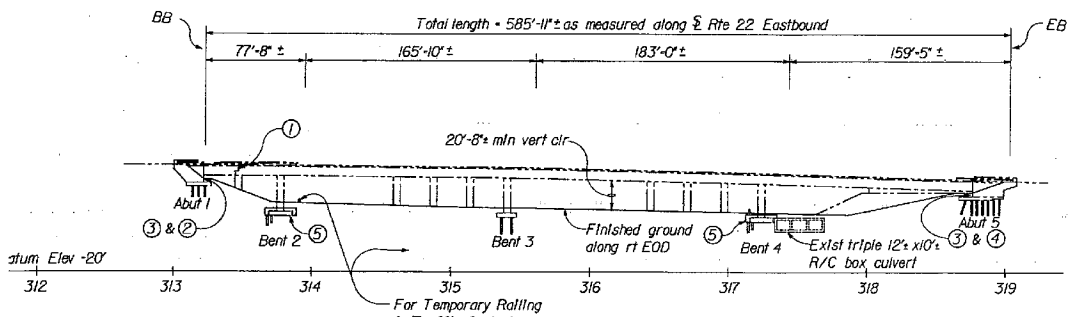

PROFILE GRADE
ELEVATION
PRESTRESSED BOX GIRDERS
TYPICAL SECTION
PLAN
TO SAN DIEGO
TO LONG BEACH
SAN DIEGO FREEWAY
AS BUILT PLANS
Contract No. 07-031804
Date Completed
Document No. 20002465
DESIGN SECTION 9
RTE. 22/405
ROUTE 179/158 SEPARATION
GENERAL PLAN
07-031804

Figure C-1



ELEVATION
1"=40'

RETROFIT LEGEND

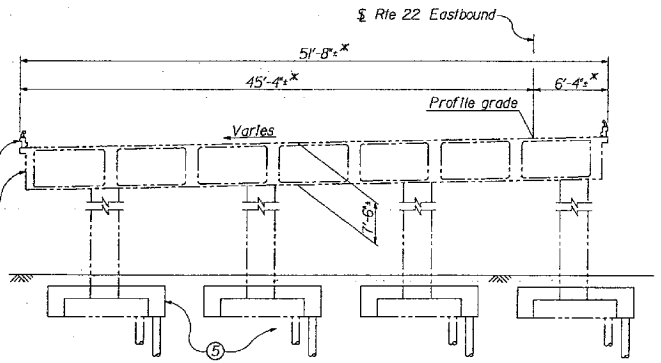
1. Hinge joint pipe restrainers
2. Abutment timber bumpers
3. Abutment concrete catchers
4. Abutment concrete bumpers
5. Footing retrofit

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	Ora	22, 405, 605	Var	67	94

Nader Tamannaie
REGISTERED CIVIL ENGINEER
5-23-94
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — N. TAMANNAIE — No. 37289 — Exp. 5-30-96 — CIVIL — STATE OF CALIFORNIA

Dokken Engineering
5221 Ramos Circle
Sacramento, CA 95827 · (916) 361-3111



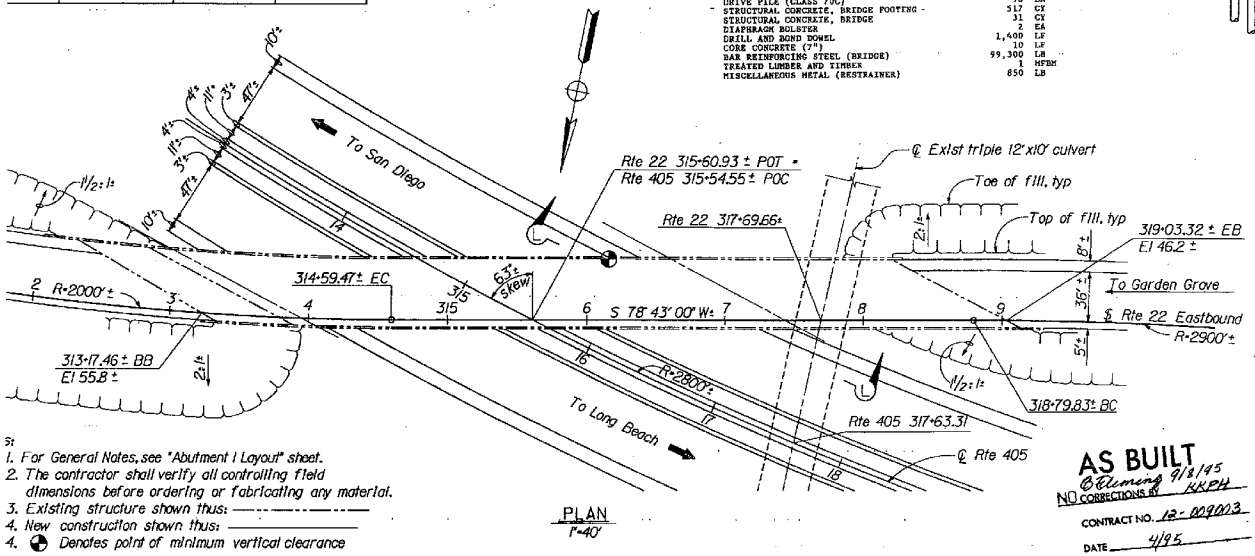
SECTION L-L
1" = 10'
*Normal to ℄ Rte 22

PILE DATA-CLASS 70C PILES

cation	Design loading (Service Load)	Specified Tip Elevation	Probable Tip Elevation
ent 2	70 tons	-32.0	-37.0
ent 4	70 tons	-42.0	-47.0

QUANTITIES

ACCESS OPENING, SOFFIT	2	EA
BRIDGE REMOVAL (PORTION)	LUMP	SUM
STRUCTURE EXCAVATION (TYPE M)	1,050	CY
STRUCTURE BACKFILL (BRIDGE)	550	CY
FURNISH PILING (CLASS 70C)	5,432	LF
DRIVE PILE (CLASS 70C)	98	EA
STRUCTURAL CONCRETE, BRIDGE FOOTING	517	CY
STRUCTURAL CONCRETE, BRIDGE	31	CY
DIAPHRAGM BOLSTER	2	EA
DRILL AND BOND DOWEL	1,400	LF
CORE CONCRETE (7")	10	LF
BAR REINFORCING STEEL (BRIDGE)	99,300	LB
TREATED LUMBER AND TIMBER	1	MFBM
MISCELLANEOUS METAL (RESTRAINER)	850	LB



PLAN
1"=40'

INDEX TO PLANS

Sheet No.	Title
1	General Plan
2	Abutment 1 Layout
3	Abutment 1 Retrofit Details
4	Abutment 5 Layout
5	Abutment 5 Retrofit Details
6	Bents 2 & 4 Retrofit Details
7	Excavation & Backfill Limits
8	Hinge Retrofit Details
9	Deck & Soffit Openings
10	As-Built Log of Test Borings

STANDARD PLANS DATED JULY 1992

SHEET NO.	TITLE
A10-A	Abbreviations
A10-B	Symbols
A62-C	Limits of Payment for Excavation & Backfill Bridge
B0-1	Bridge Details
B2-8	Pile Details - Class 45C & Class 70C

Standard plan sheet No.
Detail no.

AS BUILT
Contractor 9/8/95
NO CORRECTIONS BY HKPH
CONTRACT NO. 12-009003
DATE 4/95

5:
1. For General Notes, see "Abutment 1 Layout" sheet.
2. The contractor shall verify all controlling field dimensions before ordering or fabricating any material.
3. Existing structure shown thus: ———————
4. New construction shown thus: ———
4. Denotes point of minimum vertical clearance

DESIGN	BY N. Tamannaie	CHECKED W. Kwan	LOAD FACTOR DESIGN				
DETAILS	BY G. Bangs	CHECKED W. Kwan	LAYOUT	BY Y. HU	CHECKED W. Kwan		
QUANTITIES	BY Y. Hu	CHECKED B. Meyer	SPECIFICATIONS	BY J. Maniscalco	PLANS AND SPECS COMPARED N. Tamannaie		

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Nader Tamannaie
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES
FOR REDUCED PLANS 0 1 2 3

CU 12
EA 009001
591763-7

BRIDGE NO. 55-331R
POST MILE 07

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 1 OF 10

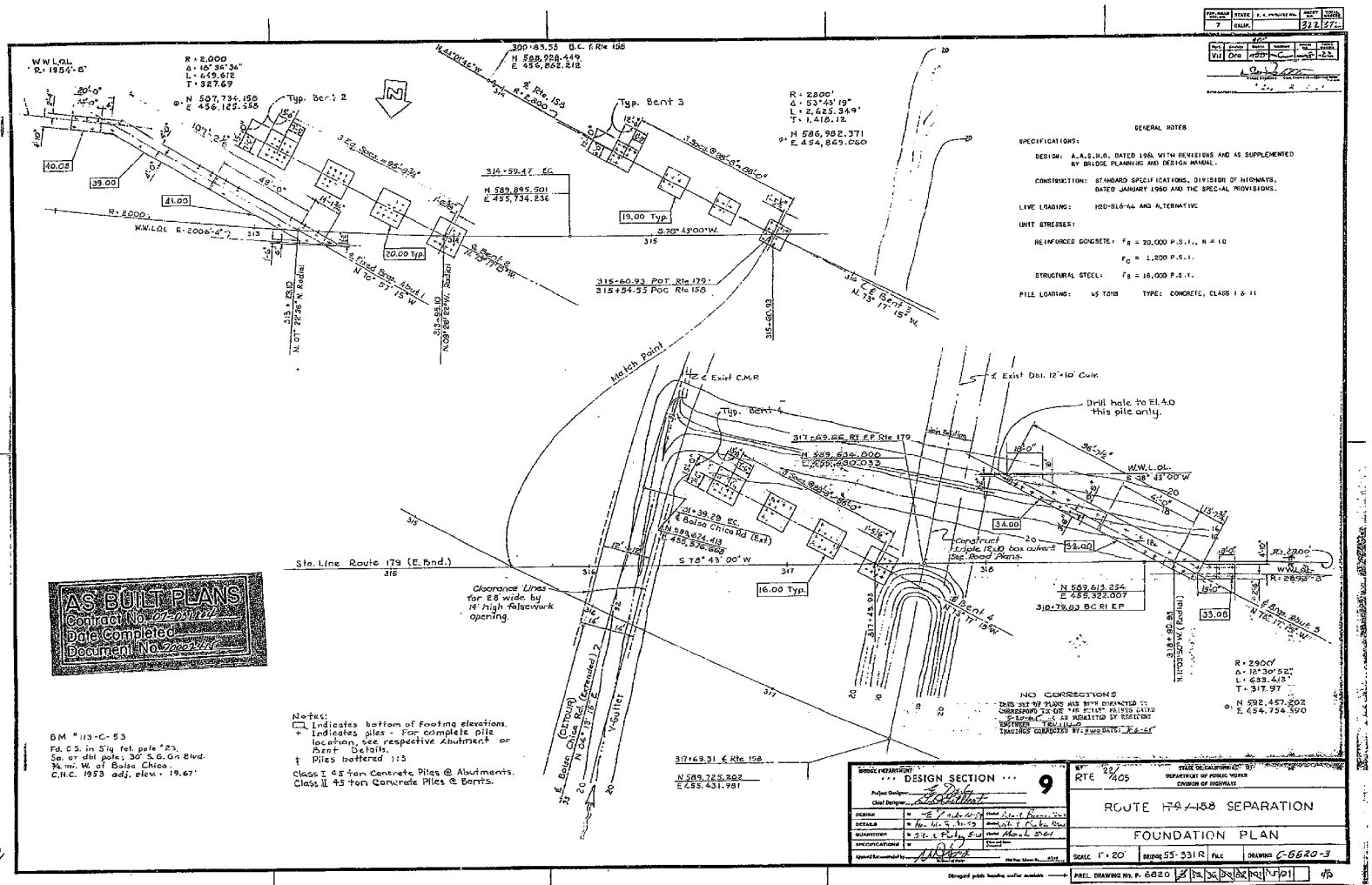
EARTHQUAKE RETROFIT PROJECT NO. 124
ROUTE 22/405 SEPARATION
GENERAL PLAN

BRIDGE NO. 55-331R

BRFTGPGN REV 6 KD 12/22/93

CutePDF - www.cutepdf.com

Figure C-2



I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND DOWNLOADED THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 2-10-77 SIGNATURE [signature] TITLE SR ENG

Figure C-3

ClibPDF - www.fastio.com

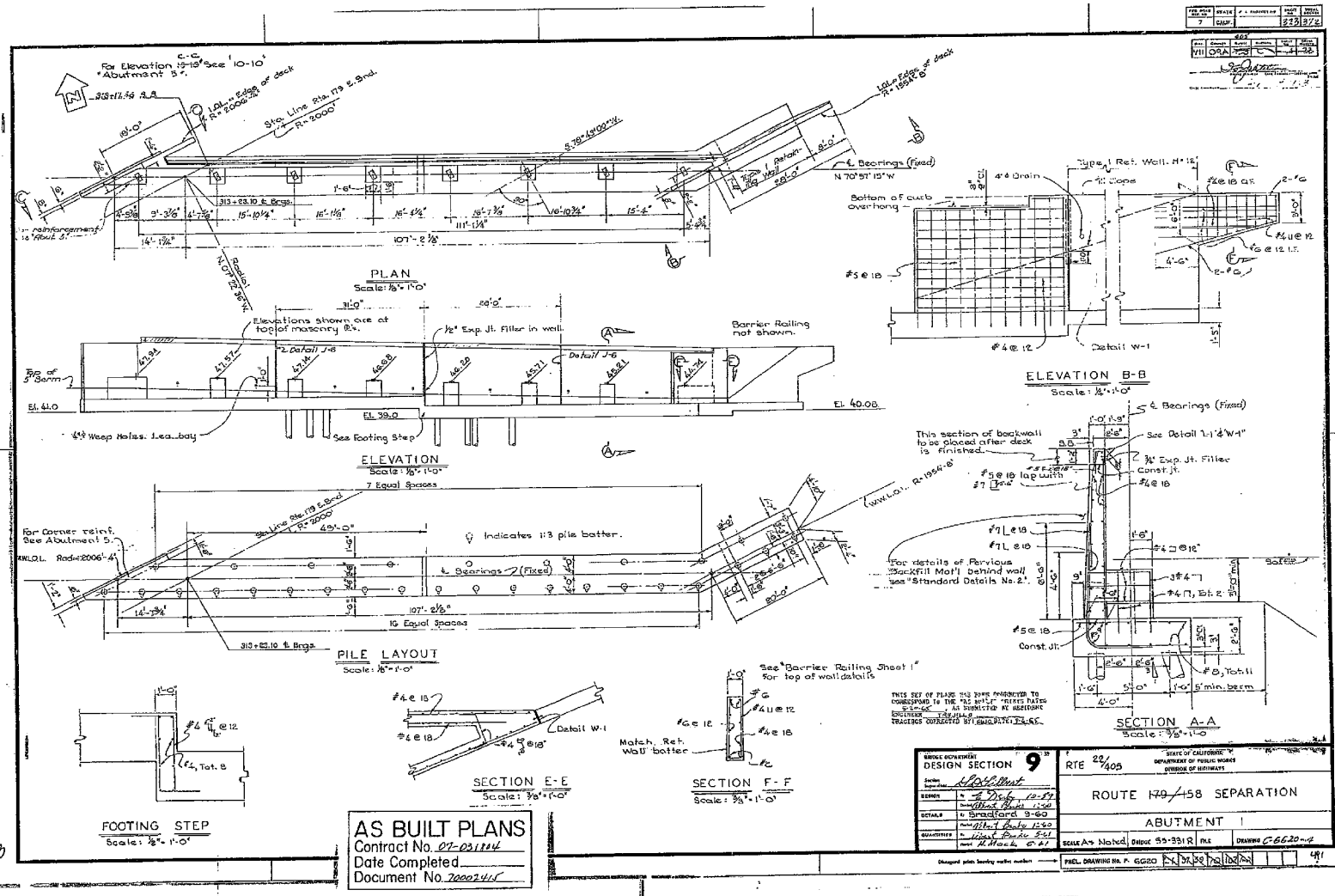
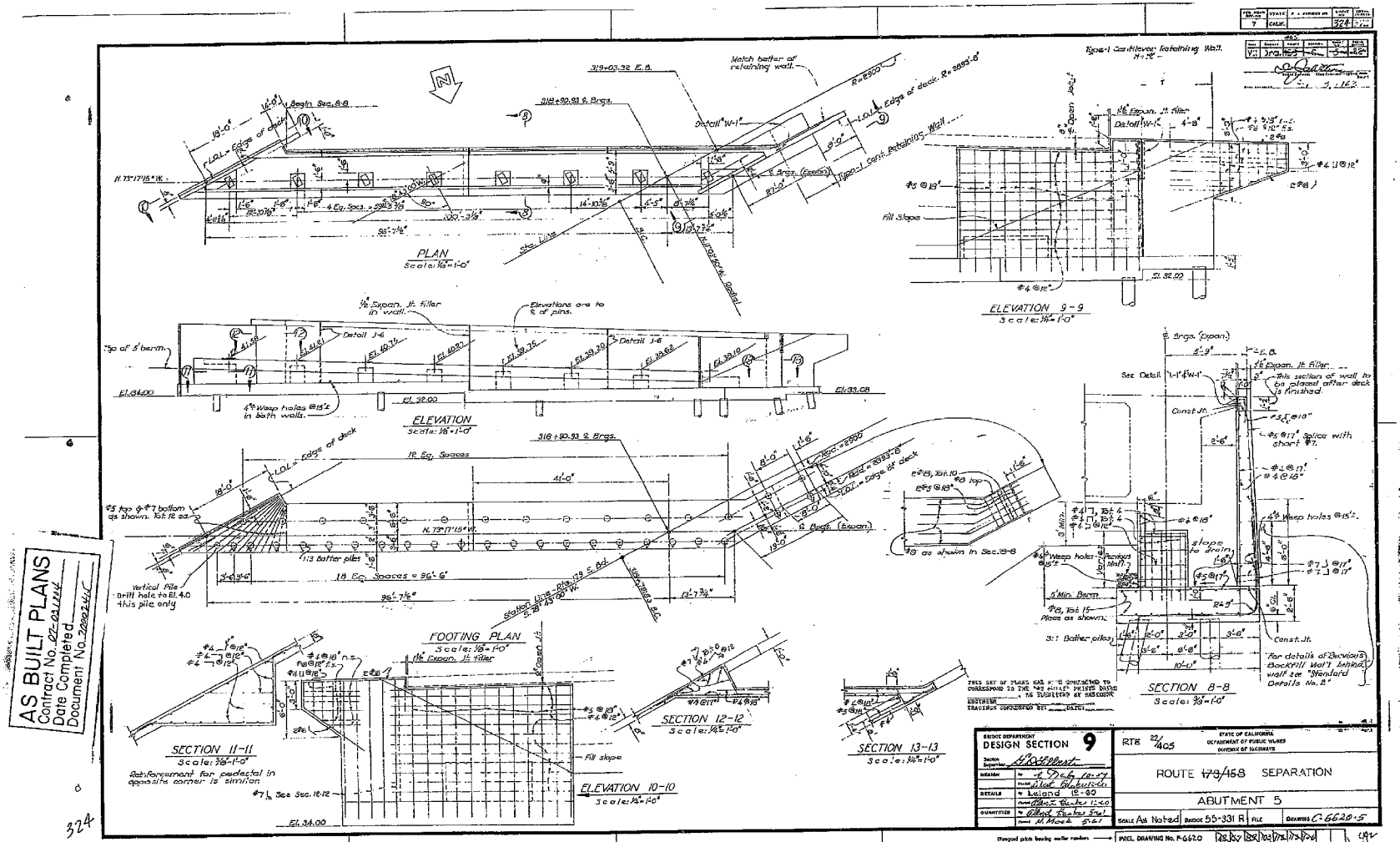

PLAN
Scale: 1/8"=1'-0"
ELEVATION
Scale: 1/8"=1'-0"
PILE LAYOUT
Scale: 1/8"=1'-0"
ELEVATION B-B
Scale: 1/2"=1'-0"
SECTION A-A
Scale: 1/2"=1'-0"
SECTION E-E
Scale: 3/8"=1'-0"
SECTION F-F
Scale: 3/8"=1'-0"
FOOTING STEP
Scale: 1/8"=1'-0"
Detail W-1
Type 1 Ret. Wall. H=12'
Barrier Railing not shown.
Elevations shown are at top of masonry ℄'s.
Indicates 1:3 pile batter.
℄ Bearings (Fixed)
313+83.10 ℄ Brgs.
Const. Jt.
Weep Holes. 1 ea. bay
See Footing Step
See Detail J-6
See Detail 1-1 & W-1
See Barrier Railing Sheet 1 for top of wall details
For details of Pervious Backfill Mat'l behind wall see "Standard Details No. 2".
This section of backwall to be placed after deck is finished.
Match. Ret. Wall batter
AS BUILT PLANS
Contract No. 07-051104
Date Completed
Document No. 7000245
DESIGN SECTION 9
RTE 22/405
ROUTE 179/458 SEPARATION
ABUTMENT 1
SCALE As Noted
DRAWING C-6620-4

Figure C-4



I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CHECKED ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 2-10-22 SIGNATURE _____ TITLE "A" Level

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Figure C-5

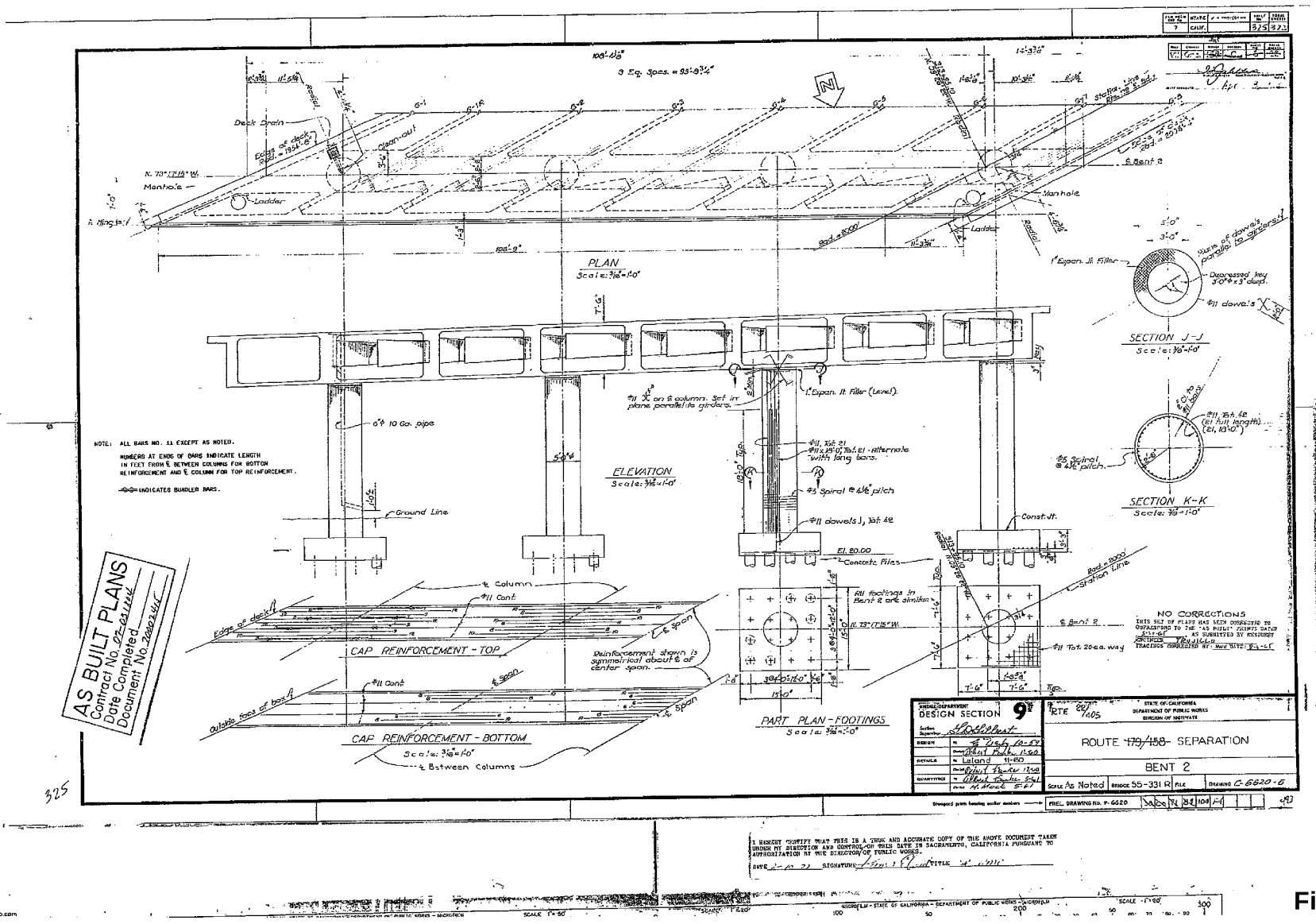
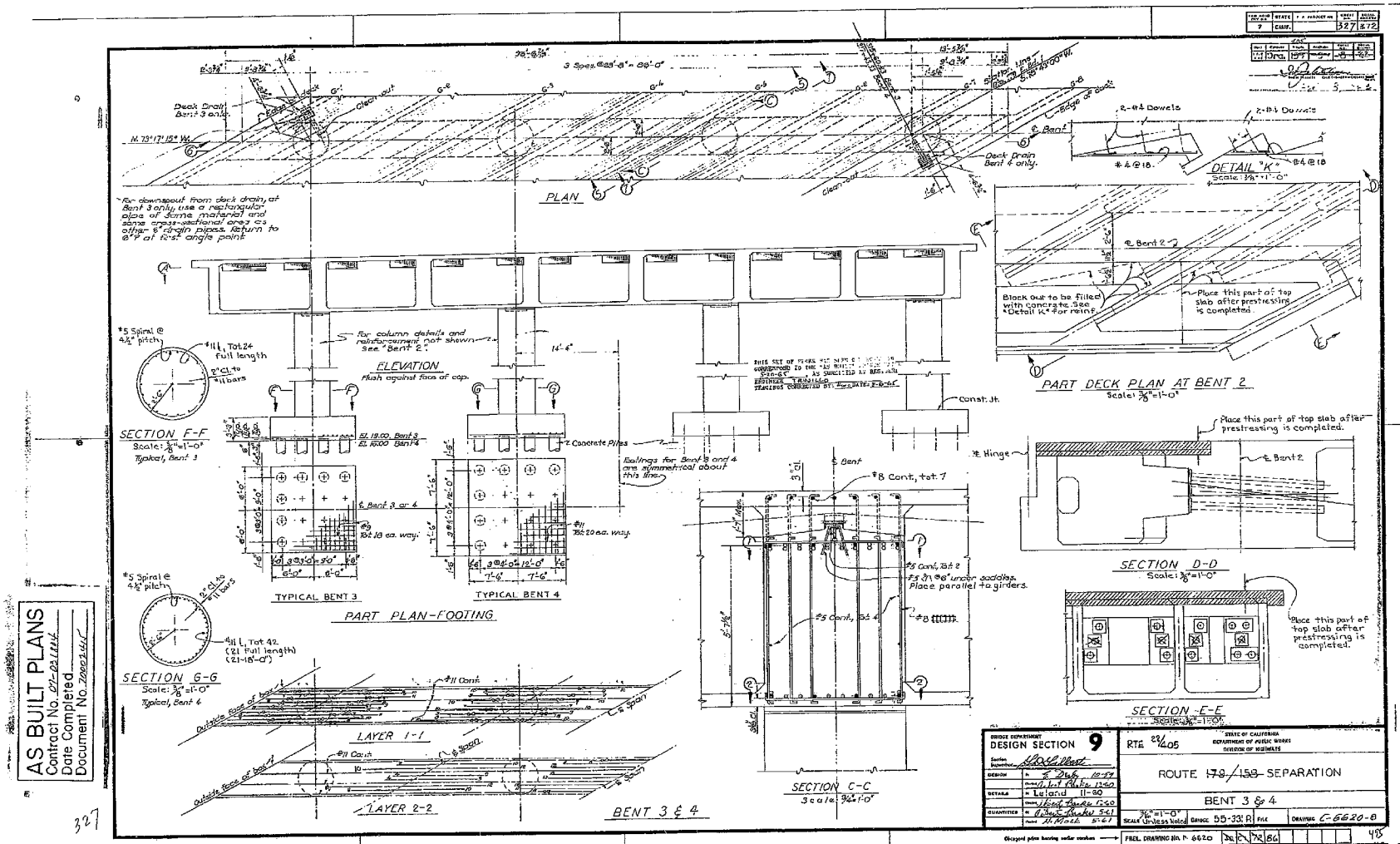

PLAN
Scale: 3/16"=1'-0"
ELEVATION
Scale: 3/16"=1'-0"
CAP REINFORCEMENT - TOP
CAP REINFORCEMENT - BOTTOM
Scale: 3/16"=1'-0"
PART PLAN - FOOTINGS
Scale: 3/16"=1'-0"
SECTION J-J
Scale: 3/8"=1'-0"
SECTION K-K
Scale: 3/8"=1'-0"
NOTE: ALL BARS NO. 11 EXCEPT AS NOTED.
NUMBERS AT ENDS OF BARS INDICATE LENGTH IN FEET FROM ℄ BETWEEN COLUMNS FOR BOTTOM REINFORCEMENT AND ℄ COLUMN FOR TOP REINFORCEMENT.
INDICATES BUNDLED BARS.
AS BUILT PLANS
Contract No. 07-0J1U4
Date Completed
Document No. 2002-Jul-
NO CORRECTIONS
DESIGN SECTION 9
ROUTE 170/158 SEPARATION
BENT 2
Scale As Noted
Bridge 55-331 R
Drawing C-6620-6
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

Figure C-6



AS BUILT PLANS
Contract No. 07-03 1446
Date Completed
Document No. 2000134

327

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DATE 2-10-22 SIGNATURE [illegible] TITLE "A" Level

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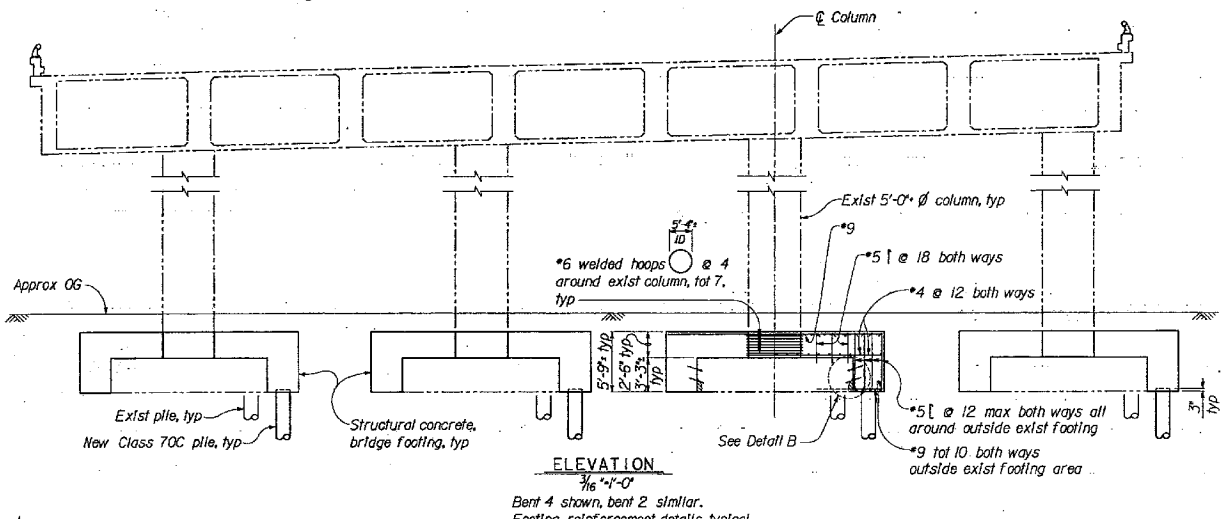
Figure C-7



ELEVATION

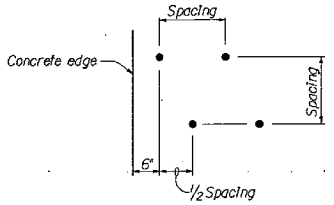
3/16"=1'-0"

Bent 4 shown, bent 2 similar.
Footing reinforcement details typical

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	Ora	22,405, 605	Var	72	94

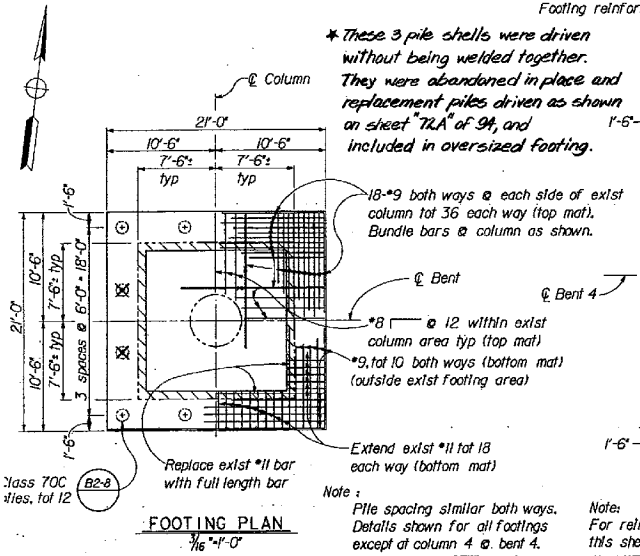
Nader Tamannaie
REGISTERED CIVIL ENGINEER
N. TAMANNAIE No. 37269 Exp. 6-30-96 CIVIL STATE OF CALIFORNIA
5-23-94
PLANS APPROVAL DATE

Dokken Engineering
3221 Ramos Circle
Sacramento, CA 95827 · (916) 361-3111



STAGGERED HOLE PATTERN

No Scale

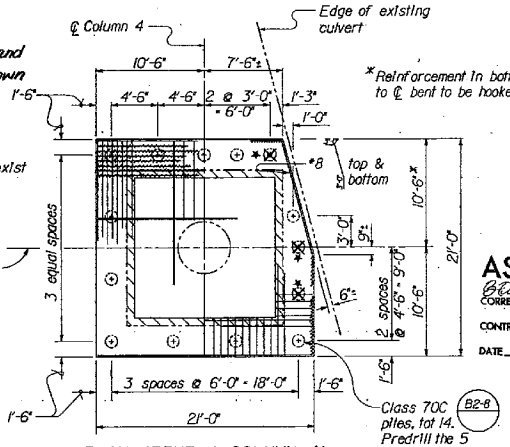


FOOTING PLAN

3/16"=1'-0"

Note:
Pile spacing similar both ways.
Details shown for all footings except at column 4 @ bent 4.

*These 3 pile shells were driven without being welded together. They were abandoned in place and replacement piles driven as shown on sheet "72A" of 94, and included in oversized footing.

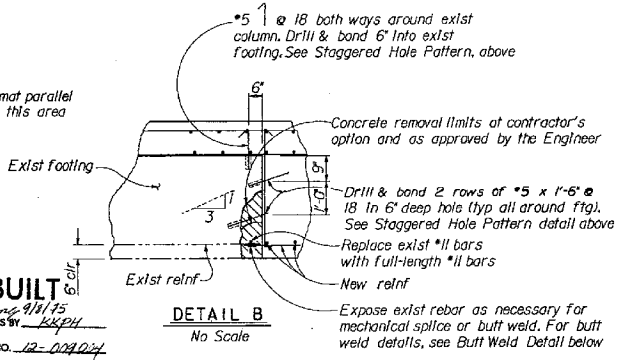


PLAN (BENT 4-COLUMN 4)

3/16"=1'-0"

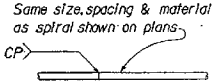
Note:
For reinforcement details not called out, see "Footing Plan" & "Elevation" on this sheet. Columns numbered left to right looking ahead on station

AS BUILT
Bfleming 9/8/95
CORRECTIONS BY KKPH
CONTRACT NO. 12-009014
DATE 4/95



DETAIL B

No Scale



BUTT WELD DETAIL

No Scale

Notes:
1. ▨ Denotes concrete removal
2. ⊃ Denotes bundled bars.
3. The contractor shall verify all controlling field dimensions before ordering or fabricating any material.
4. Existing structure shown thus: ——— ——— ———
5. New construction shown thus: ———

EARTHQUAKE RETROFIT PROJECT NO. 124

ROUTE 22/405 SEPARATION

BENTS 2 & 4 RETROFIT DETAILS

Moe Amini			
DESIGN OVERSIGHT			
COMPT DATE 5/94			
DESIGN	BY N. Tamannaie	CHECKED W. Kwan	
DETAILS	BY B. Waldrop	CHECKED W. Kwan	
QUANTITIES	BY Y. Hu	CHECKED B. Meyer	
PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION			
Nader Tamannaie PROJECT ENGINEER			
CU 12 EA 409001			

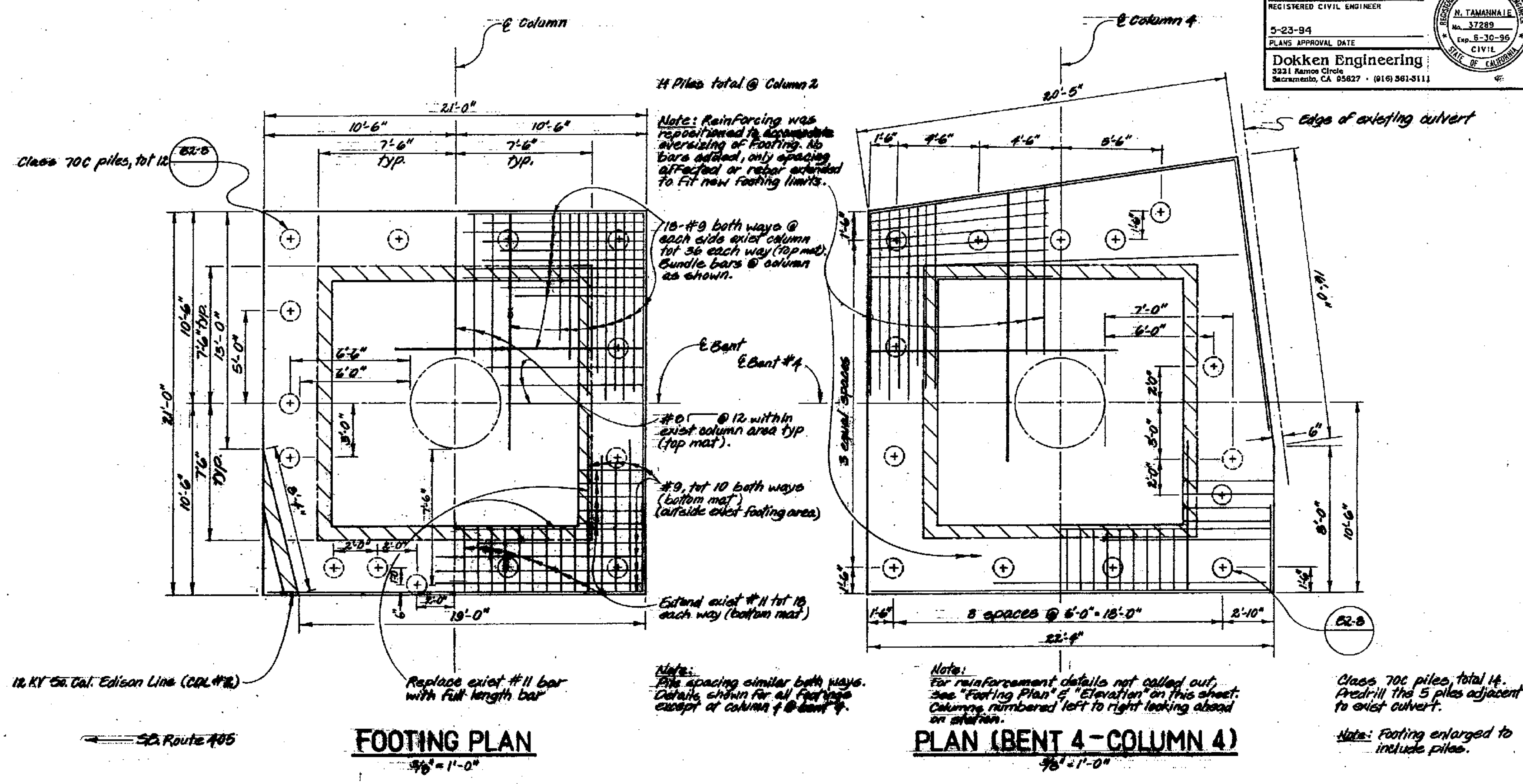
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.	55-331R
POST MILE	0.7
DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET	6
OF	10

816FTBDLGN REV 3 KD 11/15/93

CTBMPDF - www.ctsiip.com

Figure C-8



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	Ora	22,405, 605	Var	12A	34

REGISTERED CIVIL ENGINEER
5-23-94
PLANS APPROVAL DATE

Dokken Engineering
3231 Ramos Circle
Sacramento, CA 95827 · (916) 361-3111

REGISTERED PROFESSIONAL ENGINEER — N. TAMANNAIE — No. 37289 — Exp. 6-30-96 — CIVIL — STATE OF CALIFORNIA

Moe Amini
DESIGN OVERSIGHT
SIGN OFF DATE 3/94

DESIGN	N. Tamannaie	CHECKED	W. Kwan
DETAILS	B. Waldrop	CHECKED	W. Kwan
QUANTITIES	Y. Hu	CHECKED	B. Meyer

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Nader Tamannaie
PROJECT ENGINEER

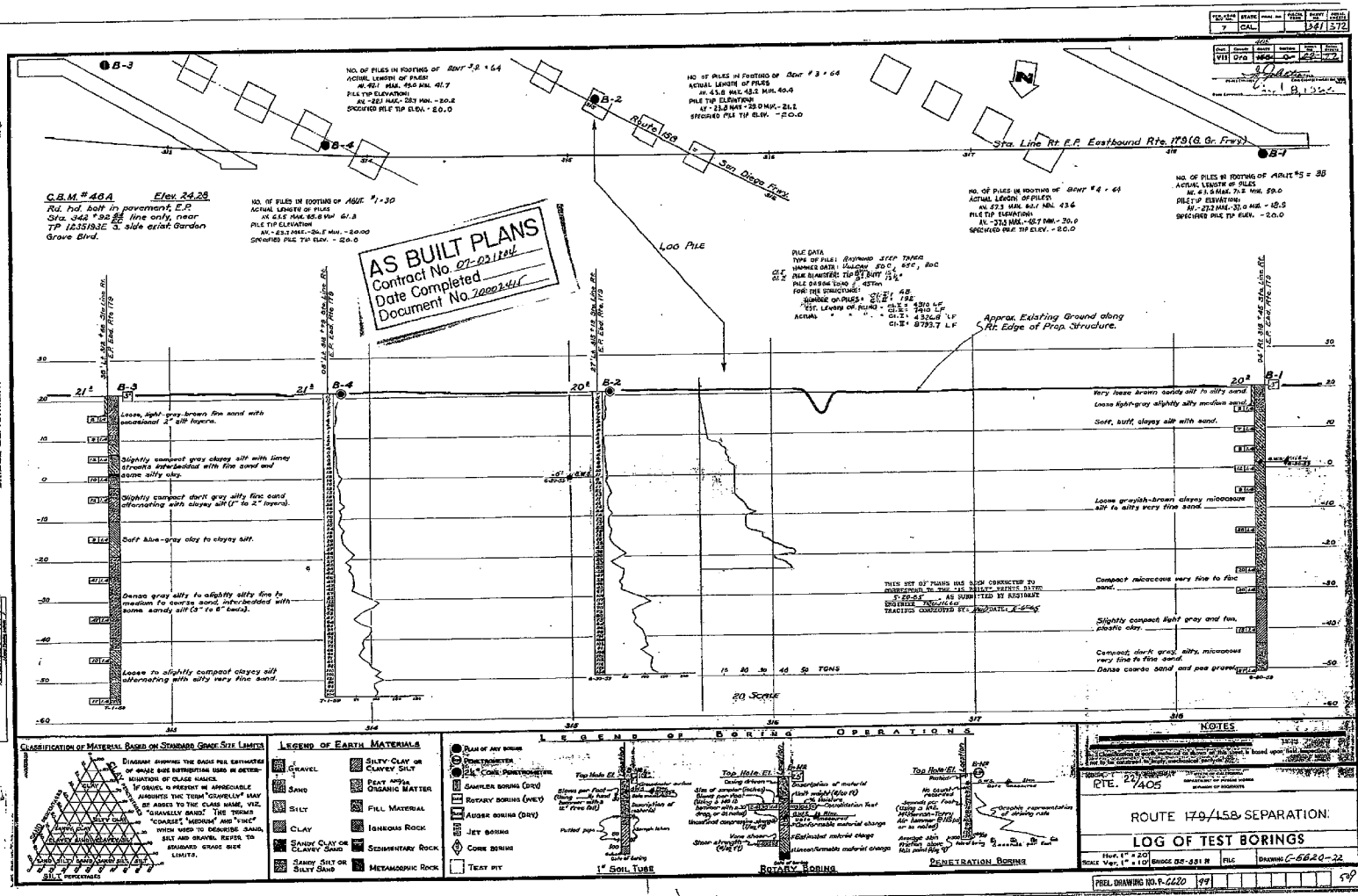
BRIDGE NO. 55-331R
POST MILE 07

EARTHQUAKE RETROFIT PROJECT NO. 124
ROUTE 22/405 SEPARATION
BENTS 2 & 4 RETROFIT DETAILS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
CU 12
EA 009001
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 6A OF 10

BIGFTBOLDGN REV 3 KD 11/15/93

Figure C-9



I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION OF THE DIRECTOR OF PUBLIC WORKS.

DATE 2-10-22 SIGNATURE [signature] TITLE SR DRAFTSMAN

Figure C-10

APPENDIX D
CALTRANS FOUNDATION REVIEW – SEISMIC DESIGN CRITERIA

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)

FAX: (916) 227- 9765

DATE: December 11, 2007

FILE: 12 (District) ORA (County) 22 (Route) (Post Mile)

MEMO BY: Group Delta Consultants DATED: 11/14/2007

SR-22 Phase 2 project: Valley View UC, S405/E22 Connector OC, New SR22/I-405 HOV Connector
Structure Name

GENERAL PLAN DATED: N/A FDN PLAN DATED: N/A

12-071630 (EA Number) 55-var (Bridge Number)

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4Th [ ] Other: _____

The following are our review comments on the memorandum you forwarded with the subject titled "**Seismic Design Criteria for Bridges** (SR 22 Valley View OC Replacement. S405/E-22 Connector OC Replacement, New SR-22/I-405 HOV Connector)", dated November 14, 2007, prepared by Group Delta Consultants.

1. The design ARS for all structures located within the identified limits of the project should be developed based on a design PBA of 0.5g and Maximum Credible Earthquake (MCE) magnitude of 7.0 associated with the Newport-Inglewood fault. This is because, except at very low periods, spectral accelerations for this ARS should be higher than those for the ARS corresponding to a PBA=0.6g and MCE magnitude of 6.0 associated with the Los Alamitos fault. The design ARS shall include modifications due to near-fault effects as specified in the Caltrans Seismic Design Criteria (SDC).
2. The Table 2 in the report should also include estimated median Peak Ground Acceleration (PGA) using Sadigh et al (1997) attenuation relationships. Geotechnical analysis such as liquefaction may need to be performed for more than one fault or combination of PGA and MCE magnitude to determine the controlling case.
3. The "Rated Magnitude" in Table 1 should be replaced with "Maximum Credible Earthquake or MCE Magnitude". The MCE magnitude for the Puente Hills Blind Thrust fault should be 7.25.
4. When available, only the "EQFAULT Fault to Site Distance (km)" in Table 2, which in fact is the closest distance to the fault rupture surface, should be used when using Sadigh et al (1997) attenuation relationships.
5. Due to the limited scope of the memo, the title should be changed from "Seismic Design Criteria for Bridges ", to "Design Ground Motion Criteria for Bridges".
6. "Caltrans seismology department" should be replaced with "Caltrans Geotechnical Services".

Reviewed By: Mohammed Islam, Ph.D., G.E., Senior Transportation Engineer/Seismic Specialist

Tel. 916-983-3328

Geotechnical Design South-1

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)

FAX: (916) 227- 8683

DATE: January 11, 2008

FILE: 12 (District) ORA (County) 405 (Route) (Post Mile)

MEMO BY: Group Delta Consultants (GDC)

DATED: 12/19/2007

SR-22 Phase 2 project: Valley View UC, S405/E22 Connector OC, New SR22/I-405 HOV Connector
Structure Name

GENERAL PLAN DATED: N/A

FDN PLAN DATED: N/A

12-071631
EA Number

405-var
Bridge Number

Submittal (*Check One*): [ ] 1st [x] 2nd [ ] 3rd [ ] 4Th [ ] Other: _____

The following are our review comments on the memorandum with the subject title "**Seismic Memorandum No. 2 – ARS Curves for Bridges Design Criteria for Bridges** (SR 22 Valley View OC Replacement. S405/E-22 Connector OC Replacement, New SR-22/I-405 HOV Connector), to be used in conjunction with our memorandum dated 11-14-07 previous submitted addressing PBA.

1. The report presents two ARS curves in Figure 2. It does not identify the recommended ARS curve. Furthermore, any recommended ARS curve at this time should be identified as preliminary.
2. The suggested design PBA of 0.6g in the memorandum dated 11-14-07 was based on a MCE magnitude M= 6.0. However, the modified ARS curves for PBA=0.6g presented in the subject memorandum for PBA=0.6g were developed based on the standard SDC curve for M=6.5±0.25. There are no standard SDC curves for M=6.0
3. A modified Type E ARS curve for PBA=0.5g and M=7.0 should be recommended as the preliminary design ARS curve for this project.
4. If, after completion of the geotechnical exploration, the soil profile at the site is categorized as Type F due to liquefaction, two different ARS curves, one without liquefaction and the other considering liquefaction should be recommended for structure design. Soil or foundation design parameters used in the structural analysis should correspond to the conditions appropriate for the ARS under consideration.
5. Please see our "Foundation Review" document, dated December 11, 2007 for comments on the GDC memorandum dated 11-14-2007.

Reviewed By:	Mohammed Islam, Ph.D., G.E., Senior Transportation Engineer/Seismic Specialist		
	Geotechnical Design South-1 5900 Folsom Blvd Sacramento, CA 95630		Tel. 916-983-3328; email: mislam@dot.ca.gov

APPENDIX E
(Submitted in a Separate Package)

APPENDIX F
CALTRANS COMMENTS AND RESPONSES

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

April 9, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments dated March 26, 2009**
(2nd Submittal)
Foundation Report
S405-E22 Connector Separation (Replace)
BRIDGE NO. 55-1101F
12-ORA-22,405-PM 20.75, CU 12235, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 21, 2008 (revised February 17, 2009)
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Is LRFD Design Guidelines 4th Edition, dated 2007 used for design? If not, explain.

Yes, geotechnical design is in general accordance. Please refer to the General Notes and Index to Plans for design criteria for structures (more detail in response to Bolsa Chica Road OC).

2. LOTB must have the name of Caltrans OSFP liaison engineer …… .

The requested change has been made in the revised logs. The space will be left blank for Caltrans to insert electronic signature.

3. LOTBs must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to …….).

The requested change has been made in the revised logs.

4. Include in Tabular form in the Appendix, a summary of laboratory test results ……..

The requested summary is provided in Table B-1 through B-4 in Appendix B.

5. Table 1 summarizes the recommended design properties. Explain in section 3.3.3 of the subject submittal, how strength parameters (both drained and undrained) and internal friction angle were evaluated.

Drained shear strength parameters are primarily obtained from the Consolidated Drained (CD, slow) direct shear test results using peak and ultimate values of cohesion intercept and friction angle. Undrained shear strengths were obtained from the interpreted CPT data which uses $S_u = Q_c / N_k$ in which:

S_u = undrained shear strength, ksf
Q_c = cone tip resistance, tsf, and
N_k = 15.

Interpreted S_u values are shown in the interpreted CPT data in Appendix A. Penetration resistance and pocket penetrometer / torvane data were used to confirm reasonableness of CPT S_u data. Discussion has been added to Section 3.3.3.

6. Are the consolidation coefficients found based on Consolidation tests (direct method) or by correlation (indirect method)? Explain.

C_c and C_r were obtained from consolidation tests (direct method) applying Schmertmann's correction; Cr was approximated by C_e (unloading). C_v, coefficient of consolidation, was based on correlations (Navfac, 1987) Figure 3-6, 7-3-15.

7. Explain why no Triaxial tests were performed to assess the strength of the soils. Please refer to 2007 LRFD Design specification Guidelines, Section 10.4.6.2.2.

The local Southern California practice is to use pocket penetrometer and interpreted CPT data for undrained shear strength. A conservative interpretation of the CPT interpreted undrained shear strength is used in the design. Where very soft cohesive soils are present, such as Bay Mud, triaxial tests or vane shear tests may be warranted. However, in our 20 years of experience on Caltrans projects and 38 years experience using CPT data on local generally medium stiff to stiff cohesive soils, no triaxial tests have conventionally been performed.

8. What does Method 2 refer to in the CPT liquefaction calculations? Explain.

Method 2 refers to triggering analysis based on CPT data and settlement calculations based on equivalent SPT blow count. Method 1 refers to triggering analysis and settlement calculations based on equivalent SPT values.

9. Are there any facilities nearby the pile driving activities and if so what is impact of the pile driving vibration on these facilities, both airborne and in ground? Explain.

The closest pile driving operations are 365 ft from Abutment of the new bridge to the housing north of the site. Based on experience (Theissen and Wood, 1982), at a distance of 365 ft, no significant vibration or damage from pile driving is anticipated. Charts are included in Attachment 2. Noise will be an issue; however, existing soundwalls are present and will mitigate the sound effects to some extent.

10. How the nominal resistance was arrived at?

Factored loads were provided by the Structural Engineer and nominal resistance was obtained by dividing the sum of factored loads by resistance factor. As per Caltrans requirements, a resistance factor of 0.7 was used for strength limit state and 1.0 was used for extreme limit state.

Nominal Resistance = Sum of the Factored Loads / Resistance factor

11. Explain how you are planning to drive the concrete piles through the extremely high blow count material, if piles do not punch through these very dense layers? Elaborate.

It is true that there are zones of high blow count above the specified pile tips. However, CPT data show the sand layers near the tip may be quite erratic and variable and may or may not be present under the entire foundation. An indicator pile program is proposed and pile lengths will be adjusted, if refusal is obtained at shorter penetrations.

12. It is not clear to the reviewer how the settlement was calculated for the piles? Provide calculation and elaborate.

Vesic' (1977) states that "Modern research on pile behavior has established that full mobilization of skin resistance requires a relative displacement between the pile shaft and surrounding soil of 0.25 to 0.4 inches (6 to 10 mm)." Based on this, we conservatively assumed a value of 0.4 inch for mobilization of ultimate frictional capacity. The pile load vs deflection curve for deflections less than 0.4 inches is generally a straight line. Based on the average pile load for dead plus 50% live load, we calculated the movement required for supporting the pile load by linear interpolation as:

Settlement (inches) = Average pile load *0.4 / Ultimate frictional capacity

Once the settlement under a single pile was estimated, we obtained a group factor using the formula by Vesic' (1977) as follows:

Equivalent Group Width = B = (length x width)$^{1/2}$

Group Factor = (B/b) $^{1/2}$

In which B = equivalent group width and b = pile width.

The appropriate calculations are shown in Attachment E-7 (See Figure 1).

13. Is live load used for pile settlement calculation? If so, explain. Note that LRFD guidelines do not include live load for assessment of consolidation settlement.

We used dead plus 50% live load which are typically used for settlement calculations. In accordance with LRFD guidelines (which does not use live load), settlement will actually be slightly smaller and thus more conservative.

14. LPILE graphic representation does not correspond to the specified pile tip elevation and hence pile depth depicted in Table 3D. Explain and reconcile.

Pile lengths for Abutments 1 and 4 for 14-in. square pre-cast pre-stressed piles are 65 to 68 feet, and analyses used a pile length of 63 to 68 feet. A critical length analysis (pile length versus top deflection in LPILE) indicates that there is no effect of pile length on deflection beyond a length of about 20 feet (See Figure 2). Therefore for piles longer than about 20 feet, there is no effect on the lateral capacity of the pile.

Pile lengths for Bents 2 and 3 for 48-in. diameter pipe piles are about 100 feet. A review of the lateral deflection, shear force, and bending moment vs depth plots (see Appendix E-5), indicate that pile length of 98 ft was used for the analysis. A critical length analysis for these piles indicates that there is no effect of pile length on deflection beyond a length of about 50 feet (See Figure 3). Therefore for piles longer than about 50 feet, there is no effect on lateral capacity of the pile.

15. Foundation recommendations for abutment piles Tables 3C and 3E show only the design tip elevations for compression for Abutments 1 and 4 and is missing the design tip elevations for settlement and lateral load. Calculate the later and revise tables accordingly.

In Table 3C, it is stated as per Caltrans Design Memo, the design tip elevation for lateral is typically provided by the Structural Designer (see Note 4 on Table 3C). For abutment piles, based on the data shown in Figure 2, a pile length of 1.25 times the critical length or about 25 ft is appropriate for lateral load (design pile tip elevation of El. -1 ft for Abut 1 and El. -9 ft for Abut. 4. For settlement, the specified design tip provides as settlement of less than 1 inch as per note 1. A revised Table 3C is included.

16. Explain how design tips were calculated for lateral load and elaborate on the apparent inconsistencies between design pile tip elevations and actual calculations.

See response to questions 14 and 15.

17. It is not clear how the design pile tip elevations were calculated for tension for extreme events for the bent piles? Provide calculations and elaborate.

Design tip elevations for tension were calculated using outside friction plots for pipe piles and assuming that the friction in uplift is 2/3rd of the downward friction. Calculations and plots are provided in the calculation package.

18. How the values of group efficiencies for lateral pile capacity arrived at?

Reasonable values of average group p-multiplier (0.5) were selected from Caltrans Research Report GRG, Vol. 1, No. 6 and used for evaluating deflections for both transverse and longitudinal loading. The p-multiplier was taken as 0.75 for the leading row of piles to determine maximum bending moment in the group.

19. Explain why the group efficiency for both transverse and longitudinal loading was not incorporated in the calculation and /or text of the subject report?

See Response to Item 18.

20. Calculate the lateral load from the bridge foundation on the RCB due to extreme event, show the calculations.

Ultimate passive pressure on the sides of the pile cap was estimated using Rankine theory, and movement required for full passive was estimated using NAVFAC DM7. The piles caps are designed for maximum 1 inch movement. Passive pressure on the pile cap at 1 inch movement is 1.5 ksf. Maximum soil reaction on the sides of

leading row piles at 1 inch top deflection from LPILE analysis is about 2.1 ksf. If the RCB is designed in accordance with Bridge Design Practice Section 6, Part 2A (December 1992), it will be designed for a lateral equivalent fluid pressure of 140 pcf. We recommended designing for 15 feet of cover, in which case design lateral pressure at top and bottom of RCB are about 2.1 and 3.5 ksf, respectively. This is adequate to accommodate the soil pressures exerted by the piles and pile cap under extreme event loading. It should be noted there is an existing footing immediately adjacent to the box, which will be removed. Calculations and supporting data are provided in Attachment 3.

21. What the construction concerns and issues related to water quality during dewatering? Elaborate.

GDC prepared a Site Investigation report, which included testing of groundwater. A total of seven water samples were collected along the freeway. The water samples were analyzed for petroleum hydrocarbons – EPA Method 8015 (gas and diesel) and for volatile organic compounds (VOCs) – EPA Method 8260B. No petroleum hydrocarbons or VOCs were reported in the water samples analyzed except for the water at G405-04 that is located near the southbound on-ramp from Valley View to I-405. At this location diesel range concentration of 0.545 mg/L was reported in the water. This low level impact appears to be limited to this location and may relate to a localized condition near the on-ramp. The groundwater tested in the S405-E22 Connector Separation vicinity did not contain petroleum hydrocarbons or VOCs.

REFERENCES

Caltrans, Bridge Design Practice, December, 1992.

Caltrans, Research Notes, The GeoReserach Group, May 2003, GRG Vol.1, No.6, "Lateral Load Tests Of Pile Groups Lead to Improved Design Recommendations."

Group Delta Consultants, January 30, 2009, "Report of Environmental Site Investigation,SR-22 Freeway Phase II Improvements, I-405/SR-22 HOV Connector, Orange County, California, Caltrans EA#12-071631."

Theissen, J. R. and Wood W. C., "Vibrations in Structures Adjacent to Pile Driving," Engineering Bulletin 60, Dames and Moore, Los Angeles, July 1982.

Vesic', A. S., "Design of Pile Foundations, National Cooperative Highway Research Program, Highway Synthesis of Highway Practice, 42," Transportation Research Board, National Research Council, Washington, D.C., 1977.

The following are attached and completes our response:

Figure 1	Settlement Calculations (from Attachment E-7)
Figure 2	Critical Length for Lateral Deflection, Abutment Piles
Figure 3	Critical Length for Lateral Deflection, Bent Piles
Figure 4	Revised Table 3C.
Figure 5	Revised Table 3E

Attachment 1	Caltrans Comments dated March 31, 2009
Attachment 2	Vibration from Pile Driving (Theissen & Wood, 1982)
Attachment 2	Lateral Pressure on Box Culvert

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

FIGURES

PILE SETTLEMENT ANALYSIS

S-405-E22 CONNECTOR SEPARATION

APPENDIX E7

Abutments

PILE LENGTH = 100'

Ult. Cap/Pile = 202 x 2 = 404 Kips

Settlement to Mobilize ult Cap = 0.4" (Mostly Skin Friction).

Dead + 50% LL/Pile = [10750 + (11400 - 10750)/2] x 125

= 11075/125 = 89 Kips.

Settlement to mobilize d.l+l.l/2 = $\frac{89}{404} \times 0.4 = 0.09$

Group Size = 20 x 100

Group width = B = $\sqrt{20 \times 100}$ = 44.7'

Group Factor J = $\sqrt{\frac{44.7}{1.16}}$ = 6.2

Group Settlement = 6.2 * 0.09 = 0.55" < 1.0" O.K

Bents 2 & 3

Load/Pile = $\left[\frac{(11950 - 10610)}{2} + 10610\right]/18$

= 11280/18 = 627 Kips.

Ult Cap/Pile @ 0.4" settlement

= 1800 Kips

Settlement under Dead + 50% LL = $\frac{627}{1800} * 0.4 = 0.14$"

Group width B = $\sqrt{34 \times 68}$ = 48.1

FIGURE 1

Group Factor = $\sqrt{\frac{48.1}{4.0}}$ = 3.46

FIGURE 1

Group Settlement = 3.46 * 0.14 = 0.5" < 1" O.K.

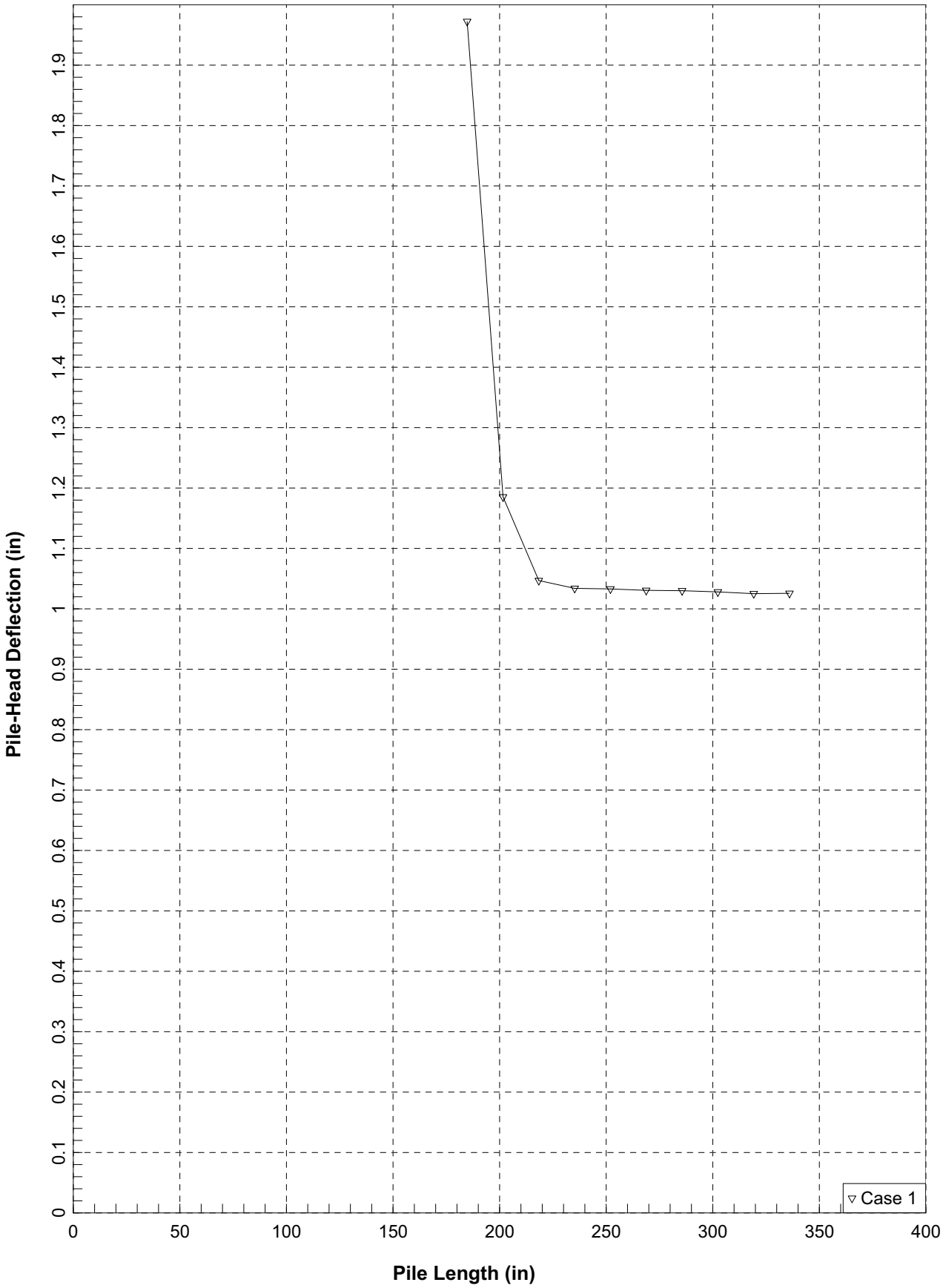

Pile-Head Deflection (in)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
0
50
100
150
200
250
300
350
400
Pile Length (in)
Case 1

FIGURE 2

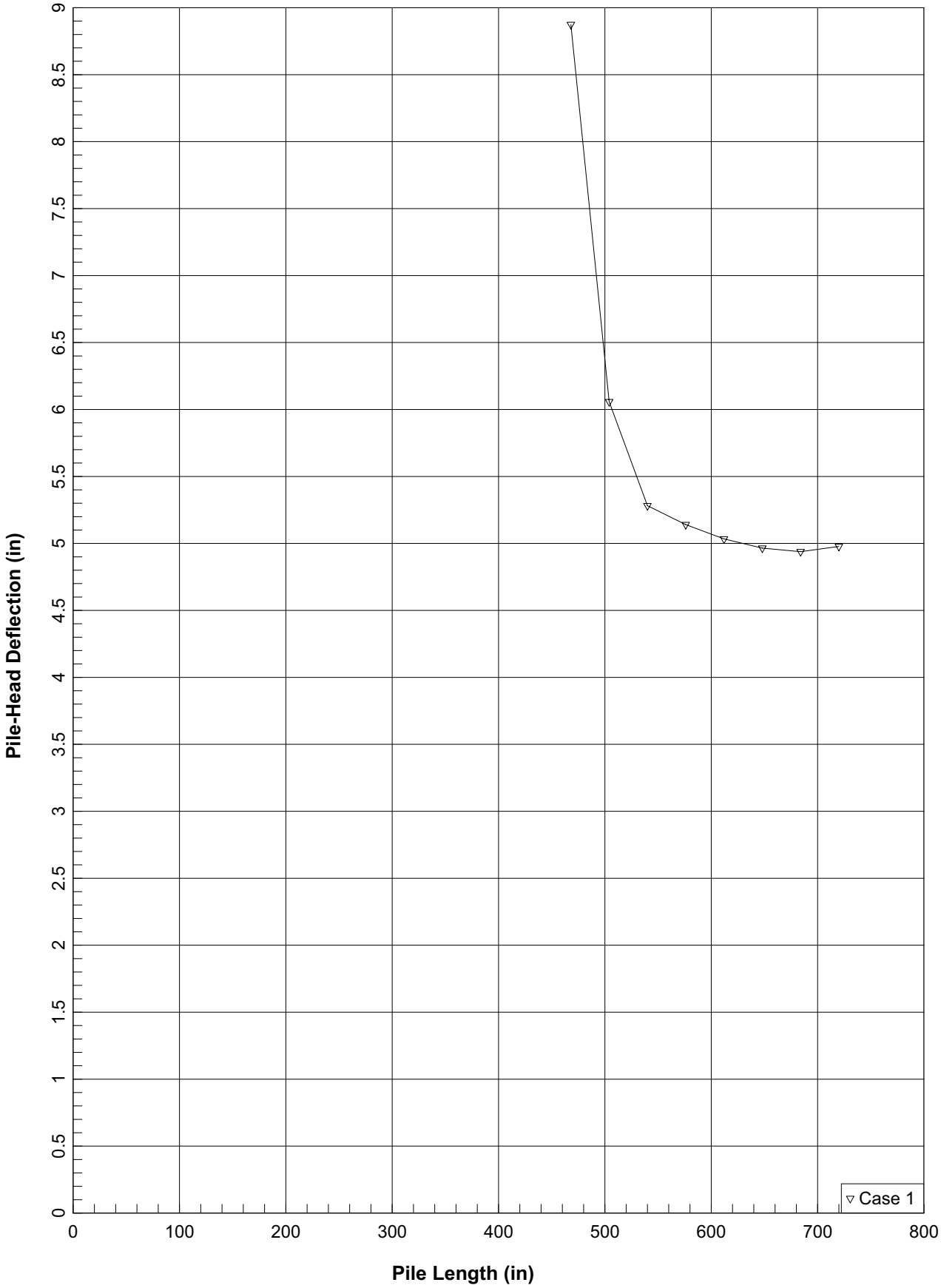

Pile-Head Deflection (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
0
100
200
300
400
500
600
700
800
Pile Length (in)
Case 1

FIGURE 3

Table 3C. Foundation Recommendations for Abutments

S405-E22 Connector Separation (Replace)										
Support	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
				Total	Perma-nent					
Abut 1	Class 200	24.0	24.5	11400	10750	157	400	-44.0 (a), -1.0 (d)	-44	400
Abut 4	Class 200	16.0	16.5	11200	10550	149	400	-49.0 (a), -9.0 (d)	-49	400

Notes:
1. Design tip elevations are controlled by: a) compression, (c) settlement, (d) lateral load, respectively. Settlement for piles driven to the nominal capacity is less than 1 inch.
2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load.
4. Design tip elevation for Lateral Load is typically provided by SD.

GROUP DELTA CONSULTANTS

FIGURE 4

Table 3E. Pile Data Table

S405-E22 Connector Separation (Replace)						
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 200, Alt X	400	0	-44.0 (a), -1.0 (d)	-44.0	400
Bent2	CISS NPS 48 x 0.75"	1800	900	-83.8(a), -69 (b), -40 (d)	-83.8	1800
Bent 3	CISS NPS 48 x 0.75"	1800	900	-86.5(a), -72 (b), -42 (d)	-86.5	1800
Abut 4	Class 200, Alt X	400	0	-49.0 (a), -9.0 (d)	-49.0	400

Notes:

*1. Design tip elevations for **Abutments** are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load. Settlement for piles driven to the nominal capacity is less than 1 inch.*

*2. Design tip elevations for **Bents** are controlled by: (a) Compression, (b) Tension, (c) Settlement, (d) Lateral Load. Settlement for piles driven to the nominal capacity is less than 1 inch.*

GROUP DELTA CONSULTANTS

FIGURE 5

ATTACHMENT 1
CALTRANS COMMENTS DATED March 26, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 20.75
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: February 17, 2009 S405-E22 Connector Sep (Replace)
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: February 23, 2009 12-071621 55-1101F
EA Number Bridge Number

Submittal (Check One): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Foundation Report, S405-E22 Connector Separation, Bridge No. 55-1101F, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 17, 2009 and submitted to our office on February 26, 2009. In our review, we made reference to the following:

- "Structure Foundation Report, S405-E22 Connector Separation, Bridge No. 55-1101F, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 21, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 16, 2009."

We have the following comments:

1. Is LRFD Design Guidelines 4th edition, dated 2007 used for design? If not, explain.
2. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
3. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).
4. Include in tabulated form in the Appendix a summary of the laboratory tests results, tables should include Boring number, sample number, depth, soil type, Moisture content, dry density, grain size distribution (Gravel Sand, Fine %), Atterberg Limit. A Separate Table for the Strength tests, including boring number, sample type, depth, soil type, strength. Finally a table for consolidation test results that includes boring number, sample number, depth, soil type, t50, t90, Cc, Cr, Ccε, Crε,e0 and σ'p.
5. Table 1 summarizes the recommended design properties. Explain in section 3.3.3 of the subject submittal, how the strength parameters (both drained and undrained) and internal friction angles were evaluated.
6. Are the consolidation coefficients found based on Consolidation tests (direct method) or by correlation (indirect method)? Explain.
7. Explain why no Triaxial tests were performed to assess the strength of the soil. Please refer to 2007 LRFD Design Specification Guidelines, Section 10.4.6.2.2.
8. What does *Method 2* refer to in the CPT liquefaction calculations? Explain.

9. Are there any facilities nearby the pile driving activities and if so, what is the impact of the pile driving vibration on these facilities, both airborne and in ground? Explain.
10. How the Nominal Driving Resistance was arrived at?
11. Explain how you are planning to drive the concrete piles through the extremely high blow count material, if the piles do not punch through these very dense soil layers? Elaborate.
12. It is not clear to the reviewer how the settlement was calculated for the piles. Provide calculation and elaborate.
13. Is live load used for pile settlement calculation? If so, explain. Note that LRFD guidelines do not include live load for assessment of consolidation settlement.
14. LPILE graphic representation does not correspond to the specified tip elevation and hence the pile depth depicted in table 3D. Explain and reconcile.
15. Foundation recommendation for abutment piles, Tables 3C and 3E show only the design tip elevation for compression for Abutments 1 and 4 and is missing the design tip elevations for settlement and lateral load. Calculate the latter and revise the Tables accordingly.
16. Explain how the pile tip elevations were calculated for the lateral load and elaborate on the apparent inconsistencies between the design pile tip elevations and the actual calculations.
17. It is not clear how the design tip elevations were calculated for tension for extreme events for the bent piles? Provide calculation and elaborate.
18. How the values of group efficiencies for lateral pile capacity were arrived at?
19. Explain why the group efficiency for both transverse and longitudinal loading was not incorporated in the calculation and/or text of the subject report?
20. Calculate the lateral load from the bridge foundation on the RCB due to extreme event, show the calculations.
21. What are the construction concerns and issues related to the water quality during dewatering? Elaborate.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

ATTACHMENT 2
VIBRATION FROM PILE DRIVING (THEISSEN AND WOOD, 1982)

SCAN + SAVE IN:
N:\ADMIN\Resources\Vibrations in Structures Adjacent to Pile Driving (Theissen + Wood, 1982). pdf

Toms. 818-996-9739

PDF I-391 Return to Karl

01 Return to my desk. Karl

Vibrations in Structures Adjacent to Pile Driving

Comparison of 10 case histories provides guidelines for gauging potential effects of various pile hammers on soft and firm soil sites.

By John R. Theissen and William C. Wood

INTRODUCTION

The effect of construction activities at a given property on adjacent properties is a significant consideration of environmental impact statements used to obtain construction permits from local governments and agencies. Disruption of business and trade, blocked access, dust and dirt are typical problems associated with construction. In addition, a significant number of large construction projects also involve pile driving, resulting in noise and vibrations. Such vibrations may cause architectural or structural distress to adjacent structures, damage to building contents, and may also result in the densification of cohesionless soils with ompanying settlement of building otings, floor slabs and walls.

This paper provides a discussion of the authors' experience in monitoring construction vibrations adjacent to pile-driving projects in San Francisco and provides a comparison of the data obtained from these projects with published vibration attenuation and damage criteria. The case studies discussed in this article encompass 10 projects for which vibration levels were measured in buried structures, buildings supported on piles and spread footings, and on the ground or pavement at some of the sites. The data obtained are principally for impact pile drivers and concrete piles, but some data for sheet piles driven with vibratory hammers are included.

In each of the 10 case histories, the purpose of vibration monitoring was to assess vibration levels, usually within a structure, and to gauge the potential for damage or distress in adjacent structures or facilities. Most of the structures monitored were supported on piles or on footings on very dense soils and thus were not subject to settlements resulting from soil densification. Therefore, it was assumed that any damage produced during pile driving was probably due to construction vibrations rather than associated settlements.

CASE STUDIES

The 10 projects studied are all located in the City of San Francisco as indicated in Figure 1. Six of the projects are in the downtown area near Market Street, an area of major high-rise construc-

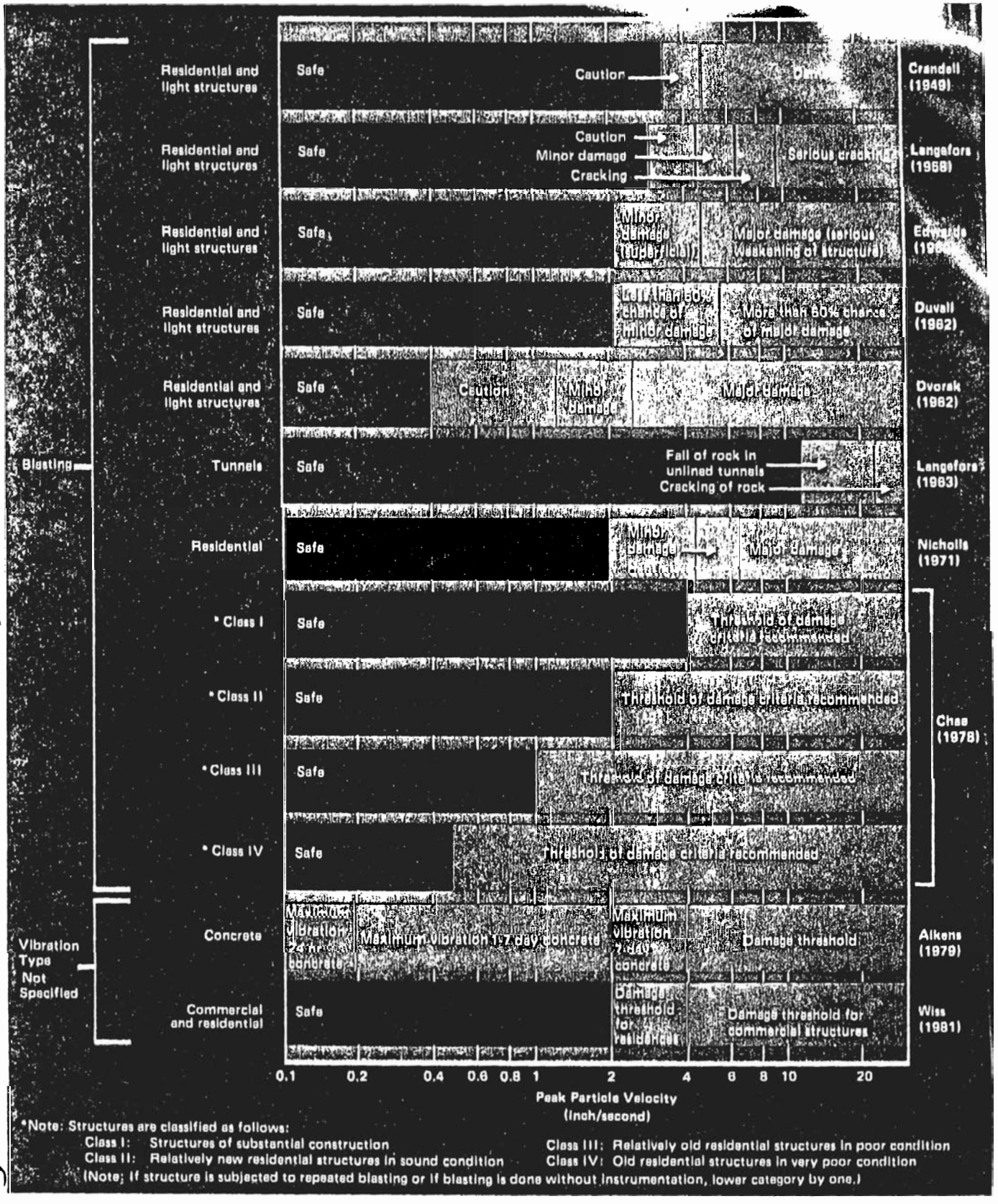


Figure 5. Observed or anticipated damage thresholds.

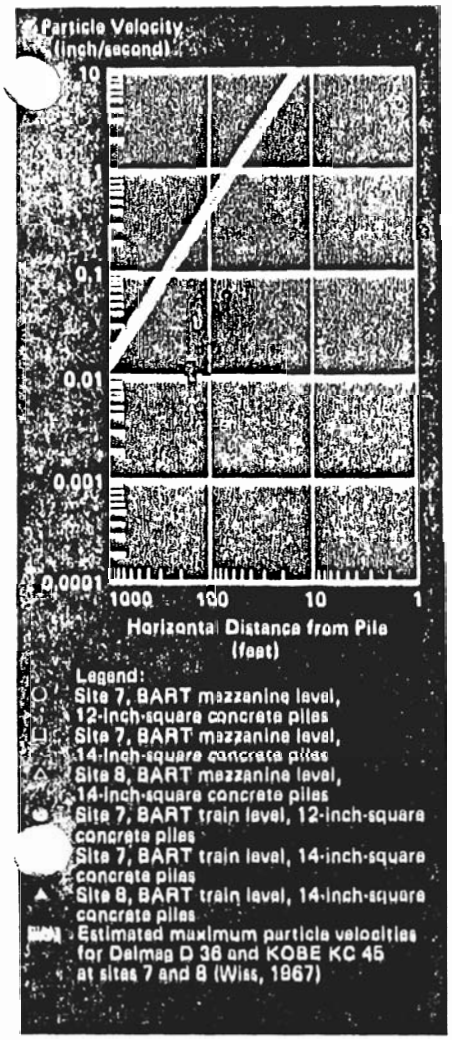


Figure 9. Observed particle velocities in underground structures at soft soil sites, using impact pile drivers.

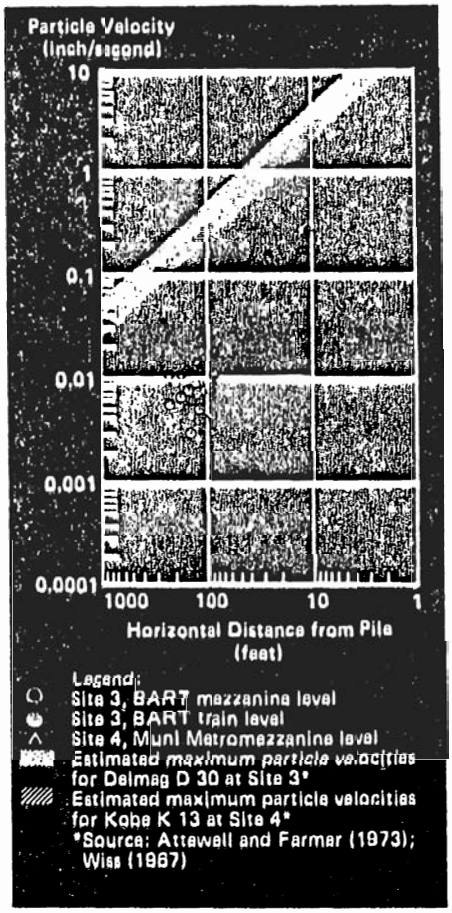


Figure 10. Observed particle velocities in underground structures at firm soil sites, using impact pile drivers.

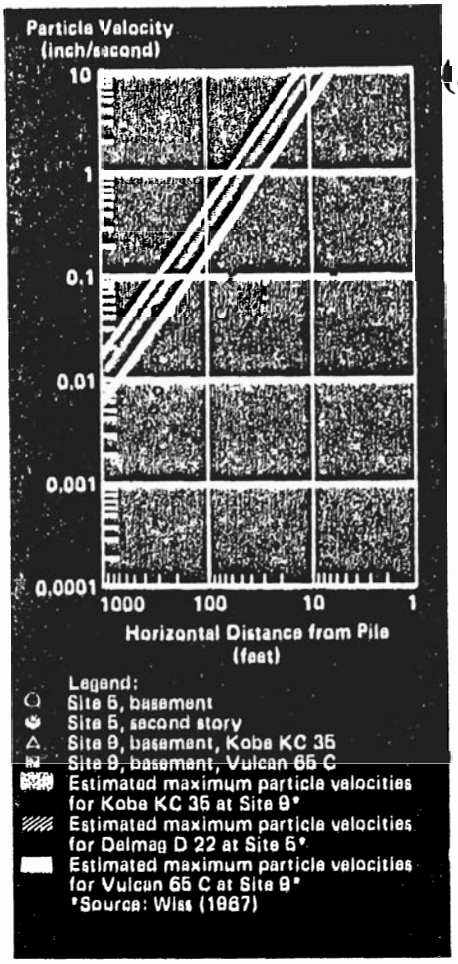


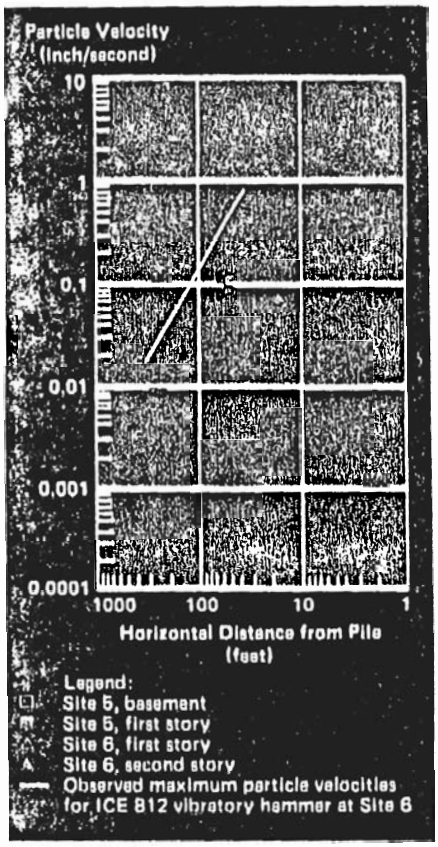
Figure 11. Observed particle velocities in buildings at soft soil sites, using impact pile drivers.

of the observed peak particle velocities may be approximated by a geometrical-damping coefficient having a value of about 0.9. This corresponds with the general attenuation relationship given by Wiss (1967) for dry or wet sands and the damping coefficient of 1 presented by Attewell and Farmer (1973) for firm soil sites. It thus appears that a geometrical-damping coefficient on the order of about 1 would be suitable to model vibration attenuation at similar firm soil sites.

In observing vibrations in relatively massive underground structures, such as BART and Muni-Metro stations, some observations may be made regarding anticipated and observed peak particle velocities. Measured maximum peak particle velocities for underground structures at two soft soil sites are presented in Figure 9. Also shown in this figure are estimated maximum surface particle velocities developed from curves for clays presented by Wiss (1967). Figure 10 presents the peak vibration velocities measured in similar underground structures adjacent to two firm soil sites as well as estimated curves for maximum particle velocities at ground surface developed from information for dry sand presented by Attewell and Farmer (1973) and Wiss (1967).

Comparison of the measured velocity data and predicted particle velocities indicates that use of published velocity/attenuation curves to predict particle velocities in such massive underground facilities may result in an over estimation of velocities by about a factor of 10. Causes for such differences in vibration levels could not be ascertained from the limited data available, but it is suspected that the differences were due to a combination of structural damping and attenuation of the wave energy below ground surface. It should be noted that observed particle velocities in the structures were well below 2 inches per second, and no damage was observed at the monitored locations.

In observing peak particle velocities in commercial structures of varied construction, similar reductions in peak particle velocities were noted. Figures 11 and 12 present observed particle velocities in pile-supported buildings on soft soil sites where impact and vibratory hammers were used, respectively. As with Figures 9 and 10, estimated maximum particle velocities for impact pile drivers have been superimposed on Figure 11, and the velocity attenuation curve for the



gure 12. Observed particle velocities in buildings at soft soil sites, using vibratory pile drivers.

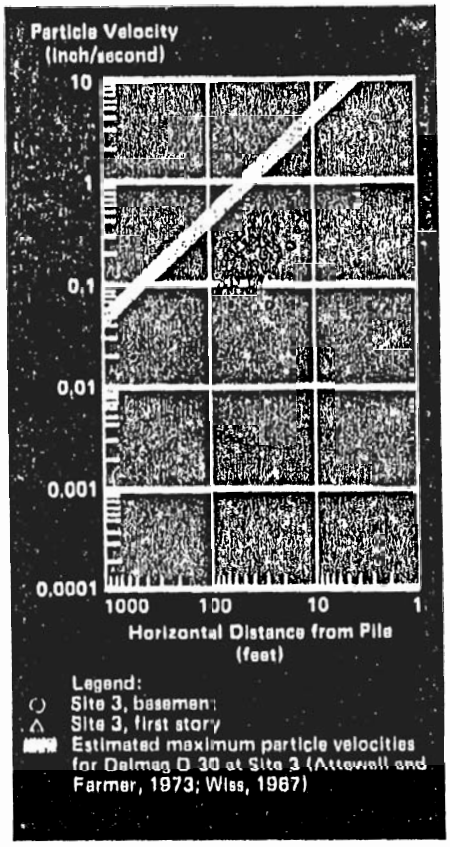


Figure 13. Observed particle velocities in buildings at firm soil sites, using impact pile drivers.

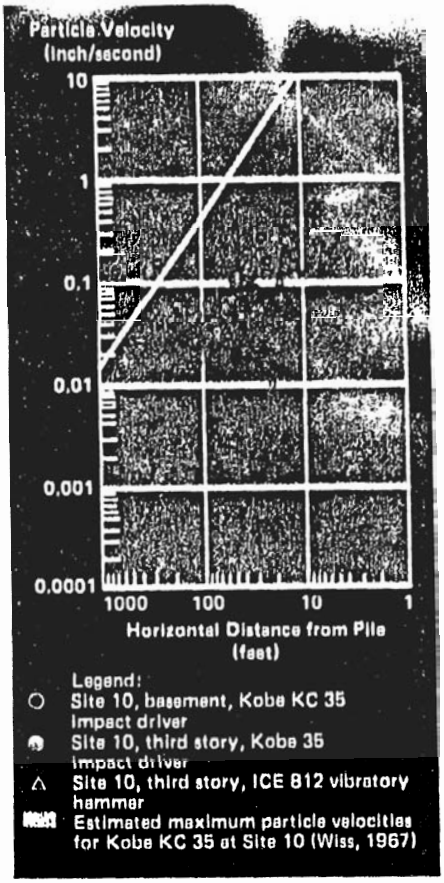


Figure 14. Observed particle velocities in buildings at soft soil sites, using impact and vibratory pile drivers.

ICE 812 Hammer from Figure 7 has been superimposed on Figure 12. Comparison of the observed structural vibrations and observed or estimated ground motions indicates that vibration levels within such substantial buildings may be only one-half of or less than those on surrounding ground surfaces. A similar relationship for such structures located on firm soil sites is shown in Figure 13.

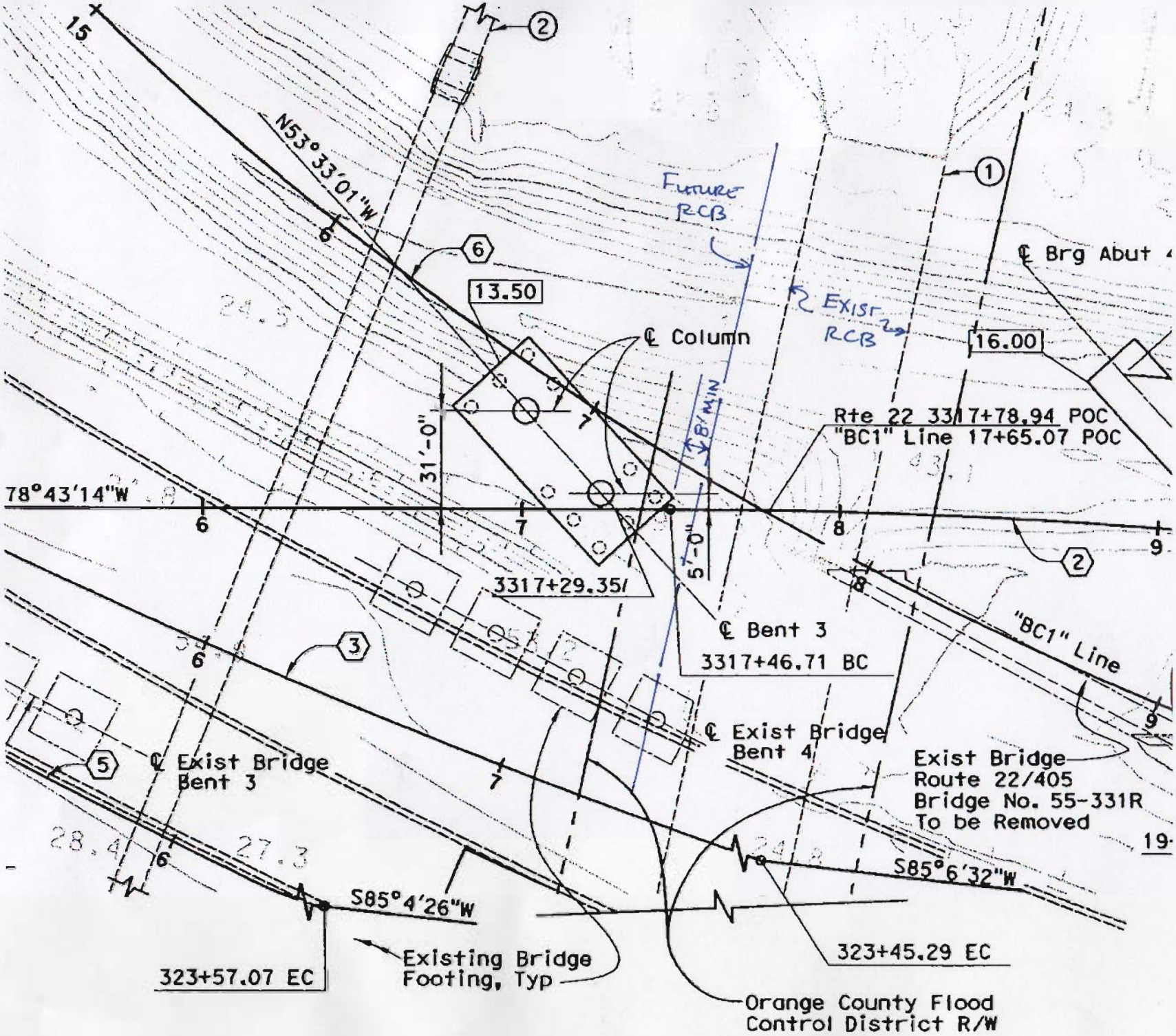
Figure 14 presents observed peak velocities in a reinforced concrete building at Site 10 (a soft soil site), where the greatest number of measurements were obtained. An estimate of maximum peak ground surface accelerations, developed from information presented by Wiss (1967), is also shown for the Kobe KC 35 pile driver used at the site. Figure 14 illustrates the same trends of structure-attenuated velocities as shown in Figures 11, 12, and 13. In addition, there are sufficient data to indicate a rate of attenuation similar to that expected at ground surface. Comparison of vibration data from basement and third-story monitoring locations indicates little discernable difference in vibration levels; this trend is similar to that observed in comparing vibration levels in the basement and first-floor levels in the structure at Site 3.

In addition to the recorded observations, some general observations have also been made during these studies. While general vibration levels did not vary significantly from floor to floor in the monitored structures, as noted previously, significant variations in vibration levels did occur, depending on whether the sensors were placed next to columns or walls. Maximum vibrations were usually observed in the middle of column bays probably due to resonant vibration of the floor slab.

In addition, vibration levels from sheet pile driving were at least as severe as driving of bearing piles with impact hammers and, in some cases, such vibrations were significantly more severe. Due to the continuous nature of such vibrations, they were typically more objectionable to building occupants. Generally, the authors found that vibrations from driving sheet piles could be significantly reduced by driving only one sheet pile at a time or by substituting an impact hammer for a vibratory hammer.

In general, measured vibration levels in these studies were much lower than those predicted for damage, primarily due to the distance from the pile driving to the buildings. At only two sites (Sites 9 and 10) was pile driving sufficiently close to the structure to expect that vibration levels would reach 2 inches per second at the building wall. At Site 9 some damage was observed in the light, reinforced concrete structure, which was noted as being in poor condition initially; however, such damage was relatively minor, consisting of a cracked mirror and tilted door frame. At Site 10, the substantial concrete structure did not suffer any noticeable damage, although paint flaking and some slight cracking of an associated

ATTACHMENT 3
LATERAL PRESSURE ON BOX CULVERT

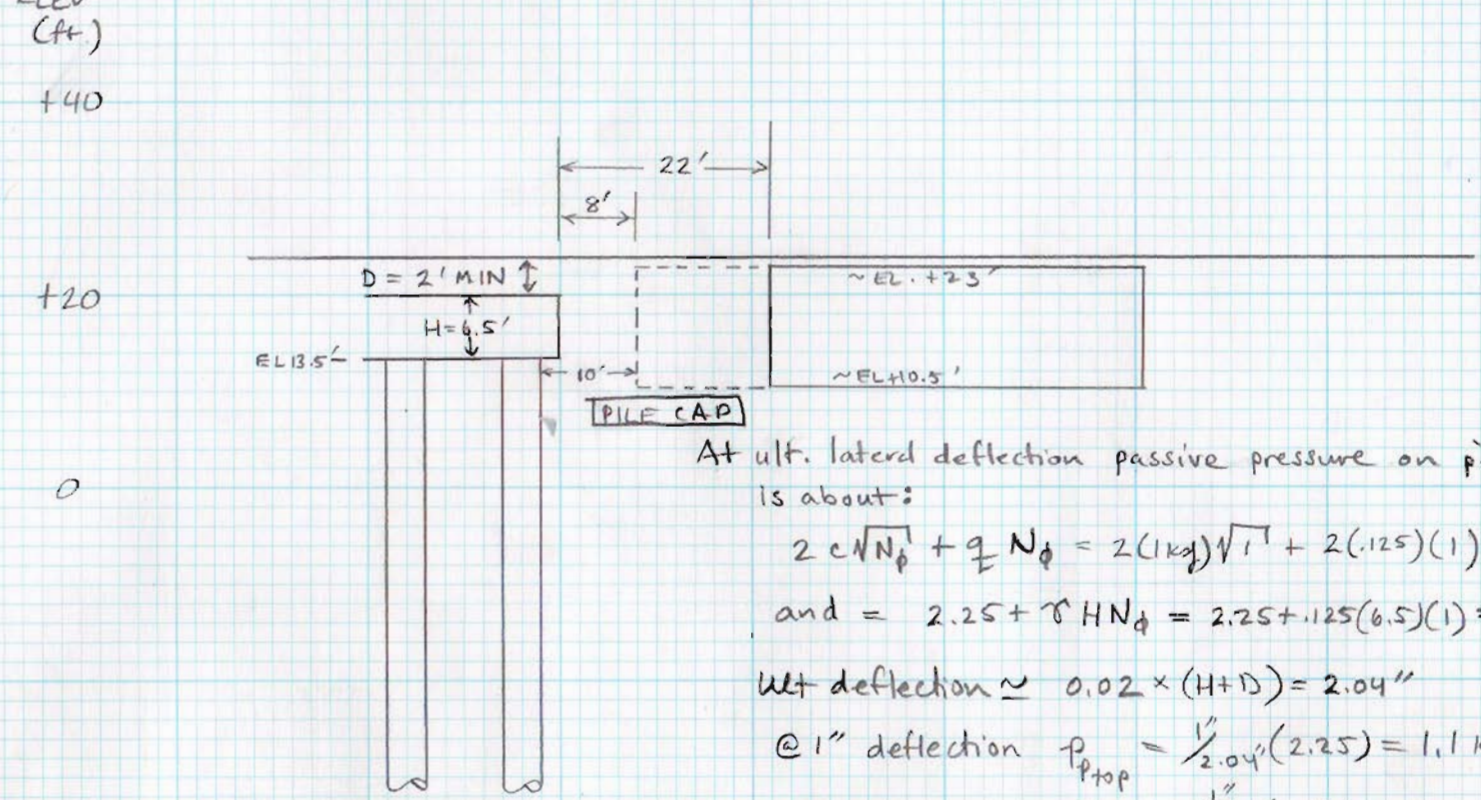

N53°33'01"W
FUTURE RCB
EXIST RCB
℄ Brg Abut
13.50
℄ Column
16.00
Rte 22 3317+78.94 POC
"BC1" Line 17+65.07 POC
8'MIN
31'-0"
5'-0"
78°43'14"W
3317+29.35
℄ Bent 3
3317+46.71 BC
"BC1" Line
℄ Exist Bridge
Bent 4
℄ Exist Bridge
Bent 3
Exist Bridge
Route 22/405
Bridge No. 55-331R
To be Removed
S85°6'32"W
S85°4'26"W
323+45.29 EC
323+57.07 EC
Existing Bridge
Footing, Typ
Orange County Flood
Control District R/W

DELTA GROUP

PROJECT NAME: WCC; 405/22 HOV Conn. Seq. DRAWN BY: CL

PROJECT NUMBER: T-436 CHECKED BY:

DATE: 4-9-09 PAGE: 1 OF 1



At ult. lateral deflection passive pressure on pile cap is about:

$2c\sqrt{N_\phi} + q N_\phi = 2(1\,ksf)\sqrt{1} + 2(.125)(1) = \underline{2.25\,ksf}$ @top

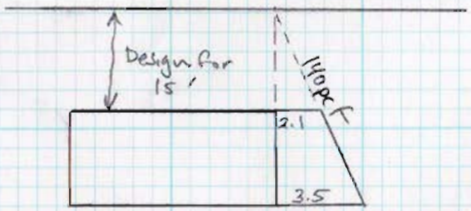
and $= 2.25 + \gamma H N_\phi = 2.25 + .125(6.5)(1) = \underline{3.06\,ksf}$ @bottom

Ult deflection $\simeq 0.02 \times (H+D) = 2.04''$

@ 1" deflection $p_{p_{top}} = \frac{1''}{2.04''}(2.25) = 1.1\,ksf$

$p_{p_{bot}} = \frac{1''}{2.04''}(3.06) = 1.5\,ksf$

PILE Soil Rxn. from LPILE $\simeq$ 2.1 ksf @ 1" top deflection



BOX DESIGN

Lateral 140pcf fluid pressure w/ 15' soil cover

$= 140 \times 15' = 2.1\,ksf$ @ top RCB

$\simeq 140 \times 25' = 3.5\,ksf$ @ bottom RCB

which $\geq$ max soil pressure 0.1K.

per Bridge Design Practice Section 6 Part 2A Dec., 1992

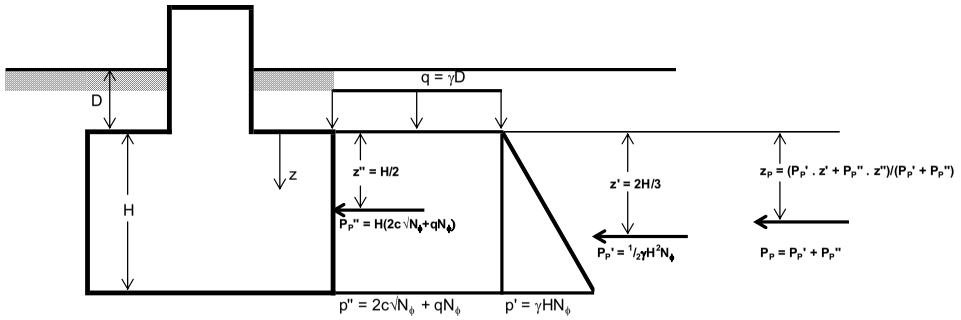
PASSIVE LATERAL RESISTANCE ON AN EMBEDDED FOOTING

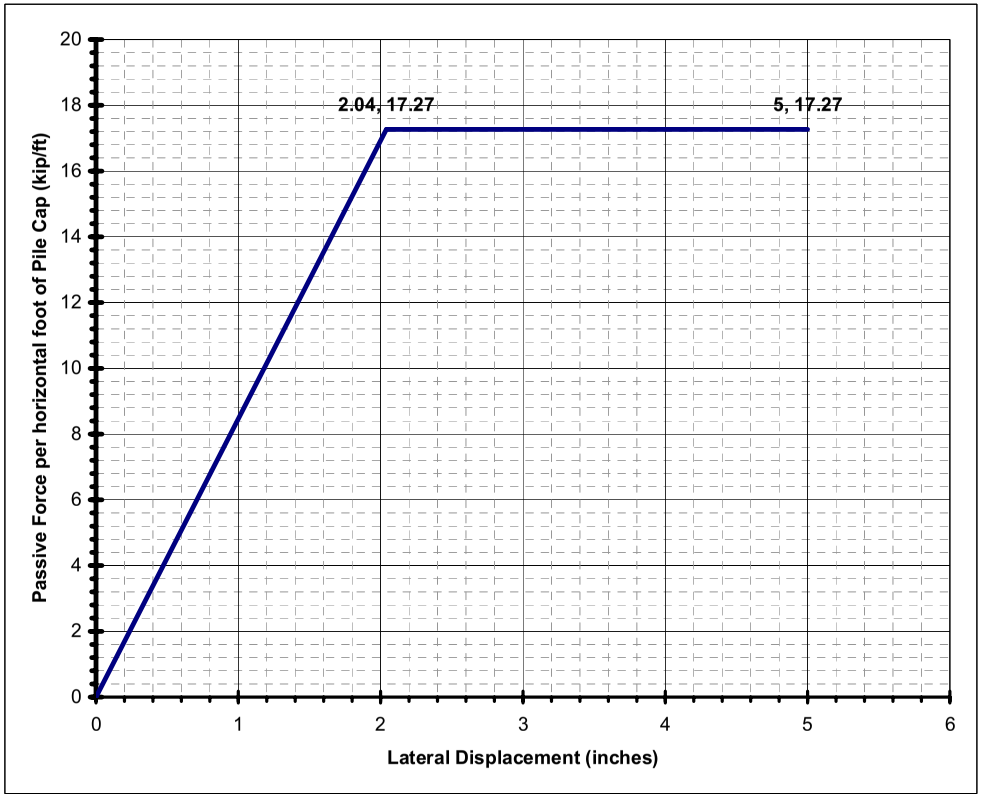
Input	
Sand or Clay (S or C) =	C
Soft, Firm, Stiff (S,F,ST) =	ST
Unit Wt, γ (pcf) =	125.0
Cohesion, c (psf) =	1,000
Friction Angle, ϕ (deg) =	0.00
Soil Cover, D (ft) =	2.00
Footing Thickness, H (feet)=	6.50

Output		
Movement to mobilize full passive, δ_{ult} (inches) =	2.04	
Surcharge above top of footing, q (psf) =	250	= γD
Factor N_ϕ =	1.00	= $\tan^2(45+\phi/2)$
Passive pressure at top of footing, p" (psf) =	2,250	= $2c\sqrt{N_\phi}+qN_\phi$
Increase in passive pressure btwn top and bottom of footing, p' (psf) =	812.5	= γHN_ϕ
Passive pressure at bottom of footing, p" + p' (psf) =	3,062.5	= $2c\sqrt{N_\phi}+qN_\phi + \gamma HN_\phi$
Passive Force from Rectanglar Block, P_P" (lbs/ft) =	14,625	= $H(2c\sqrt{N_\phi}+qN_\phi)$
Depth of P_P" below top of footing, z" (feet) =	3.25	= H/2
Passive Force from Trianglar Block, P_P' (lbs/ft) =	2,641	= $1/2\gamma H^2N_\phi$
Depth of P_P' below top of footing, z' (feet) =	4.33	= 2H/3
Total Ultimate Passive Force, P_P (lbs/ft) =	**17,266**	= P_P" + P_P'
Depth of P_P below top of footing, z_P (feet) =	3.42	= $(P_P" \cdot z" + P_P' \cdot z')/(P_P" + P_P')$

Plot Data

δ (inch)	Pp (kip/ft)
0	0.00
2.04	17.27
5	17.27





DISPLACEMENT REQUIRED FOR FULL PASSIVE AS A FUNCTION OF SOIL TYPE

Soil Type	δ/(H+D) for Full Passive	δ (inch)
Dense Sand	0.002	0.204
Medium Dense Sand	0.004	0.408
Loose Sand	0.006	0.612
Soft Clay	0.040	4.080
Firm Clay	0.030	3.060
Stiff Clay	0.020	2.040

Reference: NAVFAC - DESIGN MANUAL 7.02, "Foundations & Earth Structures," Revalidated by Change September 1, 1986, Section 2, Figure 1, Page 7.2-60.

Reference:
Passive Earth Pressure of Cohessive Soils in Contact with Smooth Vertical Surface, "Soil Mechanics in Engineering Practice", Karl Terzaghi and Ralph B.Peck, 2nd Edition, John Wiley & Sons, New York, 1967

1032.	0.000	-1.054E-20	1.720E-22	0.0000	13473.4573	-7.529E-25
1044.	0.000	-8.534E-21	1.601E-22	0.0000	13473.4573	-1.241E-24
1056.	0.000	-6.705E-21	1.434E-22	0.0000	13473.4573	-1.540E-24
1068.	0.000	-5.097E-21	1.249E-22	0.0000	13473.4573	-1.685E-24
1080.	0.000	-3.730E-21	1.037E-22	0.0000	13473.4573	-1.711E-24
1092.	0.000	-2.609E-21	8.351E-23	0.0000	13473.4573	-1.647E-24
1104.	0.000	-1.723E-21	6.452E-23	0.0000	13473.4573	-1.518E-24
1116.	0.000	-1.057E-21	4.735E-23	0.0000	13473.4573	-1.344E-24
1128.	0.000	-5.881E-22	3.245E-23	0.0000	13473.4573	-1.139E-24
1140.	0.000	-2.735E-22	2.011E-23	0.0000	13473.4573	-9.162E-25
1152.	0.000	-9.581E-23	1.053E-23	0.0000	13473.4573	-6.816E-25
1164.	0.000	-1.624E-23	3.798E-24	0.0000	13473.4573	-4.399E-25
1176.	0.000	0.0000	0.0000	0.0000	13473.4573	-1.932E-25

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	.50000000 in
Computed slope at pile head	=	0.000
Maximum bending moment	=	-29856579.717 lbs-in
Maximum shear force	=	259843.663 lbs
Depth of maximum bending moment	=	0.000 in
Depth of maximum shear force	=	0.000 in
Number of iterations	=	19
Number of zero deflection points	=	9

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 3

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Specified deflection at pile head = 1.000000 in
Specified slope at pile head = 0.000E+00 in/in
Specified axial load at pile head = 1500000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in	Ksf
0.000	1.000	-4.847E+07	3.749E+05	0.0000	56651.2949	-693.9722	2.08
12.000	.995677	-4.401E+07	3.665E+05	-5.874E-04	52821.5301	-717.0237	2.15
24.000	.983503	-3.965E+07	3.577E+05	-.001305	49070.3908	-738.5516	2.21
36.000	.964257	-3.538E+07	3.487E+05	-.001839	45394.2163	-759.6581	2.28
48.000	.939358	-3.121E+07	3.395E+05	-.002283	37575.7409	-778.1697	
60.000	.909473	-2.715E+07	3.301E+05	-.002671	34438.0272	-795.1800	
72.000	.875250	-2.319E+07	3.204E+05	-.003006	31383.7190	-810.6444	
84.000	.837321	-1.935E+07	3.099E+05	-.003290	28415.2681	-952.1144	
96.000	.796302	-1.564E+07	2.983E+05	-.003522	25549.1184	-966.4093	
108.000	.752783	-1.206E+07	2.867E+05	-.003707	22787.5457	-978.7194	
120.000	.707338	-8.623E+06	2.749E+05	-.003845	20132.5817	-989.0054	
132.000	.660515	-5.325E+06	2.630E+05	-.003937	17586.0067	-997.1883	
144.000	.612841	-2.170E+06	2.510E+05	-.003987	15149.3409	-1003.1958	
156.000	.564820	8.412E+05	2.389E+05	-.003996	14123.0780	-1006.9533	
168.000	.516934	3.707E+06	2.268E+05	-.003966	16336.4457	-1008.3855	
180.000	.469640	6.427E+06	2.086E+05	-.003898	18436.9871	-2028.4309	
192.000	.423373	8.853E+06	1.943E+05	-.003797	20310.7619	-2019.4436	
204.000	.378520	1.099E+07	1.801E+05	-.003665	21958.3203	-2005.4376	
216.000	.335423	1.283E+07	1.362E+05	-.003506	23380.8252	-1986.2459	
228.000	.294376	1.438E+07	1.125E+05	-.003325	24580.0699	-1961.6782	
240.000	.255627	1.565E+07	89145.8736	-.003125	25558.4990	-1931.5144	
252.000	.219378	1.663E+07	66183.8238	-.002910	26319.2324	-1895.4938	
264.000	.185787	1.734E+07	43691.0631	-.002684	26866.0937	-1853.2996	
276.000	.154967	1.778E+07	21744.0556	-.002450	27203.6441	-1804.5350	
288.000	.126987	1.795E+07	424.7390	-.002212	27337.2257	-1748.6845	
300.000	.101876	1.787E+07	-20177.6671	-.001974	27273.0174	-1685.0499	
312.000	.079620	1.754E+07	-39963.7857	-.001738	27018.1113	-1612.6365	
324.000	.060166	1.697E+07	-58819.2340	-.001508	26580.6215	-1529.9382	
336.000	.043424	1.618E+07	-76605.8115	-.001287	25969.8494	-1434.4914	
348.000	.029268	1.518E+07	-93143.6943	-.001079	25196.5559	-1321.8224	
360.000	.017537	1.398E+07	-1.081E+05	-8.845E-04	24273.4559	-1163.0830	
372.000	.008040	1.262E+07	-1.172E+05	-7.374E-04	23218.4237	-369.0478	
384.000	5.60E-04	1.120E+07	-1.196E+05	-5.488E-04	22120.0150	-26.3326	
396.000	-.005131	9.767E+06	-1.183E+05	-4.093E-04	21016.6056	247.0756	
408.000	-.009262	8.372E+06	-1.141E+05	-2.985E-04	19938.8650	456.3883	
420.000	-.012055	7.040E+06	-1.077E+05	-1.859E-04	18910.3287	607.5765	
432.000	-.013723	5.794E+06	-99801.1651	-1.004E-04	17948.0565	707.0900	
444.000	-.014466	4.648E+06	-90988.9374	-3.092E-05	17063.3457	761.6146	
456.000	-.014465	3.611E+06	-81752.0360	2.407E-05	16262.4718	777.8689	
468.000	-.013888	2.686E+06	-72510.1637	6.600E-05	15547.4345	762.4431	
480.000	-.012881	1.869E+06	-63605.4378	9.632E-05	14916.6896	721.6779	
492.000	-.011576	1.156E+06	-55305.8724	1.165E-04	14365.8549	661.5830	
504.000	-.010087	5.373E+05	-47809.6212	1.277E-04	13888.3794	587.7922	
516.000	-.008511	3514.4484	-41249.5671	1.313E-04	13476.1714	505.5502	
528.000	-.006935	-4.574E+05	-35697.8914	1.283E-04	13826.7307	419.7291	
540.000	-.005432	-8.579E+05	-27973.0990	1.195E-04	14135.9565	867.7363	
552.000	-.004066	-1.133E+06	-17923.3879	1.063E-04	14348.5247	807.2156	
564.000	-.002881	-1.292E+06	-8635.7188	9.014E-05	14471.1145	740.7293	
576.000	-.001902	-1.344E+06	-183.8514	7.260E-05	14511.0905	667.9153	
588.000	-.001138	-1.299E+06	7350.1575	5.501E-05	14476.5405	587.7529	
600.000	-5.82E-04	-1.169E+06	13861.9082	3.857E-05	14376.3875	497.5389	
612.000	-2.13E-04	-9.676E+05	19175.7074	2.435E-05	14220.6879	388.0943	
624.000	2.19E-06	-7.098E+05	20991.6265	1.318E-05	14021.6502	-85.4411	
636.000	1.04E-04	-4.642E+05	18561.1771	5.365E-06	13831.9828	-319.6338	
648.000	1.31E-04	-2.646E+05	14604.8316	5.130E-07	13677.7752	-339.7571	
660.000	1.16E-04	-1.137E+05	10588.2306	-2.086E-06	13561.3023	-329.6764	
672.000	8.28E-05	-10376.4787	6792.9656	-2.832E-06	13481.4708	-302.8678	
684.000	4.80E-05	49384.8493	3392.4405	-2.572E-06	13511.5960	-263.8864	
696.000	2.11E-05	71134.6939	523.6042	-1.770E-06	13528.3929	-214.2529	
708.000	5.53E-06	62015.0666	-1677.2456	-8.835E-07	13521.3500	-152.5554	
720.000	-1.16E-07	30912.6027	-2255.3491	-2.648E-07	13497.3303	56.2048	
732.000	-8.24E-07	7896.2201	-1362.2091	-6.411E-09	13479.5553	92.6519	
744.000	-2.70E-07	-1780.1846	-398.9881	3.431E-08	13474.8321	67.9016	
756.000	-7.65E-10	-1678.3283	73.7131	1.128E-08	13474.7534	10.8652	
768.000	5.34E-10	-11.4767	70.0698	3.187E-11	13473.4662	-11.4724	
780.000	9.36E-16	3.3451	.4782	-2.227E-11	13473.4599	-.1262	
792.000	-1.72E-16	1.981E-06	-.1394	-7.921E-17	13473.4573	.023230	
804.000	-9.65E-16	1.656E-06	-2.649E-08	-5.499E-17	13473.4573	1.111E-10	
816.000	-1.49E-15	1.347E-06	-2.478E-08	-3.509E-17	13473.4573	1.742E-10	
828.000	-1.80E-15	1.063E-06	-2.246E-08	-1.896E-17	13473.4573	2.133E-10	
840.000	-1.95E-15	8.087E-07	-1.978E-08	-6.501E-18	13473.4573	2.331E-10	
852.000	-1.96E-15	5.881E-07	-1.696E-08	2.799E-18	13473.4573	2.376E-10	
864.000	-1.88E-15	4.017E-07	-1.415E-08	9.388E-18	13473.4573	2.307E-10	
876.000	-1.74E-15	2.483E-07	-1.147E-08	1.371E-17	13473.4573	2.155E-10	
888.000	-1.55E-15	1.259E-07	-9.005E-09	1.621E-17	13473.4573	1.950E-10	

Bottom RCB

Soil Rxn

$$\text{lbs/inch} \div 48\,\text{inch} \times \frac{144\,\text{in}^2}{\text{ft}^2} \div 1000\,\frac{\text{psf}}{\text{ksf}}$$

$$\Rightarrow \text{lbs/inch} \times 0.003 = \text{ksf}$$

B. Caltrans Research

The research conducted by Caltrans of three reinforced concrete (horseshoe) arches (1963 thru 1975) resulted in a significant change in the design of reinforced concrete underground structures. It was found that the lateral pressures can be as much as the vertical pressures. Therefore, the traditional loading wherein the lateral pressure is taken as 30% of the vertical pressure has been supplemented with a second loading wherein the lateral pressure is also taken as 100% of the vertical pressure. These two loadings are applied separately and the resulting maximum moments are utilized in design.

Loading 1	140V:	42H
Loading 2	140V:	140H

Recent research by Tadros, of Nebraska University (TRB 1231 – 1989) has affirmed the two bands of loading concept on RCB Culvert Design.

C. Design Method

Caltrans RCB culverts are analyzed and checked by load factor design only. The service load (i.e., working stress or elastic design) does not apply to these structures — see *Bridge Design Specifications* 17.2.

The derived applicable load factors for Group X (culverts) are obtained from

$$\frac{1.3}{0.9}(D + E + 1.67(L+I)).$$

Simplifying:

$$1.5D + 1.5E + 2.5(L + I)$$

Where D = Dead Load
E = Earth Load
L = Live Load
I = Impact

See page 12 and 13 for formula derivation and values.

1. Dead Load (D)

Assume a structure weight for concrete plus reinforcement of 150 pounds per cubic foot.

2. Earth Loads (E)

Based on Caltrans culvert research, it has been determined that the "equivalent soil density" is 140 pcf. This "equivalent soil density" is based on the actual maximum in-situ densities observed on Caltrans culvert research projects. The full lateral pressure condition also satisfies the saturated fill situation.

3. Live Loads

For box culverts under highways, only HS20 truck loads apply. Alternative loadings, lane loadings, and P-Loads are not used in the design.

When the RCB is at grade, or with a cover equal to or less than 2 feet, wheel loads are distributed as though they were applied directly to the roof, as in ordinary slab bridges. Wheel live load distribution to the invert is assumed as a uniform load applied transversely across the width and 7 feet longitudinally along the length of the RCB. Concentrated live load distribution reinforcement shall be placed in the roof. All RCB's with cover equal to and less than 10' shall be designed for two conditions:

a) 2 feet cover with HS20-44 live load
b) 10 feet of cover (See BDS 6.4.4 for live load distribution)

If loaded construction equipment passes across an RCB when the cover is less than 5 feet, temporary cushioning and possibly struts may be required (see Standard Plan D88), or the roof shall be designed for the construction equipment loading.

See the current A.R.E.A. specifications for the design of reinforced concrete box culverts with railway loading.

The 2-foot live load surcharge, formerly added on top of the lateral load to simulate highway live loads, is no longer applied because of the more conservative design resulting from the two bands of earth loading.

4. Impact (I)

Apply impact only to the roof slab of RCB culverts.

Earth Cover	Impact
0 ≤ 1 feet	30%
1 ≤ 2 feet	20%
2 ≤ 3 feet	10%
over 3 feet	0%

Railroad impact may be much larger than 30% and is determined by the formula given in A.R.E.A. Specifications.

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Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

February 12, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments**
Structure Foundation Report
S405-E22 Connector Separation (REPLACE)
BRIDGE NO. 55-1101F
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 21, 2008
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Revise the title in the subject report: "Structure Foundation Report…" to "Foundation Report …"

The requested change has been made in the revised report.

2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.

The requested change has been made in the revised report.

3. Include in tabulated form, the top of the pile and the pile tip elevation for the existing bridge structure. These piles will remain in place, regardless of the status of the existing bridge structure.

A table has been added to the report.

4. Section 1.1.5 Design Foundation Sizes and Loads. No need for inclusion of this subsection and Table in the section.

We have deleted this section and the table.

5. Include a Figure describing Site Location Map in Section 1.

The site vicinity map (Figure 1) is included in Figures at the end of report, and is referenced in Section 1.0.

6. Revise section 2 title "Field and Laboratory Investigations" to "Field Investigation and Laboratory Testing"

The requested change has been made in the revised report.

7. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).

The requested table is included in Appendix A, Table A-1. We have added a sentence in the revised report directing the reader to this table.

8. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).

We have modified the table in Section 2.2 to include the requested data, A complete description of the tests, their purpose, and ASTM / CT test numbers are included in Appendix B. The reader is referred to Appendix B in Section 2.2.

9. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.

The Exploration Location Plan (Figure 3) is included in Figures at the end of report, and is referenced in Section 2.1.

10. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.

The borings and CPTs were surveyed and the locations and elevations have been updated in Appendix A and in the LOTB in the revised report and plans.

11. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per comment No.10.

Refer to our response to Comment 10.

12. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

The requested change has been made in the revised report.

13. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

The requested information is included in Section 3.3.2.2. The high historical groundwater contour map is included in Figure 6 at the end of the report, and is consistent with our recent data at the site. The text of the report has been changed to Reference CDC.

14. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion, and friction angle.

The tabulated idealized soil profile containing the requested information is included in Table 1 at the end of the report, and is referenced in Section 3.3.3.

15. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.

The graphic soil profile is included in Figure 5B at 11x17" size at the end of the report and is referenced in Section 3.3.3.

16. There is no reference to LRFD and WSD design methods in calculating the Bent and abutment piles respectively, in the subject report, explain.

This was indicated (but not explicitly stated) in the table in Section 1.1.5 (now deleted per Comment 3). We have added a statement clarifying this fact in Section 4.4.2, New Foundations.

17. Refer to 2008 Caltrans Memo to Designers for the LRFD design of piles. The latter information was emailed by Caltrans OGDS-1 to the respective consultant designers and was also discussed during the geotechnical focus and PDT meetings.

At the time of our report this section of MTD had not been updated on the website. We have revised the report to follow the 2008 MTD.

18. Include tables for the Foundation Design Data Sheet, Foundation Design Loads, Foundation Recommendations and Pile Data Sheet, per 2008 LRFD Caltrans Memo to Designers.

Refer to our response to Comment 16.

19. Include the Nominal Driving Resistance in the appropriate section of the tables cited above and explain how it was arrived at.

The requested change has been made in the revised report.

20. Concrete class 200C is recommended in the subject report: Class C piles are no longer part of Caltrans Standard Plans. Project Standard Special Provisions need to discuss the corrosion remediation for the piles.

The reference has been corrected in the revised report. We will coordinate with Parsons to address in the SSPs.

21. Include a section on static settlement criteria during construction and BEFORE commencement of pile driving, where appropriate.

This information was included in the 2nd paragraph of Section 4.5 for Abutment 1 and paragraph 3 , Approach Fill Earthwork.

22. Settlement monitoring for the embankment should be discussed and included in the construction consideration.

Since no new net load is applied due to the use of lightweight fill and overexcavation of regular fill, no significant settlement is expected and settlement monitoring is not considered necessary.

23. Include backup data for the Corrosion in the Appendix.

Corrosion test results are presented in Section B.7 of Appendix B (Table B-2 has been added).

24. Discuss the settlement of piles and explain how they were arrived at.

We have added a discussion of pile settlement as Section 4.4.2.4, and changed Pile Installation to Section 4.4.2.5 in the revised report.

25. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report. Included in the CD should also be the input files and output files for LPILE software lateral pile capacity.

The requested items are submitted along with the revised report.

26. Why LPILE version 5 (latest) was not used for the lateral pile capacity calculations and an outdated LPILE 4 is used.

The sand and clay p-y curves and the finite difference beam on elastic foundation model and p-y curve methodology have not changed since the original version of LPILE, so use of Version 4.0 is does not affect the result unless some specific new features of the program are used. We have not used any such features in our runs. This was confirmed by a sample calculation using both Version 4.0 and 5.0.

27. Provide the slope stability using SLIDE program, provide the input and output files.

GDC does not currently possess the SLIDE software. We have used PCSTABL5M, which is well documented and widely used software for slope stability analysis. We have ordered the SLIDE program for future projects, to meet Caltrans requirements.

28. Provide axial pile capacity by sample hand calculation verification or a sample spreadsheet where it can be verified by Caltrans OGDS-1.

The requested information is included in the revised report.

29. The data for the GRLWEAP is not referenced and/or is not made available for our review, include the latter and a complete feasibility study for the pile load static and/or PDA testing for the 48-inch CISS piles in a separate report.

The GRLWEAP analysis for an assumed Delmag D36-32 hammer is included with the revised report. Production driving criteria will be developed from the indicator

program, using the actual driving equipment selected by the contractor, Pile Driving Analyzer (PDA) measurements, CASE method, and CAPWAP method. A separate pile driveability and load test report will be submitted as required by Caltrans.

30. Elaborate and expand on drivability of the recommended piles, based on the recommendations of the report cited in comment No. 29.

The requested information is included in a separate pile driveability and load test report dated February 5, 2009.

The following is attached and completes our response:

Attachment 1 Caltrans Comments dated January 16, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
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Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

ATTACHMENT 1
CALTRANS COMMENTS DATED JANUARY 16, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 16, 2009

FILE: 12 ORA 22 20.75
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: October 21, 2008 S405-E22 Connector Sep (Replace)
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 55-1101F
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Structure Foundation Report, S405-E22 Connector Separation, Bridge No. 55-1101F, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 21, 2008 and submitted to our office on December 9th, 2008.

We have the following comments:

1. Revise the title in the subject report: "Structure Foundation Report…" to "Foundation Report …"
2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.
3. Include in tabulated form, the top of the pile and the pile tip elevation for the existing bridge structure. These piles will remain in place, regardless of the status of the existing bridge structure.
4. Section 1.1.5 Design Foundation Sizes and Loads. No need for inclusion of this subsection and Table in the section.
5. Include a Figure describing Site Location Map in Section 1.
6. Revise section 2 title " Field and Laboratory Investigations" to " Field Investigation and Laboratory Testing"
7. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).
8. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).
9. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.
10. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.
11. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per comment No.10.

12. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.
13. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?
14. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion and friction angle.
15. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.
16. There is no reference to LRFD and WSD design methods in calculating the Bent and abutment piles respectively, in the subject report, explain.
17. Refer to 2008 Caltrans Memo to Designers for the LRFD design of piles. The latter information was emailed by Caltrans OGDS-1 to the respective consultant designers and was also discussed during the geotechnical focus and PDT meetings.
18. Include tables for the Foundation Design Data Sheet, Foundation Design Loads, Foundation Recommendations and Pile Data Sheet, per 2008 LRFD Caltrans Memo to Designers.
19. Include the Nominal Driving Resistance in the appropriate section of the tables cited above and explain how it was arrived at.
20. Concrete class 200C is recommended in the subject report: Class C piles are no longer part of Caltrans Standard Plans. Project Standard Special Provisions need to discuss the corrosion remediation for the piles.
21. Include a section on static settlement criteria during construction and BEFORE commencement of pile driving, where appropriate.
22. Settlement monitoring for the embankment should be discussed and included in the construction consideration.
23. Include backup data for the Corrosion in the Appendix.
24. Discuss the settlement of piles and explain how they were arrived at.
25. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report. Included in the CD should also be the actual graph developed for API pile capacity, the input files and output files for LPILE software lateral pile capacity.
26. Why LPILE version 5 (latest) was not used for the lateral pile capacity calculations and an outdated LPILE 4 is used.
27. Provide the slope stability using SLIDE program.
28. Provide axial pile capacity by sample hand calculation verification or a sample spreadsheet where it can be verified by Caltrans OGDS-1.
29. The data for the GRLWEAP is not referenced and/or is not made available for our review, include the latter and a complete feasibility study for the pile load static and/or PDA testing for the 48 inch CISS piles in a separate report.
30. Elaborate and expand on drivability of the recommended piles, based on the recommendations of the report cited in comment No.29.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

FOUNDATION REPORT
BOLSA CHICA ROAD OC (REPLACE)
BRIDGE NO. 55-1102
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Prepared By:

Group Delta Consultants, Inc.
32 Mauchly, Suite B
Irvine, CA 92618

GDC Project No. I-436
August 5, 2008
(Revised Oct. 24, 2008)
(Revised February 12, 2009)
(Revised April 16, 2009)

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

August 5, 2008
(Revised 10-24-08, 2-12-09, and 4-16-09)

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: Foundation Report
BOLSA CHICA ROAD OC (REPLACE)
BRIDGE NO. 55-1102
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our Structure Foundation Report (SFR) for the replacement of Bolsa Chica Road OC over SR-22 in Orange County, California. This report presents the results of our field and laboratory investigations, and provides recommendations for the foundation design of the proposed bridge replacement. This report has been revised to incorporate additional comments from Caltrans dated March 26, 2009. We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 450-2100.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
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FOUNDATION REPORT
BOLSA CHICA ROAD OC (REPLACE)
BRIDGE NO. 55-1102
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The proposed project has been divided into 2 segments, and the overall project name is "West County Connector Project." The easterly segment is named "I-405/SR-22 HOV Connector Segment," which extends from Valley View Street to just east of Seal Beach Boulevard, and the westerly segment is named "I-405/I-605 HOV Connector Segment," which extends from just east of Seal Beach Boulevard to the I-605 interchange. The Bolsa Chica Road OC Replacement is part of the easterly segment (Bolsa Chica Road and Valley View St are same roads at this location). The site location is shown in Figure 1.

1.1 Project Description

The length of main portion of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405, from just east of Valley View Street to just east of Seal Beach Boulevard (see Figure 1). In addition, from just east of Valley View Street to just east of Springdale Street, several signs are proposed which are outside the main project area. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges (Bolsa Chica Road OC over SR-22 and 22/405 Connector Separation [to be renamed S405-E22 Connector Separation]), and construct a new HOV Connector bridge (405-22 HOV Connector Separation);
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls (RW3311+3312 at east abutment of S405-E22 HOV Connector Separation);
- Pre-cast Lightweight Fill (PCLW) Retaining Walls (RW1325+1326 at west abutment of 405-22 HOV Connector Separation, RW1299+1300 at east abutment of 405-22 HOV Connector Separation, and RW3319+3320 at west abutment of S405-E22 HOV Connector Separation);

- Drainage improvements; and
- Lighting, roadside signs, and overhead signs.

This report presents the Bolsa Chica Road OC (Replace) foundation recommendations.

1.1.1 Location

The site of the proposed bridge widening is located at the intersection of Valley View Street and SR-22 Freeway in Orange County, California (Figure 1). The bridge site latitude and longitude are approximately as follows:

- Latitude: 33.7743° North
- Longitude: 118.0380° West

1.1.2 Datum Shift

We understand that the datum (El. 0) for the as-built plans is 2.3 feet higher than the datum used for the current plans. ***All as-built logs of test borings and plans must be adjusted to the current datum by adding 2.3 feet to the as-built elevations.*** Elevations mentioned in this report have been adjusted and refer to the current datum.

1.1.3 Existing Bridge

The existing bridge was built in 1965, and will be demolished and replaced in two stages as part of this project. It is a 4-span structure with existing foundations supported on driven 45-ton Raymond Step Taper piles (concrete-filled mandrel driven steel shells) with 8 inch tip diameter and 15 inch butt diameter. The bridge was seismic retrofitted in 1994 by adding concrete catchers and treated timber bumpers at the abutments. No foundation retrofit was performed. Selected as-built plans are shown in Appendix C. Details of the existing bridge foundations are presented in Table C-1, Appendix C.

1.1.4 Proposed Replacement Bridge

The proposed General Plan is shown in Figure 2A, and the proposed Foundation Plan is shown in Figure 2B.

The replacement structure will be a 2 span cast-in-place pre-stressed concrete box girder, to be constructed in 2 stages. Girder depth is 7'2". Span lengths are 180'9" between Abutment 1 and Bent 2, and 175'3" from Bent 2 to Abutment 3, for a total length of 356 feet. The overcrossing will be two separate bridges connected by a closure pour, with total width of the two bridges equal to 116.5 feet. Proposed

abutments are seat type with continuous footings within the abutment slopes, and Bent 2 is two continuous footings with 3 columns each, for a total of 6 columns. Bottom of Bent 2 footing is at El. 21.5 feet, and bottom of abutment footing ranges from El. 38.3 feet (Abutment 1) to El. 32.8 feet (Abutment 3). Bent footings will be supported on HP 14x117 piles. The new Bent 2 location overlaps with the existing Bent 3 footings. Existing Bent 3 footings will be demolished but the piles will remain, and some of the new Bent 2 piles may need to driven between existing Bent 3 piles. New abutment footings will be behind the existing abutment footings, and some of the new batter piles will need to be driven between the existing abutment vertical piles.

Profile grades on Valley View Street will be raised by up to about 4 feet above existing grades to El. 57.5 at Abutment 1 and El. 52.3 at Abutment 3. Abutment slopes below the bridge will be paved and sloped at 1.5h:1v inclination, and will be graded to cut into the existing slopes to provide a wider SR-22 freeway. Abutment fills will be extended on the east side to widen the approaches for the new bridge. Side slopes for the approach fills are proposed at 2h:1v or flatter.

1.2 Scope of Work

Our scope of work for this project included the following:

- Review existing data;
- Perform subsurface investigation along the bridge replacement alignment;
- Perform laboratory testing on selected samples of the subsurface soils;
- Develop geologic profiles and engineering parameters for foundation design;
- Perform geotechnical analyses;
- Develop geotechnical recommendations for design and construction of the bridge foundations;
- Present the results of our investigations and our recommendations in this report.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

Two rotary wash borings (R-08-019 and R-08-023) were performed from the roadway of Valley View Street to depths of 86.5 and 96.5 feet at Abutments 1 and 3, respectively. A total of three Cone Penetration Tests (CPT-08-020, CPT-08-021, and CPT-08-022) were performed in the SR-22 freeway to depths of 118 to 150 feet below freeway grades. Figure 3 shows the boring and CPT locations on a topographic plan. Detailed descriptions of the explorations and the boring logs, CPT logs, and interpretations are presented in Table A-1 in Appendix A. The Log of Test Borings sheets are provided as Plates 1 through 6.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, engineering, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

Test	ASTM Designation	Purpose
• Moisture Content and Dry Density	ASTM D 2216	Soil Classification
• Grain Size Distribution (Sieve Analysis)	ASTM D 422	Soil Classification
• Percent Passing #200 Sieve	ASTM D 1140	Soil Classification
• Atterberg Limits	ASTM D 4318	Soil Classification
• Direct Shear	ASTM D 3080	Shear Strength
• Pocket Penetrometer		Undrained Shear Strength
• Soil Corrosivity (pH, sulfate, and chloride)	CT 422. 443 417, and 643	Corrosion Potential

Moisture content, dry density, percentage passing a No. 200 sieve, and the pocket penetrometer readings are shown on the boring logs in Appendix A. Detailed descriptions of the other tests performed and their results are presented in Appendix B.

2.3 Existing Data

In 1959 Caltrans performed 1 rotary soil boring and 3 penetration borings. The approximate locations of the Caltrans 1959 borings are shown on the current site plan in Figure 3. The as-built Log of Test Borings (LOTB) sheet is presented in Figure 4. No laboratory data from the original investigation are available.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The original site grades along SR-22 were relatively level near El. 25 to 26 feet. Approach fills were placed to raise Valley View Street above the freeway at the location of the Overcrossing. The fills have a maximum height of about 25 to 30 feet, and are inclined at 1.5H: 1V below the abutments. Side slopes generally range from 1.5H: 1V to 2H: 1V. Existing road elevation on Valley View Street is near El. 54 feet at Abutment 1 and near El. 46 to 48 feet at Abutment 3. Freeway elevation is near El. 28 to 30 feet below Abutment 1 and near El. 26 feet below Abutment 3. The lowest surrounding grades are about El. 25 feet southeast of Abutment 1. Valley View Street has a high point near El. 54 feet at the Garden Grove Boulevard ramp (Figure 3), and drains to the north and south from this high point. Valley View Street is paved with Asphalt Concrete (AC).

3.2 Geologic Conditions

3.2.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange County coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

3.2.2 Stratigraphy

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange

County coastal plain of the southern portion of the Central Block of the Los Angeles Basin. The basin is in filled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of poorly consolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Stratigraphy consists of alternating layers of sands, silts, and clays (Figure 5B). Shallow compacted roadway fills and abutment approach fills up to about 30 feet high have been placed in the area over the natural alluvial deposits. Relative density and stiffness of the alluvial soils generally increases with depth.

3.2.3 Geologic Structure

Since the bedrock is more than 4,000 ft deep, geologic structure at the site is not a design issue.

3.2.4 Geologic Hazards

Geologic hazards include landslides, expansive or collapsible soils, and seismic hazards include liquefaction, lateral spreading, seismic slope stability, fault rupture, tsunamis, and seismic shaking. The site is not located in landslide prone area and no natural slopes are present. Expansive soils are present and recommendations regarding expansive soils with 4 ft of the finished grade are provided in the GDR and in expansive soil exclusion zone are provided in Section 4.5 of this report.

3.3 Subsurface Conditions

3.3.1 Generalized Soil Profile

Based on borings / CPTs from our current investigation, we developed a generalized soil profile along the bridge, as shown in Figure 5A. The soil conditions are generally consistent with those disclosed by the as-built LOTB in Figure 4. General engineering characteristics of the subsurface soils are illustrated in the Geotechnical Cross-Section in Figure 5B. The soil profile is divided into 5 general layers. Layer descriptions and approximate layer boundary elevations are described below, and engineering properties for design are presented in Section 3.3.2.

3.3.1.1 Layer 1 – Fill and Stiff Native (El. 20+)

Road fill and abutment approach fill is present above about El. +23 feet. The upper native alluvial material above El. 20 feet is similar to the compacted fill. Fill and stiff native alluvial soils encountered in the test borings and CPTs consist primarily of very

stiff to hard lean sandy clays and sandy clayey silts (CL, ML), with less frequent layers of silty sands (SM) and clayey sands (SC).

3.3.1.2 Layer 2 – Firm to Stiff CL (El. +20' to +6')

This layer is mostly below the water table, and is present throughout the project area. It is typically about 12 to 15 feet thick, and classifies as locally firm but predominantly stiff lean clay or lean sandy clay (CL) with typical undrained shear strengths of 1.0 to 1.4 ksf based on CPT correlations and pocket penetrometer readings. Thin seams of sand to silty sand to sandy silt are present in this layer (see Figure 5b). Layer 2 is generally overconsolidated with respect to the freeway grades, but is close to normally consolidated where present under the 25 to 30 feet of abutment fill. Since it is fairly shallow below the freeway grades and is generally the weakest and most compressible layer at the site, it typically controls the magnitude and time rate of settlement and global stability of slopes at the site.

3.3.1.3 Layer 3 – Very Stiff CL, ML (El. +6' to -14')

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with thin interbeds of medium dense to dense silty sands (SM) and sandy silts (ML). Pocket penetrometer readings in the fine grained materials range from 2.0 to 4.5 ksf, and CPT correlations indicate average undrained shear strengths in this layer generally more than 3.0 ksf. These clays are overconsolidated.

<u>Layer 3A – Dense to Very Dense SP, SM (El. +2' to -3')</u>

Between about El. +2 and -3 feet within Layer 3 is a layer of dense to very dense sand and silty sand with average SPT N-Value of 40 to 45 blows per foot. The thickness of the very dense portion of the layer is about 3 feet, which has SPT N-Value greater than 50 and CPT tip resistance of 200 to 300 tsf. This layer is evident in all the current borings and CPTs as well as in the as-built LOTB. A short distance of hard driving will be experienced as piles penetrate this layer.

3.3.1.4 Layer 4 – Dense to V. Dense SM/ML/SP (El. -14 to -44')

Layer 4 is a predominantly granular layer about 30 feet thick. Pile foundations will have tips driven into this layer.

The upper 10 feet of the layer is generally dense silty sand and sandy silt with 1-2 foot thick layers of dense sand (SP) and very stiff to hard clayey silt and clay (ML, CL). Average SPT N-Value in the upper 10 feet is 37 to 40 blows per foot, and clay lenses have undrained shear strength of 3 to more than 4 ksf.

The lower 20 feet of this layer is primarily very dense sand and gravelly sand (SP) and sand with silt (SM-SM, SW-SM), with occasional thin lenses of dense silt or silty sand (ML, SM). SPT blowcount in the lower 20 feet is generally greater than 50 blows per foot, and CPT tip resistance is generally between 250 and 450 tsf.

3.3.1.5 Layer 5 – V. Dense SP & Hard CL/ML (below El. -44')

This layer is composed of alternating beds of very dense sands and very stiff to hard clays and silts. The sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 600 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf.

3.3.2 Surface Water and Groundwater

3.3.2.1 Surface Water

Surface water generally consists of sheet flow to existing storm drainage facilities. A small open channel drainage ditch is located just southeast of Abutment 1 (see Figure 3).

3.3.2.2 Groundwater

In the Caltrans 1959 As-Built LOTB, groundwater was reported near El. +7 feet. Groundwater was measured in Boring R-08-023 near El. +16 feet. Based on California Geological Survey (CGS) (previously known as California Department of Conservation (CDC), Division of Mines and Geology) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater is at a depth of about 10 to 20 feet. The reference elevation is not known. If the 10 foot depth is taken below freeway grade (El. 26 ft) then the groundwater would be near El. 16 feet, which is consistent with our investigation data. Based on the above data, we selected a design groundwater elevation of 16 feet for analysis.

3.3.3 Engineering Parameters

Recommended design engineering properties for the soil layers shown in Figure 5 were developed from the field and laboratory data from our investigation, and are summarized in Table 1. Index properties of soils were based on testing for natural moisture content and dry density, percent passing No. 200 sieve, grain size distribution, and Atterberg Limits. Drained strength parameters for c-ϕ soils were taken from results of direct shear tests. Undrained shear strengths of clays were taken from conservative interpretation of CPT test results, pocket penetrometer readings, and torvane readings. Friction angles

of sandy soils below the water table were based on CPT and SPT penetration resistance correlations. Consolidation parameters for poorly consolidated clays were developed based on consolidation testing in combination with correlations of natural moisture content, ratio of undrained shear strength to effective overburden stress, and Atterberg Limits. Compressibility of sands and very stiff overconsolidated clays were based on published CPT and SPT penetration resistance correlations. Boring and CPT data are presented in Appendix A, and laboratory test results are presented in Appendix B.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Seismic Evaluation

4.1.1 Potential Seismic Hazards

The project is located in a seismically active area. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding. The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 7. A summary of the nearby fault data is provided below:

Fault Name	Fault Type	MCE Magnitude	Closest Distance (km)	
			1996 Map[6]	EQFAULT[7]
Los Alamitos[1,4]	Reverse-Oblique[5]	6.0[6]	2.0	N/A
Newport-Inglewood / Rose Canyon East[1,2]	Strike-Slip[6]	7.0[6]	Use EQFAULT	5.5
San Joaquin Hills[2,3]	Blind-Thrust[7]	7.0[8]	N/A	13.3
Puente Hills[2,3]	Blind-Thrust[7]	7.25[7]	N/A	18.1

Footnotes:
1. Included on Caltrans 1996 Map
2. Included in CGS 2002 Fault Data (EQFAULT)
3. Not included in Caltrans 1996 Map
4. Not included in CGS 2002 Fault Data (EQFAULT)
5. Unclassified in Caltrans 1996 Report, classified by others as Reverse-Oblique
6. From Caltrans 1996 Map and Report
7. From CGS 2002 Fault Data, except M=7.25 for Puente Hills per Caltrans
8. Listed as 6.6 in CGS 2002, revised to 7.0 by Caltrans (SR-22 Phase 1)

4.1.2 Ground Surface Rupture

The site is not located in the Alquist-Priolo Earthquake Fault Zone, and the closest known active fault is the Los Alamitos Fault at a distance of about 2 km. Due to the distance from the closest faults ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed.

4.1.3 Ground Motion

The bridge site latitude and longitude are approximately as follows:

- Latitude: 33.7743° North
- Longitude: 118.0380° West

GDC performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base, as well as seismic data from the Caltrans 1996 map (see Figure 7). Los Alamitos is not in the EQFAULT CGS 2002 data base, and the closest mapped fault to the site according to EQFAULT is the Newport / Inglewood Strike-Slip Fault at a distance of 5.5 km, with a rated maximum credible magnitude of M=7.0. The bridge site is located between the 0.4 and 0.5g contours, which would indicate a rounded up design PBA of 0.5g. For EQFAULT analysis and the Los Alamitos Fault we used the attenuation relationships presented by Sadigh et. al. (1997). EQFAULT output and deterministic analyses using Sadigh relationships are presented in Appendix E-1. A summary of Peak Ground Acceleration (PGA) from Sadigh 1997 – Soil and PBA from Sadigh 1997 - Rock, and PBA per Caltrans Map, for the bridge is presented in the following table:

Fault	Caltrans 1996 Map Fault to Site Distance (km)	EQFAULT Fault to Site Distance (km)	Rounded-up Caltrans 1996 Map PBA (g's)	Sadigh 1997 Rock PBA (g's)	Sadigh 1997 Soil PGA (g's)
Los Alamitos M=6.0	2.0	N/A	0.5	0.57	0.48
Newport-Inglewood M=7.0	Use EQFAULT	5.5	0.5	0.50	0.41
San Joaquin Hills M=7.0	N/A	13.3	N/A	0.37	0.35
Puente Hills M=7.25	N/A	18.2	N/A	0.32	0.32

The PBA for a magnitude 6.0 earthquake on Los Alamitos Fault is 0.6g and for a magnitude 7.0 earthquake on Newport-Inglewood is 0.5g. Peak Ground Acceleration (PGA) may be taken as 0.48g for M_w=6.0 and 0.41g for M_w=7.0. For seismic slope stability evaluation, we recommend using a horizontal acceleration coefficient of Kh=0.16 or 1/3 of the maximum PGA.

4.1.4 ARS Curve

Per Caltrans Foundation Reviews dated 12-11-07 and 01-11-08 (See Appendix D) ARS curves for the project may be taken as Seismic Design Criteria (SDC) ARS curves for PBA of 0.5g and MCE magnitude of 7.25+/-0.25 for Bolsa Chica Road OC. Based on CPT data, boring data, and our liquefaction assessment at the site, the soil profile classifies as Type D in accordance with Caltrans SDC (see Appendix E-2). To account for near-source effect (site less than 15 km from fault), the following adjustments on the spectral acceleration values are recommended on the Caltrans SDC response spectra:

- 20% increase for periods equal to or greater than 1.0 second.
- No changes for periods less than 0.5 second.
- Linear interpolation for periods between 0.5 second and 1.0 second.

The recommended ARS curve is shown in Figure 8.

4.1.5 Liquefaction Evalauation

The site is located within a State Liquefaction Hazard Zone (CDMG, 1999). Highest historical groundwater in this area based on Figure 6 is between the 10 and 20 foot depth contours. Groundwater was encountered at El. 16 feet in boring R-08-023, which is about 10 feet below lowest freeway grades. Sediments below the groundwater at the site are primarily stiff to very stiff clays and dense to very dense sands, but contain localized thin interbeds of loose to medium dense sands, silty sands, and silts that may be prone to liquefaction.

We performed liquefaction calculations for CPT-08-020, 021, and 022 assuming a high historical groundwater depth of 10 feet below freeway level (see Appendix E-3). Calculations were carried to a depth of 60 feet below the freeway grades. We determined that use of Magnitude 7.0 and PGA of 0.45g was more critical than using Magnitude 6.0 and PGA of 0.5g, and therefore used the higher magnitude case in our analyses. The resulting analyses show that limited 1 to 5 foot thick layers of silty and sandy soils below El. 15 feet may liquefy in the design earthquake. Potentially liquefiable layers are shown on Figure 5B. Estimated liquefaction-induced ground settlements for all 3 CPTs are less than ½ an inch. A summary of the liquefaction settlements is included in Table 2, and calculations are in Appendix E-3.

Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1500 psf. Estimated residual shear strengths range from a minimum of 875 up to 1500 psf. Only two isolated 1-foot zones had values less than 1000 psf, and on average they were about 1450 psf, with the vast majority of layers having the limiting value of 1500 psf.

Due to the relatively isolated thin liquefied layers, small ground settlements, and relatively high residual shear strengths, it is our conclusion that liquefaction does not have a significant impact on the design of piles or stability of the slopes.

4.1.6 Other Seismic Hazards

The site has no known history of subsidence. The site is generally level and the embankment slopes were engineered during construction and liquefiable soil layer are relatively thin and isolated. Therefore, the impact of liquefaction on seismic slope stability is not an issue. Static and seismic stability of abutment slopes is evaluated later in this report.

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the 100-yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

4.2 Soil Corrosivity

Caltrans Corrosion Guidelines (2003) define a corrosive area as “an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates or has a pH of less than 5.5.”

Representative samples of the abutment fills and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests performed are summarized as:

BORING NO	SAMPLE NO	DEPTH (ft)	USCS CLASS.	PH CALTRANS 643	CHLORIDE CONTENT CALTRANS 422 (ppm)	SULFATE CONTENT CALTRANS 417 (ppm)
R-08-019	S-7	35-36.5	SM	8.5	336	538
R-08-023	S-4	20-21.5	CL	7.8	2897	2432
R-08-023	S-6	30-31.5	CL	8.0	25	490

Based on these test data the site soils classify as corrosive due to high sulfates and chlorides in accordance with Caltrans Corrosion Guidelines (2003).

4.2.1 Corrosion Mitigation for Reinforced Concrete

Design of reinforced concrete in contact with native soils should consider the site corrosion potential in accordance with Bridge Design Specifications (BDS) Section 8.22 (July 2000):

- For 500 to 5000 ppm Chlorides in soil the minimum concrete cover and mix design for protection of reinforcement against corrosion due to chlorides shall be as provided in BDS Table 8.22.1:
  - The maximum water to cementitious material ratio shall not exceed 0.40;
  - Minimum concrete cover for footings and pile caps is 3 inches;
  - Minimum concrete cover for walls and columns is 3 inches;
  - Minimum concrete cover for precast piles is 2 inches, and Mineral admixtures conforming to ASTM Designation C1240 and/or ASTM Designation C618 Type F and/or N, may be required.;
- For 2000 to 15,000 ppm Sulfates in soil the minimum requirements for protection of concrete against sulfate exposure shall conform to the requirements in BDS Table 8.22.2:
  - Cement shall be Type II modified or Type V;
  - The minimum cementitious material content shall be 658 pounds per cubic yard with a 25% mineral admixture replacement by weight. Maximum water to cementitious material ratio shall not exceed 0.40.
- Concrete abutment piles shall be Class 200.

We understand that the design concrete cover for the bridge columns and walls is 2 inches, which is not adequate to resist corrosion from native soils. To avoid contact between native soils and concrete columns and walls, the special provisions should require that all backfill within 2.5 ft of the column or wall concrete be non-corrosive

imported structural backfill with pH >5.5, sulfates < 2000 ppm and chlorides <500 ppm.

4.2.2 Corrosion Mitigation for Steel H-Piles

Steel piles in a corrosive environment must consider a sacrificial corrosion rate of 0.001 inches per year for 75 years, or 0.075 inches off all surfaces of steel H-piles (total of 0.150 inches from thickness) in accordance with Memo to Designers 3-1(July, 2008). The following table summarizes the depth, width, flange, and web thickness of the proposed HP 14x117 piles before and after consideration of the design corrosion loss, along with the un-corroded sections of the next two smaller sizes of H-Piles:

H-Pile Section	Flange Thickness, t_f (inches)	Web Thickness, t_w (inches)	Depth (inches)	Width (inches)
HP14x117	0.805	0.805	14.21	14.885
HP14x117 (corroded)	0.655	0.655	14.06	14.735
HP14x102	0.705	0.705	14.01	14.785
HP14x89	0.615	0.615	13.83	14.695

The corroded HP 14x117 is smaller than the HP 14x102 but larger than HP 14x89; therefore we used section properties of HP 14x89 piles for lateral capacity analyses. For steel piling driven into undisturbed soil, the region of greatest concern for corrosion is the portion of the pile from the bottom of the pile cap or footing down to 3 feet below the water table. Since the axial capacity of the proposed piles comes primarily from below this depth, corrosion will not adversely affect the axial capacity of the piles and the full HP 14x117 dimensions are used in axial calculations.

4.3 Scour Potential

The proposed bridge is not located in a flood/drainage or river channel. Therefore, scour potential is not an issue for this bridge.

4.4 Foundation Recommendations

4.4.1 Existing Structure Foundations

Since the existing structure will be demolished and replaced, an as-built assessment of the capacities of existing bridge foundations was not necessary. A brief summary of the existing bridge (new datum elevations) is presented below:

- The bridge structure is a four-span cast-in-place concrete box girder built in 1965 and retrofitted in 1994 (no foundation retrofit was performed);
- Existing Abutments 1 and 5 are supported on 45-ton Class I driven Raymond Step Taper Piles (pile tip diameter = 8 inches, butt = 15 inches). Bottom of footing elevations are 42.8 to 44.3 feet at Abutment 1 and 36.3 to 38.8 feet at Abutment 5. The average tip elevation at Abutment 1 is El.-21.1 feet and it ranges between El.-16.8 to El.-25.3 feet. At Abutment 5 the average tip elevation is El.-20.1 feet and it ranges between El.-15.7 to El. -24.3 feet. Specified tip elevation was El. -12.7 feet.
- Existing Bents 2, 3 and 4 are supported on 45-ton Class II driven Raymond Step Taper Piles (pile tip diameter = 8 inches, butt diameter = 15 inches). Bottom of footing elevations are El. 24.3, 23.3, and 21.3 at Bents 2, 3, and 4, respectively. The average tip elevation at Bent 2 is El.-22.1 feet and it ranges between El.-18.6 to El.-28.2 feet. At Bent 3, the average tip elevation is El.-23.4 feet and it ranges between El.-15.9 to El.-24.8 feet. The average tip elevation at Bent 4 is at El.-23.4 feet and it ranges between El.-16.6 to El.-25.7 feet. Specified tip elevation was El.-12.7 feet.

- In 1994 the structure was retrofitted for design PBA of 0.5g by adding concrete catchers and treated timber bumpers to Abutments 1 and 5 (no foundation retrofit was performed).

Location of new foundation will need to avoid conflict with existing abandoned foundations. Selected as-built plans for the existing bridge are presented in Appendix C for reference. If necessary, vertical steel H-Piles at Bent 2 may be driven between the existing piles and batter piles at abutments may be driven between existing vertical abutment piles. Care should be taken to avoid any conflicts between the new and existing piles during pile driving. The existing foundations are summarized in Table C-1 in Appendix C.

4.4.2 New Foundations

4.4.2.1 Foundation Type

Small displacement steel H-Piles are recommended due to potential for hard driving between existing piles at Bent 2. Pre-cast pre-stressed reinforced concrete piles are recommended at Abutments 1 and 3 since they are considered to be the most economical. Due to the spacing of existing vertical piles at the abutments, conflicts between existing and new piles are not significant.

The Abutment Piles are designed in accordance with WSD design method bent piles are designed in accordance with LRFD. In accordance with LRFD memo to designers 3-1 (July, 2008), pile Loads are summarized in Table 3A and pile details, design method, bottom of footing elevation, pile cut off elevation, pile cap size, allowable settlement, and number of piles per support are shown in Table 3B.

4.4.2.2 Axial Capacity

Since the number of piles is generally controlled by lateral capacity, the full standard 400 kip nominal resistance may not be required for the static or seismic axial loads. However, in order to penetrate sufficiently through any potentially liquefiable layers (see Figure 5B), we recommend that all piles be driven to the full nominal capacity of 400 kips.

Piles will derive their capacity by a combination of skin friction on the sides of the piles and from end bearing at the pile tip. Abutment piles may be predrilled through the embankment fills to El. 26 feet in accordance with Caltrans practice, and axial capacity in this zone was ignored in computations.

We computed axial friction and end bearing capacities using the method of Meyerhof for sands, and we used the α-method for skin friction in clays. End bearing in clays was taken as 9 times undrained shear strength. For steel H-Piles, we used the box perimeter for skin friction computations, and a half-plugged condition was assumed for the end-bearing calculations since the piles are driven into very dense sands. Axial pile capacities versus depth are shown in Figures 9A through 9C, and calculations are presented in Appendix E-4.

Specified tip elevation at Abutments is El. -25 feet, and at the Bent is El. -28.4 feet. Abutment pile lengths range from 63 feet at Abutment 1 to 58 feet at Abutment 3, and Bent pile length is 50 feet. The axial capacities and tip elevations for abutments and bents are summarized in the Foundation Recommendations for Abutments, Table 3C

and Foundations Recommendations for Bents, Table 3D, respectively. Pile Data Table for the project plans is provided in Table 3E.

We recommend that all the piles be installed at a minimum spacing of 3 pile diameters or 3.5 feet center-to-center. Piles with this minimum spacing will not require a reduction in vertical capacity for group action.

4.4.2.3 Lateral Capacity

Lateral capacity of pile groups includes the passive resistance on the pile cap and lateral resistance of the piles.

Estimates of lateral pile capacity of new Abutment and Bent piles were made using the computer program LPILE Plus 4.0 (Ensoft, 2000) and soils data from our investigation. For the piles spaced at 3 diameters on centers we used an average group p-multiplier of 0.5 to model reduction due to group effects. Maximum bending moments were estimated utilizing the higher p-multiplier of 0.75 for the leading row piles, which generates higher bending moments. The structural engineer is using a pinned connection at both abutments and the bent; therefore analyses were performed for free-head conditions. The effect of ground slope was included in the longitudinal abutment pile analysis. H-Piles were analyzed in both the strong and weak directions assuming HP14x89 section to account for corrosion loss. For abutment batter piles, the horizontal component of axial capacity may be added to the lateral capacity. The results are summarized in Table 4. Computer outputs are presented in Appendix E-5.

At the request of Caltrans, a comparison run was made by using both version 4.0 and 5.0 to verify that no significant difference in results is present between the two versions for the cases analyzed. The comparison is shown in Appendix E-8.

We computed passive resistance on the Bent 2 pile cap using Rankine theory and an undrained shear strength of 1.5 ksf for the stiff native clays at the pile cap level. The recommended Bent 2 passive resistance versus deflection is shown in Figure 10. Calculations are included in Appendix E-6.

4.4.2.4 Pile Settlement

We used dead plus 50% live load for estimating settlements of the pile groups. Dead plus 50% live load for abutment piles is 118 kips per pile and for bent piles is 107 kip per pile. Ultimate load per pile at the recommended pile penetrations is about 412 kips. Since a significant portion of the load is carried in friction, settlement required to mobilize the ultimate load is about 0.2 to 0.4 inches. Assuming a maximum settlement of 0.4 inches to mobilize the ultimate friction plus mobilized end bearing load, we

calculated settlement to mobilize design loads of 107 to 118 kips as about 0.1 to 0.12 inches for a single pile. The group factor was calculated as $\zeta = (B/b)^{1/2}$ in which b = width of the pile and B is the equivalent width of the group (Vesic', 1977). Using this formula, the calculated settlement of the groups is less than 1 inch. Calculations are provided in Appendix E-9.

4.4.2.5 Pile Installation

Hard Driving

While the clays should be fairly easily penetrated, layers of dense sand are present locally above the tip elevations. For instance layer 3A (Figure 5B) is a 3- to 5-foot thick dense sand layer between about El. +2 and -3 feet, and dense layers with a few feet thickness are present above the tip elevations near the top of layer 4 between about El. -15 and -20 feet (Figure 5B). Due to presence of these zones with higher end bearing, hard driving for several feet at selected depths should be anticipated, especially in the concrete abutment piles, although the layers are thin enough that the piles are expected to punch through. The H-piles can more readily cut through these layers.

Hammer Selection

Due to presence of these layers, we recommend that piles be driven with a hammer with rated capacity of at least 90,000 ft lbs. per blow (such as a Delmag D-36/32).

Blowcount Criteria

We performed preliminary driveability analysis and developed blowcount criteria for the piles using the computer program GRLWEAP (Computer output is shown in Appendix E-10). Concrete piles driven with a Delmag D36-32 should be driven to a minimum blowcount of 22 blows per foot, and steel H-Piles should be driven to a minimum blowcount of 20 blows per foot. If blowcount is not reached on initial driving, re-tapping the pile for several inches and counting blows per inch may be performed after 24 to 48 hours to evaluate increased capacity with "set-up." More detailed drivability analysis should be performed after the hammer-pile-cushion parameters are available.

Pre-Drilling

Piles may be predrilled through the abutment fills in accordance with Caltrans practice as recommended in Section 4.4.2.2. We recommend that piles otherwise be driven without pre-drilling. If excessively difficult driving is encountered during construction, use of undersized pre-drilling can be considered with the written approval of Group

Delta. Undersized pre-drilling should be done with a maximum 12-inch auger for 14-inch piles.

Indicator Pile Program

We recommend that an indicator pile program be performed with Pile Driving Analyzer (PDA) measurements. The benefits of the PDA measurements include:

- monitor hammer efficiency by measuring the energy delivered to the pile
- monitor compressive stresses at the end of pile driving to determine refusal blow count and compressive stress damage
- monitor tensile stresses during soft driving and to assess the potential for tensile stress damage
- confirm the ultimate dynamic friction and end bearing capacity
- determine setup so that long term frictional uplift and downdrag capacity can be verified
- optimize the blow count criteria
- optimize the production pile lengths

The indicator program should consist of driving a minimum of 8 pre-stressed concrete piles (4 in each stage of construction) and 10 steel H-piles (5 in each stage of construction). Suggested locations are shown in Figures 2C and 2D. The length of the test piles should be at least 10 ft longer than the lengths based on the specified pile tip elevations in Table 3E. Final pile driving criteria and production pile lengths should be defined after the results of the indicator pile program are available.

4.5 Approach Fill Earthwork

Existing 1.5h:1v abutment fills were constructed during the original project grading, and these slopes will be excavated back at the same inclination to create a wider SR-22 and longer bridge than the existing conditions. Profile grades on Bolsa Chica Road will be raised by a maximum of about 4 feet, and fairly minor fills with an estimated maximum thickness of about 15 feet will be placed along the east sides of the abutment approaches to create a wider Bolsa Chica Road.

Placement of fills is expected to cause consolidation settlements in Layer No. 2 (Figure 5B). Other fill and native site soils are stiff and overconsolidated and will settle quickly under the new embankments.

Settlement due to fill placement is estimated to range from a maximum of 2 to 4 inches under the highest part of the approach fills, decreasing to 1 to 2 inches near the edges of the filled area. Some of the settlement may be offset by the unloading due to

excavation of abutment slopes. Time dependent settlements still may occur due to consolidation of Layer 2. A waiting period of 45 days after placing fill and prior to driving abutment piles should be specified in the contract documents. Settlement monitoring should be performed at the abutment locations. GDC should review the settlement data and confirm stabilization prior to allowing piles to be driven.

The entire footprint of areas to receive new fill shall be cleared and grubbed of any vegetation, the subgrade shall be scarified and recompacted. Abutment wall backfill shall conform to Caltrans Standard Specifications for structural fill. All earthwork shall conform to the current edition of Caltrans Standard Specifications. All new fill placed within 150 feet of the abutment should have an expansion index (EI) of less than 50. Positive surface drainage away from foundation areas should be maintained. The required expansive soil exclusion zone in a bridge abutment is illustrated in Figure 11.

4.6 Slope Stability

Abutment slopes are very stiff to hard compacted clayey fills, were engineered during original grading of the project, and based on our visual observations the slopes have performed well. The fill and upper stiff native alluvium are underlain by a weaker firm to stiff clay layer. We performed slope stability analyses for the proposed abutment and new fill slopes, with a maximum inclination of 1.5h: 1v and maximum height of about 30 feet. Soil layering and shear strengths used in our analyses are shown in Table 1. For static analyses, we used ultimate (post-peak) drained shear strengths for clayey fills, and undrained shear strengths for Layer 2 (which is more critical than the drained condition). For seismic analyses, we used peak drained strengths for the fill and undrained shear strength for Layer 2.

The stability analyses show that the stability of the slopes is controlled by deeper surfaces passing into Layer 2. Analyses for static conditions indicate factors of safety in excess of 1.5, and for pseudo-static analyses using Kh=0.16 indicate factors of safety in excess of 1.1, and therefore meet Caltrans requirements for static and seismic stability. Calculations are included in Appendix E-7.

4.7 Earth Pressures

4.7.1 Active Pressures

Static and seismic (if required) earth pressures for abutment walls with level backfill designed in accordance with Caltrans standards may be taken as:

- Unit Weight, γ = 120 pcf
- Active Earth Pressure Coefficient, K_a = 0.30

- Lateral earth pressure = 36 pcf
- Horizontal pressure due to areal surcharge loads = K_a x vertical pressure
- Additional Seismic earth pressure = 15 pcf as inverted triangular pressure

4.7.2 Passive Resistance of Abutments

The ultimate lateral capacity of an abutment wall is a function of the height of the abutment wall that is acted on by the passive soil pressure on the backfill. The Caltrans Seismic Design Criteria (SDC), Section 7.8, dated February 2004 recommends a passive pressure of 5 ksf for a wall height of 5.5 feet based on full-scale abutment testing conducted at UC Davis. For wall heights other than 5.5 feet, the passive pressure may be determined by multiplying the 5-ksf value with the ratio (H/5.5) where H is wall height in feet in accordance with SDC. For higher walls the maximum value of the passive resistance should be limited to 7.3 ksf corresponding to an abutment height of 8 feet.

4.8 Temporary Excavation and Shoring

Excavations should be readily accomplished with conventional equipment such as backhoes and excavators. Excavation safety is the responsibility of the contractor and shall comply with all applicable OSHA regulations. The safety of all excavations shall be verified by the designated competent person in the field, and excavation slopes or shoring modified as necessary to maintain a safe and stable excavation. No surcharge loads should be permitted within a horizontal distance of 5 feet or the depth of the shoring, whichever is greater, unless the excavation / shoring has been designed for these loads. In general, temporary excavations within the very stiff clay existing fills may be made near vertical for cuts up to about 5 feet without shoring. Where not supporting existing improvements, higher temporary cuts may be made at maximum inclinations of ¾ h: 1v to depths of up to about 20 feet below Bolsa Chica Road. Vertical cuts higher than 5 feet, or cuts encroaching into a 1:1 plane below the edge of existing infrastructure, should be properly shored. Cantilever shoring may consist of soldier piles and lagging. Tied-back shoring may be required to facilitate staged construction.

For temporary cantilevered shoring consisting of soldier piles and lagging, lateral earth pressures may be determined based on Figure 5.5.5.6-4 of Bridge Design Specifications (BDS) Section 5.5.5.6 (August 2003), "Simplified Lateral Earth Pressure Distributions for Temporary Non-gravity Cantilevered Walls with Vertical Wall Elements Embedded in Cohesive Soil and Retaining Cohesive Soil." For temporary braced or tied-back shoring, lateral earth pressures may be determined in accordance with BDS Section 5.5.5.7.2. Undrained shear strengths, drained friction angles, unit weights, and elevations of the cohesive soil layers may be determined using Table 1.

4.9 Construction Considerations

The following construction considerations should be taken into account by bidders and contractors:

- Bolsa Chica Road and SR-22 have daily commuter traffic, and construction will need to be carefully planned to minimize impacts to traffic;
- The bridge will be constructed in two stages, and travel lanes on Bolsa Chica will be reduced to about half the current number of lanes during construction;
- Work at freeway level will require traffic control and/or lane closure or night work to reduce the impact on freeway traffic;
- Construction staging areas are limited;
- Buried utilities are present and may cause construction conflicts;
- The surrounding area contains residential development and noise from pile driving may be an issue;
- A waiting period of minimum of 45 days should be specified after placing the fill along abutments and start of pile driving. Settlement should be monitored at the abutments by settlement plates to verify that the settlement has been completed;
- Existing foundation are present in the area of new piles and may conflict with the proposed pile foundation;
- Localized zones of hard driving may be encountered above the tip elevations, undersized pre-drilling will only be allowed if necessary with written approval of Group Delta;
- The Abutment and Bent pile caps are above the groundwater table, but will require temporary excavations. Excavation adjacent to the existing bridge may require temporary shoring with tiebacks. The contractor should submit temporary excavation and shoring shop drawings for the engineer's approval prior to excavation.
- Our subsurface characterization is based on the borings performed at the locations shown in Figure 3. Subsurface conditions between borings are based on extrapolation between these points. Therefore, if conditions different than those assumed in the design are encountered during construction, excavation, or pile driving, we should be notified immediately so that we can assess the impact to our current recommendations and make appropriate modifications, if required.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report, or portions of this report, are provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report.

6.0 REFERENCES

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TABLES

TABLE 1
SUMMARY OF ENGINEERING PROPERTIES
BOLSA CHICA ROAD OC

Layer No.	Soil Type	El. (feet)	Index Properties	SPT N-Value (blow/ft)	Drained Shear Strength Parameters				Undrained Shear Strength (psf)	Compressibility Parameters				
					Peak Cohesion c' (psf)	Peak Friction Angle ϕ' (deg)	Ultimate Cohesion c' (psf)	Ultimate Friction Angle ϕ' (deg)		Modulus E (ksf)	$Cc/(1+e_0)$	$Cr/(1+e_0)$	OCR	Cv (ft^2/day)
1	Very Stiff to Hard Sandy Clay / Silt (CL, ML)	+54 to +20	**(-)#200**=54 to 71% (avg 59%) **LL**=32 to 39 (avg 35) **PI**=19 to 20 (avg 20) **PI**=12 to 19 (avg 15) ω_N=10 to 27% (avg 19%) γ=125 pcf (average)	**Borings:** 21 to 40 (avg 30)	400	30	250	30	3,000	-	-	0.018	7	**Over Consolidated:** 2.3
2	Firm to Stiff Sandy Clay (CL)	+6 to +20	**(-)#200**=26 to 86% (avg 58%)* **LL**=33 to 39 (avg 36)* **PL**=19 to 21 (avg 20)* **PI**=12 to 19 (avg 16)* ω_N=23 to 34% (avg 28%) γ=125 pcf (average)	**Borings:** 10 to 17 (avg 14) **CPT:** 5 to 20 (avg 10)#	250	28	100	28	1,000	-	0.17	0.016	2.5 at Freeway 1.0 below Abuts	**Normally Consolidated:** 0.33 **Over Consolidated:** 2.1
3	Very Stiff Clay, Sandy Clay, Silty Clay and Sandy to Clayey Silt (CL, ML)	-14 to +6	**(-)#200**=49 to 84% (avg 66%) **LL**=29 **PL**=19 **PI**=10 ω_N=24 to 26% (avg 25%) γ=125 pcf (average)	**Borings:** 15 to 47 (avg 32) **CPT:** 12 to 50 (avg 23)#	-	-	-	-	2,000	-	-	0.019	>3	**Over Consolidated:** 3.3
3A	Dense to Very Danse Sand and Silty Sand (SP, SM)	-2 to +3	**(-)#200**=11 to 31% (avg 21%) ω_N=19% γ=125 pcf (average)	**Borings:** 27 to 50+ (avg 39) **CPT:** 34 to 50+ (avg 43)#	0	36	-	-	-	1,750	-	-	-	-
4 upper 10'	Dense Silty Sand, Sandy Silt, Sand and Stiff to Hard Clayey Silt and Clay (SM, ML, SP & CL, ML)	-24 to -14	**(-)#200**=2 to 86% (avg 35%) ω_N=15 to 40% (avg 25%) γ=125 pcf (average)	**Borings:** 27 to 50+ (avg 38) **CPT:** 18to 50+ (avg 36)#	-	-	-	-	-	1,000	-	-	-	-
4 lower 20'	Very Dense Sand, Gravelly Sand and Sand with Silt (SP, SP-SM, SW-SM)	-44 to -24	**(-)#200**=2 to 12% ω_N=19-29% γ=125 pcf (average)	**Borings:** 50+ **CPT:** 25 to 50+ (avg 50+)#	0	38	-	-	-	2,000	-	-	-	-
5 clay	Very Stiff to Hard Clay and Silt (CL, ML)	-61 to -44	**(-200)**=27–96% (avg 60%) ω_N=17 to 45% (avg 28%) γ=125 pcf (average) **LL**=31;**PL**=15;**PI**=16	**CPT:** 8-50+ (avg 26)#	-	-	-	-	3,000	-	-	0.017	>2	**Over Consolidated:** 3.3
5 sand	Dense to Very Dense Sand and Silty Sand (SP, SM)	-71 to -61		**CPT:** 38-50+ (avg 50+)#	0	38	-	-	-	3,000	-	-	-	-

* Where data not present average values from the overall project were usec

CPT N-Values are based on available correlations (Robertson et al., 1983) -see Appendix A

TABLE 2
SUMMARY OF LIQUEFACTION ANALYSES
BOLSA CHICA ROAD OC

Mw = 7.0 PGA = 0.45g (Newport-Inglewood - Strike Slip Fault)

CPT	Thickness of Liqufiable Layer (ft)	Liqufaction Induced Settlement (in)	Seismic Compaction Settlement (in)	Total Settlement (in)
CPT-08-020	13	0.19	0.00	0.19
CPT-08-021	14	0.33	0.01	0.34
CPT-08-022	10	0.12	0.00	0.12

Table 3A. Foundation Design Data Sheet

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Bottom of Footing Elevation (ft)	Cut-Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)*	Number of Piles per Support
						B	L		
Abut 1	WSD	Class 200	46.6	38.3	38.6	9	152.5	1	42
Bent2L	LRFD	HP 14x117	29.7	21.5	22.0	13.5	59.17	1	58
Bent2R	LRFD	HP 14x117	28.4	21.5	22.0	13.5	59.17	1	58
Abut 3	WSD	Class 200	41.8	32.8	33.1	9	152.5	1	42

*Based on CALTRANS' current practice, the total permissible settlement is one inch for multi-span structures with continuous spans or multi-column bents, one inch for singe span structures with diaphragm abutments, and two inches for single span structures with seat abutments. Different permissible settlement under service loads may be allowed if a structural analysis verifies that required level of serviceability is met.

Table 3B. Foundation Design Loads

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. per Pile	Per Support	Per Support	Max. per Pile	Per Support	Max. per Pile	Per Support	Max. per Pile	Per Support	Max. per Pile
Abut 1	6209	167	3693	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent2L	6817	N/A	5532	9517	166	0	0	5526	158	0	0
Bent 2R	6817	N/A	5532	9517	166	0	0	5526	158	0	0
Abut 3	6080	166	3631	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 3C. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support	Pile	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required[3] (kips)
			Total	Perma-nent					
Abut 1	Class 200, Alt "X"	38.6	6210	3695	200	400	-25.0 (a), -25.0 (c), +13.3 (d)	-25.0	400
Abut 3	Class 200, Alt "X"	33.1	6080	3635	200	400	-25.0 (a), -25.0 (c), +7.8 (d)	-25.0	400

Notes:

1. Design tip elevations are controlled by: a) compression, (c) settlement, (d) lateral load, respectively. Settlement was verified to be less than 1 in. at design penetration.

2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.

3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (liquefiable) which do not contribute to the design resistance.

4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3D. Foundation Recommendations for Bents

Bent Foundations Design Recommendations												
Support Location	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required[3] (kips)
						Strength Limit		Extreme Event				
						Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)			
Bent2L	HP 14x117	21.5	22.0	6820	1	240	0	160	0	-28.4 (a), -28.4 (c), -7.0 (d)	-28.4	400
Bent 2R	HP 14x117	21.5	22.0	6820	1	240	0	160	0	-28.4 (a), -28.4 (c), -7.0 (d)	-28.4	400

Notes:

1. Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) settlement, (d) lateral load. For settlement penetration, it was verified that settlement is less than 1 inch.

2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.

3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (liquefiable) which do not contribute to the design resistance.

4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3E. Pile Data Table

Pile Data Table						
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 200, Alt "X"	400	0	-25.0 (a), -25.0 (c), +13.3 (d)	-25.0	400
Bent 2	HP 14x117	240	0	-28.4 (a), -28.4 (c), -7.0 (d)	-28.4	400
Abut 3	Class 200, Alt "X"	400	0	-25.0 (a), -25.0 (c), +7.8 (d)	-25.0	400

Notes:

1. Design tip elevations for Abutments are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load.

2. Design tip elevations for Bents are controlled by: (a) Compression, (b) Tension, (c) Settlement, (d) Lateral Load

3. Nominal driving resistance was selected to obtain required penetration below liquefiable layers.

TABLE 4
SUMMARY OF LATERAL CAPACITY OF PROPOSED PILES

I-436 West County Connectors Project - 405/22 HOV Segment
SR-22 Bolsa Chica Rd OC (Abutments 1 and 3)

Pile Type	Loading Direction	Head Condition	Top Deflection (inches)	Top Shear (kips)	Maximum Bending Moment (foot-kips)	Depth to Maximum Bending Moment (feet)
Class 200 14" Square Pre-Cast Pre-Stressed Concrete Pile	Longitudinal (*1.5h:1v ground slope*)	Free / Pinned	0.25	15.7	52	4.5
			0.5	21.2	80	5.0
			1.0	28.4	122	6.0
	Transverse (*level ground*)	Free / Pinned	0.25	22.8	65	4.0
			0.5	31.0	101	4.5
			1.0	41.8	157	5.0

Notes:

1) The horizonal component of axial load in batter piles may be added to the capacities above.

2) The above lateral capacity values use a group average p-multiplier of 0.5 to account for lateral load group effects.

3) Maximum bending moments were computed using the higher p-multiplier of 0.75 for leading row piles.

4) Lower capacities in longitudinal direction account for the 1.5:1 abutment sloping ground.

5) Structural capacity of piles shall be checked by the structural engineer.

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TABLE 4
SUMMARY OF LATERAL CAPACITY OF PROPOSED PILES

I-436 West County Connectors Project - 405/22 HOV Segment
SR-22 Bolsa Chica Rd OC (Bent 2)

Pile Type	Loading Direction	Head Condition	Top Deflection (inches)	Top Shear (kips)	Maximum Bending Moment (foot-kips)
HP14x117 (*HP14x89 section properties used to account for corrosion loss*)	Strong $I_{xx}=904\ in^4$ $S_x=131\ in^3$	Free / Pinned	0.25	17.6	66
			0.5	23.4	102
			1.0	31.1	157
			2.0	41.6	243
	Weak $I_{yy}=326\ in^4$ $S_x=44.3\ in^3$	Free / Pinned	0.25	13.4	40
			0.5	17.8	61
			1.0	23.5	95
			2.0	30.8	146

Notes: 1) The above lateral capacity values use a group average p-multiplier of 0.5 to account for lateral load group effects.

2) Maximum bending moments were computed using the higher p-multiplier of 0.75 for leading row piles.

3) Lower capacities in weak direction account for the lower moment of inertia.

4) Structural capacity of piles shall be checked by the structural engineer.

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FIGURES

The base maps are from Microsoft Virtual Earth

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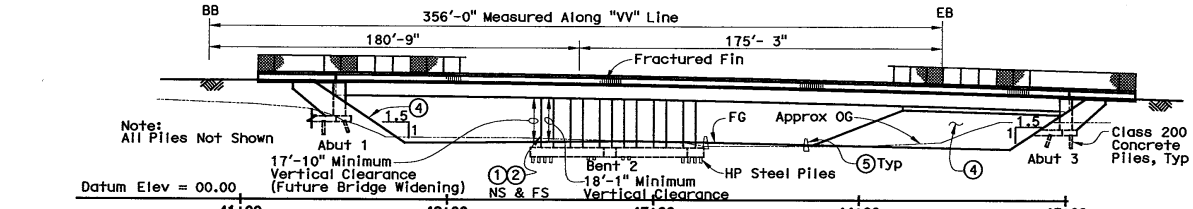
GDC Project No. I-436

Bolsa Chica Road OC (Replace)
Garden Grove, CA

VICINITY MAP

Figure 1



CURVE DATA (1)
R = 20016'
Δ = 1°23'2"
L = 483.46'
T = 241.74'

CURVE DATA (2)
R = 4816'
Δ = 6°51'29"
L = 576.45'
T = 288.57'

CURVE DATA (3)
R = 5000'
Δ = 7°1'44"
L = 613.39'
T = 307.08'

CURVE DATA (4)
R = 6635'
Δ = 07°33'49"
L = 875.87'
T = 438.57'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

5/17/09
REGISTERED CIVIL ENGINEER DATE

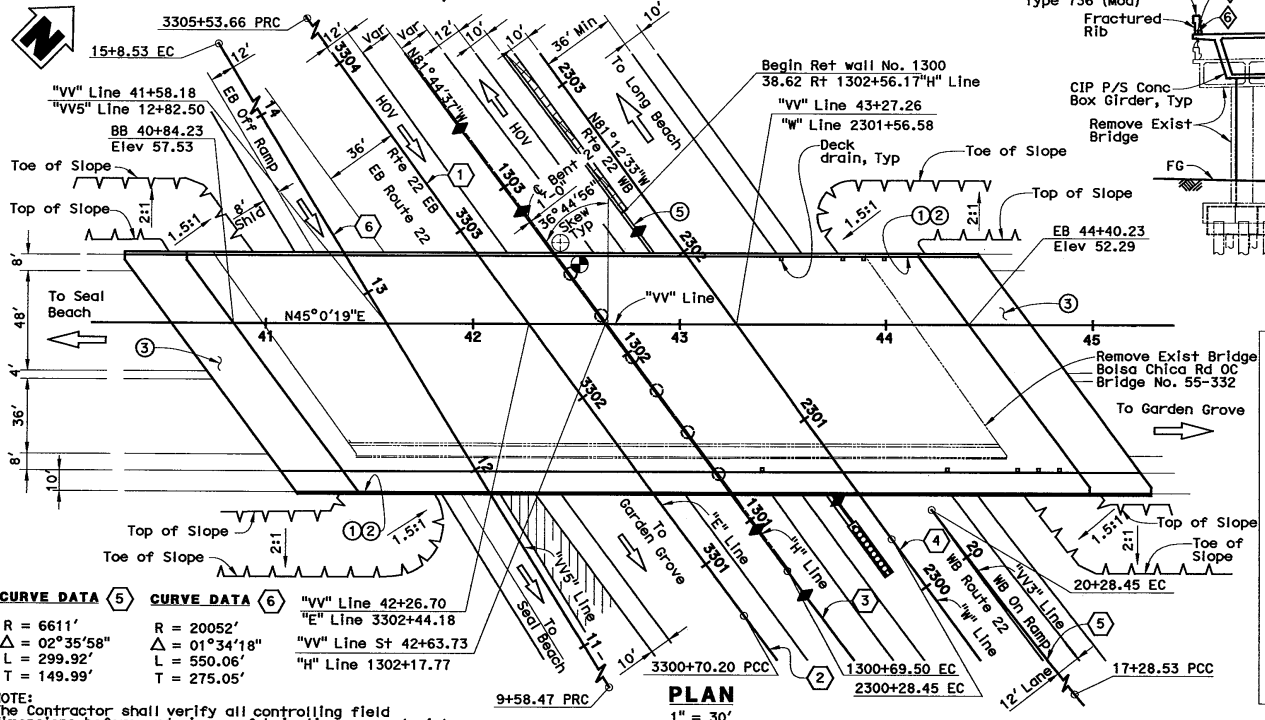
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

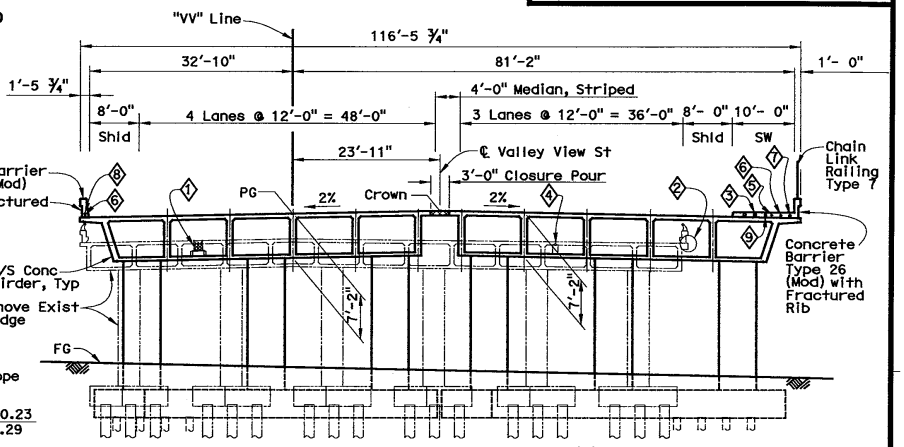
REGISTERED PROFESSIONAL ENGINEER
MOHSEN MOHSENI
No. C45999
Exp. 12/31/10
STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

UTILITIES
1. 4-5" ø SCE Electrical Ducts
2. 2'-8" OD Future Utility Opening
3. 2 - 5" ø Future Utility Openings - Caltrans
4. 4" PVC Irrigation Pipe - Caltrans
5. 2" Conduit for Low Voltage Irrigation Controllers - Caltrans
6. 2" Electrical Conduit for Lighting - Caltrans
7. 3" Conduit for Signal Interconnect Cable (SIC) - Caltrans
8. 2" Conduit for Detector Lead-In Cable (DLC) - Caltrans
9. 3" Conduit for Fiberoptic Cable - Caltrans



PLAN
1" = 30'



TYPICAL SECTION
1" = 10'
Note:
All Piles Not Shown

NOTES
1. Paint "Bolsa Chica Road Overcrossing"
2. Paint "Bridge No. 55-1102"
3. Structure Approach Type N(30S)
4. Slope Paving
5. Concrete Barrier Type 60, See "Road Plans"

LEGEND
- Indicates Existing Structure
- Closure Pour
- Gore Area
- Indicates Minimum Vertical Clearance
- Indicates Minimum Vertical Clearance (Future Bridge Widening)
- Indicates Concrete Barrier Type 60, see "Road Plans"
- Indicates Direction of Traffic

CURVE DATA (5)
R = 6611'
Δ = 02°35'58"
L = 299.92'
T = 149.99'

CURVE DATA (6)
R = 20052'
Δ = 01°34'18"
L = 550.06'
T = 275.05'

"VV" Line 42+26.70
"E" Line 3302+44.18
"VV" Line St 42+63.73
"H" Line 1302+17.77

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

FIGURE 2A

DESIGN OVERSIGHT	DESIGN	BY S. Mullangi	CHECKED G. Sarah	LRFD DESIGN	LIVE LOADING: HL-93 AND "LOW-BOY" AND PERMIT DESIGN LOAD		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1102
	DETAILS	BY P. Johnson	CHECKED G. Sarah	LAYOUT	BY P. Johnson	CHECKED G. Sarah			POST MILES 0.92
SIGN OFF DATE	QUANTITIES	BY T. Howell	CHECKED M. Martin	SPECIFICATIONS	BY G. Matesic	PLANS AND SPECS COMPARED M. Mohseni		CU 12235 EA 071621	

BOLSA CHICA ROAD OVERCROSSING (REPLACE)
GENERAL PLAN

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 2/25/08)
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY) 4/28/08 10/27/08 1/23/09 05/11/09
SHEET 1 OF 34

FILE => $REQUEST
USERNAME => $USER
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

NOTES

1. Contours shown represent existing ground..
2. For "Pile Data Table" see Foundation Details sheet.
3. All piles not shown.
4. Existing bridge footing and piles which interfere with the bridge foundations and roadway sections to be removed. Cut existing piles 2' Min below bottom of proposed footings at these locations.
5. The types and locations of all utilities are provided for information only. The Contractor shall verify all existing utilities and notify utility agencies prior to any removal, relocation or new construction. See "Road Plans" for utility details not shown.
6. For Curve Data see "General Plan" sheet.

LEGEND

XX.XX — Indicates Bottom of Footing Elevation

Exist Structure

Vertical PS Conc Pile

3:1 Battered PS Conc Pile

Vertical HP Steel Pile

UTILITY

① Irrigation Crossover

② Abandoned Sewer

③ Exist SCG 16" HP Gas

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

5/17/09
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/10 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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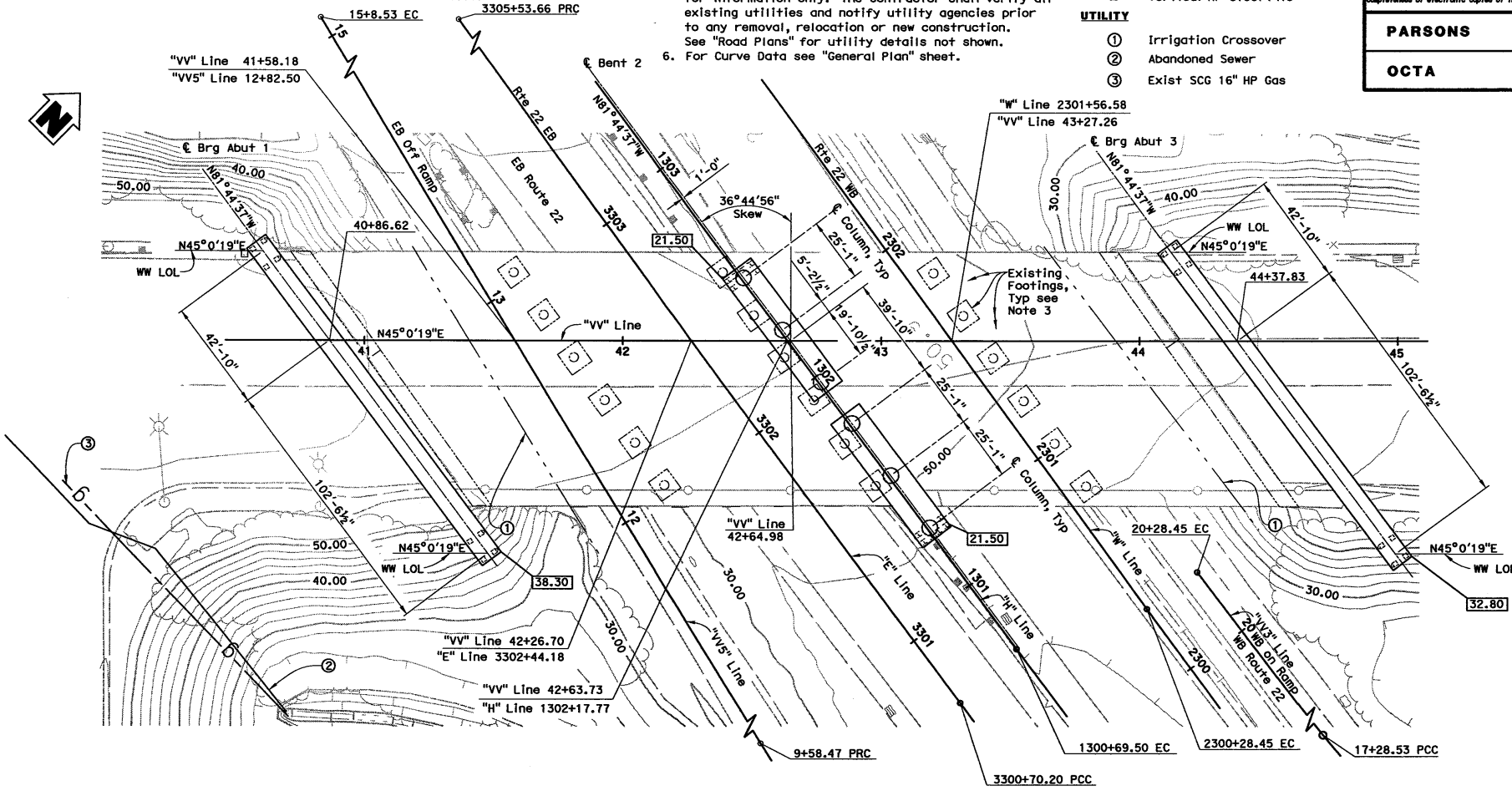
PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863



PLAN
1" = 20'

FIGURE 2B

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Carl Ahlberg 2/23/09
GEOTECHNICAL PROFESSIONAL APPROVAL DATE

DESIGN OVERSIGHT: X	SCALE: 1"=20'	VERT.DATUM NAV 1988	HORZ.DATUM NAD 1983	DESIGN	BY S. Mulfangl	CHECKED C. Sarah	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1102
SIGN OFF DATE	PHOTOGRAMMETRY AS OF: 01/08	ALIGNMENT TIES X		DETAILS	BY P. Johnson	CHECKED C. Sarah			POST MILE 0.92
	SURVEYED BY PSOMAS	DRAFTED BY PSOMAS		QUANTITIES	BY T. Howell	CHECKED M. Martin			CU 12235 EA 071621
	FIELD CHECKED BY PSOMAS	CHECKED BY PSOMAS							

BOLSA CHICA ROAD OVERCROSSING (REPLACE)

FOUNDATION PLAN

FOUNDATION PLAN SHEET (ENGLISH) (REV. 2-25-08)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

FILE => sREQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 1/2/08 | 10/2/08 | 2/27/09 | 05/17/09

SHEET 4 OF 34

DATE PLOTTED => $DATE

TIME PLOTTED => $TIME

USERNAME => $USER

NOTES:

1. For bottom of footing elevations, see "Foundation Plan" sheet.
2. For pile type and tip elevations, see "Foundation Details" sheet.
3. Existing abutment piles shall be located and exposed prior to installation of Abutment Piles.
4. Contractor may adjust pile locations within ±1' horizontal direction from shown locations in order to avoid conflict with the existing abutment vertical piles, pending Engineer's approval. However, center to center pile spacing shall not be less than 3'-6" nor shall exceed 9'-0".
5. For existing abutment removal details see "Bridge Removal Plan"
6. Pile Driving Analyzer (PDA) test pile lengths should be at least 10 ft longer than lengths based upon recommended pile tip elevations.

LEGEND:

- □ Indicates Vertical PS Conc Pile.
- ▽ Indicates 1:3 Battered PS Conc Pile.
- \+ Indicates existing Vertical Pile.
- ⫲ Indicates existing Battered Pile.
- ◯ Indicates PDA test pile location

B2-8 / B2-8

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

5/17/09
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — MOHSEN MOHSENI — No. C45999 — Exp. 12/31/10 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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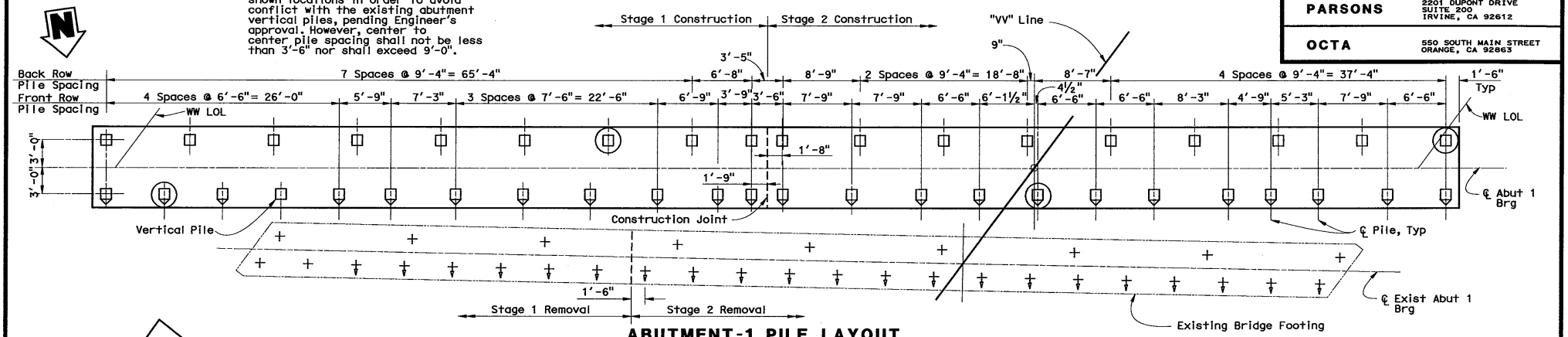
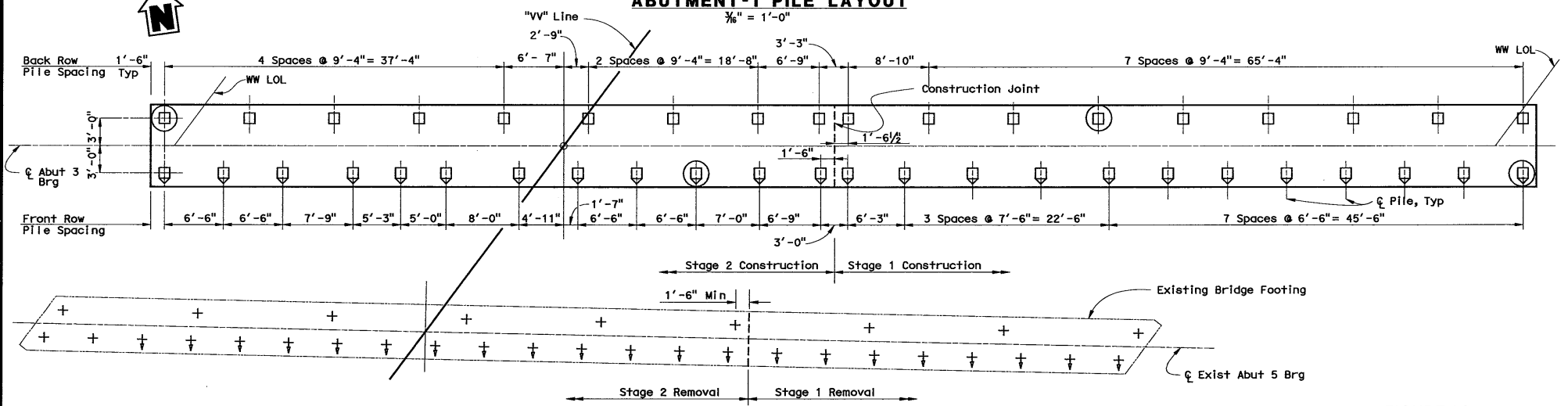
PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863



ABUTMENT-1 PILE LAYOUT

3/16" = 1'-0"



ABUTMENT-3 PILE LAYOUT

3/16" = 1'-0"

FIGURE 2C

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

DESIGN OVERSIGHT	DESIGN	BY S. Mullangi	CHECKED G. Sarah	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER
X	DETAILS	BY P. Johnson	CHECKED G. Sarah		
SIGN OFF DATE	QUANTITIES	BY T. Howell	CHECKED M. Martin		

BRIDGE NO.	BOLSA CHICA ROAD OVERCROSSING (REPLACE)
55-1102	ABUTMENT PILE LAYOUTS
POST MILE 0.92	

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 10/29/08 2/25/09 05/11/09

SHEET 10 OF 34

[FILE => H:\646929 OCTA I405-SR22 HOV Connector Project\SHT\STRUCTURES\Bolsa Chica Rd OC (Replace)\55-1102rl-f-a03 plot.dgn

USERNAME => b0004260? DATE PLOTTED => 4/16/2009 TIME PLOTTED => 2:43:28 PM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

5/17/09
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
MOHSEN MOHSENI
No. C45999
Exp. 12/31/10
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

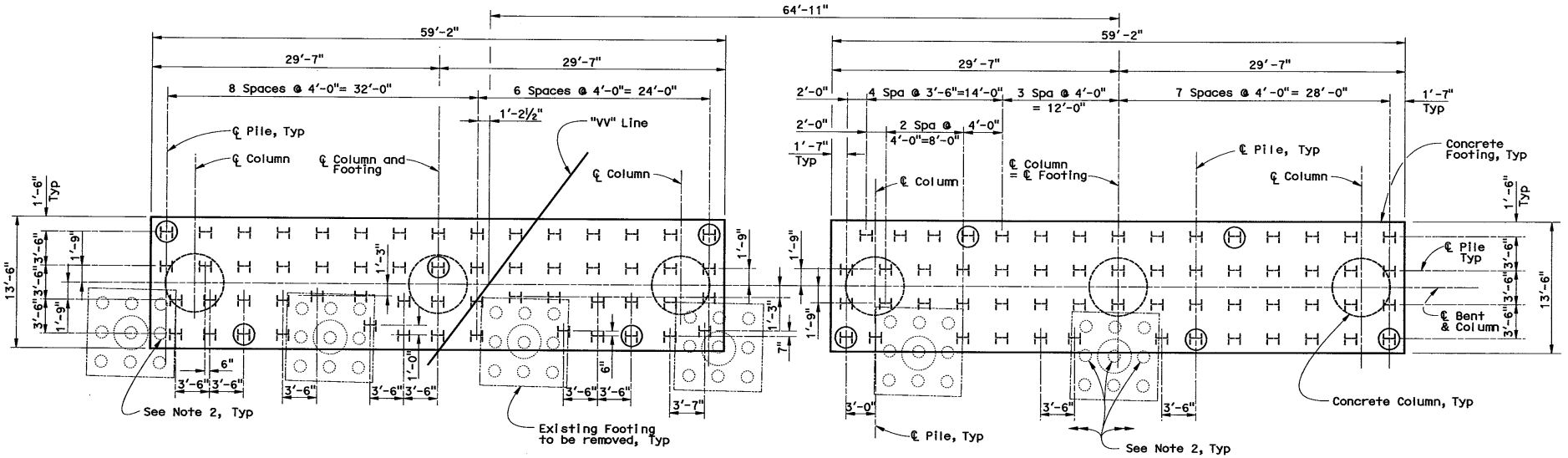
PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

NOTES:

1. For Steel Pile Anchor Details, see "Foundation Details" sheet.
2. Cut all existing Piles 2'-0" Min below bottom of proposed Footings.
3. Pile Driving Analyzer (PDA) test pile lengths should be at least 10 ft longer than lengths based upon recommended pile tip elevations.

LEGEND:

- Indicates Vertical HP Steel Piles
- Indicates Existing Piles
- Indicates PDA Test Pile Location



BENT 2 - PILE LAYOUT

3/16" = 1'-0"

FIGURE 2D

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

DESIGN OVERSIGHT X SIGN OFF DATE		DESIGN	BY S. Mullangi	CHECKED G. Sarah	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1102 POST MILE 0.92
		DETAILS	BY P. Johnson	CHECKED G. Sarah			
		QUANTITIES	BY T. Howell	CHECKED M. Martin			

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/28/08)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 10/27/08 2/28/09 05/1/09

BOLSA CHICA ROAD OVERCROSSING (REPLACE)

BENT DETAILS NO. 3

SHEET 17 OF 34

FILE => H:\646929 OCTA I405-SR22 HOV Connector Project\SHT\STRUCTURES\Bolsa Chica Rd OC (Replace)\55-1102rl-h-bldt03.dgn

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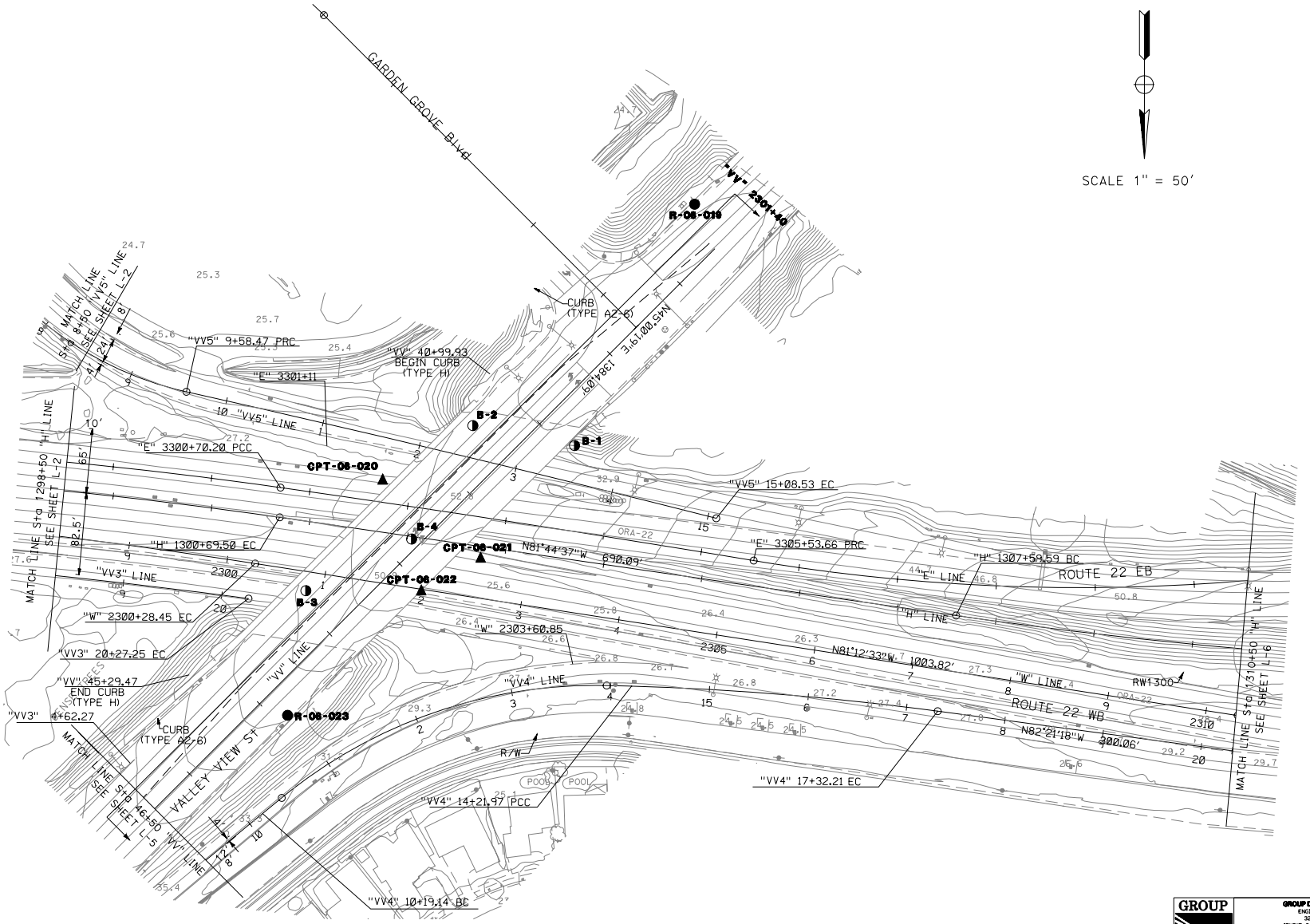


LEGEND

- ▲ GDC CPT (2008)
- ● GDC BORING (2008)
- ◑ CALTRANS BORING (1959)

RELATIVE BORDER SCALE IS IN INCHES

0 2 3

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER 3

PROJECT NAME: BOLSA CHICA ROAD OC

PROJECT NUMBER: I-430

EXPLORATION LOCATION PLAN

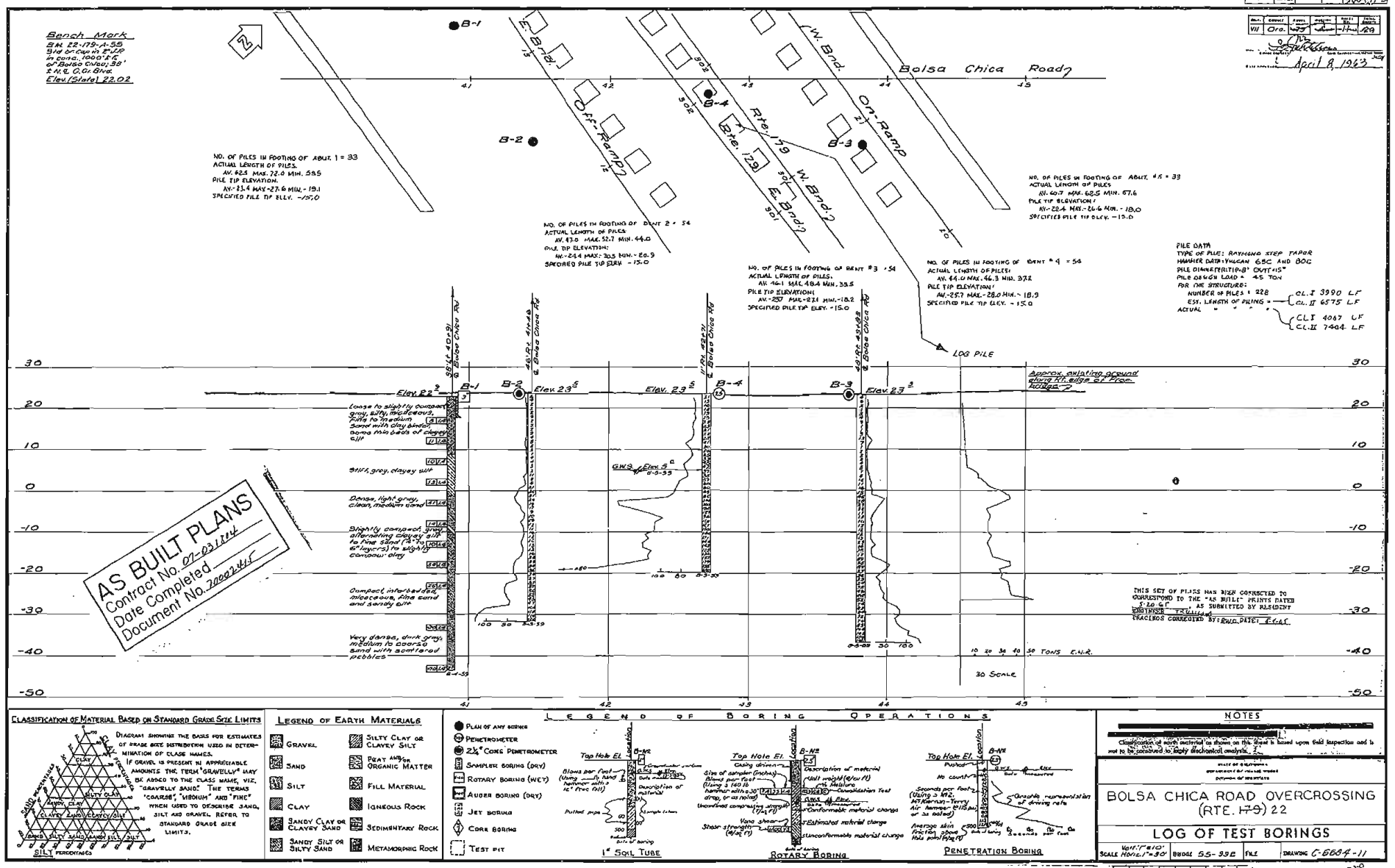

Bench Mark
BM 22-179-A-55
Std. Cap in Pile in Conc. 1000'± E. of Bolsa Chica Rd. 38' ± N.E. C.G.I. Blvd.
Elev. (State) 22.02
B-1
B-2
B-3
B-4
E. Bnd. 1
Off-Ramp
Rte. 179 W. Bnd. 2
Rte. 129 E. Bnd. 2
W. Bnd.
On-Ramp
Bolsa Chica Road
NO. OF PILES IN FOOTING OF ABUT. 1 = 33
ACTUAL LENGTH OF PILES.
AV. 62.5 MAX. 72.0 MIN. 53.5
PILE TIP ELEVATION.
AV.-23.4 MAX.-27.6 MIN.-19.1
SPECIFIED PILE TIP ELEV. -15.0
NO. OF PILES IN FOOTING OF BENT 2 = 54
ACTUAL LENGTH OF PILES
AV. 47.0 MAX. 52.7 MIN. 44.0
PILE TIP ELEVATION:
AV.-24.4 MAX.-30.5 MIN.-20.9
SPECIFIED PILE TIP ELEV. -15.0
NO. OF PILES IN FOOTING OF BENT #3 =54
ACTUAL LENGTH OF PILES.
AV. 46.1 MAX. 49.4 MIN. 33.5
PILE TIP ELEVATION:
AV.-25.7 MAX.-28.0 MIN.-18.9
SPECIFIED PILE TIP ELEV. -15.0
NO. OF PILES IN FOOTING OF ABUT #4 = 33
ACTUAL LENGTH OF PILES
AV. 60.7 MAX. 68.5 MIN. 57.6
PILE TIP ELEVATION:
AV.-28.4 MAX.-36.6 MIN.-18.0
SPECIFIED PILE TIP ELEV. -15.0
NO. OF PILES IN FOOTING OF BENT #4 = 54
ACTUAL LENGTH OF PILES:
AV. 44.0 MAX. 46.3 MIN. 37.2
PILE TIP ELEVATION:
AV.-25.7 MAX.-28.0 MIN.-18.9
SPECIFIED PILE TIP ELEV. -15.0
PILE DATA
TYPE OF PILE: RAYMOND STEP TAPER
HAMMER DATA: VULCAN 65C AND 80C
PILE DIAMETER: 18" OUT 15"
PILE DESIGN LOAD = 45 TON
FOR THE STRUCTURE:
NUMBER OF PILES = 228
EST. LENGTH OF PILING = CL. I 3990 LF, CL. II 6575 LF
ACTUAL " " " CL. I 4087 LF, CL. II 7404 LF
LOG PILE
Approx. existing ground along Rt. edge of Prop. Roadway
Elev. 22.5
Elev. 23.5
Elev. 23.5
Elev. 23.3
AS BUILT PLANS
Contract No. 07-03 1114
Date Completed
Document No. 2002 2446
THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED 5-20-63 AS SUBMITTED BY RESIDENT ENGINEER
TRACINGS CORRECTED BY: DATE:
CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS
LEGEND OF EARTH MATERIALS
GRAVEL
SAND
SILT
CLAY
SANDY CLAY OR CLAYEY SAND
SANDY SILT OR SILTY SAND
SILTY CLAY OR CLAYEY SILT
PEAT AND/OR ORGANIC MATTER
FILL MATERIAL
IGNEOUS ROCK
SEDIMENTARY ROCK
METAMORPHIC ROCK
LEGEND OF BORING OPERATIONS
PLAN OF ANY BORING
PENETROMETER
2½" CONE PENETROMETER
SAMPLER BORING (DRY)
ROTARY BORING (WET)
AUGER BORING (DRY)
JET BORING
CORE BORING
TEST PIT
1" SOIL TUBE
ROTARY BORING
PENETRATION BORING
NOTES
Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply geotechnical analysis.
BOLSA CHICA ROAD OVERCROSSING
(RTE. 179) 22
LOG OF TEST BORINGS
SCALE VERT. 1"=10' HORIZ. 1"=30'
BRIDGE 55-93E
FILE
DRAWING C-6684-11
PREL. DRAWING NO. P-6684
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.
DATE SIGNATURE TITLE
BRIDGE DEPARTMENT

FIGURE 4

SOIL LAYER LEGEND

① V. STIFF TO HARD CL, ML WITH INTERBEDS OF MED. DENSE TO DENSE SM, SC

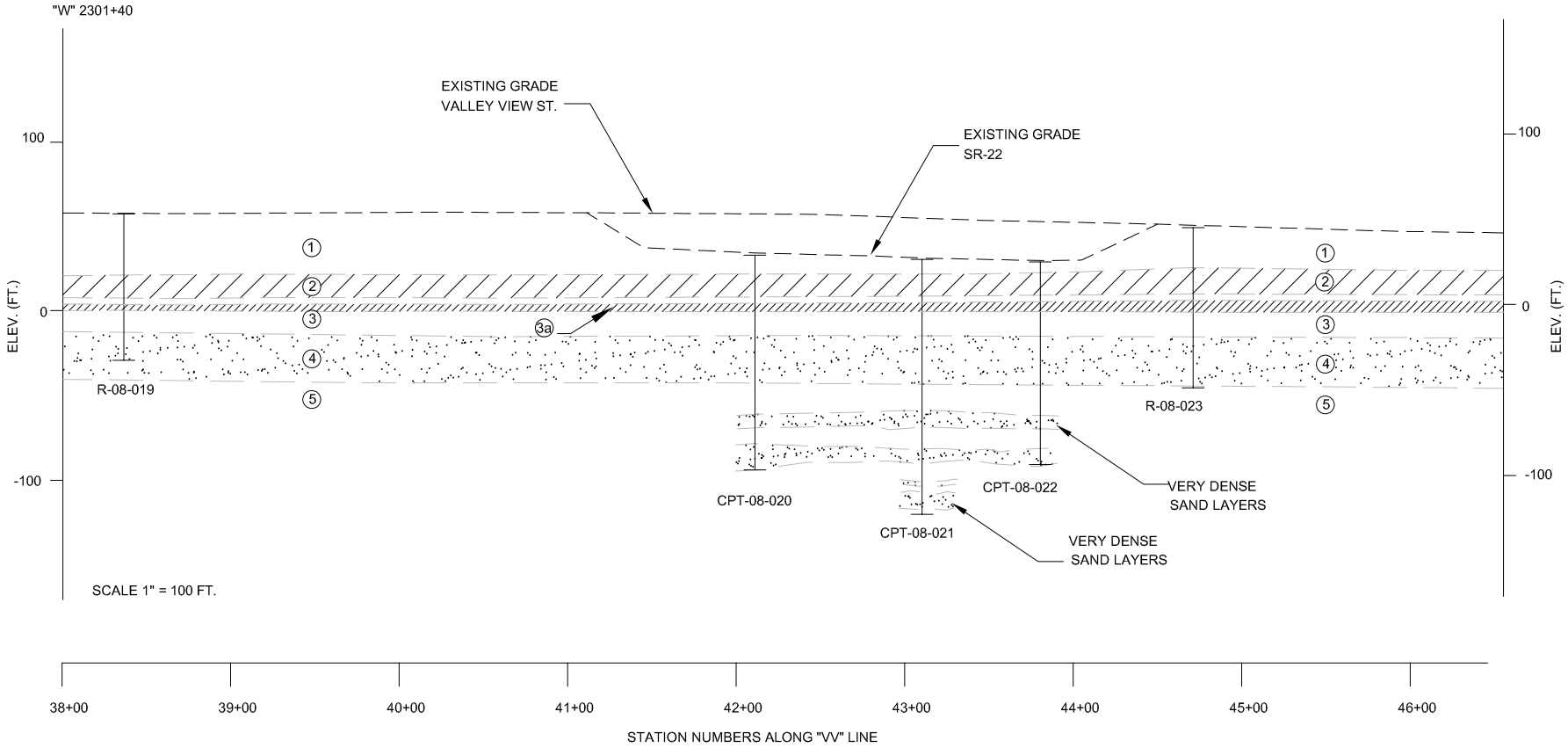
② FIRM-STIFF CL

③ V. STIFF CL, ML WITH INTERBEDS OF M. DENSE TO DENSE SP, SM, ML

③a DENSE TO VERY DENSE SAND

④ DENSE TO V. DENSE SP, SM WITH LENSES OF HARD ML, CL

⑤ V. STIFF TO HARD CL, ML INTERBEDDED WITH DENSE TO V. DENSE SP, SM



GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
92 ARGONAUT, SUITE 120
ALISO VIEJO, CA 92656 (949) 609-1020

FIGURE NUMBER
5A

PROJECT NAME
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV. CONN. SEGMENT

PROJECT NUMBER
I-436

GENERALIZED SOIL PROFILE
BOLSA CHICA RD OC

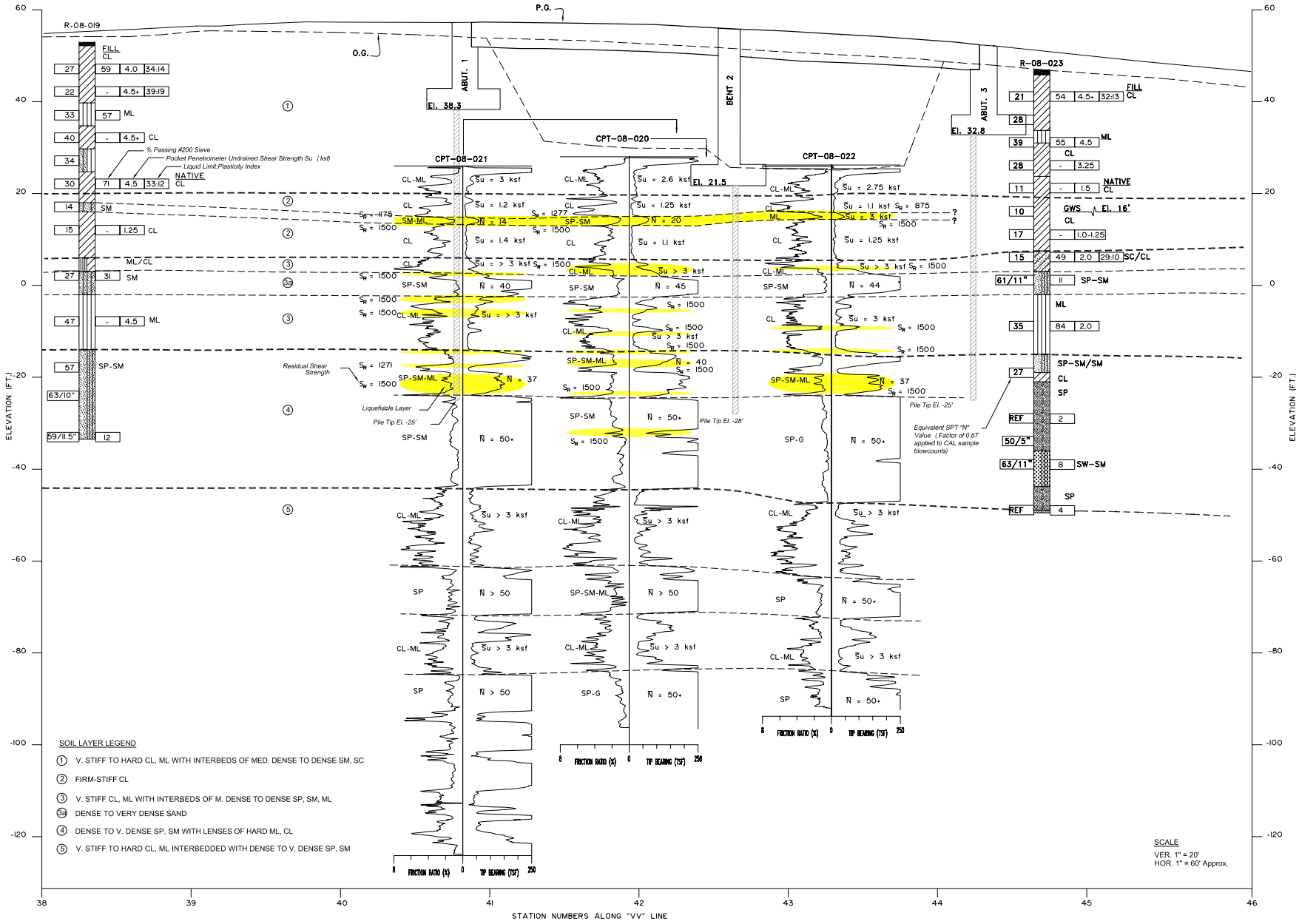


FIGURE 5B
Geotechnical Cross Section

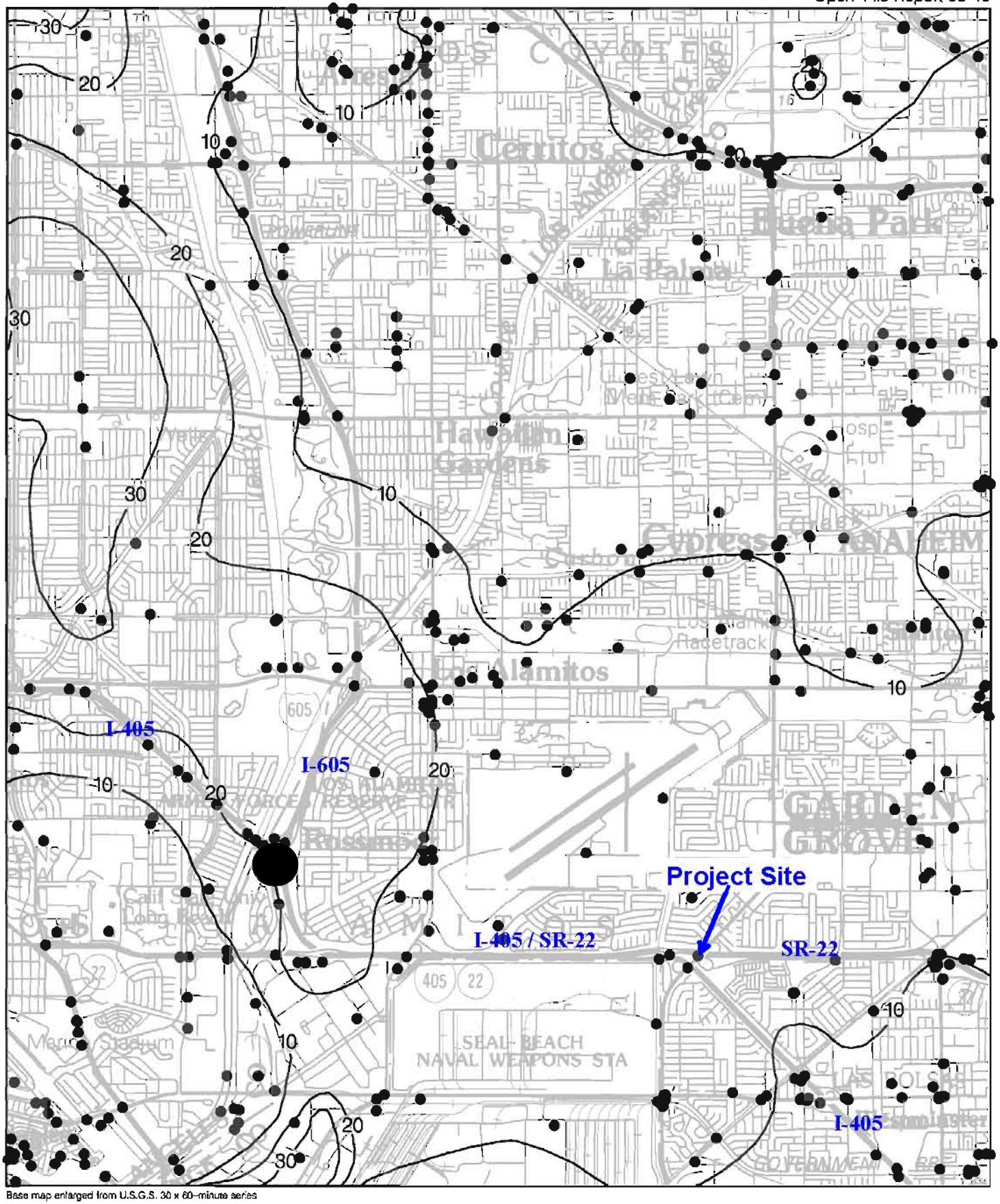


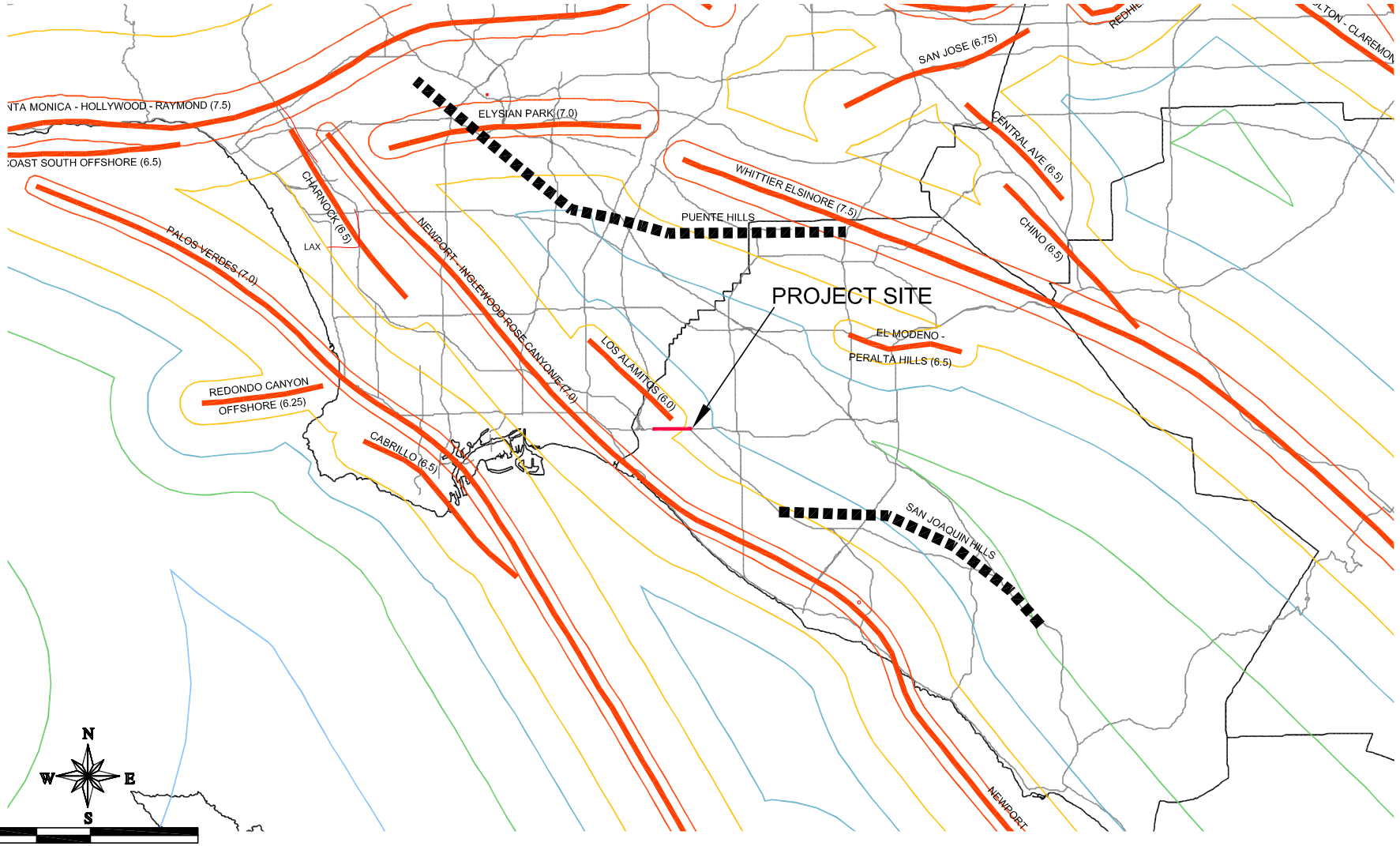
Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

● Borehole Site

30 Depth to ground water in feet

Figure 6: Historically Highest Groundwater Map

ONE MILE
SCALE



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills and the Puente Hills faults in Orange County are currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

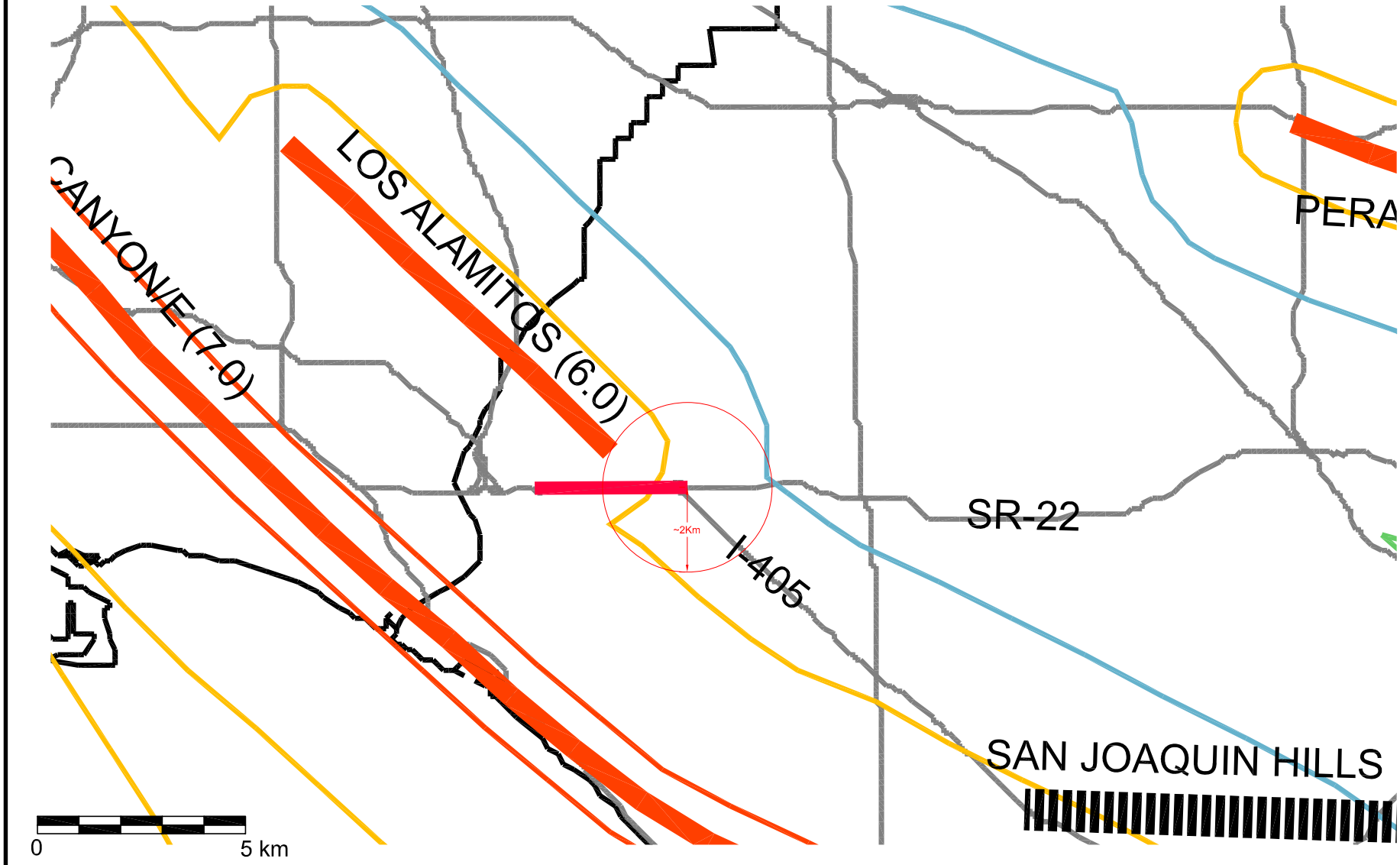
GROUP DELTA

GDC PROJECT NO. I-436

Bolsa Chica Road OC (Replace)
SR 22 Improvements - Phase 2

Caltrans Fault and PBA Map

Figure 7a



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills and the Puente Hills faults in Orange County are currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

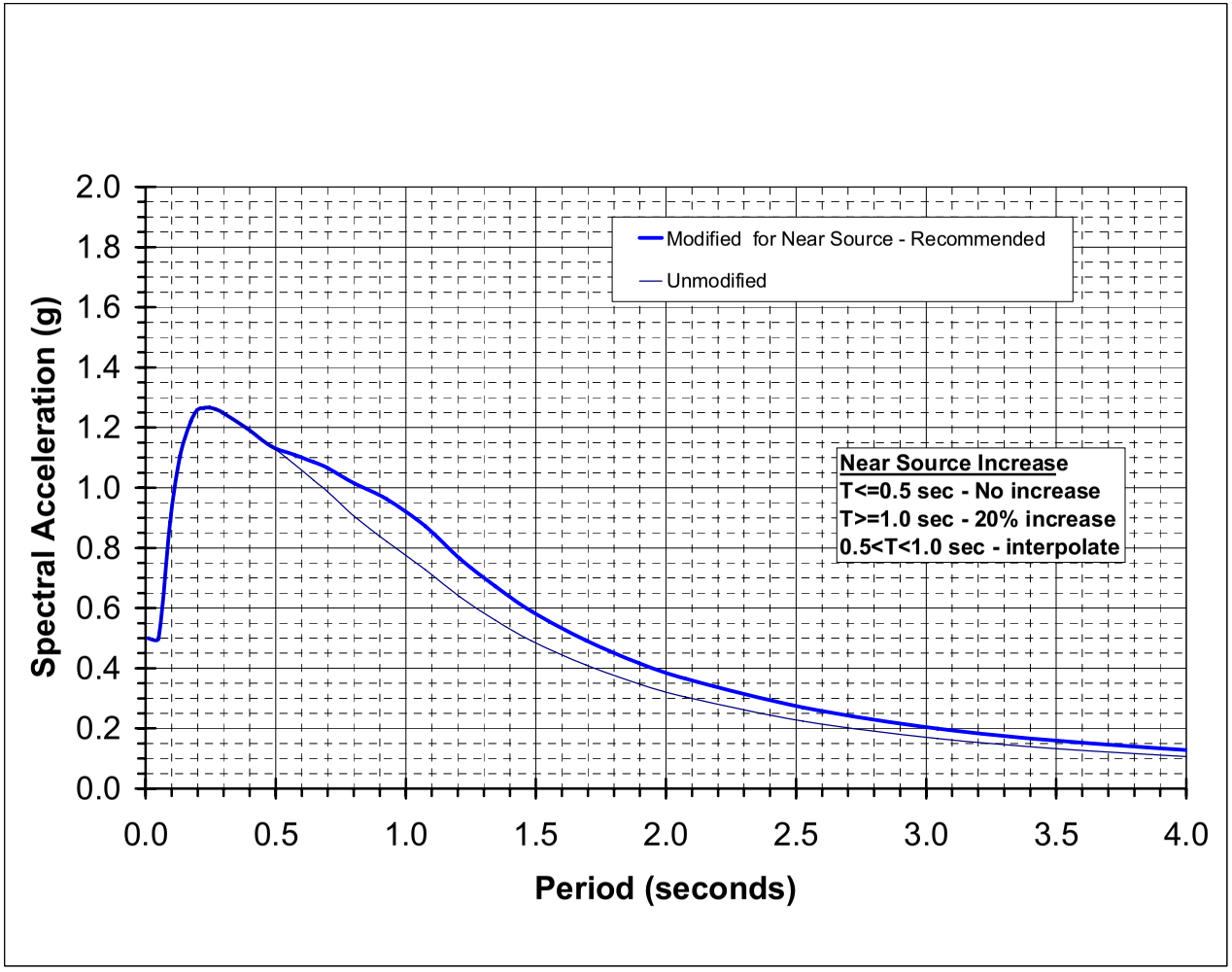
GROUP DELTA

GDC PROJECT NO. I-436

Bolsa Chica Road OC (Replace)
SR 22 Improvements - Phase 2

Caltrans Fault and PBA Map

Figure 7b



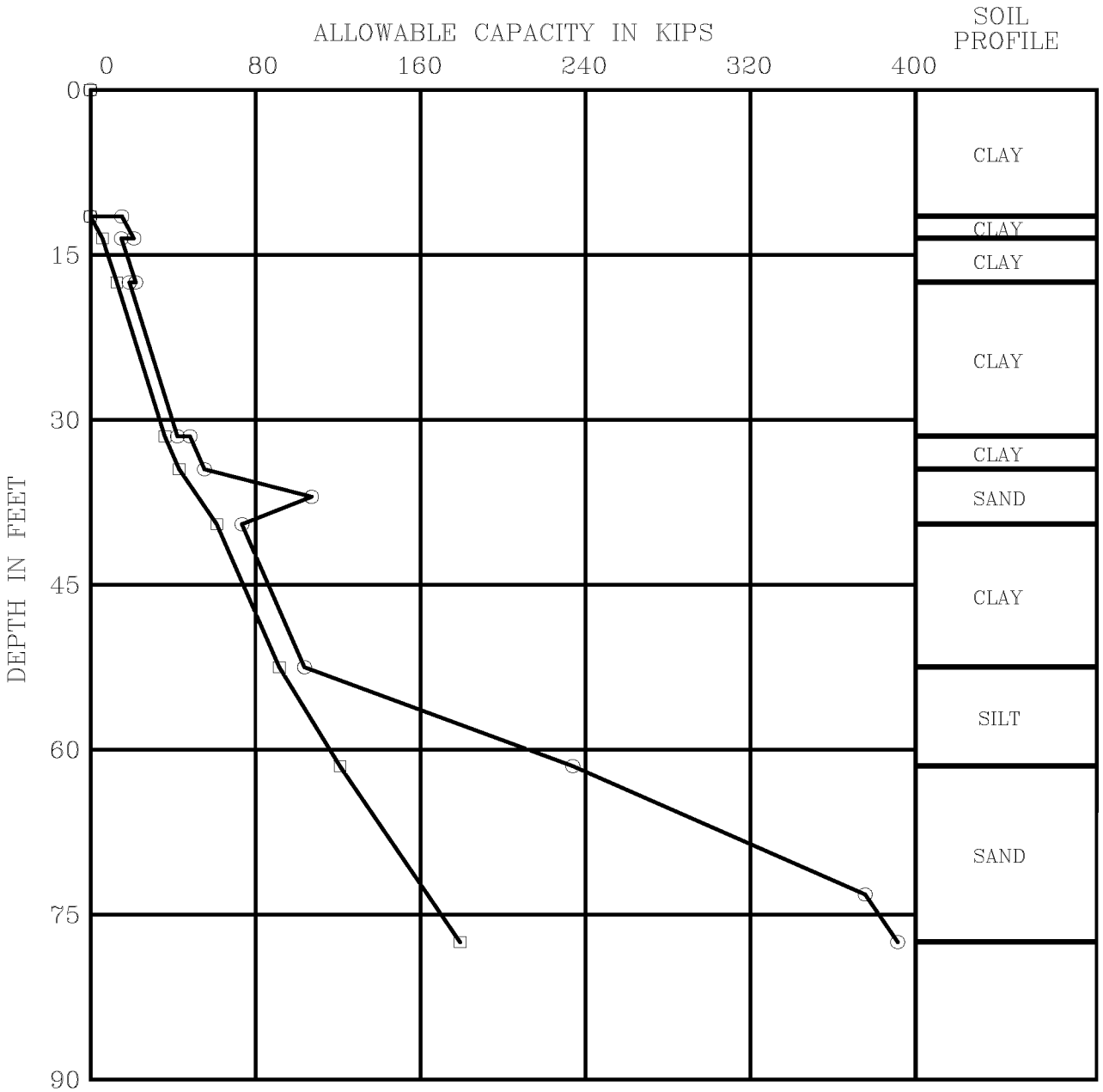
Digitized Spectra
M7_0.5g_Type D

PERIOD (Seconds)	Unmodified ARS-G'S	Near-Source Modified ARS-G'S
0.0100	0.5003	0.5003
0.0500	0.5002	0.5002
0.0946	0.8854	0.8854
0.1322	1.1055	1.1055
0.1748	1.2211	1.2211
0.1985	1.2587	1.2587
0.2252	1.2656	1.2656
0.2462	1.2661	1.2661
0.2687	1.2611	1.2611
0.2968	1.2488	1.2488
0.3880	1.1985	1.1985
0.4833	1.1370	1.1370
0.5719	1.0782	1.1092
0.6448	1.0263	1.0857
0.6980	0.9874	1.0656
0.8042	0.9033	1.0132
0.9257	0.8227	0.9628
1.0764	0.7270	0.8724
1.2056	0.6380	0.7656
1.3462	0.5593	0.6712
1.4843	0.4909	0.5891
1.6922	0.4107	0.4928
1.8989	0.3472	0.4166
2.0738	0.3044	0.3653
2.5266	0.2244	0.2693
3.0435	0.1659	0.1991
3.5058	0.1326	0.1591
4.0000	0.1064	0.1277

GROUP DELTA CONSULTANTS

Caltrans SDC ARS Curves
Soil Type D, M=7.25+/-0.25, PBA=0.5g

Figure 8



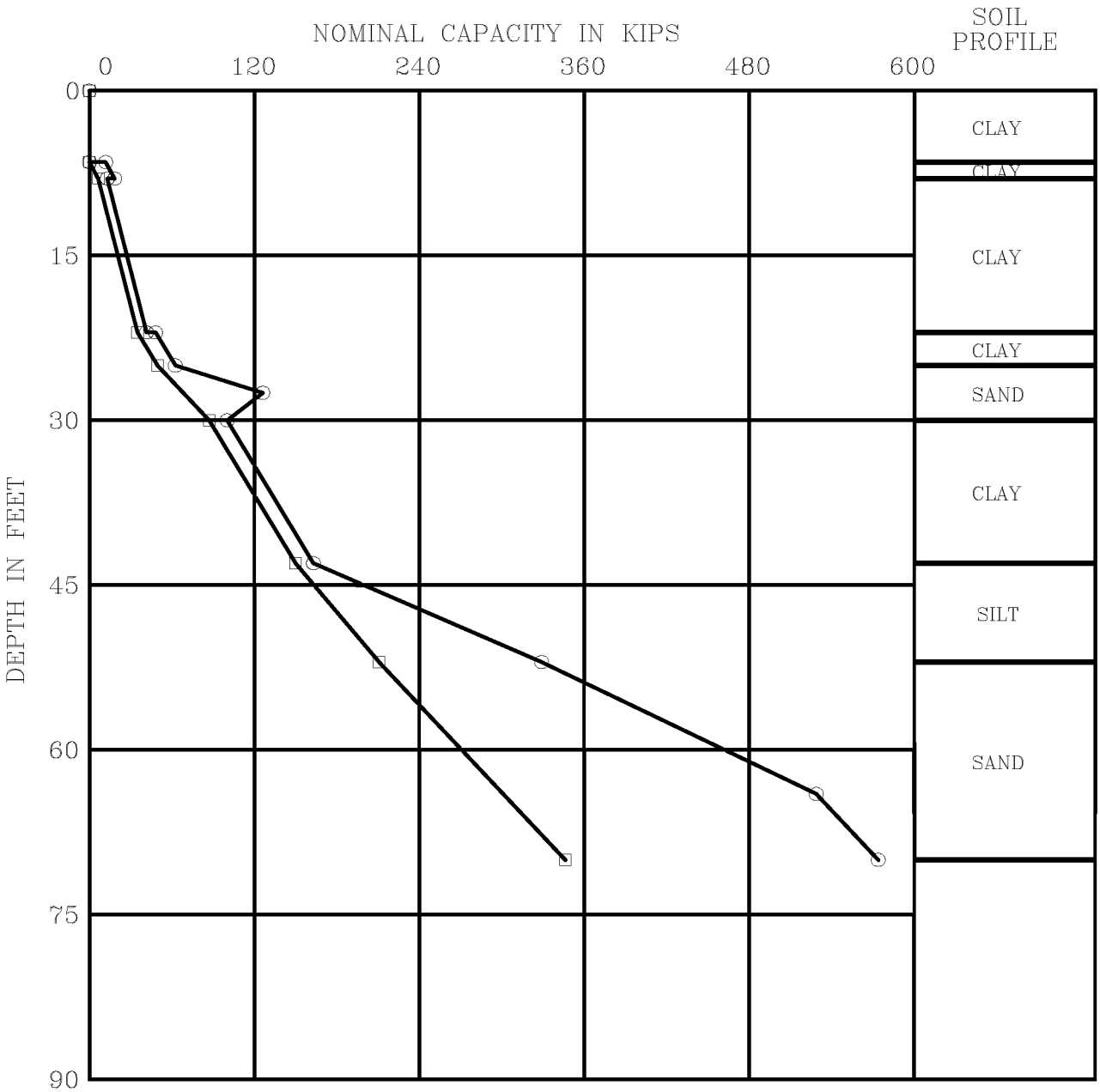
LEGEND

□ SKIN FRICTION
○ TOTAL PILE CAPACITY

PILE DIAMETER	:	1.17 ft.
PILE TYPE	:	DRIVEN,LD
FACTOR OF SAFETY		
END BEARING	:	2.00
SKIN FRICTION	:	2.00

Problem No.	Bolsa Chica Road OC abut 1
GROUP DELTA CONSULTANTS	ALLOWABLE PILE CAPACITY

FIGURE 9A



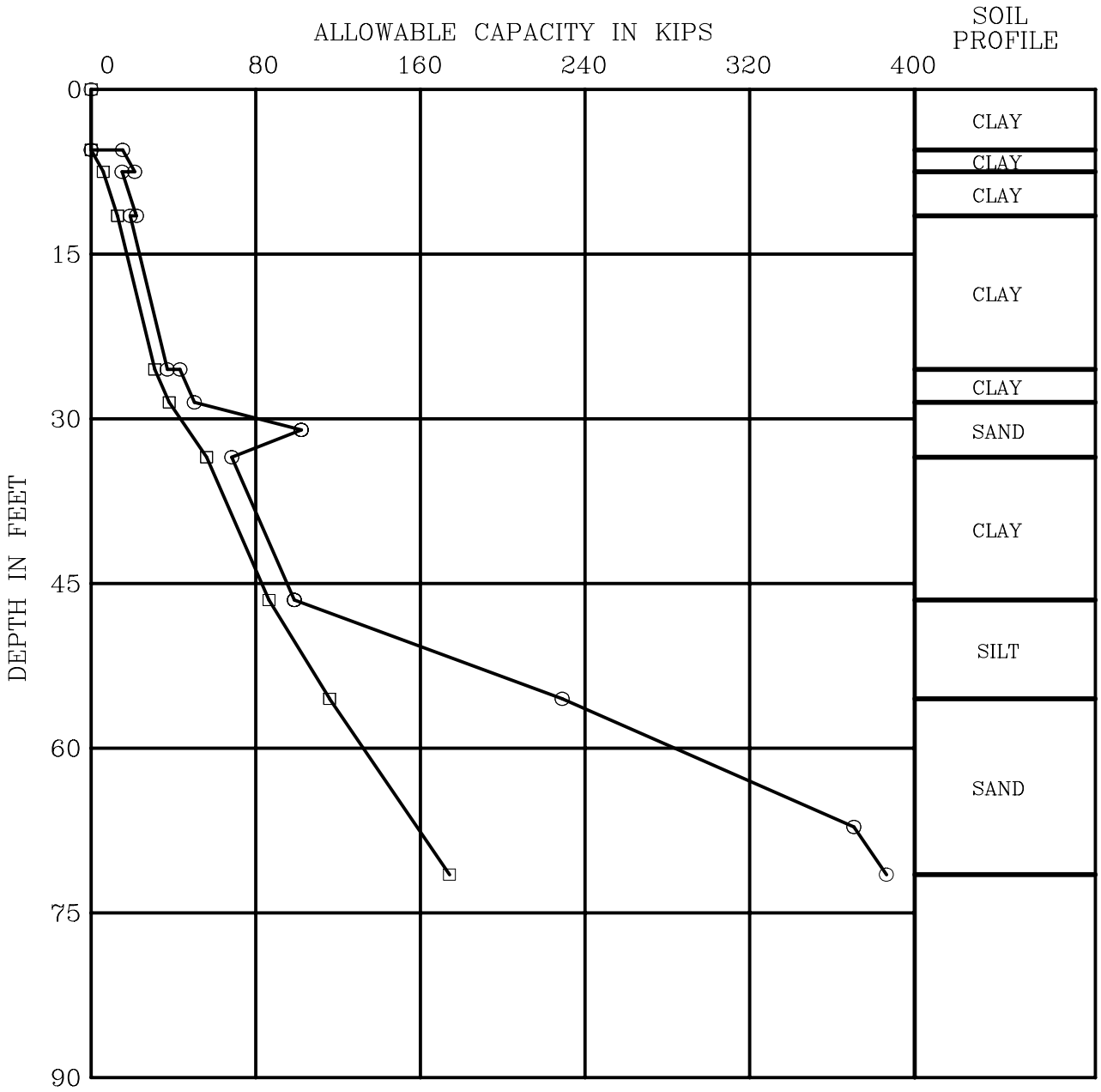
LEGEND

- ▫ SKIN FRICTION
- ○ TOTAL PILE CAPACITY

PILE DIAMETER	:	1.20 ft.
PILE TYPE	:	DRIVEN,SD
FACTOR OF SAFETY		
END BEARING	:	1.00
SKIN FRICTION	:	1.00

Problem No.	Bolsa Chica Road OC Bent 2
GROUP DELTA CONSULTANTS	NOMINAL PILE CAPACITY

FIGURE 9B



LEGEND

□ SKIN FRICTION
○ TOTAL PILE CAPACITY

PILE DIAMETER : 1.17 ft.
PILE TYPE : DRIVEN,LD
FACTOR OF SAFETY
END BEARING : 2.00
SKIN FRICTION : 2.00

Problem No.	Bolsa Chica Road OC abut 3
GROUP DELTA CONSULTANTS	ALLOWABLE PILE CAPACITY **FIGURE 9C**

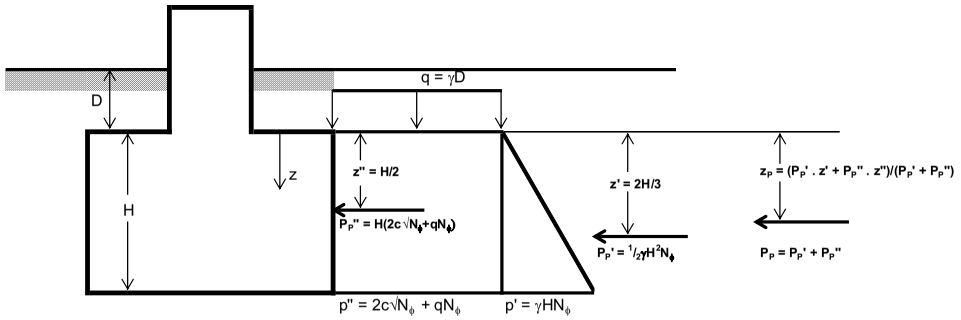
PASSIVE LATERAL RESISTANCE ON AN EMBEDDED FOOTING

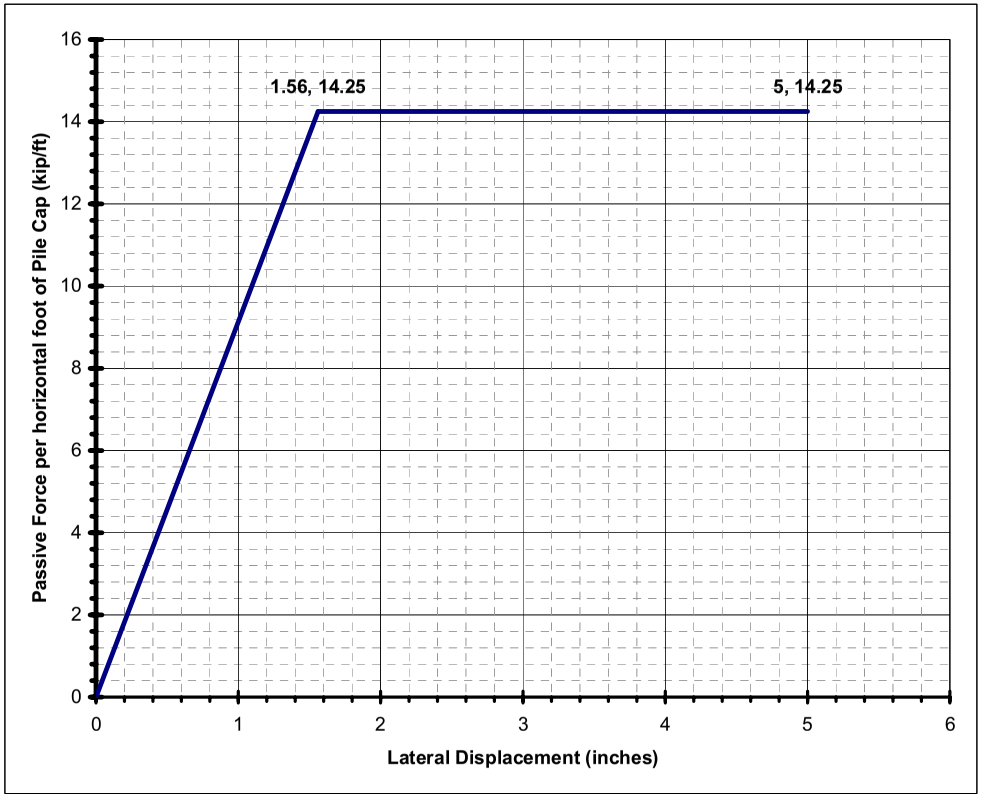
Input	
Sand or Clay (S or C) =	C
Soft, Firm, Stiff (S,F,ST) =	ST
Unit Wt, γ (pcf) =	125.0
Cohesion, c (psf) =	1,500
Friction Angle, ϕ (deg) =	0.00
Soil Cover, D (ft) =	2.50
Footing Thickness, H (feet)=	4.00

Output		
Movement to mobilize full passive, δ_{ult} (inches) =	1.56	
Surcharge above top of footing, q (psf) =	313	= γD
Factor N_ϕ =	1.00	= $\tan^2(45+\phi/2)$
Passive pressure at top of footing, p" (psf) =	3,313	= $2c\sqrt{N_\phi}+qN_\phi$
Increase in passive pressure btwn top and bottom of footing, p' (psf) =	500.0	= γHN_ϕ
Passive pressure at bottom of footing, p" + p' (psf) =	3,812.5	= $2c\sqrt{N_\phi}+qN_\phi + \gamma HN_\phi$
Passive Force from Rectanglar Block, P_P" (lbs/ft) =	13,250	= $H(2c\sqrt{N_\phi}+qN_\phi)$
Depth of P_P" below top of footing, z" (feet) =	2.00	= H/2
Passive Force from Trianglar Block, P_P' (lbs/ft) =	1,000	= $1/2\gamma H^2N_\phi$
Depth of P_P' below top of footing, z' (feet) =	2.67	= 2H/3
Total Ultimate Passive Force, P_P (lbs/ft) =	**14,250**	= P_P" + P_P'
Depth of P_P below top of footing, z_P (feet) =	2.05	= $(P_P" \cdot z" + P_P' \cdot z')/(P_P" + P_P')$

Plot Data

δ (inch)	Pp (kip/ft)
0	0.00
1.56	14.25
5	14.25



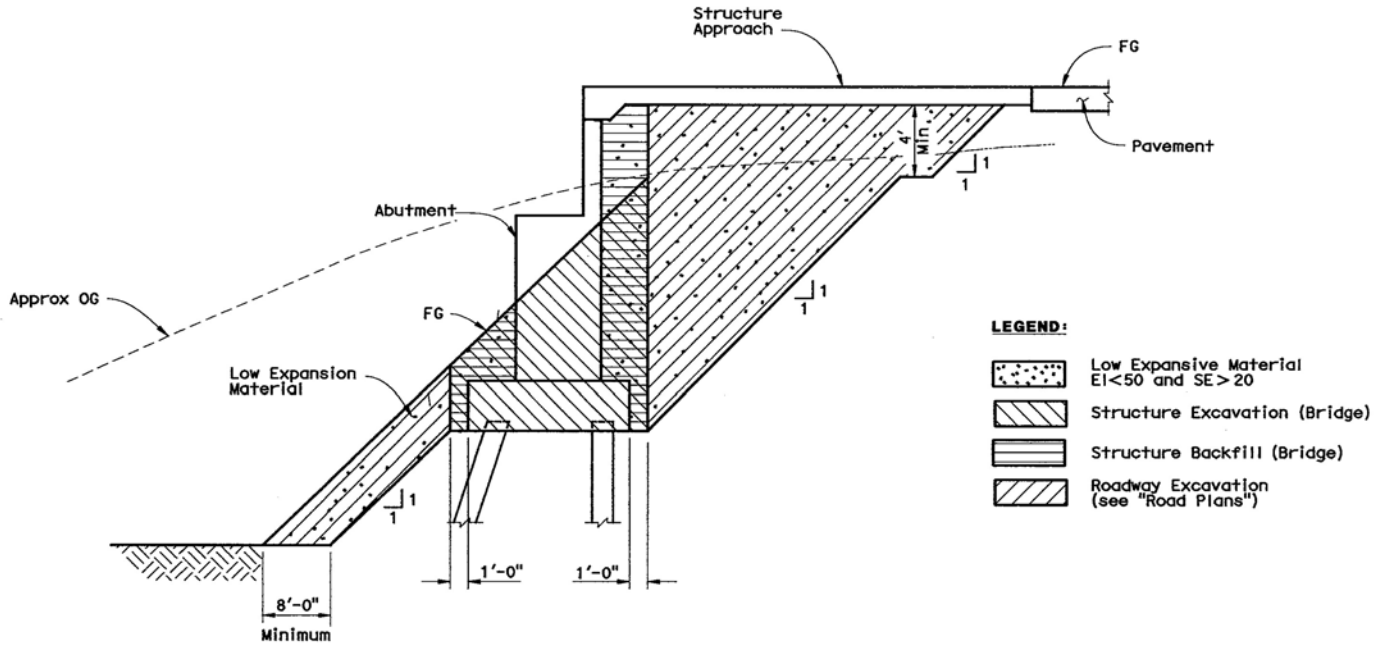


DISPLACEMENT REQUIRED FOR FULL PASSIVE AS A FUNCTION OF SOIL TYPE

Soil Type	δ/(H+D) for Full Passive	δ (inch)
Dense Sand	0.002	0.156
Medium Dense Sand	0.004	0.312
Loose Sand	0.006	0.468
Soft Clay	0.040	3.120
Firm Clay	0.030	2.340
Stiff Clay	0.020	1.560

Reference: Passive Eart
Pressure of Cohessive Soils in Contact with Smooth Vertical Surface, "Soil Mechanics in Engineering Practice", Karl Terzaghi and Ralph B.Peck, 2nd Edition, John Wiley & Sons, New York, 1967

FIGURE 10
PASSIVE RESISTANCE OF PILE CAP AGAINST NATIVE STIFF CLAY



LIMITS OF EXPANSIVE SOIL EXCLUSION ZONE IN BRIDGE EMBANKMENT A62C

No Scale

GROUP DELTA CONSULTANTS

GDC Project No. I-436

WCC Project: 405-22 HOV Connector Segment
Orange County, California

LIMITS OF EXPANSIVE SOIL EXCLUSION ZONE IN BRIDGE EMBANKMENT

Figure 11

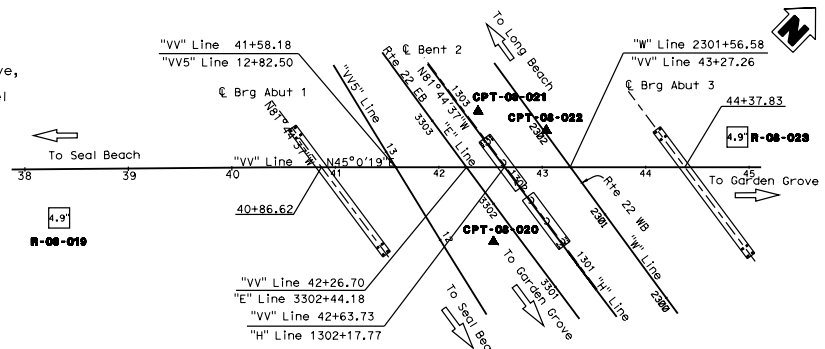
PLATES

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 60'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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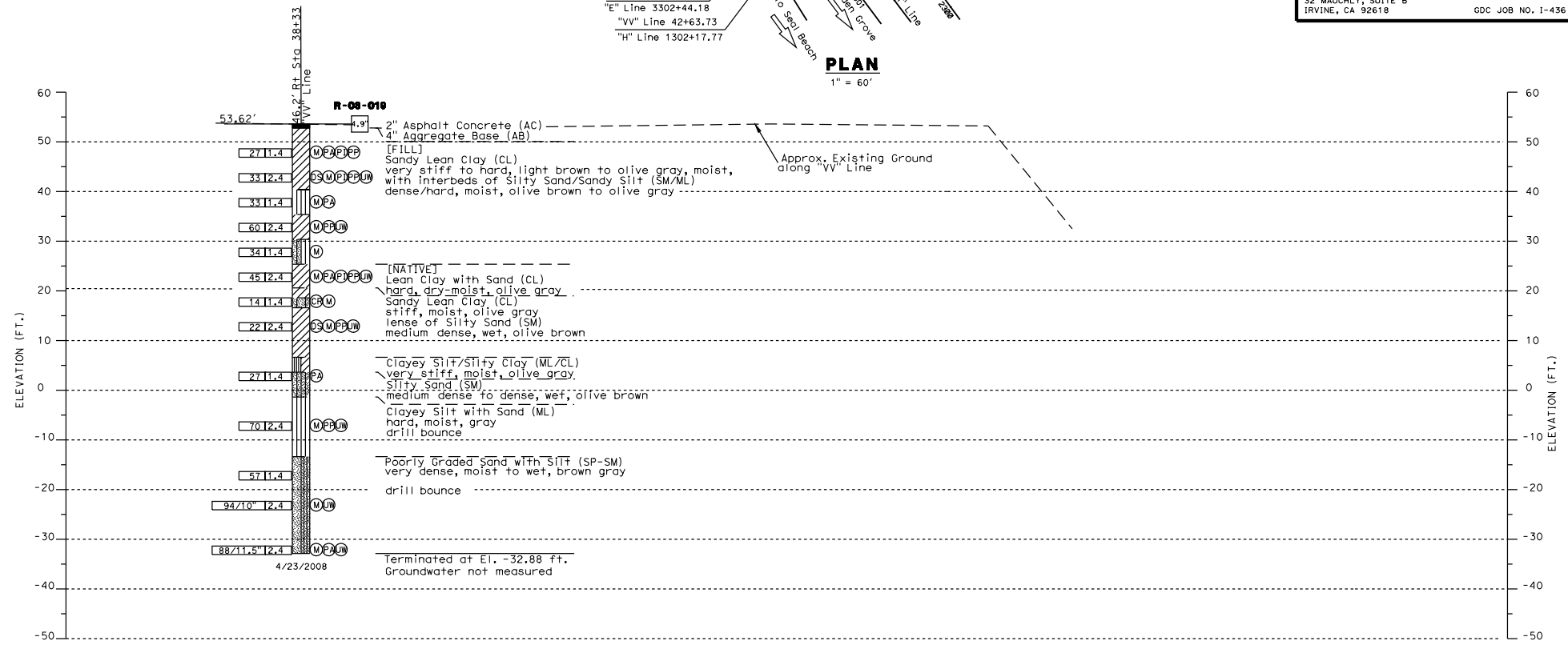
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

See LOTB 2

38+00 39+00 40+00 41+00
STATION NO. ALONG "VV" LINE

PLATE 1

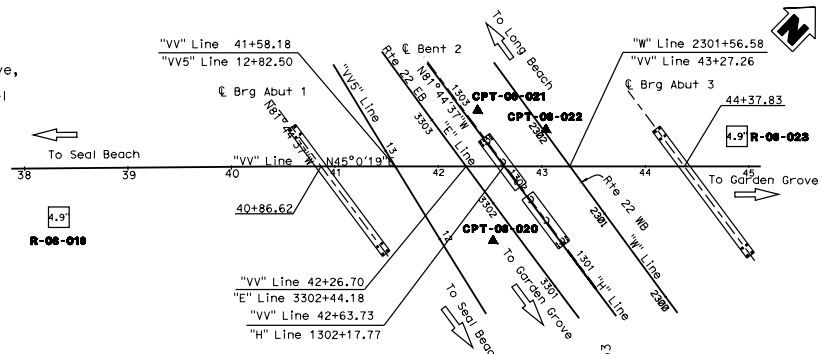
DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1102 POST MILES 0.92	BOLSA CHICA ROAD OVERCROSSING (REPLACE) LOG OF TEST BORINGS 1 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 10/20/08 12/20/09 05/18/09 SHEET 30 OF 34

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)



PLAN
1" = 60'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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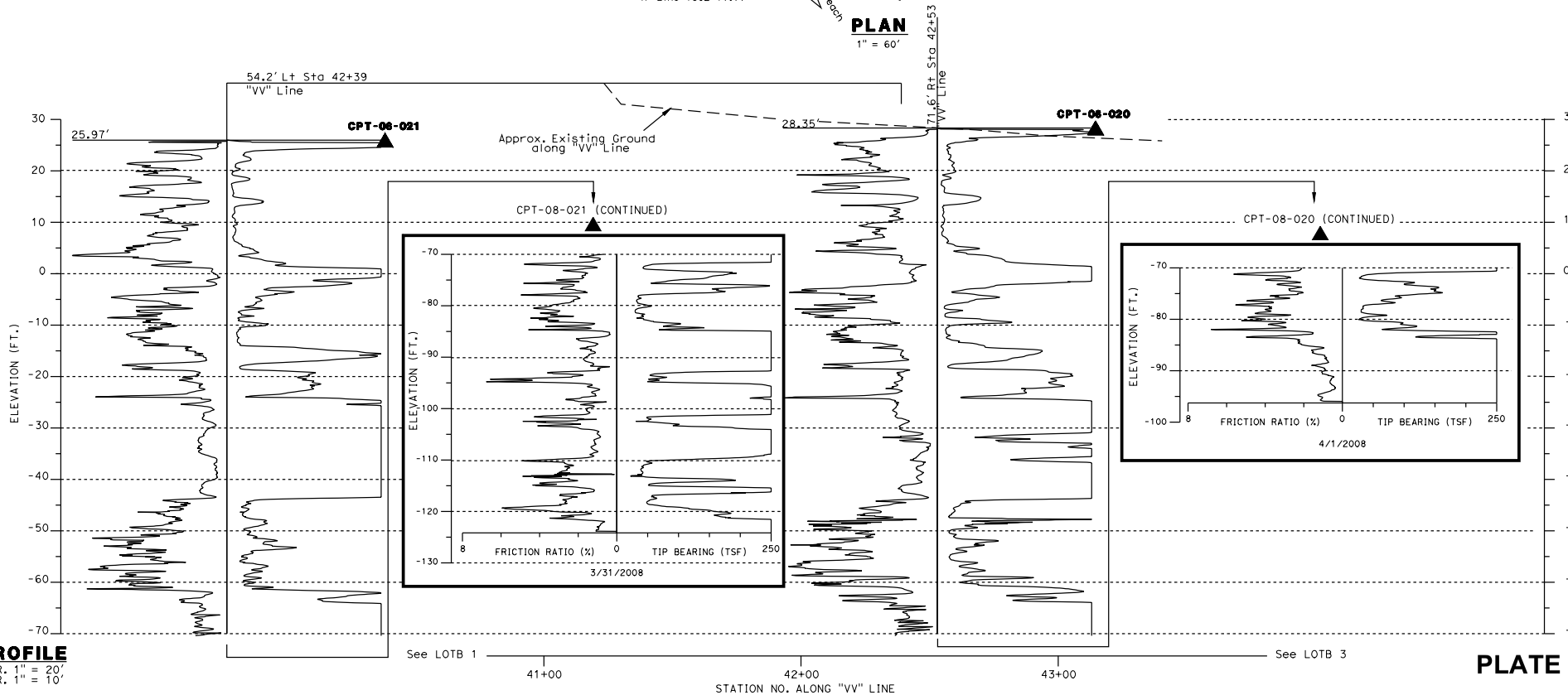
PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 2

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1102 POST MILES 0.92

BOLSA CHICA ROAD OVERCROSSING (REPLACE)
LOG OF TEST BORINGS 2 OF 5

OGS CIVIL LOG OF TEST BORINGS SHEET
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
CU 12235
EA 071621
FILE => $REQUEST
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES: 10/28/08 12/28/09 05/18/09
SHEET 31 OF 34

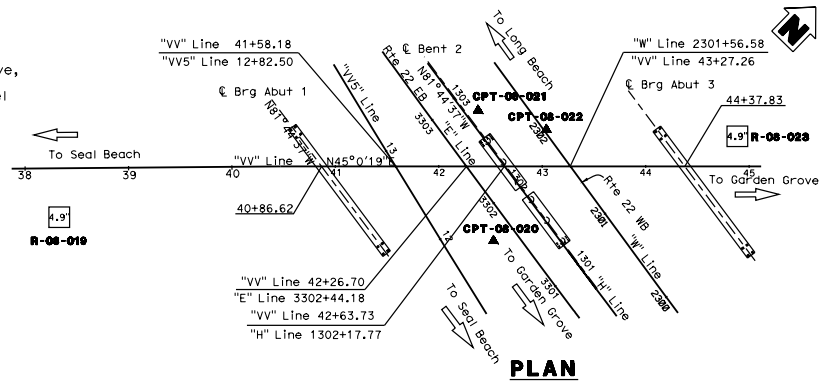
DATE PLOTTED => $DATE TIME PLOTTED => $TIME USERNAME => $USER

BENCHMARK:
Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

2) See notes on LOTB 4 for additional description of samplers, hammer, blowcounts etc.



PLAN
1" = 60'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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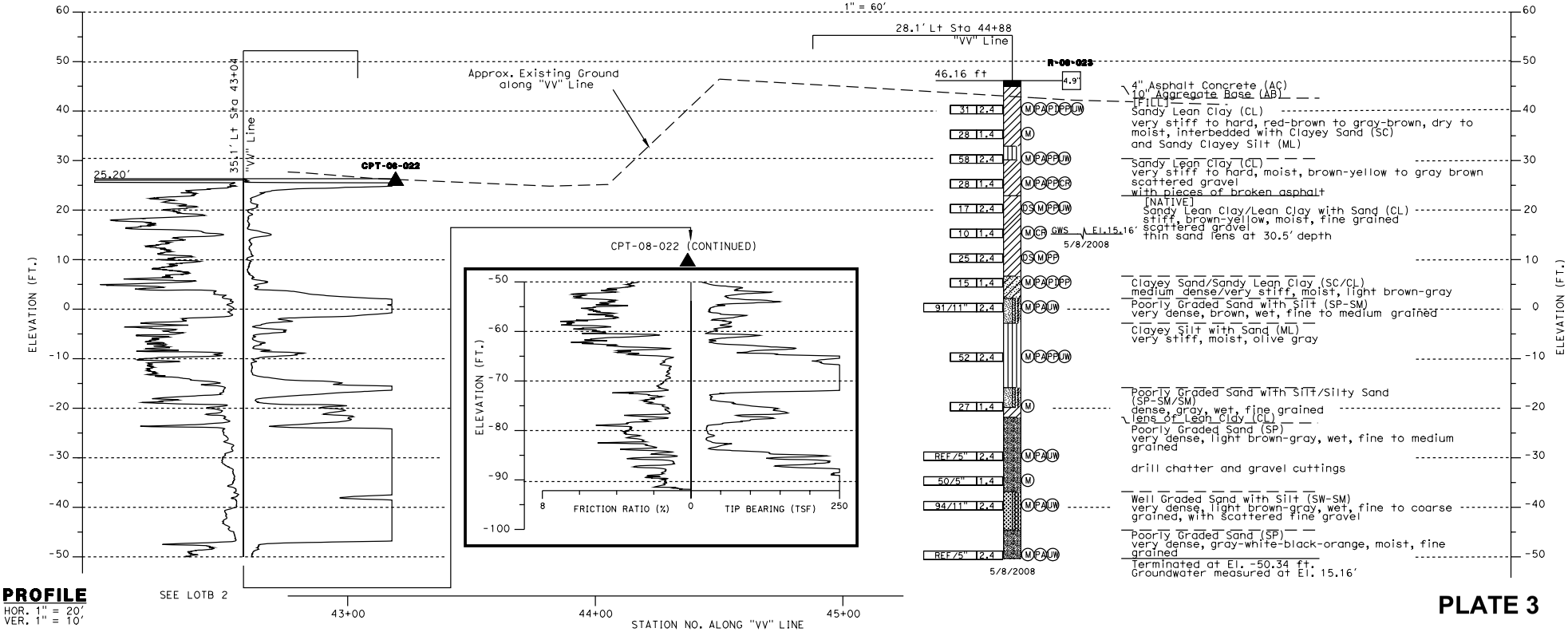
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



PROFILE
HOR. 1" = 20'
VER. 1" = 10'

PLATE 3

DESIGN OVERSIGHT / SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1102 POST MILES 0.92

BOLSA CHICA ROAD OVERCROSSING (REPLACE)
LOG OF TEST BORINGS 3 OF 5

OGS CIVIL LOG OF TEST BORINGS SHEET
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
CU 12235
EA 071621
FILE => $REQUEST
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES: 10/20/08 12/20/09 05/18/09
SHEET 32 OF 34

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

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GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
ST20	A	Auger Boring
ST20	R P	Rotary drilled boring Rotary percussion boring (air)
ST20	R	Rotary drilled diamond core
ST20	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

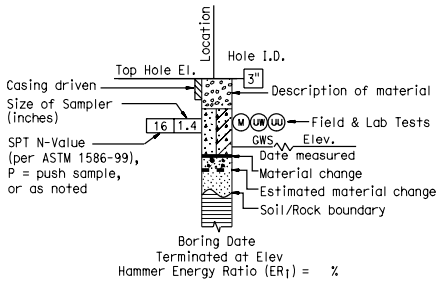
PLASTICITY OF FINE-GRAINED SOILS

Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

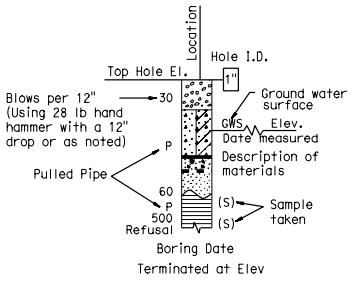
Notes :

1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.
2) A rope and cat-head hammer system consisting of a hammer weight of 140 lbs. falling a distance of 30" was used to advance the drive samplers for rotary borings
3) For drive sample blow counts the following convention is used:
   38 = 38 blows required to produce 12" penetration after the initial 6" seating
   80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
   REF/2" = 50 blows produced 2" penetration during the initial 6" interval

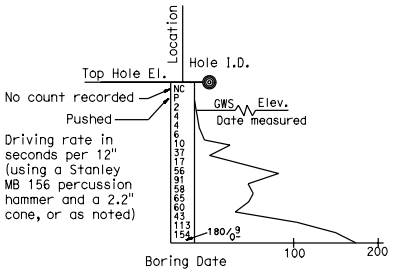
PLATE 4



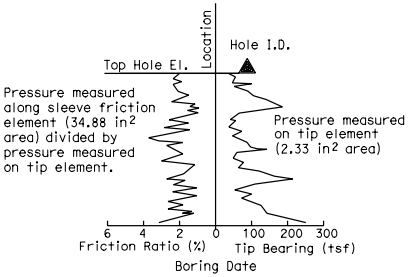
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

DESIGN OVERSIGHT SIGN-OFF DATE	DRAWN BY: K. FERNANDES CHECKED BY: C. SCHEYHING	FIELD INVESTIGATION BY: A. TUCKER, S. NAVARATNARAJAH	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1102 POST MILES 0.92	SOIL LEGEND LOG OF TEST BORINGS 4 OF 5
OGS CIVIL LOG OF TEST BORINGS SHEET	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 12235 EA 071621 FILE => $REQUEST	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 10/20/08 12/20/09 05/18/09 SHEET 33 OF 34

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166)
Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.9 20.4/22.3		

Curt Scheyhing 05/18/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 5

DESIGN OVERSIGHT
SIGN-OFF DATE

DRAWN BY: K. FERNANDES
CHECKED BY: C. SCHEYHING

FIELD INVESTIGATION BY:
A. TUCKER, S. NAVARATNARAJAH

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. MOHSENI
PROJECT ENGINEER

BRIDGE NO. 55-1102
POST MILES 0.92

SOIL LEGEND
LOG OF TEST BORINGS 5 OF 5

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 10/28/08 12/28/09 05/18/09

SHEET 34 OF 34

FILE => $REQUEST
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

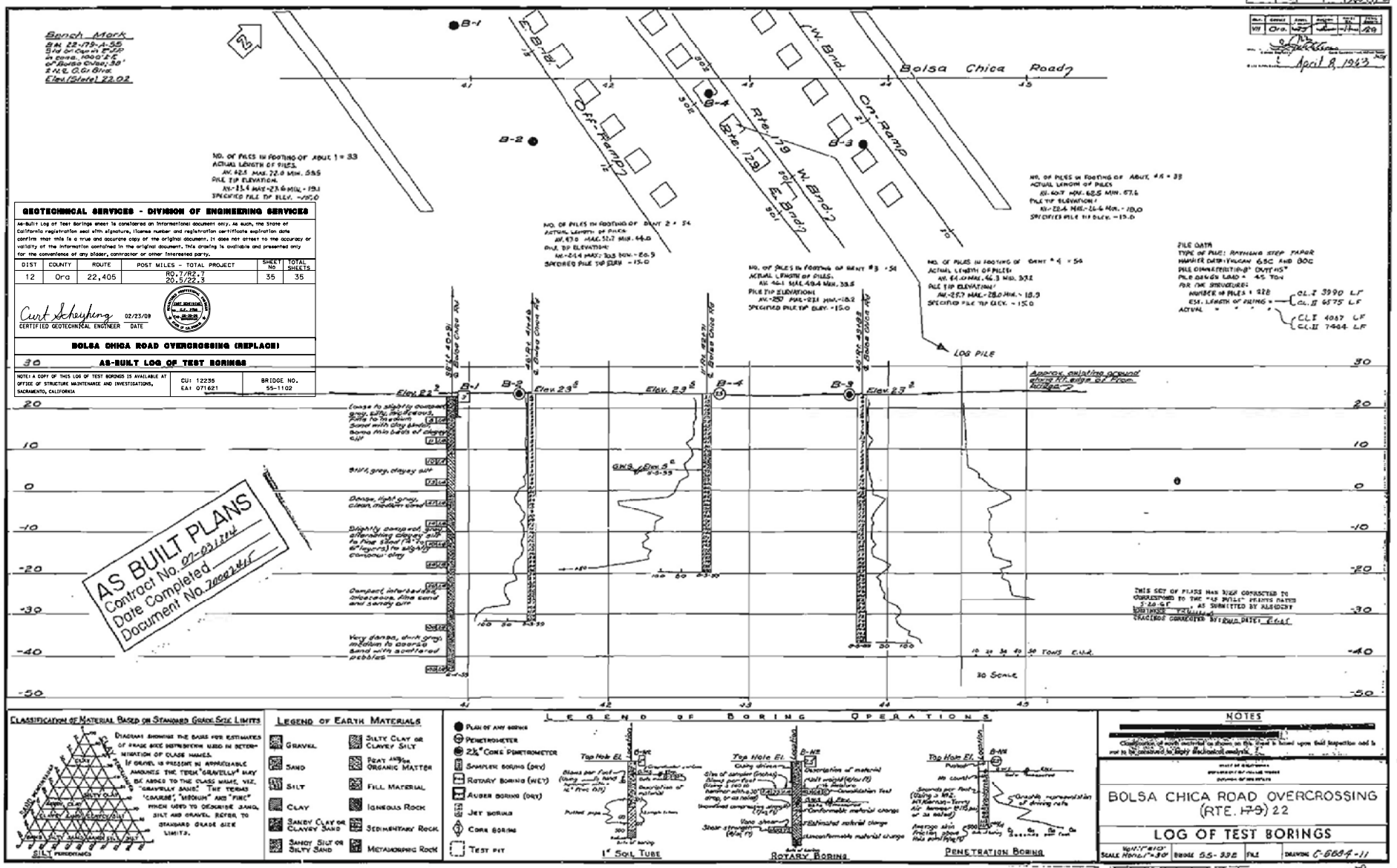

Bench Mark
BM 22-179-A-56
3" Dia Br Cap in Top
in conc. Hdwall at
of Bolsa Chica, 38'
± N.E. C.L. Brdg.
Elev (Static) 22.02
Bolsa Chica Road
Off-Ramp
Rte. 179 W. Brdg.
Rte. 179 E. Brdg.
On-Ramp
B-1
B-2
B-3
B-4
GEOTECHNICAL SERVICES - DIVISION OF ENGINEERING SERVICES
As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.
DIST | COUNTY | ROUTE | POST MILES - TOTAL PROJECT | SHEET No | TOTAL SHEETS
12 | Ora | 22,405 | R0.7/R2.7 20.5/22.5 | 35 | 35
Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER DATE
BOLSA CHICA ROAD OVERCROSSING (REPLACE)
AS-BUILT LOG OF TEST BORINGS
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA
CU: 12235 EA: 071621
BRIDGE NO. 55-1102
AS BUILT PLANS
Contract No. 07-031214
Date Completed
Document No. 20082445
LOG PILE
Approx. existing ground along Rt. edge of Hdwall
Elev. 22.2
Elev. 23.6
Elev. 23.6
Elev. 23.2
Loose to slightly compact gray, silty, fine sand, Trace to medium Sand with clay and/or some thin beds of clayey silt
Stiff, gray, clayey silt
Dense, light gray, clean, medium sand
Slightly compact to compact, alternating clayey silt to fine sand (3" to 6" layers) to slightly cohesive clay
Compact, interbedded, calcareous, fine sand and sandy silt
Very dense, dark gray, medium to coarse sand with scattered pebbles
GWS @ Elev 5.6 9-3-59
PILE DATA
TYPE OF PILE: RAYMOND STEP TAPER
HAMMER DATA: VULCAN 65C AND 80C
PILE CONNECTION: CUT OFF
PILE DESIGN LOAD = 45 TON
FOR THE STRUCTURE:
NUMBER OF PILES = 328
EST. LENGTH OF PILING = CL. I 3990 LF, CL. II 6875 LF
ACTUAL = CL. I 4067 LF, CL. II 7484 LF
THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED 5-28-65 AS SUBMITTED BY RESIDENT ENGINEER
TRACINGS CORRECTED BY: Ewa DATE: 6-1-65
10 20 30 40 50 TONS E.U.D.
30 Scale
CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS
Diagram showing the basis for estimates of grade size distinction used in determination of class names. If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand." The terms "coarse", "medium" and "fine" when used to describe sand, silt and gravel, refer to standard grade size limits.
SILT FINE SAND MEDIUM SAND COARSE SAND GRAVEL
LEGEND OF EARTH MATERIALS
Gravel
Sand
Silt
Clay
Sandy Clay or Clayey Sand
Sandy Silt or Silty Sand
Silty Clay or Clayey Silt
Peat and/or Organic Matter
Fill Material
Igneous Rock
Sedimentary Rock
Metamorphic Rock
LEGEND OF BORING OPERATIONS
Plan of any borings
Penetrometer
2½" Cone Penetrometer
Sampling boring (dry)
Rotary boring (wet)
Auger boring (dry)
Jet borings
Core boring
Test pit
1" Soil Tube
Rotary Boring
Penetration Boring
NOTES
Classification of earth material as shown on the logs is based upon field inspection and is not to be construed to imply mechanical analysis.
BOLSA CHICA ROAD OVERCROSSING (RTE. 179) 22
LOG OF TEST BORINGS
Scale Horiz. 1"=30' Vert. 1"=10'
Bridge 55-332
File
Drawing C-6684-11
PREL. DRAWING NO. P.C.G.B.4
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.
DATE SIGNATURE TITLE

PLATE 6

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the subject bridge were investigated by Group Delta Consultants, Inc. (GDC) by performing two (2) soil borings and three (3) Cone Penetration Tests (CPTs) during the period of March 31st to May 8th, 2008. The borings were performed to depths of 86.5 feet to 96.5 feet below ground surface (bgs) and the CPTs were performed to depths of 118.5 to 150.2 feet bgs. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at the subject overcrossing location. Locations of the borings and CPTs are presented in Figure 2 of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1 of this appendix.

The CPTs were performed from the freeway lanes and shoulders of SR-22 within the Caltrans Right-of-Way (ROW). The borings were performed from surface streets in the vicinity of the Bolsa Chica Road OC within the Cities of Westminster and Garden Grove ROWs respectively.

Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night.

The exploration methods are described in the following sections. Boring and CPT logs from the current exploration program are presented in Figures A-2a through A-3d and A-4a through A-6d, respectively.

A.2 Soil Drilling and Sampling

A total of two (2) soil borings (R-08-019 and R-08-023) were drilled and sampled at the subject bridge using rotary wash method during this project. The borings were advanced to desired depths using a truck-mounted Mayhew 1000 drill rig and a 4.875-inch drill bit in conjunction with bentonite slurry.

C & L Drilling, Inc. of La Habra, California drilled and sampled borings as subcontractor to GDC. All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in

accordance with the Unified Soil Classification System (USCS). All soils were assigned a group name and group symbol, as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The boring logs are presented in Figures A-2a and A-3d.

Drive samples were generally collected from the borings at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D-1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using either a downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency, California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured.

The borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with asphalt patch as necessary.

Rotary wash borings drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then

transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of three (3) CPT soundings (CPT-08-020 to CPT-08-022) were performed at the subject bridge to depths ranging from 118.5 to 150.2 feet bgs. Kehoe Testing and Engineering, Inc. of Long Beach, California performed the CPT soundings as a subcontractor to GDC.

The CPT soundings were conducted in general accordance with the ASTM D-3441 test standard using an electronic cone penetrometer. A 0.155-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in this appendix on Figures A-4a through A-6d. Soil behavior type and other interpretations of the CPT data provided by Kehoe are in our files.

At the completion of each sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned by backfilling bentonite into the hole to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1 Summary of Field Explorations

List of Figures

Figure A-1a Key for Soil Classification
Figure A-1b Boring Legend
Figures A-2a and A-3d Boring Logs
Figures A-4a through A-6d Cone Penetration Test Results

TABLE A-1:
SUMMARY OF TEST EXPLORATIONS
BOLSA CHICA OC
SR-22 WEST ORANGE COUNTY CONNECTORS PROJECT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Plan Figure No.	Appendix Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft) [2]	Notes
R-08-019	38+33 47 R	4/23/2008	Rotary Wash Boring	53.62	86.5	L-4	A-2	NM	NM	
CPT-08-020	42+53 72 R	4/1/2008	CPT	28.35	124.6	L-3	A-4	Hole obstructed at 12' (dry)	NA	GW is below Elev. 16 feet
CPT-08-021	42+39 54 L	3/31/2008	CPT	25.97	150.2	L-3	A-5	Hole obstructed at 7' (dry)	NA	GW is below Elev. 19 feet
CPT-08-022	43+04 35 L	4/24/2008	CPT	25.20	118.5	L-3	A-6	Hole obstructed at 5' (dry)	NA	Tip Refusal at 118.5' GW is below Elev. 21 feet
R-08-023	44+88 28 L	5/8/2008	Rotary Wash Boring	46.16	96.5	L-3	A-3	31	15.16	

Notes:
1. Stationing relative to the "W" line. Right and left offsets defined by looking along centeline in direction of increasing station.
2. Elevations based on survey conducted in January 2009

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

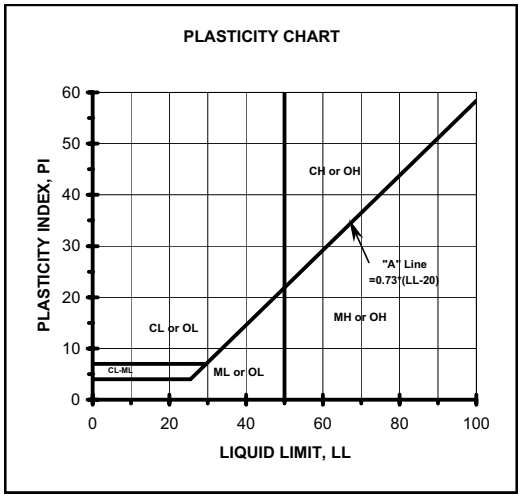
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375 inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5			B1									
10			R2									
15			S3									
20												

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-019

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	1 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53.62	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												2" Asphalt Concrete (AC) **4" Aggregate Base (AB)** **[FILL]** **Sandy Lean Clay (CL)** very stiff to hard, moist, light brown olive to olive gray, fine to coarse grained with scattered fine gravel
5	50		S1	8 12 15		20		59	34:14	4.0		no gravel
10	45		R2	8 13 20	114.3	17	DS		39:19	4.5+		
15	40		S3	9 13 20		27		57				**Sandy Clayey Silt (ML)** hard, moist, olive brown, very fine grained
20	35		R4	13 24 36	110.8	15				4.5+		**Sandy Lean Clay (CL)** hard, moist, olive gray, fine grained with scattered fine gravel, trace of silt
	30											**Silty Sand/Sandy Silt (SM/ML)** dense/hard, moist, olive gray, fine grained

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-019

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	2 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53.62	▼ N/A / *na*

SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in.

NOTES: Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S5	9 14 20		18						**Silty Sand/Sandy Silt (SM/ML)** dense/hard, moist, olive gray, fine grained
	25											**[NATIVE]** **Silty Clay with Sand (CL)** hard, dry-moist, olive gray, fine grained, with small roots and twigs
30			R6	13 17 28	107.6	19		71	33:12	4.5		
												Sandy Lean Clay (CL) stiff, moist, olive gray
	20											
35			S7	5 7 7		29	CR					**Silty Sand (SM)** medium dense, wet, olive brown, fine grained with few scattered fine gravel, trace to no clay
												Sandy Lean Clay (CL) stiff, moist, olive gray, fine grained
	15											
40			R8	5 9 13	103.8	23	DS			1.25		
												Silty Sand (SM) medium dense, moist, olive brown, fine grained with scattered coarse grains, trace to no clay
	10											**Sandy Lean Clay (CL)** stiff, moist, olive gray, fine grained
45												
												Clayey Silt/Silty Clay (ML/CL) very stiff, moist, olive gray
	5											

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-019

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	3 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53.62	▼ N/A / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S9	6 11 16				31				**Silty Sand (SM)** medium dense to dense, wet, olive brown, fine grained
	0											
55												
												Clayey Silt with Sand (ML) hard, moist, gray, fine grained
	-5											becomes harder, drill bounce
60			R10	14 40 30	100.2	24				4.5		
	-10											
65												
												Poorly Graded Sand with Silt (SP-SM) very dense, moist to wet, brown gray, fine grained, no gravel
	-15											
70			S11	20 27 30								no recovery (no catcher) SP in tip as described above
	-20											becomes harder, drill bounce

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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FIGURE A-2 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-019**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/23/2008	4/23/2008	4 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	86.5	53.62	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R12	17 44 50/4"	103.8	23						**Poorly Graded Sand with Silt (SP-SM)** very dense, moist, olive gray
	-25											
80												
	-30											
85			R13	19 38 50/5.5"	94.4	29		12				
												Boring terminated at 86.5 feet below ground surface (bgs). *Groundwater not measured.* *Borehole backfilled with grout mix and patched with asphalt.*
	-35											
90												
	-40											
95												
	-45											

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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FIGURE A-2 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	1 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	46.16	▼ 31.0 / *15.2*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	45											**4" Asphalt Concrete (AC)** **10" Aggregate Base (AB)**
												[FILL] **Sandy Lean Clay (CL)** very stiff to hard, red-brown, dry, fine to coarse grained with scattered pieces of hard red clay and fine subrounded granite gravel
5												
	40		R-1	8 13 18	115.8	10		54	32:13	4.5+		light brown-yellow fine grained Clayey Sand (SC) in sampler shoe
												Clayey Sand (SC) medium dense, moist, brown-yellow, fine grained
10												
	35		S-2	6 12 16		23						
												Sandy Clayey Silt (ML) very stiff, moist, gray, with some fine grains and scattered fine gravel
15												
	30		R-3	8 24 34	113.8	15		55		4.5		**Sandy Lean Clay (CL)** hard, moist, brown-yellow, fine grained
												Sandy Lean Clay (CL) very stiff, moist, gray-brown, scattered fine grains and fine gravel, with some very thin bedding present, little silt, rolls excellent thread with pieces of broken asphalt in sampler shoe
20												
	25		S-4	5 11 17		22	CR	61		3.25		
												[NATIVE] **Sandy Lean Clay/Lean Clay with Sand (CL)** stiff, brown-yellow, moist, fine grained

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-023

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	2 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	46.16	▼ 31.0 / *15.2*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	20		R-5	3 7 10	88.7	31	DS			1.5		**[NATIVE]** **Sandy Lean Clay/Lean Clay with Sand (CL)** stiff, brown-yellow, moist, fine grained
30	15		S-6	3 4 6		34	CR					**Lean Clay (CL)** stiff, moist, gray-brown, scattered fine grains and fine gravel, with thin sand lense at 30.5', rolls excellent thread
35	10		R-7	6 12 13		28	DS			1-1.25		with some pieces of dry light brown-gray clay and red-orange color mottling
40	5		S-8	4 6 9		24		49	29:10	2.0		**Clayey Sand/Sandy Lean Clay (SC/CL)** medium dense/stiff to very stiff, moist, light brown-gray, with some fine grains and silt
45	0		R-9	21 41 50/5"	107.8	19	PA	11				**Poorly Graded Sand with Silt (SP-SM)** very dense, brown, wet, fine to medium grained
												Clayey Silt with Sand (ML) very stiff, moist, olive gray

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	3 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	46.16	▼ 31.0 / *15.2*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-5											**Clayey Silt with Sand (ML)** very stiff, moist, olive gray
55												
	-10		R-10	9 17 35	98.8	26		84		2.0		
60												
	-15											**Poorly Graded Sand with Silt/Silty Sand (SP-SM/SM)** dense, gray, wet, fine grained, long organic fibers present
65												
	-20		S-11	15 14 13		40						**Lean Clay (CL)** very stiff, gray, moist, with some silt
												Poorly Graded Sand (SP) very dense, light brown-gray, wet, fine to medium grained, little to no silt
70												
	-25											

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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FIGURE A-3 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-023**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	5/8/2008	5/8/2008	4 of 4

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	96.5	46.16	▼ 31.0 / *15.2*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-30		R-12	50/5"	106.8	21		2				**Poorly Graded Sand (SP)** very dense, light brown-gray, wet, fine to medium grained, little to no silt drill chatter and fine to 1/2" gravel cuttings 77.5' to 78'
80	-35		S-13	40 50/5"		25						with red staining of quartz grains drill chatter and fine gravel cuttings
85	-40		R-14	25 44 50/5"	108.1	19		8				**Well Graded Sand with Silt (SW-SM)** very dense, light brown-gray, wet, fine to coarse grained, with scattered fine gravel up to 1/2" with thin lenses of interbedded gray Silt (ML)
90	-45											**Poorly Graded Sand (SP)** very dense, gray-white-black-orange, moist, fine grained
95	-50		R-15	50/5" 10/1"	101.4	23		4				*Boring terminated at 96.5 feet below ground surface (bgs).* *Groundwater measured at 31 feet bgs with tape after bailing hole.* *Borehole backfilled with grout mix and patched with asphalt.*

GDC_LOG_BORING_1A I-436 BOLSA CHICA OC BORING LOGS.GPJ GDCLOG.GDT 01/30/09

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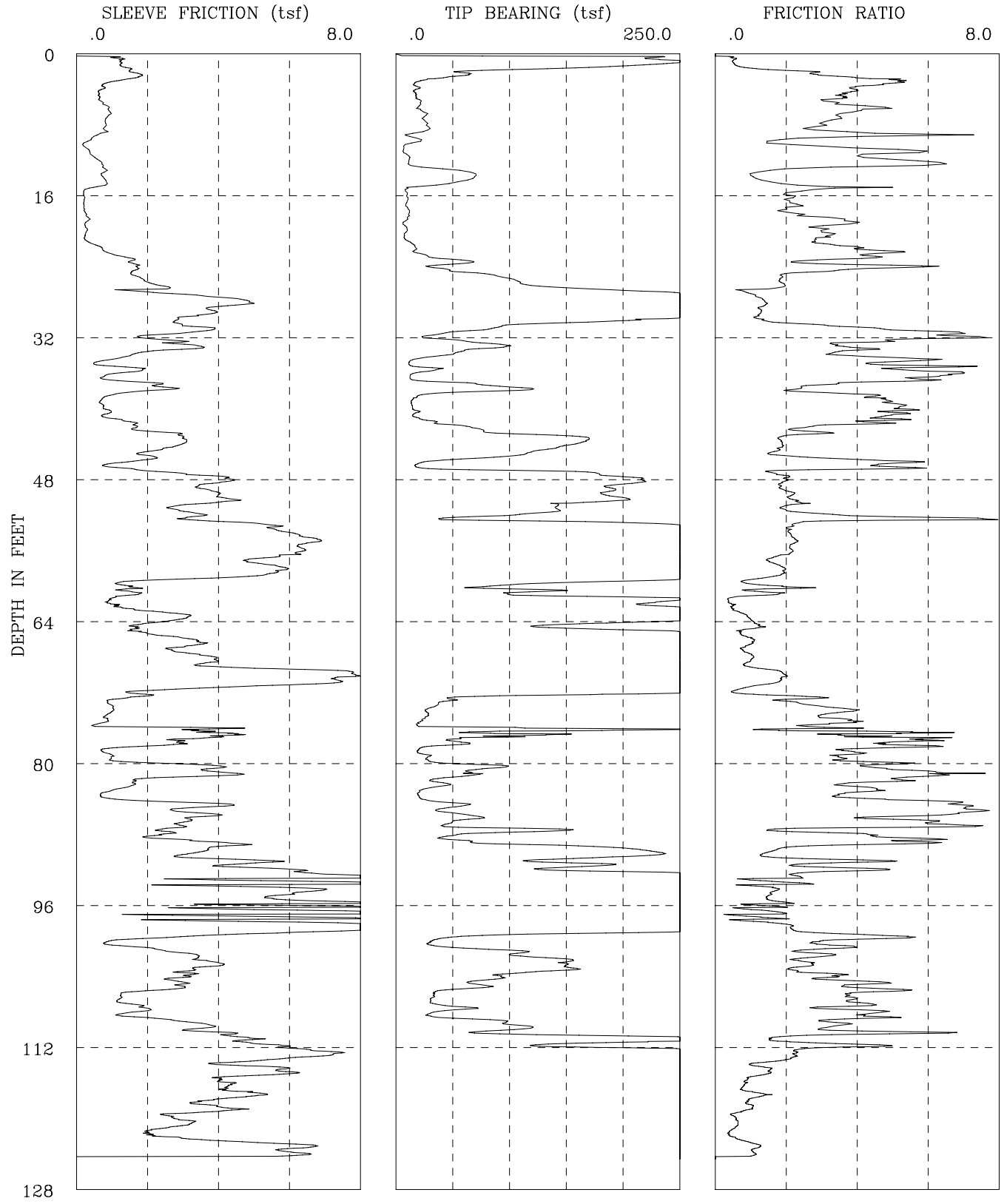
FIGURE A-3 d



CPT-08-020	I-436 Garden Grove Freeway (SR-22)
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-4a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-020
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date :04/01/2008
Cone Used :30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	199.33	1.02	0.51	0.03	sand	>90	>48	38	UNDEFINED
0.60	2	152.07	1.39	0.91	0.09	sand	>90	>48	29	UNDEFINED
0.95	3	43.99	1.55	3.53	0.15	clayey silt to silty clay	UNDFND	UNDFD	21	2.9
1.25	4	17.70	0.75	4.25	0.22	clay	UNDFND	UNDFD	17	1.1
1.55	5	17.64	0.63	3.58	0.28	silty clay to clay	UNDFND	UNDFD	11	1.1
1.85	6	21.00	0.79	3.74	0.33	silty clay to clay	UNDFND	UNDFD	13	1.3
2.15	7	24.78	0.92	3.73	0.39	silty clay to clay	UNDFND	UNDFD	16	1.6
2.45	8	25.47	0.83	3.26	0.45	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
2.75	9	22.65	0.79	3.50	0.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
3.05	10	17.51	0.38	2.17	0.57	clayey silt to silty clay	UNDFND	UNDFD	8	1.1
3.35	11	5.71	0.26	4.53	0.61	clay	UNDFND	UNDFD	5	.3
3.65	12	11.00	0.50	4.57	0.64	clay	UNDFND	UNDFD	11	.6
3.95	13	18.99	0.80	4.21	0.67	clay	UNDFND	UNDFD	18	1.2
4.25	14	81.63	0.73	0.90	0.69	sand to silty sand	60-70	40-42	20	UNDEFINED
4.55	15	39.08	1.00	2.55	0.72	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
4.85	16	10.46	0.21	2.00	0.75	clayey silt to silty clay	UNDFND	UNDFD	5	.6
5.15	17	8.28	0.18	2.17	0.78	silty clay to clay	UNDFND	UNDFD	5	.4
5.45	18	14.27	0.21	1.50	0.81	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.75	19	6.91	0.28	4.04	0.84	clay	UNDFND	UNDFD	7	.3
6.05	20	10.73	0.32	3.00	0.86	silty clay to clay	UNDFND	UNDFD	7	.6
6.40	21	5.72	0.20	3.56	0.89	clay	UNDFND	UNDFD	5	.2
6.70	22	15.50	0.54	3.49	0.93	silty clay to clay	UNDFND	UNDFD	10	.9
7.00	23	22.70	1.04	4.56	0.95	clay	UNDFND	UNDFD	22	1.4
7.35	24	47.71	1.63	3.41	0.98	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
7.65	25	68.39	1.62	2.37	1.02	sandy silt to clayey silt	UNDFND	UNDFD	26	4.4
7.95	26	107.67	2.01	1.87	1.04	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
8.25	27	201.56	2.23	1.11	1.07	sand	80-90	42-44	39	UNDEFINED
8.55	28	335.71	4.39	1.31	1.10	sand	>90	44-46	>50	UNDEFINED
8.85	29	306.91	4.05	1.32	1.13	sand	>90	44-46	>50	UNDEFINED
9.15	30	265.86	3.26	1.23	1.16	sand	>90	44-46	>50	UNDEFINED
9.45	31	114.78	3.22	2.80	1.19	sandy silt to clayey silt	UNDFND	UNDFD	44	7.5
9.75	32	41.01	2.63	6.42	1.21	clay	UNDFND	UNDFD	39	2.6
10.05	33	73.89	2.93	3.96	1.24	clayey silt to silty clay	UNDFND	UNDFD	35	4.7
10.35	34	60.49	2.29	3.78	1.27	clayey silt to silty clay	UNDFND	UNDFD	29	3.8
10.65	35	17.59	0.88	5.00	1.30	clay	UNDFND	UNDFD	17	1.0
10.95	36	25.60	1.46	5.70	1.33	clay	UNDFND	UNDFD	25	1.5
11.25	37	15.36	0.92	5.98	1.36	clay	UNDFND	UNDFD	15	.8
11.55	38	92.89	2.41	2.59	1.38	sandy silt to clayey silt	UNDFND	UNDFD	36	6.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-4b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	32.31	1.08	3.33	1.41	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
12.15	40	13.96	0.71	5.08	1.44	clay	UNDFND	UNDFD	13	.7
12.45	41	16.61	0.84	5.09	1.47	clay	UNDFND	UNDFD	16	.9
12.80	42	36.77	1.42	3.85	1.50	clayey silt to silty clay	UNDFND	UNDFD	18	2.2
13.10	43	89.90	2.22	2.47	1.53	sandy silt to clayey silt	UNDFND	UNDFD	34	5.8
13.40	44	165.21	3.05	1.84	1.56	sand to silty sand	70-80	40-42	40	UNDEFINED
13.75	45	130.84	2.29	1.75	1.59	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
14.05	46	59.30	1.85	3.12	1.62	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
14.35	47	55.58	1.37	2.47	1.65	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.65	48	198.10	3.82	1.93	1.68	sand to silty sand	70-80	40-42	47	UNDEFINED
14.95	49	197.80	3.66	1.85	1.70	sand to silty sand	70-80	40-42	47	UNDEFINED
15.25	50	188.92	3.98	2.11	1.73	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
15.55	51	165.77	3.71	2.24	1.76	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
15.85	52	129.33	3.11	2.40	1.79	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
16.15	53	118.85	3.85	3.24	1.82	sandy silt to clayey silt	UNDFND	UNDFD	46	7.7
16.45	54	272.51	5.68	2.08	1.85	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.75	55	297.00	6.58	2.21	1.87	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.05	56	296.56	6.36	2.15	1.90	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.35	57	313.26	5.80	1.85	1.93	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.65	58	311.48	5.27	1.69	1.96	sand to silty sand	80-90	42-44	>50	UNDEFINED
17.95	59	292.43	5.50	1.88	1.99	sand to silty sand	80-90	42-44	>50	UNDEFINED
18.25	60	190.58	2.02	1.06	2.02	sand	70-80	40-42	37	UNDEFINED
18.55	61	102.88	1.55	1.51	2.04	sand to silty sand	50-60	36-38	25	UNDEFINED
18.85	62	215.27	1.05	0.49	2.07	sand	70-80	40-42	41	UNDEFINED
19.20	63	290.20	1.58	0.55	2.10	sand	80-90	42-44	>50	UNDEFINED
19.50	64	313.36	2.94	0.94	2.13	sand	80-90	42-44	>50	UNDEFINED
19.80	65	160.82	1.73	1.07	2.16	sand to silty sand	60-70	38-40	39	UNDEFINED
20.15	66	293.35	2.57	0.88	2.19	sand	80-90	42-44	>50	UNDEFINED
20.45	67	349.50	3.14	0.90	2.22	sand	>90	42-44	>50	UNDEFINED
20.75	68	347.39	3.34	0.96	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	407.69	3.74	0.92	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	412.50	7.07	1.71	2.31	sand to silty sand	>90	42-44	>50	UNDEFINED
21.65	71	410.21	7.27	1.77	2.34	sand to silty sand	>90	42-44	>50	UNDEFINED
21.95	72	394.85	3.06	0.78	2.37	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.25	73	79.24	1.42	1.80	2.39	silty sand to sandy silt	40-50	34-36	25	UNDEFINED
22.55	74	32.55	0.99	3.04	2.42	clayey silt to silty clay	UNDFND	UNDFD	16	1.8
22.85	75	26.83	0.87	3.24	2.45	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
23.15	76	35.50	1.23	3.47	2.48	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
23.45	77	137.53	3.92	2.85	2.51	sandy silt to clayey silt	UNDFND	UNDFD	>50	8.8
23.75	78	53.48	2.95	5.52	2.54	clay	UNDFND	UNDFD	>50	3.2
24.05	79	21.43	0.95	4.43	2.56	clay	UNDFND	UNDFD	21	1.1
24.35	80	30.01	1.17	3.90	2.59	silty clay to clay	UNDFND	UNDFD	19	1.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

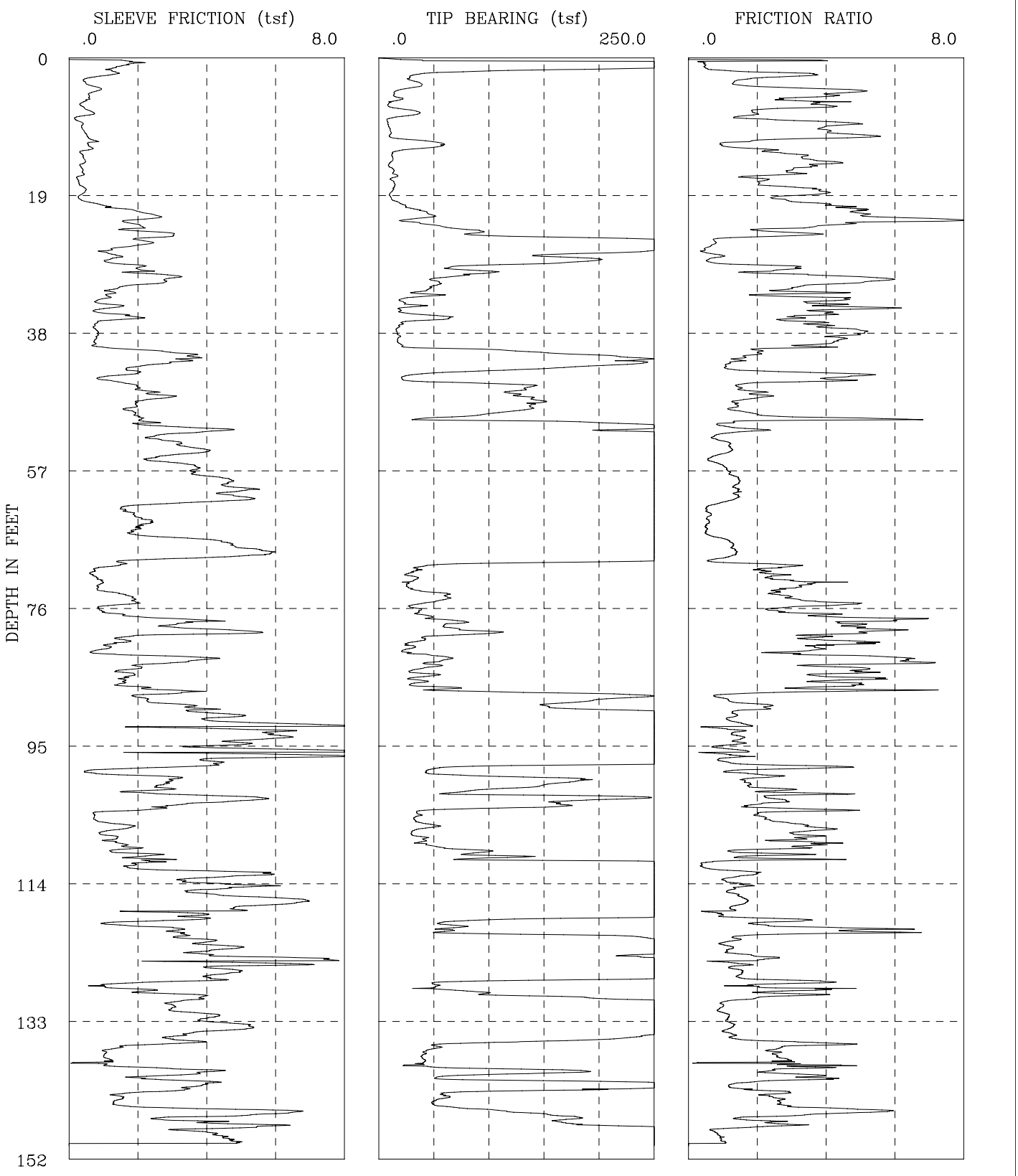
**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-4c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	76.99	3.73	4.84	2.62	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.95	82	53.27	3.17	5.95	2.65	clay	UNDFND	UNDFD	>50	3.2
25.25	83	37.16	1.49	4.01	2.68	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
25.60	84	20.61	0.82	3.98	2.71	silty clay to clay	UNDFND	UNDFD	13	1.0
25.90	85	49.09	3.37	6.87	2.74	clay	UNDFND	UNDFD	47	2.9
26.20	86	51.52	3.33	6.46	2.77	clay	UNDFND	UNDFD	49	3.0
26.55	87	53.38	3.04	5.69	2.80	clay	UNDFND	UNDFD	>50	3.2
26.85	88	99.07	2.47	2.49	2.83	silty sand to sandy silt	50-60	34-36	32	UNDEFINED
27.15	89	61.05	3.29	5.39	2.86	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
27.45	90	204.30	3.74	1.83	2.88	sand to silty sand	70-80	38-40	49	UNDEFINED
27.75	91	170.34	3.96	2.32	2.91	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
28.05	92	157.54	5.06	3.21	2.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.1
28.35	93	338.39	6.95	2.05	2.97	sand to silty sand	80-90	40-42	>50	UNDEFINED
28.65	94	385.38	6.04	1.57	3.00	sand to silty sand	80-90	42-44	>50	UNDEFINED
28.95	95	387.61	6.21	1.60	3.03	sand to silty sand	80-90	42-44	>50	UNDEFINED
29.25	96	424.41	6.37	1.50	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	509.78	7.39	1.45	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	477.86	5.43	1.14	3.11	sand	>90	42-44	>50	UNDEFINED
30.15	99	377.17	8.13	2.16	3.14	sand to silty sand	80-90	40-42	>50	UNDEFINED
30.45	100	80.00	3.14	3.92	3.17	clayey silt to silty clay	UNDFND	UNDFD	38	4.9
30.75	101	41.29	1.34	3.25	3.20	clayey silt to silty clay	UNDFND	UNDFD	20	2.3
31.05	102	112.26	3.10	2.76	3.22	sandy silt to clayey silt	UNDFND	UNDFD	43	7.0
31.35	103	151.08	3.82	2.53	3.25	silty sand to sandy silt	60-70	36-38	48	UNDEFINED
31.65	104	125.95	3.17	2.52	3.28	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
32.00	105	78.72	2.89	3.67	3.31	clayey silt to silty clay	UNDFND	UNDFD	38	4.8
32.30	106	49.94	2.14	4.29	3.34	silty clay to clay	UNDFND	UNDFD	32	2.9
32.60	107	31.49	1.22	3.86	3.37	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
32.95	108	47.01	1.79	3.82	3.40	clayey silt to silty clay	UNDFND	UNDFD	23	2.7
33.25	109	58.32	2.09	3.59	3.43	clayey silt to silty clay	UNDFND	UNDFD	28	3.4
33.55	110	105.60	3.53	3.34	3.46	sandy silt to clayey silt	UNDFND	UNDFD	40	6.6
33.85	111	191.60	4.50	2.35	3.49	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
34.15	112	184.55	5.29	2.87	3.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
34.45	113	307.66	6.95	2.26	3.55	sand to silty sand	80-90	40-42	>50	UNDEFINED
34.75	114	331.14	4.82	1.46	3.57	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.05	115	393.12	5.85	1.49	3.60	sand	80-90	40-42	>50	UNDEFINED
35.35	116	451.96	4.24	0.94	3.63	sand	>90	40-42	>50	UNDEFINED
35.65	117	535.15	4.35	0.81	3.66	gravelly sand to sand	>90	42-44	>50	UNDEFINED
35.95	118	392.58	4.63	1.18	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	391.03	3.89	0.99	3.72	sand	80-90	40-42	>50	UNDEFINED
36.55	120	511.97	3.08	0.60	3.74	gravelly sand to sand	>90	42-44	>50	UNDEFINED
36.85	121	497.06	3.08	0.62	3.77	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.15	122	499.91	2.14	0.43	3.80	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.45	123	515.30	4.07	0.79	3.83	gravelly sand to sand	>90	42-44	>50	UNDEFINED
37.75	124	548.07	6.19	1.13	3.86	sand	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 u: Nk= 15
(*) overconsolidated or cemented

Figure A-4d



I-436 SR-22 Phase 2	CPT-08-021
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-5a

Engineer : Nava
On Site Loc: CPT-08-021
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 9.84

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	312.43	1.49	0.48	0.03	gravelly sand to sand	>90	UNDFD	50	UNDEFINED
0.60	2	188.74	1.30	0.69	0.09	sand	>90	>48	36	UNDEFINED
0.95	3	30.90	0.83	2.70	0.15	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
1.25	4	36.20	0.61	1.68	0.22	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
1.55	5	16.48	0.74	4.47	0.28	clay	UNDFND	UNDFD	16	1.0
1.85	6	16.43	0.53	3.24	0.33	silty clay to clay	UNDFND	UNDFD	10	1.0
2.15	7	11.70	0.39	3.30	0.39	silty clay to clay	UNDFND	UNDFD	7	.7
2.45	8	32.16	0.60	1.85	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	2.1
2.75	9	9.17	0.26	2.83	0.51	silty clay to clay	UNDFND	UNDFD	6	.5
3.05	10	9.44	0.39	4.10	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	10.59	0.50	4.73	0.61	clay	UNDFND	UNDFD	10	.6
3.65	12	44.22	0.63	1.42	0.64	silty sand to sandy silt	40-50	38-40	14	UNDEFINED
3.95	13	34.87	0.54	1.55	0.67	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
4.25	14	12.36	0.40	3.22	0.69	silty clay to clay	UNDFND	UNDFD	8	.7
4.55	15	10.37	0.41	3.93	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	12.67	0.39	3.07	0.75	silty clay to clay	UNDFND	UNDFD	8	.7
5.15	17	13.77	0.30	2.17	0.78	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.45	18	14.07	0.33	2.35	0.81	clayey silt to silty clay	UNDFND	UNDFD	7	.8
5.75	19	11.59	0.44	3.82	0.84	clay	UNDFND	UNDFD	11	.6
6.05	20	12.37	0.34	2.78	0.86	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	26.20	1.19	4.53	0.89	clay	UNDFND	UNDFD	25	1.6
6.70	22	46.14	2.36	5.11	0.93	clay	UNDFND	UNDFD	44	2.9
7.00	23	31.89	1.89	5.94	0.95	clay	UNDFND	UNDFD	31	2.0
7.35	24	75.65	2.11	2.78	0.98	sandy silt to clayey silt	UNDFND	UNDFD	29	4.9
7.65	25	159.69	2.58	1.62	1.02	sand to silty sand	70-80	42-44	38	UNDEFINED
7.95	26	294.45	2.12	0.72	1.04	sand	>90	44-46	>50	UNDEFINED
8.25	27	233.07	1.16	0.50	1.07	sand	80-90	44-46	45	UNDEFINED
8.55	28	176.59	1.28	0.72	1.10	sand	80-90	42-44	34	UNDEFINED
8.85	29	105.96	1.77	1.67	1.13	silty sand to sandy silt	60-70	40-42	34	UNDEFINED
9.15	30	88.45	2.28	2.58	1.16	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
9.45	31	54.22	2.92	5.38	1.19	clay	UNDFND	UNDFD	>50	3.4
9.75	32	49.47	1.67	3.37	1.21	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
10.05	33	41.59	1.17	2.81	1.24	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.35	34	22.05	0.92	4.16	1.27	silty clay to clay	UNDFND	UNDFD	14	1.3
10.65	35	25.65	1.13	4.42	1.30	silty clay to clay	UNDFND	UNDFD	16	1.5
10.95	36	45.23	1.57	3.47	1.33	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
11.25	37	29.83	0.95	3.19	1.36	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
11.55	38	16.84	0.78	4.62	1.38	clay	UNDFND	UNDFD	16	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.76	0.81	4.56	1.41	clay	UNDFND	UNDFD	17	1.0
12.15	40	19.31	0.75	3.87	1.44	silty clay to clay	UNDFND	UNDFD	12	1.1
12.45	41	116.15	2.44	2.10	1.47	silty sand to sandy silt	60-70	40-42	37	UNDEFINED
12.80	42	229.00	3.44	1.50	1.50	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.10	43	188.22	2.11	1.12	1.53	sand	70-80	40-42	36	UNDEFINED
13.40	44	53.23	1.70	3.20	1.56	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
13.75	45	57.04	1.31	2.30	1.59	sandy silt to clayey silt	UNDFND	UNDFD	22	3.6
14.05	46	130.58	2.12	1.62	1.62	sand to silty sand	60-70	40-42	31	UNDEFINED
14.35	47	130.24	2.64	2.03	1.65	silty sand to sandy silt	60-70	40-42	42	UNDEFINED
14.65	48	143.42	1.99	1.38	1.68	sand to silty sand	60-70	40-42	34	UNDEFINED
14.95	49	125.21	1.79	1.43	1.70	sand to silty sand	60-70	38-40	30	UNDEFINED
15.25	50	67.85	2.03	2.99	1.73	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
15.55	51	235.05	2.59	1.10	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	263.32	3.81	1.45	1.79	sand to silty sand	80-90	42-44	>50	UNDEFINED
16.15	53	316.90	2.61	0.83	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	281.50	3.42	1.22	1.85	sand	80-90	42-44	>50	UNDEFINED
16.75	55	341.06	3.51	1.03	1.87	sand	>90	42-44	>50	UNDEFINED
17.05	56	389.51	2.60	0.67	1.90	gravelly sand to sand	>90	44-46	>50	UNDEFINED
17.35	57	345.43	3.65	1.06	1.93	sand	>90	42-44	>50	UNDEFINED
17.65	58	301.63	3.83	1.27	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	318.01	4.64	1.46	1.99	sand to silty sand	80-90	42-44	>50	UNDEFINED
18.25	60	354.11	4.97	1.40	2.02	sand	>90	42-44	>50	UNDEFINED
18.55	61	348.02	4.85	1.39	2.04	sand	>90	42-44	>50	UNDEFINED
18.85	62	348.19	3.28	0.94	2.07	sand	>90	42-44	>50	UNDEFINED
19.20	63	297.97	1.68	0.56	2.10	sand	80-90	42-44	>50	UNDEFINED
19.50	64	372.75	2.14	0.57	2.13	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.80	65	398.39	2.13	0.53	2.16	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.15	66	351.22	2.01	0.57	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	365.15	4.25	1.16	2.22	sand	>90	42-44	>50	UNDEFINED
20.75	68	393.56	5.19	1.32	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	402.02	5.04	1.25	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	171.99	1.64	0.96	2.31	sand	70-80	38-40	33	UNDEFINED
21.65	71	33.65	0.80	2.39	2.34	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
21.95	72	30.67	0.76	2.49	2.37	sandy silt to clayey silt	UNDFND	UNDFD	12	1.7
22.25	73	26.22	0.91	3.47	2.39	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
22.55	74	42.04	1.08	2.57	2.42	sandy silt to clayey silt	UNDFND	UNDFD	16	2.5
22.85	75	59.91	1.82	3.04	2.45	sandy silt to clayey silt	UNDFND	UNDFD	23	3.6
23.15	76	34.82	1.37	3.92	2.48	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
23.45	77	37.49	1.17	3.13	2.51	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
23.75	78	61.16	3.25	5.31	2.54	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.05	79	64.33	3.29	5.11	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	82.11	3.87	4.71	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	34.89	1.49	4.27	2.62	silty clay to clay	UNDFND	UNDFD	22	2.0
24.95	82	27.43	1.01	3.70	2.65	clayey silt to silty clay	UNDFND	UNDFD	13	1.5
25.25	83	45.86	2.22	4.84	2.68	silty clay to clay	UNDFND	UNDFD	29	2.7
25.60	84	52.77	2.90	5.50	2.71	clay	UNDFND	UNDFD	>50	3.1
25.90	85	35.33	1.75	4.94	2.74	clay	UNDFND	UNDFD	34	2.0
26.20	86	39.81	1.68	4.21	2.77	silty clay to clay	UNDFND	UNDFD	25	2.3
26.55	87	45.07	1.79	3.98	2.80	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
26.85	88	160.38	2.83	1.76	2.83	sand to silty sand	60-70	38-40	38	UNDEFINED
27.15	89	196.87	2.31	1.18	2.86	sand	70-80	38-40	38	UNDEFINED
27.45	90	172.96	3.65	2.11	2.88	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
27.75	91	338.22	4.45	1.32	2.91	sand	80-90	40-42	>50	UNDEFINED
28.05	92	370.89	5.11	1.38	2.94	sand	80-90	42-44	>50	UNDEFINED
28.35	93	427.10	5.31	1.24	2.97	sand	>90	42-44	>50	UNDEFINED
28.65	94	421.84	6.02	1.43	3.00	sand	>90	42-44	>50	UNDEFINED
28.95	95	372.56	4.73	1.27	3.03	sand	80-90	40-42	>50	UNDEFINED
29.25	96	512.32	6.18	1.21	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	492.28	5.81	1.18	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	232.44	3.93	1.69	3.11	sand to silty sand	70-80	38-40	>50	UNDEFINED
30.15	99	47.49	0.88	1.85	3.14	silty sand to sandy silt	<40	30-32	15	UNDEFINED
30.45	100	156.58	2.93	1.87	3.17	silty sand to sandy silt	60-70	36-38	50	UNDEFINED
30.75	101	141.39	2.75	1.95	3.20	silty sand to sandy silt	50-60	36-38	45	UNDEFINED
31.05	102	99.35	2.76	2.78	3.22	sandy silt to clayey silt	UNDFND	UNDFD	38	6.2
31.35	103	197.21	4.98	2.53	3.25	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
31.65	104	122.94	2.71	2.21	3.28	silty sand to sandy silt	50-60	36-38	39	UNDEFINED
32.00	105	34.69	0.79	2.26	3.31	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
32.30	106	40.75	1.21	2.97	3.34	sandy silt to clayey silt	UNDFND	UNDFD	16	2.2
32.60	107	36.99	1.35	3.66	3.37	clayey silt to silty clay	UNDFND	UNDFD	18	2.0
32.95	108	37.99	1.21	3.17	3.40	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
33.25	109	46.90	1.67	3.55	3.43	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
33.55	110	90.11	1.78	1.98	3.46	silty sand to sandy silt	40-50	32-34	29	UNDEFINED
33.85	111	198.07	2.17	1.10	3.49	sand	60-70	38-40	38	UNDEFINED
34.15	112	414.33	1.91	0.46	3.52	gravelly sand to sand	80-90	40-42	>50	UNDEFINED
34.45	113	294.89	5.09	1.72	3.55	sand to silty sand	70-80	40-42	>50	UNDEFINED
34.75	114	310.52	3.67	1.18	3.57	sand	80-90	40-42	>50	UNDEFINED
35.05	115	324.42	4.55	1.40	3.60	sand	80-90	40-42	>50	UNDEFINED
35.35	116	327.31	4.68	1.43	3.63	sand	80-90	40-42	>50	UNDEFINED
35.65	117	399.38	6.50	1.63	3.66	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.95	118	394.07	4.01	1.02	3.69	sand	80-90	40-42	>50	UNDEFINED
36.25	119	293.94	3.78	1.29	3.72	sand	70-80	40-42	>50	UNDEFINED
36.55	120	66.96	1.70	2.54	3.74	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
36.85	121	65.44	3.17	4.84	3.77	silty clay to clay	UNDFND	UNDFD	42	3.8
37.15	122	253.08	3.60	1.42	3.80	sand to silty sand	70-80	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5d

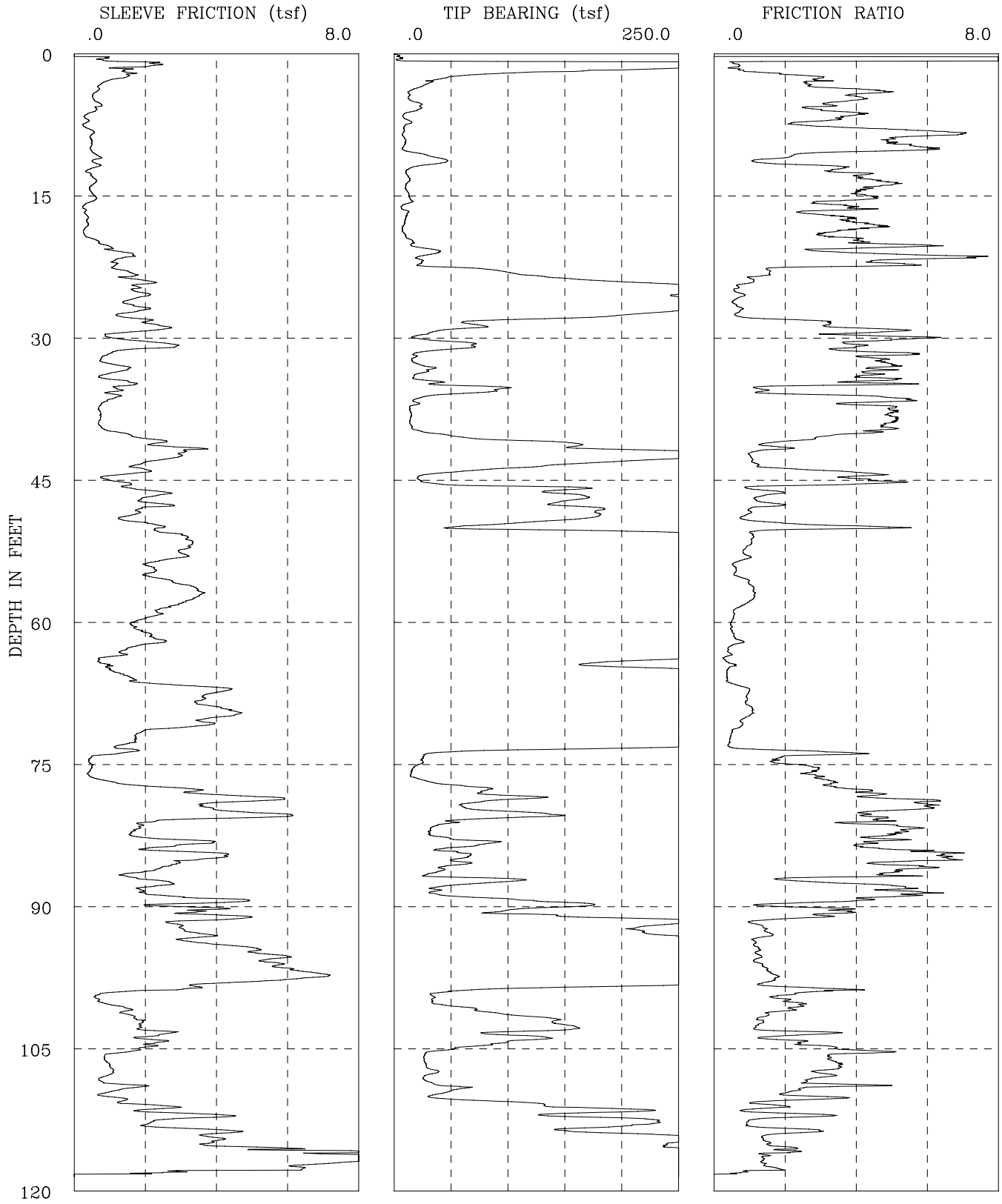
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	394.19	4.35	1.10	3.83	sand	80-90	40-42	>50	UNDEFINED
37.75	124	312.38	3.95	1.27	3.86	sand	70-80	40-42	>50	UNDEFINED
38.05	125	329.85	5.51	1.67	3.89	sand to silty sand	80-90	40-42	>50	UNDEFINED
38.40	126	354.67	5.16	1.45	3.92	sand	80-90	40-42	>50	UNDEFINED
38.70	127	289.77	4.34	1.50	3.95	sand to silty sand	70-80	38-40	>50	UNDEFINED
39.00	128	104.71	2.71	2.59	3.97	sandy silt to clayey silt	UNDFND	UNDFD	40	6.4
39.35	129	67.34	1.81	2.70	4.01	sandy silt to clayey silt	UNDFND	UNDFD	26	3.9
39.65	130	177.74	3.76	2.12	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.95	131	303.67	3.00	0.99	4.06	sand	70-80	38-40	>50	UNDEFINED
40.25	132	353.19	3.45	0.98	4.09	sand	80-90	40-42	>50	UNDEFINED
40.55	133	354.61	4.05	1.14	4.12	sand	80-90	40-42	>50	UNDEFINED
40.85	134	407.71	5.12	1.26	4.15	sand	80-90	40-42	>50	UNDEFINED
41.15	135	320.69	3.69	1.15	4.18	sand	70-80	38-40	>50	UNDEFINED
41.45	136	170.86	3.25	1.90	4.21	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
41.75	137	50.29	1.55	3.09	4.23	sandy silt to clayey silt	UNDFND	UNDFD	19	2.8
42.05	138	40.50	1.03	2.55	4.26	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.35	139	40.71	0.96	2.35	4.29	sandy silt to clayey silt	UNDFND	UNDFD	16	2.1
42.65	140	110.08	2.94	2.67	4.32	sandy silt to clayey silt	UNDFND	UNDFD	42	6.7
42.95	141	86.15	2.75	3.20	4.35	sandy silt to clayey silt	UNDFND	UNDFD	33	5.1
43.25	142	248.25	3.82	1.54	4.38	sand to silty sand	70-80	38-40	>50	UNDEFINED
43.55	143	167.67	2.88	1.72	4.40	sand to silty sand	60-70	36-38	40	UNDEFINED
43.85	144	58.78	1.45	2.47	4.43	sandy silt to clayey silt	UNDFND	UNDFD	23	3.3
44.15	145	53.77	1.54	2.87	4.46	sandy silt to clayey silt	UNDFND	UNDFD	21	3.0
44.45	146	119.04	5.71	4.79	4.49	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
44.80	147	169.89	3.53	2.08	4.52	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
45.10	148	301.47	4.84	1.60	4.55	sand to silty sand	70-80	38-40	>50	UNDEFINED
45.40	149	491.97	4.18	0.85	4.58	gravelly sand to sand	>90	40-42	>50	UNDEFINED
45.75	150	470.75	3.43	0.73	4.61	gravelly sand to sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5e



CPT-08-022	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-6a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-022
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	109.32	1.03	0.94	0.03	sand to silty sand	>90	>48	26	UNDEFINED
0.60	2	232.57	1.67	0.72	0.09	sand	>90	>48	45	UNDEFINED
0.95	3	46.61	1.18	2.53	0.15	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
1.25	4	18.71	0.66	3.54	0.22	silty clay to clay	UNDFND	UNDFD	12	1.2
1.55	5	14.24	0.55	3.86	0.28	silty clay to clay	UNDFND	UNDFD	9	.9
1.85	6	21.85	0.66	3.00	0.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.4
2.15	7	9.76	0.36	3.64	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	10.65	0.34	3.18	0.45	silty clay to clay	UNDFND	UNDFD	7	.6
2.75	9	8.31	0.49	5.91	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	8.94	0.48	5.36	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	24.24	0.61	2.50	0.61	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
3.65	12	34.31	0.60	1.75	0.64	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
3.95	13	11.27	0.43	3.81	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	12.04	0.56	4.66	0.69	clay	UNDFND	UNDFD	12	.7
4.55	15	11.67	0.48	4.11	0.72	clay	UNDFND	UNDFD	11	.7
4.85	16	13.16	0.49	3.69	0.75	silty clay to clay	UNDFND	UNDFD	8	.8
5.15	17	9.30	0.29	3.10	0.78	silty clay to clay	UNDFND	UNDFD	6	.5
5.45	18	9.84	0.37	3.81	0.81	clay	UNDFND	UNDFD	9	.5
5.75	19	7.72	0.31	4.00	0.84	clay	UNDFND	UNDFD	7	.4
6.05	20	12.55	0.47	3.77	0.86	clay	UNDFND	UNDFD	12	.7
6.40	21	27.26	1.06	3.87	0.89	silty clay to clay	UNDFND	UNDFD	17	1.7
6.70	22	24.27	1.35	5.57	0.93	clay	UNDFND	UNDFD	23	1.5
7.00	23	56.94	1.23	2.16	0.95	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
7.35	24	148.98	1.79	1.20	0.98	sand to silty sand	70-80	42-44	36	UNDEFINED
7.65	25	271.53	1.76	0.65	1.02	sand	>90	44-46	>50	UNDEFINED
7.95	26	260.22	1.81	0.70	1.04	sand	>90	44-46	50	UNDEFINED
8.25	27	262.27	1.76	0.67	1.07	sand	>90	44-46	>50	UNDEFINED
8.55	28	181.16	1.56	0.86	1.10	sand	80-90	42-44	35	UNDEFINED
8.85	29	67.04	2.34	3.49	1.13	clayey silt to silty clay	UNDFND	UNDFD	32	4.3
9.15	30	26.50	1.27	4.81	1.16	clay	UNDFND	UNDFD	25	1.6
9.45	31	59.54	2.41	4.05	1.19	clayey silt to silty clay	UNDFND	UNDFD	29	3.8
9.75	32	26.32	1.08	4.09	1.21	silty clay to clay	UNDFND	UNDFD	17	1.6
10.05	33	19.48	0.97	4.95	1.24	clay	UNDFND	UNDFD	19	1.1
10.35	34	26.69	1.19	4.46	1.27	silty clay to clay	UNDFND	UNDFD	17	1.6
10.65	35	29.75	1.32	4.44	1.30	silty clay to clay	UNDFND	UNDFD	19	1.8
10.95	36	80.35	1.14	1.42	1.33	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
11.25	37	21.57	1.01	4.68	1.36	clay	UNDFND	UNDFD	21	1.2
11.55	38	14.50	0.71	4.88	1.38	clay	UNDFND	UNDFD	14	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	14.40	0.73	5.04	1.41	clay	UNDFND	UNDFD	14	.8
12.15	40	17.41	0.83	4.76	1.44	clay	UNDFND	UNDFD	17	1.0
12.45	41	66.93	1.88	2.81	1.47	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
12.80	42	188.85	2.83	1.50	1.50	sand to silty sand	70-80	40-42	45	UNDEFINED
13.10	43	263.77	2.72	1.03	1.53	sand	80-90	42-44	>50	UNDEFINED
13.40	44	120.80	1.87	1.55	1.56	sand to silty sand	60-70	38-40	29	UNDEFINED
13.75	45	28.42	1.21	4.26	1.59	silty clay to clay	UNDFND	UNDFD	18	1.7
14.05	46	106.26	1.65	1.56	1.62	silty sand to sandy silt	60-70	38-40	34	UNDEFINED
14.35	47	157.73	2.24	1.42	1.65	sand to silty sand	70-80	40-42	38	UNDEFINED
14.65	48	158.03	2.20	1.40	1.68	sand to silty sand	70-80	40-42	38	UNDEFINED
14.95	49	176.04	1.58	0.90	1.70	sand	70-80	40-42	34	UNDEFINED
15.25	50	91.65	2.08	2.27	1.73	silty sand to sandy silt	50-60	36-38	29	UNDEFINED
15.55	51	237.16	2.76	1.16	1.76	sand	80-90	42-44	45	UNDEFINED
15.85	52	320.29	3.26	1.02	1.79	sand	>90	42-44	>50	UNDEFINED
16.15	53	355.17	3.07	0.87	1.82	sand	>90	42-44	>50	UNDEFINED
16.45	54	338.21	2.37	0.70	1.85	sand	>90	42-44	>50	UNDEFINED
16.75	55	365.14	2.17	0.60	1.87	gravelly sand to sand	>90	42-44	>50	UNDEFINED
17.05	56	291.92	2.58	0.88	1.90	sand	80-90	42-44	>50	UNDEFINED
17.35	57	311.80	3.46	1.11	1.93	sand	80-90	42-44	>50	UNDEFINED
17.65	58	310.82	3.32	1.07	1.96	sand	80-90	42-44	>50	UNDEFINED
17.95	59	386.25	2.56	0.66	1.99	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.25	60	387.99	2.10	0.54	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.55	61	352.17	1.69	0.48	2.04	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.85	62	379.90	2.19	0.58	2.07	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.20	63	350.92	1.85	0.53	2.10	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.50	64	282.08	1.05	0.37	2.13	gravelly sand to sand	80-90	42-44	45	UNDEFINED
19.80	65	200.71	0.88	0.44	2.16	sand	70-80	40-42	38	UNDEFINED
20.15	66	393.79	1.44	0.37	2.19	gravelly sand to sand	>90	42-44	>50	UNDEFINED
20.45	67	449.43	3.18	0.71	2.22	gravelly sand to sand	>90	44-46	>50	UNDEFINED
20.75	68	402.06	3.79	0.94	2.25	sand	>90	42-44	>50	UNDEFINED
21.05	69	386.43	3.72	0.96	2.28	sand	>90	42-44	>50	UNDEFINED
21.35	70	429.27	4.40	1.02	2.31	sand	>90	42-44	>50	UNDEFINED
21.65	71	467.40	3.60	0.77	2.34	gravelly sand to sand	>90	44-46	>50	UNDEFINED
21.95	72	377.27	1.95	0.52	2.37	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.25	73	367.80	1.58	0.43	2.39	gravelly sand to sand	>90	42-44	>50	UNDEFINED
22.55	74	102.48	1.32	1.29	2.42	sand to silty sand	50-60	36-38	25	UNDEFINED
22.85	75	24.58	0.45	1.82	2.45	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
23.15	76	16.24	0.45	2.76	2.48	clayey silt to silty clay	UNDFND	UNDFD	8	.7
23.45	77	23.09	0.74	3.19	2.51	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
23.75	78	72.10	2.71	3.76	2.54	clayey silt to silty clay	UNDFND	UNDFD	35	4.4
24.05	79	98.77	4.94	5.01	2.56	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.35	80	68.14	3.83	5.61	2.59	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-6c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	108.28	4.76	4.39	2.62	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
24.95	82	39.42	1.88	4.76	2.65	silty clay to clay	UNDFND	UNDFD	25	2.3
25.25	83	36.80	1.79	4.86	2.68	clay	UNDFND	UNDFD	35	2.1
25.60	84	66.12	2.95	4.47	2.71	clayey silt to silty clay	UNDFND	UNDFD	32	4.0
25.90	85	60.15	3.88	6.44	2.74	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
26.20	86	51.83	2.71	5.23	2.77	clay	UNDFND	UNDFD	50	3.1
26.55	87	51.63	1.76	3.40	2.80	clayey silt to silty clay	UNDFND	UNDFD	25	3.0
26.85	88	62.88	2.37	3.76	2.83	clayey silt to silty clay	UNDFND	UNDFD	30	3.8
27.15	89	47.90	2.38	4.97	2.86	silty clay to clay	UNDFND	UNDFD	31	2.8
27.45	90	145.93	3.67	2.51	2.88	silty sand to sandy silt	60-70	36-38	47	UNDEFINED
27.75	91	113.42	3.84	3.38	2.91	sandy silt to clayey silt	UNDFND	UNDFD	43	7.2
28.05	92	244.50	3.38	1.38	2.94	sand to silty sand	70-80	40-42	>50	UNDEFINED
28.35	93	220.00	3.32	1.51	2.97	sand to silty sand	70-80	38-40	>50	UNDEFINED
28.65	94	294.49	3.45	1.17	3.00	sand	80-90	40-42	>50	UNDEFINED
28.95	95	416.11	5.06	1.21	3.03	sand	>90	42-44	>50	UNDEFINED
29.25	96	461.20	5.67	1.23	3.05	sand	>90	42-44	>50	UNDEFINED
29.55	97	415.19	6.07	1.46	3.08	sand	>90	42-44	>50	UNDEFINED
29.85	98	370.94	6.30	1.70	3.11	sand to silty sand	80-90	40-42	>50	UNDEFINED
30.15	99	160.48	3.05	1.90	3.14	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	34.31	0.70	2.03	3.17	sandy silt to clayey silt	UNDFND	UNDFD	13	1.8
30.75	101	52.27	1.21	2.31	3.20	sandy silt to clayey silt	UNDFND	UNDFD	20	3.0
31.05	102	110.03	1.56	1.41	3.22	sand to silty sand	50-60	34-36	26	UNDEFINED
31.35	103	150.02	1.87	1.25	3.25	sand to silty sand	60-70	36-38	36	UNDEFINED
31.65	104	113.92	2.28	2.00	3.28	silty sand to sandy silt	50-60	34-36	36	UNDEFINED
32.00	105	85.44	2.18	2.55	3.31	sandy silt to clayey silt	UNDFND	UNDFD	33	5.2
32.30	106	29.97	1.15	3.84	3.34	silty clay to clay	UNDFND	UNDFD	19	1.5
32.60	107	27.45	0.95	3.46	3.37	clayey silt to silty clay	UNDFND	UNDFD	13	1.4
32.95	108	31.66	0.98	3.08	3.40	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
33.25	109	40.06	1.26	3.14	3.43	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
33.55	110	42.39	0.99	2.33	3.46	sandy silt to clayey silt	UNDFND	UNDFD	16	2.3
33.85	111	99.21	1.72	1.73	3.49	silty sand to sandy silt	40-50	34-36	32	UNDEFINED
34.15	112	176.22	2.89	1.64	3.52	sand to silty sand	60-70	36-38	42	UNDEFINED
34.45	113	215.92	2.57	1.19	3.55	sand	70-80	38-40	41	UNDEFINED
34.75	114	176.88	3.64	2.06	3.57	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	273.72	3.89	1.42	3.60	sand to silty sand	70-80	38-40	>50	UNDEFINED
35.35	116	308.96	6.18	2.00	3.63	sand to silty sand	80-90	40-42	>50	UNDEFINED
35.65	117	635.31	8.78	1.38	3.66	sand	>90	42-44	>50	UNDEFINED
35.95	118	389.55	5.88	1.51	3.69	sand to silty sand	80-90	40-42	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-6d

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. These samples were then transported to the laboratory for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of Moisture Content and Dry Unit Weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, Soil Corrosivity and Consolidation. A summary of laboratory test results are included in Table B-1. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The USCS soil classifications are presented on key for soil classification and on the boring logs in Figures A-1a to A-3d of Appendix A and summarized in Table B-1.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented in Table B-1 and on the boring logs in Figures A-2a to A-3d of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a to A-3d of Appendix A and in Table B-1 and Figure B-1 of this appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided in Figure B-2 and Table B-1 of this appendix. The relative proportion (or percentage) by dry weight fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a to A-3d of Appendix A.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under additional normal loads for selected samples. The test results are presented in Tables B-2a and B-2b and Figures B-3a to B-3b of this appendix.

B.7 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included soil minimum resistivity and pH (Caltrans method 643), water-soluble chlorides (Caltrans Test method 422), water-soluble sulfates (Caltrans Test Method 417) and electrical resistivity (Caltrans Test method 643). The test results are summarized in Table B-3 of this appendix.

B.8 Consolidation Test

One-dimensional consolidation tests were performed on selected undisturbed samples in the project area in accordance with ASTM D2435. The test was performed on 1.0-inch high, 2.42-inch diameter sample. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading; and thereafter, the sample was incrementally loaded. The results of the consolidation test are graphically shown in Figures B-4a to B-4e and consolidation parameters are summarized in Table B-4 of this appendix.

B.9 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table B-1	Summary of Index Test Results
Table B-2a	Summary of Single Point Direct Shear Test Results
Table B-2b	Summary of Direct Shear Test Results
Table B-3	Summary of Corrosion Test Results
Table B-4	Summary of Consolidation Test Results

List of Figures

Figure B-1	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figures B-3a to B-3b	Direct Shear Test Results
Figures B-4a to B-4d	Consolidation Test Results

TABLE B-1:
SUMMARY OF INDEX TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Dry Density (psf)	Moisture Content (%)	Grain Size Distribution (%)			Atterberg Limits			Pocket Penetrometer Reading (tsf)
						Gravel	Sand	Fine	LL	PL	PI	
R-08-019	S-1	5	CL	-	20	-	-	59	34	20	14	4
R-08-019	R-2	10	CL	114.3	17	-	-	-	39	20	19	4.5+
R-08-019	S-3	15	ML	-	27	-	-	57	-	-	-	-
R-08-019	R-4	20	CL	110.8	15	-	-	-	-	-	-	4.5+
R-08-019	S-5	25	SM/ML	-	18	-	-	-	-	-	-	-
R-08-019	R-6	30	CL	107.6	19	-	-	71	33	21	12	4.5+
R-08-019	S-7	35	SM	-	29	-	-	-	-	-	-	-
R-08-019	R-8	40	CL	103.8	23	-	-	-	-	-	-	1.25
R-08-019	S-9	50	SM	-	-	-	-	31	-	-	-	-
R-08-019	R-10	60	ML	100.2	24	-	-	-	-	-	-	4.5
R-08-019	S-11	70	SP-SM	-	-	-	-	-	-	-	-	-
R-08-019	R-12	76	SP-SM	103.8	23	-	-	-	-	-	-	-
R-08-019	R-13	85	SP-SM	94.4	29	-	-	12	-	-	-	-
R-08-023	R-1	5	CL	115.8	10	-	-	54	32	19	13	4.5+
R-08-023	S-2	10	SC	-	23	-	-	-	-	-	-	-
R-08-023	R-3	15	CL	113.8	15	-	-	55	-	-	-	4.5
R-08-023	S-4	20	CL	-	22	-	-	61	-	-	-	3.25
R-08-023	R-5	25	CL	88.7	31	-	-	-	-	-	-	1.5
R-08-023	S-6	30	CL	-	34	-	-	-	-	-	-	-
R-08-023	R-7	35	CL	-	28	-	-	-	-	-	-	1.0-1.25
R-08-023	S-8	40	SC/CL	-	24	-	-	49	29	19	10	2
R-08-023	R-9	45	SP-SM	107.8	19	0	89	11	-	-	-	-
R-08-023	S-10	55	ML	98.8	26	-	-	84	-	-	-	2
R-08-023	R-11	65	CL	-	40	-	-	-	-	-	-	-
R-08-023	S-12	75	SP	106.8	21	-	-	2	-	-	-	-
R-08-023	R-13	80	SP	-	25	-	-	-	-	-	-	-
R-08-023	S-14	85	SW-SM	108.1	19	-	-	8	-	-	-	-
R-08-023	R-15	95	SP	101.4	23	-	-	4	-	-	-	-

TABLE B-2a:
SUMMARY OF SINGLE POINT DIRECT SHEAR TEST RESULTS

Boring No.	Sample No.	Sample Depth (ft.)	Description	Shear Rate (in./min.)	Normal Stress (psf)	Peak Shear Stress (psf)	Shear Stress at 0.25 in.(psf)
R-08-019	R-8	41-41.5	Sandy Lean Clay (CL)	0.0042	3000	2140 @ 0.15 in.	1970
R-08-019	R-8	41-41.5	Sandy Lean Clay (CL)	0.0042	7000	4880 @ 0.20 in.	4730
R-08-023	R-7	36-36.5	Lean Clay (CL)	0.0042	2000	1340 @ 0.09 in.	1180

TABLE B-2b:
SUMMARY OF DIRECT SHEAR TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Peak		Ultimate	
				Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
R-08-019	R-2	10	CL	900	32	300	32
R-08-023	R-5	26	CL	400	30	250	30

TABLE B-3:
SUMMARY OF CORROSION TEST RESULTS

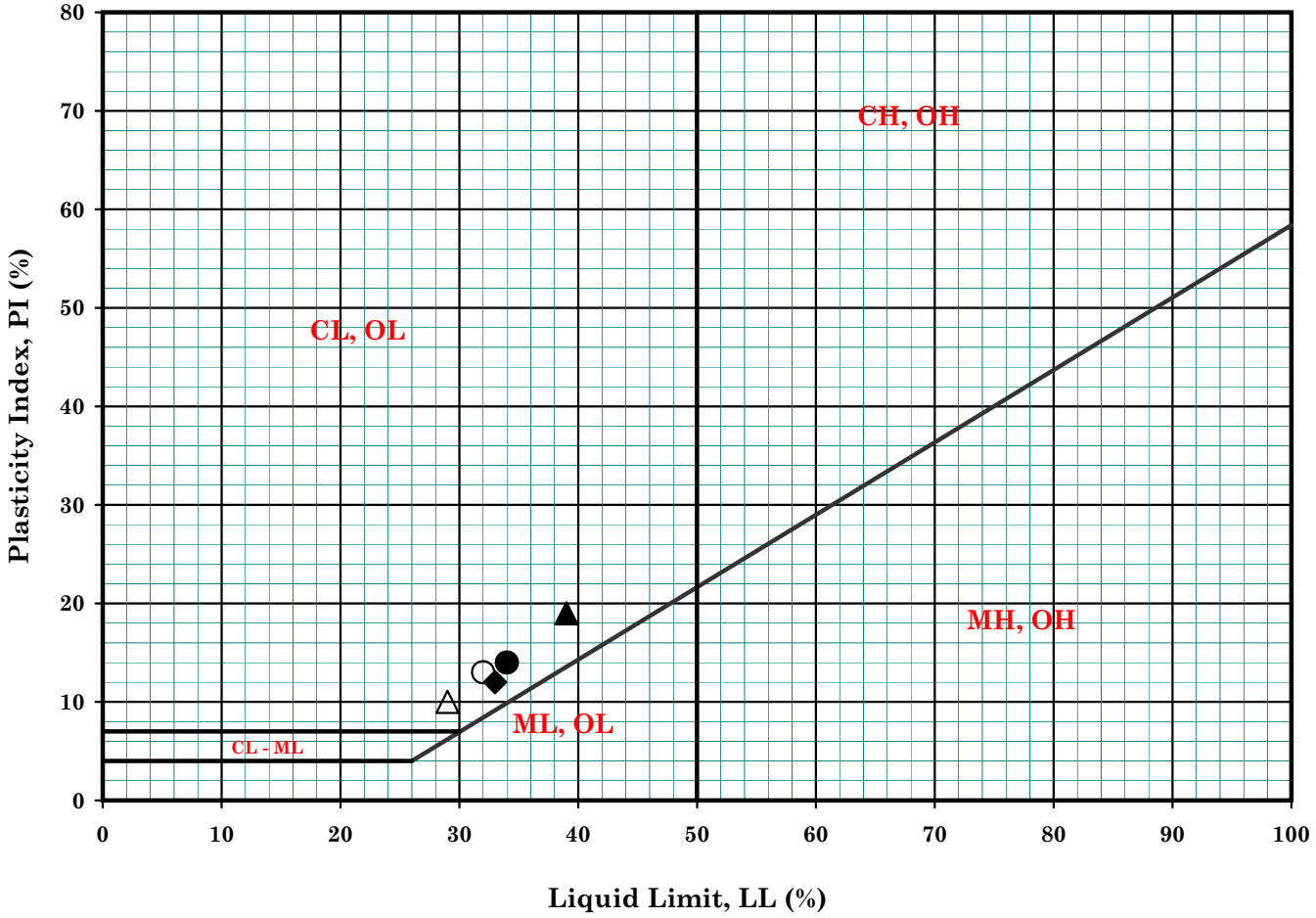
Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
R-08-019	S-7	35-36.5	SM	NA	8.5	538	336
R-08-023	S-4	20-21.5	CL	NA	7.8	2432	2897
R-08-023	S-6	30-31.5	CL	NA	8.0	490	25

TABLE B-4:
SUMMARY OF CONSOLIDATION TEST RESULTS

Boring Number	Sample Number	Depth (feet)	Soil Type	Consolidation Parameters					
				Cc	Cr	Cce	Cre	e_0	s'_p (psf)
A-08-120	R-4	16	CL	0.280	0.026	0.155	0.015	0.809	3800
A-08-122	R-2	6	SC	0.096	0.025	0.064	0.016	0.503	6500
R-08-005	R-1	6	CL	0.136	0.023	0.090	0.015	0.510	5900
R-08-011	R-4	21	CL	0.228	0.022	0.137	0.013	0.667	3700
R-08-017	R-8	41	CL	0.300	0.038	0.170	0.022	0.744	4800

Note: The value of C_v was based on available correlations.

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-019	S-1	2.5	4.0	0.8	1.2	20	34	20	14	0.00	Light Brown Sandy Lean Clay (CL)
▲	R-08-019	R-2	11.0	11.5	3.4	3.5	17	39	20	19	-0.16	Light Brown Sandy Lean Clay (CL)
◆	R-08-019	R-6	31.0	31.5	9.5	9.6	19	33	21	12	-0.17	Olive Gray Lean Clay with Sand (CL)
○	R-08-023	R-1	6.0	6.5	1.8	2.0	10	32	19	13	-0.69	Red Brown Sandy Lean Clay (CL)
△	R-08-023	S-8	40.0	41.5	12.2	12.7	24	29	19	10	0.50	Light Brown-Gray Clayey Sand/Sandy Lean Clay (SC/CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 - West County Connectors Segment

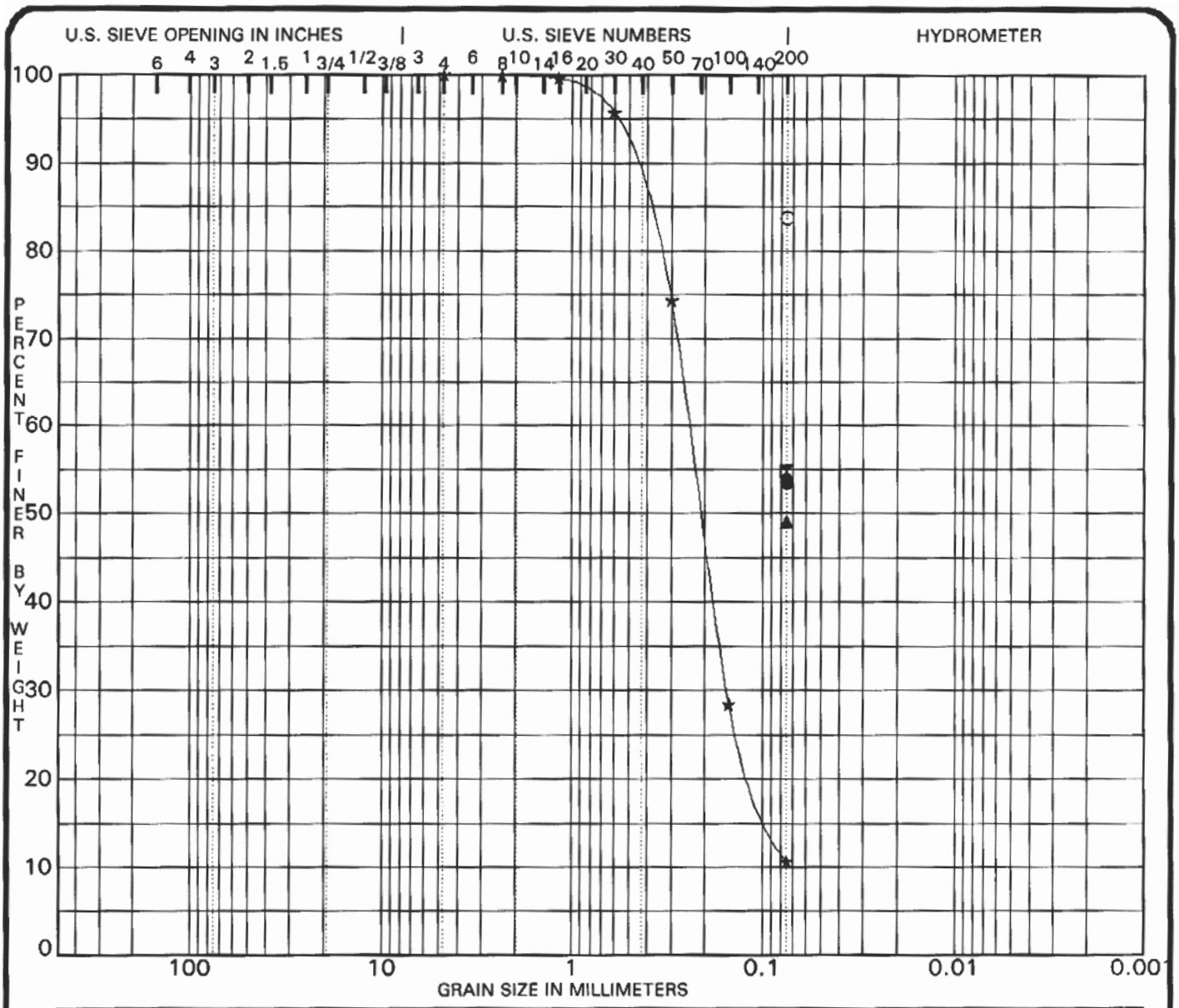
Project No. : I-436

Date : 05/21/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	R-08-023	6.5	Dark Brown Sandy CLAY (CL)	10					
⊠	R-08-023	16.5	Grayish Brown Sandy CLAY (CL)	15					
▲	R-08-023	41.5	Light Olive Gray Clayey *SAND (SC)*	24					
★	R-08-023	46.5	Light Grayish Brown Poorly Graded SAND with SILT (SP-SM)	19				1.40	3.5
⊙	R-08-023	56.5	Dark Olive Gray Sandy SILT (ML)	26					

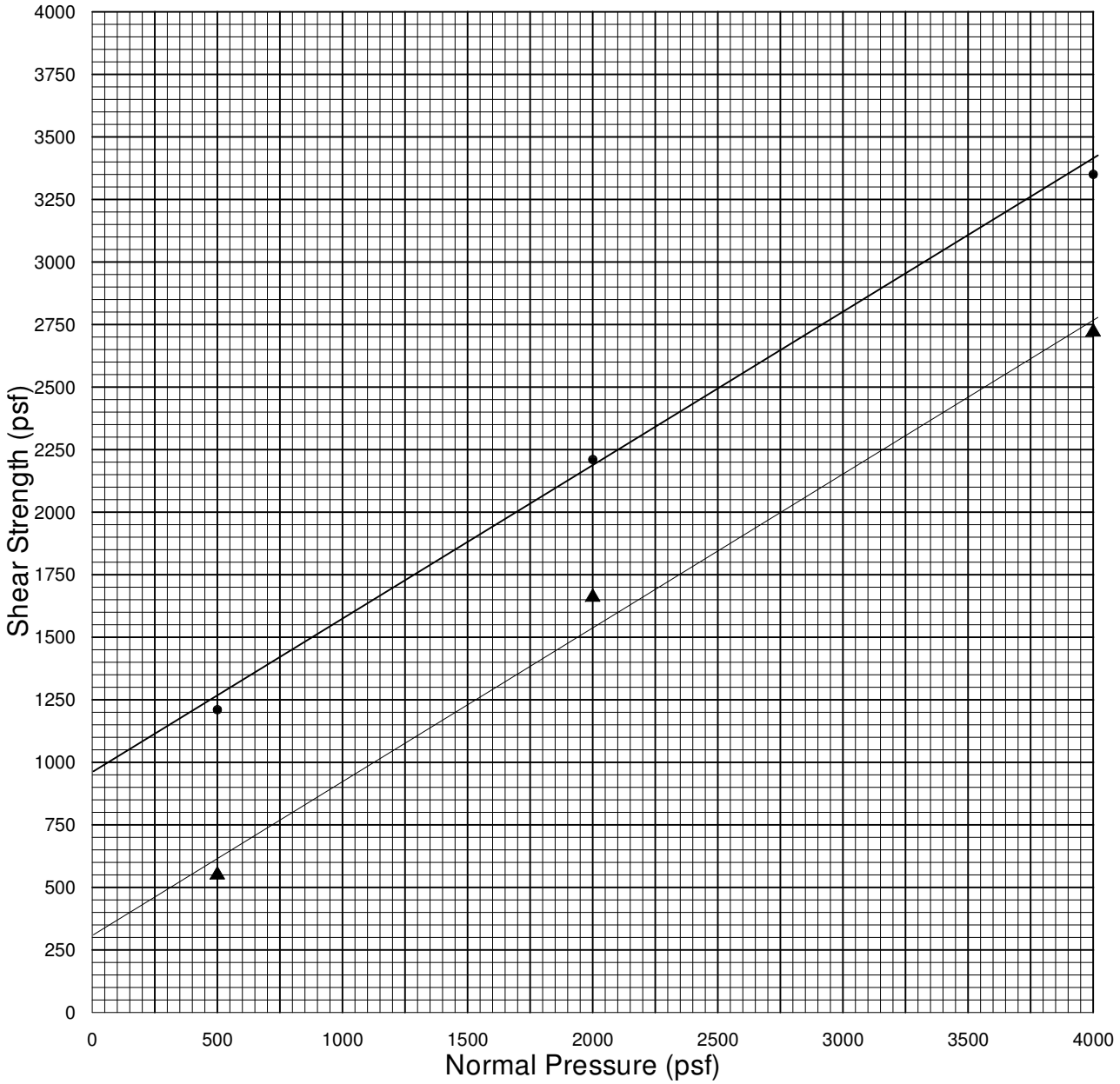
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	R-08-023	6.5							53.5	
⊠	R-08-023	16.5							54.7	
▲	R-08-023	41.5							49.0	
★	R-08-023	46.5	4.75	0.24	0.154		0.0	89.4	10.6	
⊙	R-08-023	56.5							83.7	

PROJECT SR-22 JOB NO. I-436
DATE 5/21/08

GRADATION CURVES

Figure B-2

DIRECT SHEAR TEST - ASTM D-3080



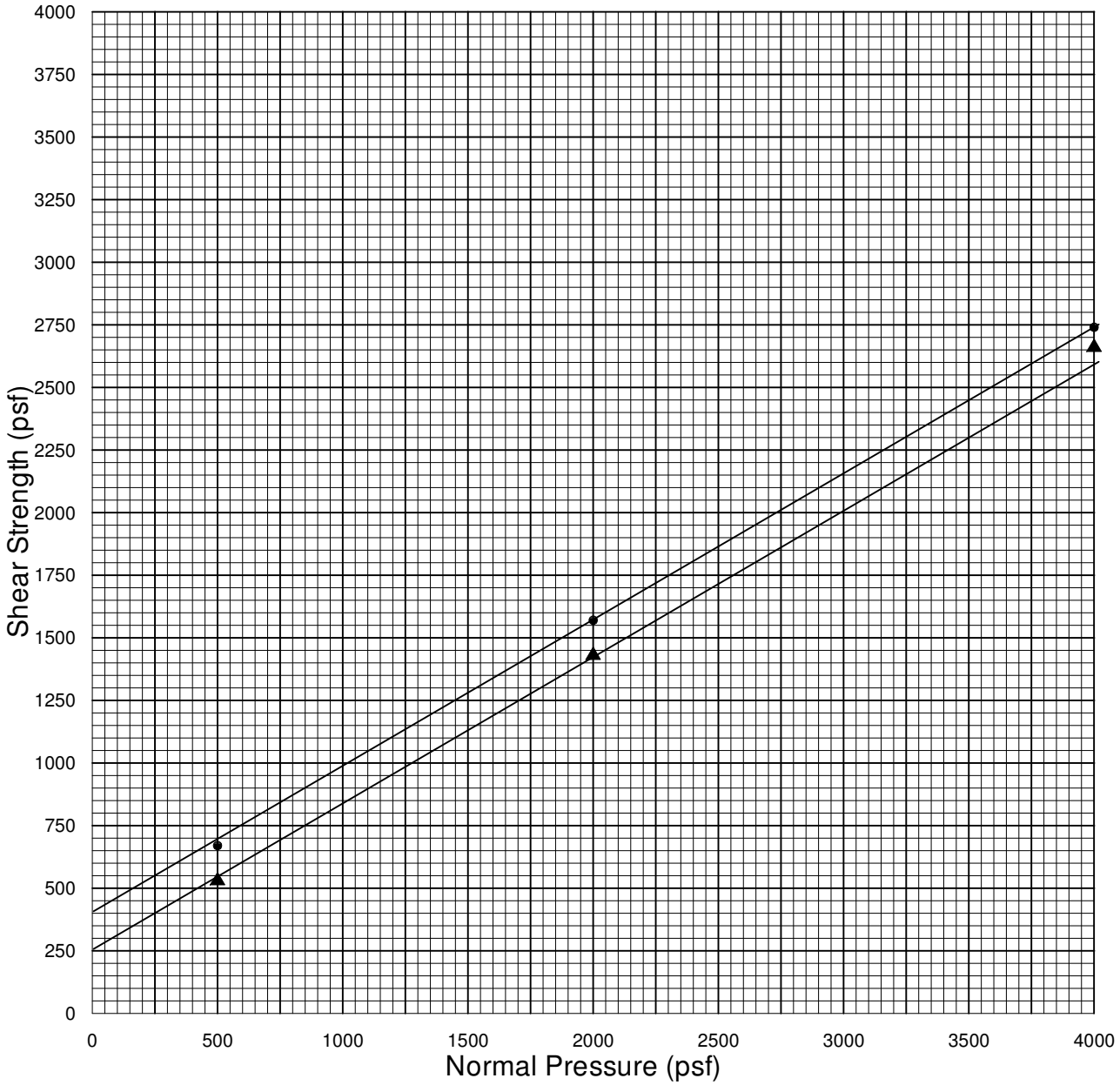
Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-019 @ 10'-11.5'	Undisturbed & Saturated	Sandy Lean Clay	115.5	15.9

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	1210 @ 0.0600"	550
2000	2210 @ 0.0900"	1660
4000	3350 @ 0.0800"	2720
	C = 900 psf	C = 300 psf
	ϕ = 32 deg.	ϕ = 32 deg.

Figure B-3a

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-023 @ 26'-26.5'	Undisturbed & Saturated	Sandy Lean Clay/ Lean Clay w/Sand	94.6	28.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	670 @ 0.1000"	530
2000	1570 @ 0.1200"	1430
4000	2740 @ 0.2000"	2660
	C = 400 psf	C = 250 psf
	ϕ = 30 deg.	ϕ = 30 deg.

Figure B-3b

Boring / Sample No.	R-08-005	Depth:	5' - 6.5'	Date	05-13-08

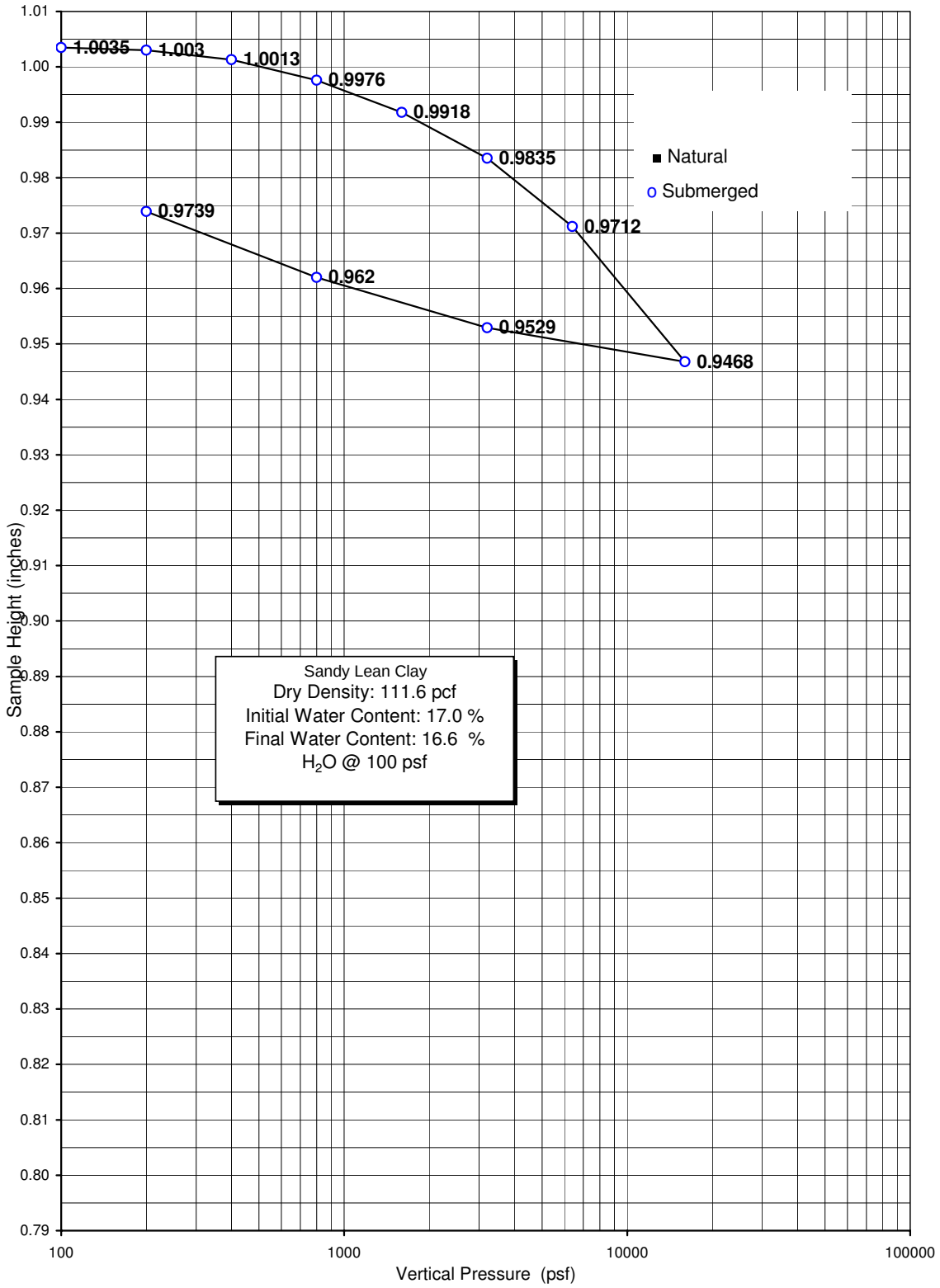


Figure No. B-4a

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-011	Depth:	20' - 21.5'	Date	05-13-08

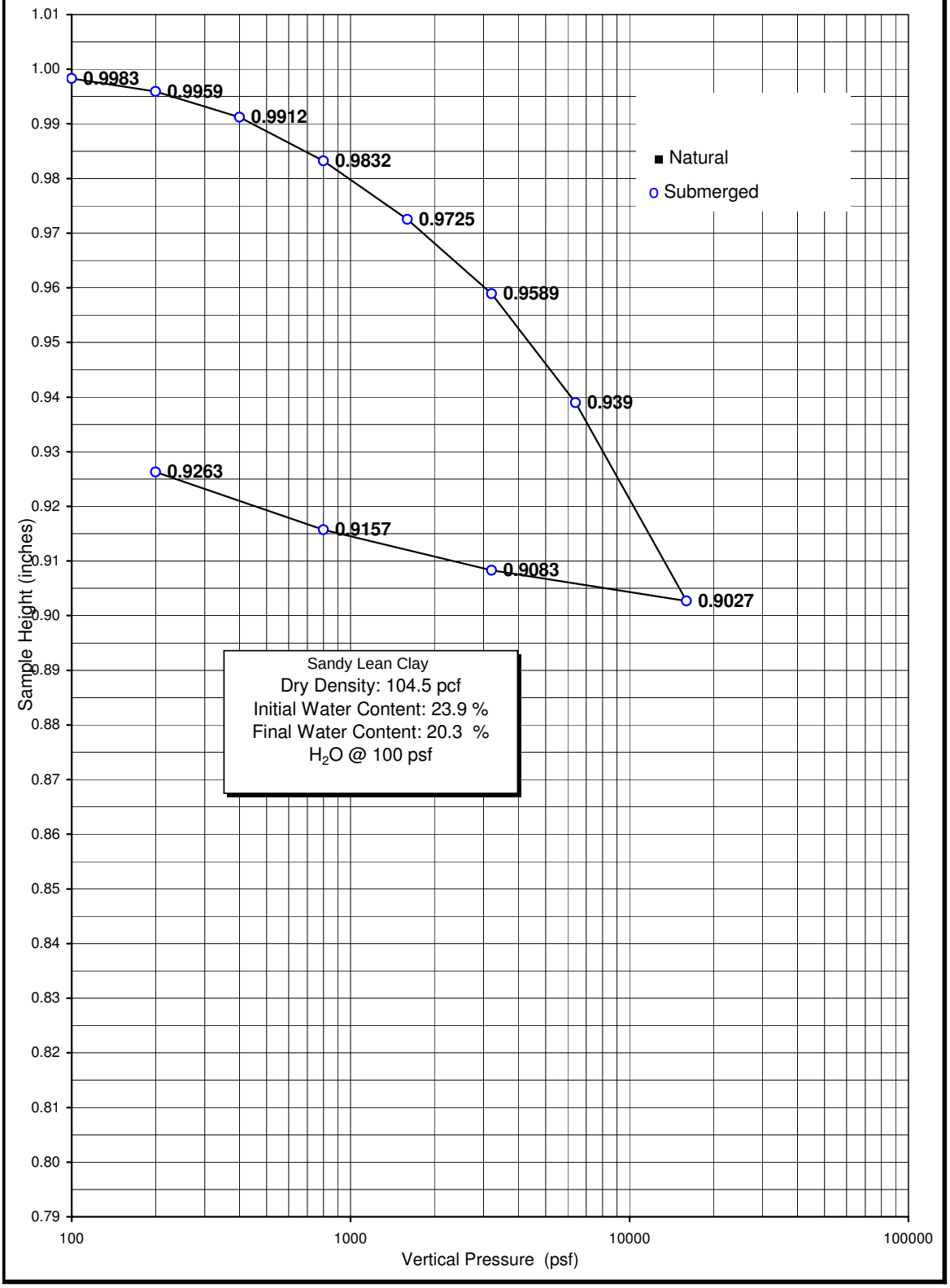


Figure No. B-4b

Geo**L**ogic **A**ssociates

Boring / Sample No.	R-08-017	Depth:	40' - 41.5'	Date	05-13-08

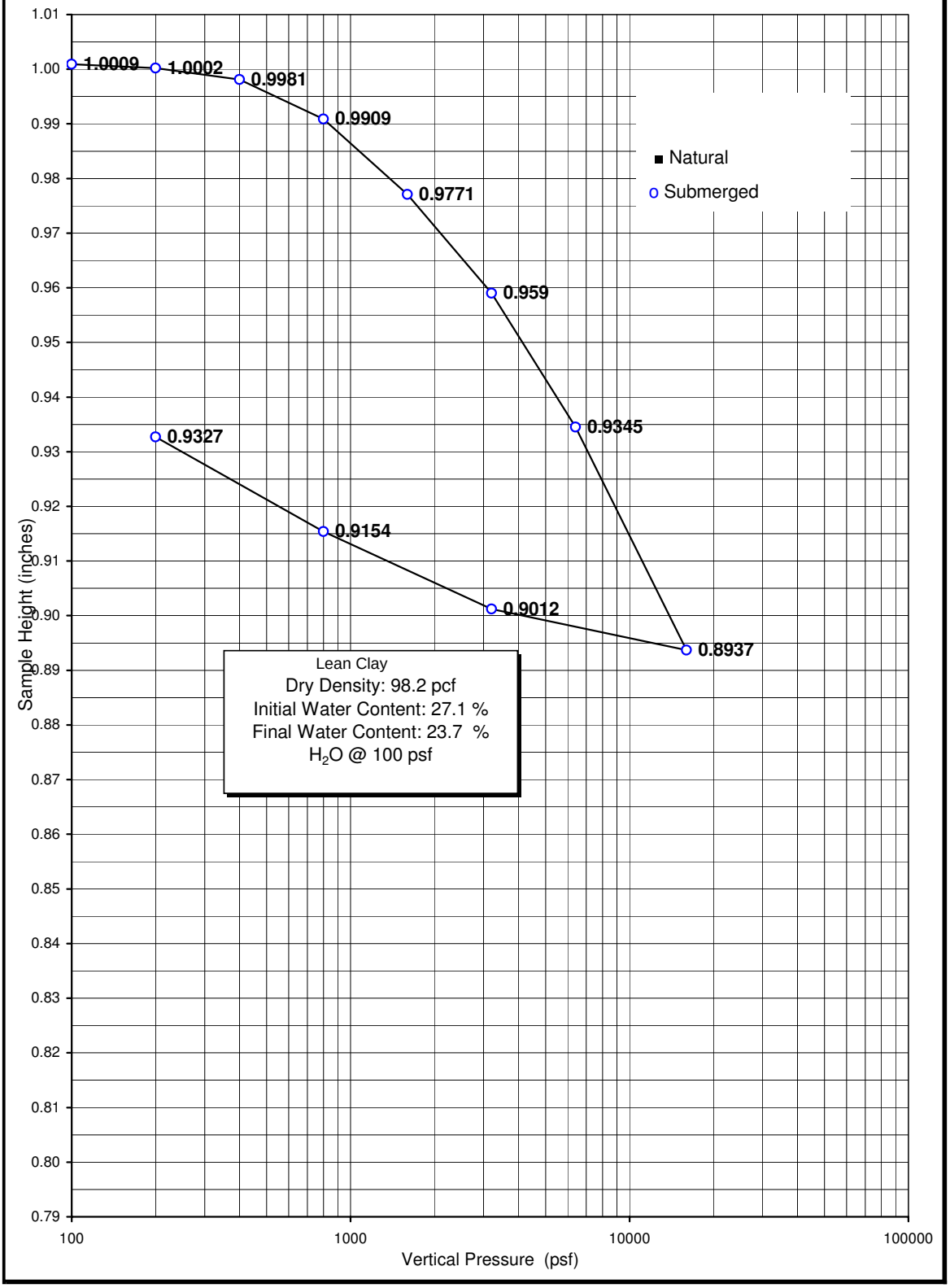


Figure No. B-4c

Boring / Sample No.	A-08-122	Depth:	5' - 6.5'	Date	05-13-08

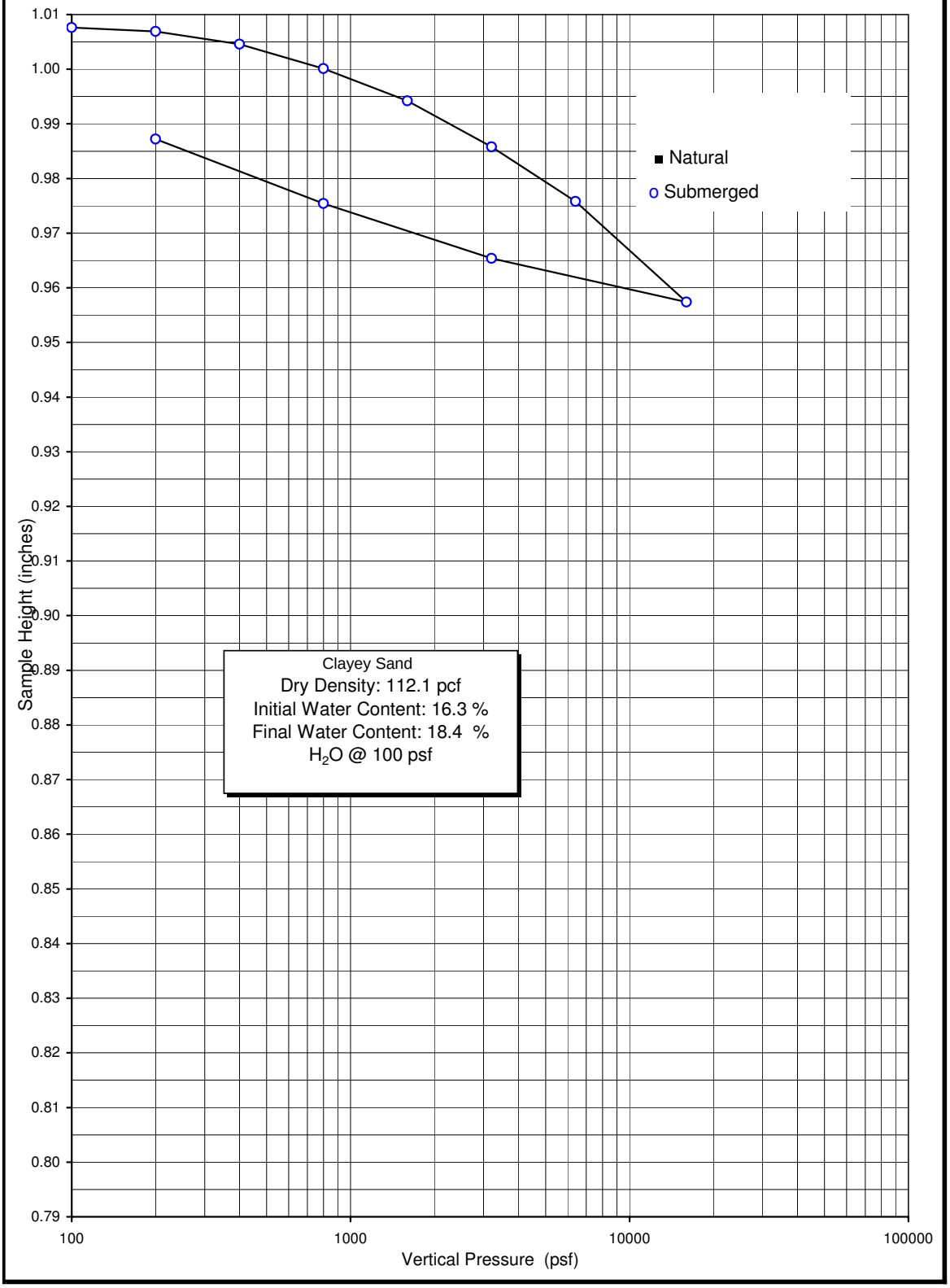


Figure No. B-4d

Geo**L**ogic **A**ssociates

Boring / Sample No.	A-08-120	Depth:	15' - 16.5'	Date	05-13-08

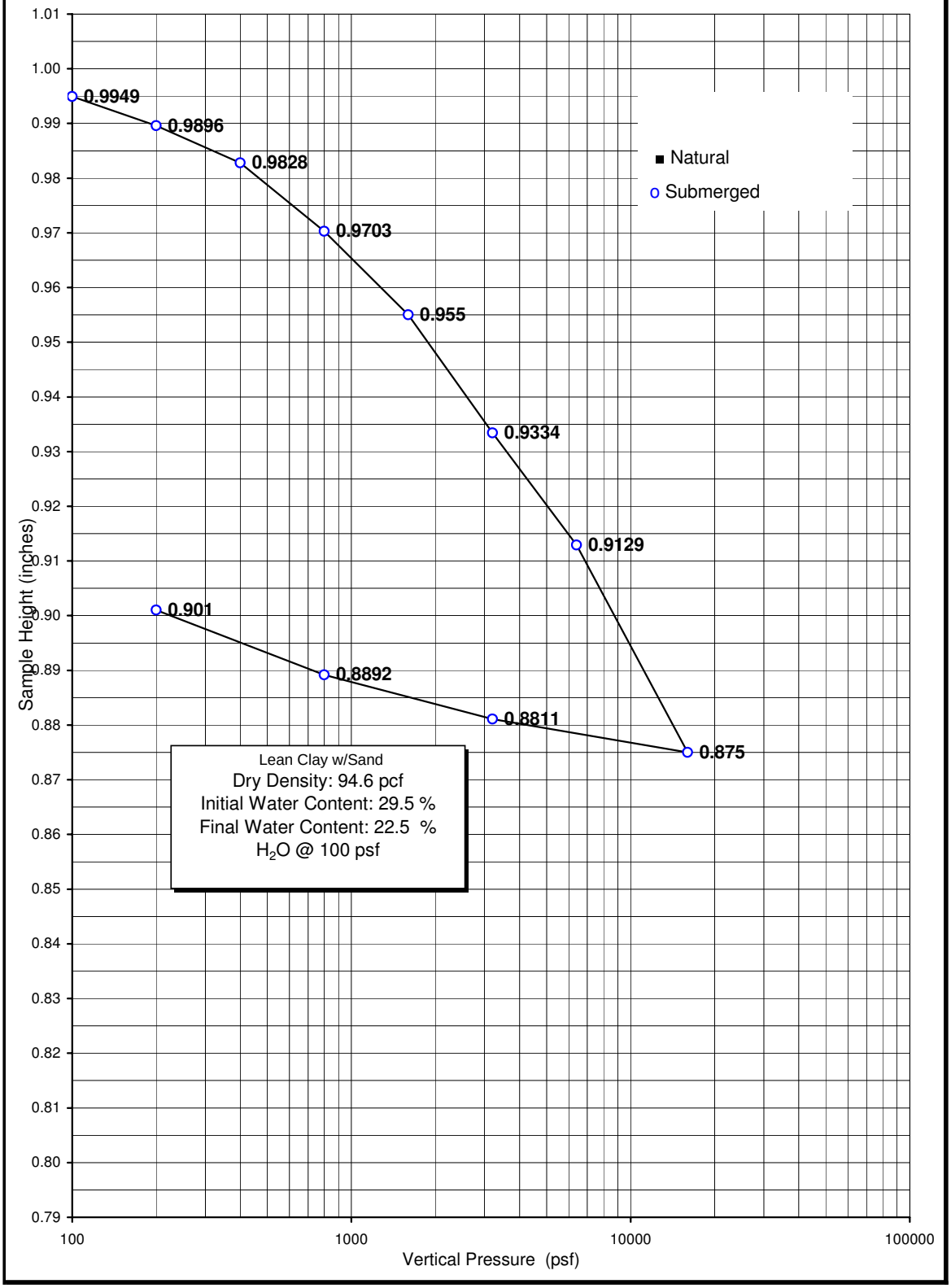


Figure No. 4-e

Geo**L**ogic **A**ssociates

APPENDIX C
SELECTED AS-BUILT DRAWINGS

Table C-1 :SUMMARY OF AS-BUILT FOUNDATION CHARACTERISTICS
Bolsa Chica Road OC, Bridge No. 55-332

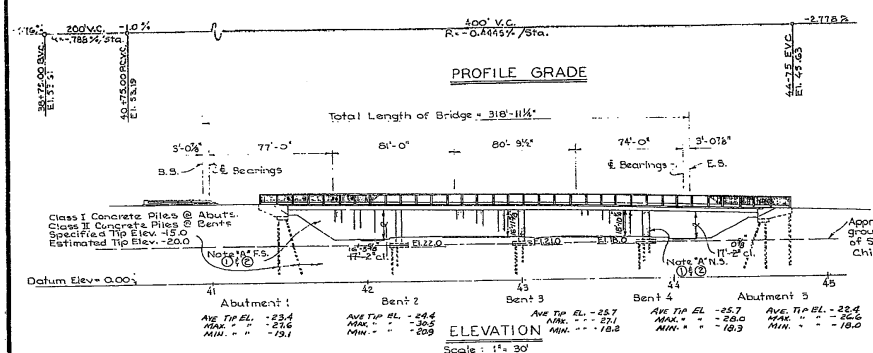
Support Location	Foundation Type	Number of Piles			Capacity			Average Bottom of Pile Cap Elevation	Pile Tip Elevation			Actual Length of Pile		
					Design Compression	Ultimate Compressive	Ultimate Uplift		Max	Min	Avg	Max	Min	Avg
		Batter	Vertical	Total	Kips	Kips	Kips	ft	ft	ft	ft	ft	ft	ft
Abut. 1	45-ton Class I Concrete Piles	21	12	33	90	180	90	41.25	-27.6	-19.1	-23.4	72.0	58.5	62.5
Bent 2	45-ton Class II Concrete Piles	0	54	54	90	180	90	22.0	-30.5	-20.9	-24.4	52.7	44.0	47.0
Bent 3	45-ton Class II Concrete Piles	0	54	54	90	180	90	21.0	-27.1	-18.2	-25.7	48.1	39.5	46.7
Bent 4	45-ton Class II Concrete Piles	0	54	54	90	180	90	18.0	-28.0	-18.9	-25.7	46.3	37.2	44.0
Abut. 5	45-ton Class I Concrete Piles	21	12	33	90	180	90	35.25	-26.6	-18.0	-22.4	62.5	57.6	60.7

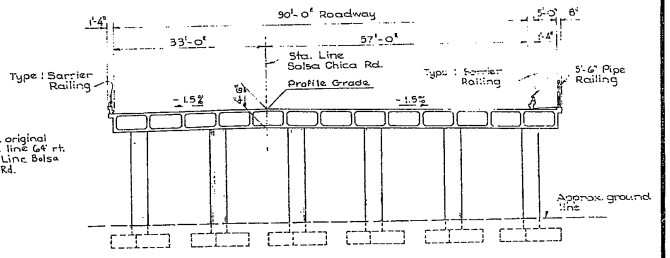
Notes:
1. Reference: As-built Plans and as-built LOTB (see Appendix A)
2. Total abutments piles includes 32 abutment footing piles and one wing wall pile.
3. 1994 Retrofit for design PBA = 0.5g included adding concrete catchers and treated timber bumpers to abutments 1 and 5.
4. Class I and Class II pile tip diameter = 8.0 inches, butt diameter= 15 inches
5. Recommended axial pile load capacity values for seismic design assuming the piles are in good condition and the connection can transmit the uplift loads. The recommended values are limited to twice the reported design values.
6. Specified tip elevation at all supports is El.-15 feet.
7. Batter piles are 1:3 batter

I-405-2(72)114

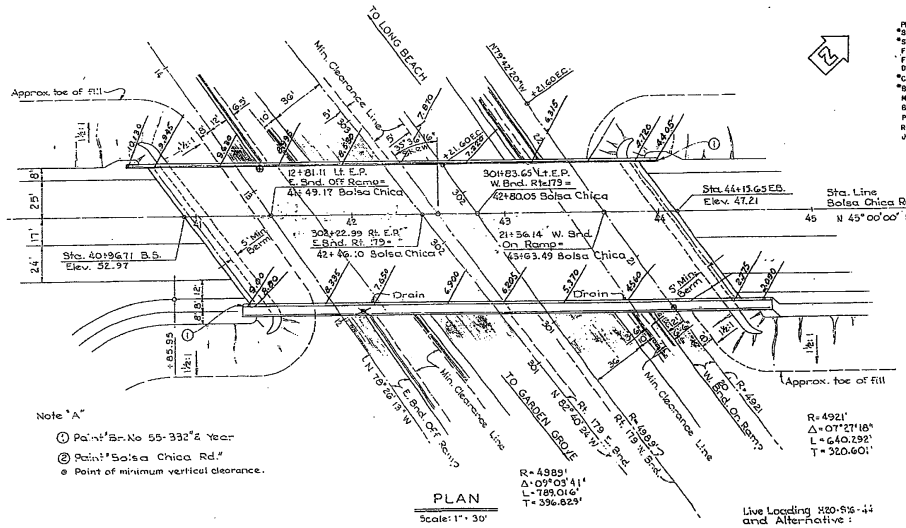
Rte-22
PM 09

April 8, 1963





TYPICAL SECTION
Scale: 1" = 10'



APPROXIMATE QUANTITIES

PERVIOUS BACKFILL MATERIAL	35 C.Y.
*STRUCTURE EXCAVATION (BRIDGE)	1,210 C.Y.
*STRUCTURE BACKFILL (BRIDGE)	440 C.Y.
FURNISHING CONCRETE PILING (CLASS I)	1,990 L.F.
FURNISHING CONCRETE PILING (CLASE II)	6,575 L.F.
DRIVING PILES	228 EA.
*CLASS "A" CONCRETE (BRIDGE)	2,435 C.Y.
*BAR REINFORCING STEEL (BRIDGE)	685,000 LBS.
MISCELLANEOUS METAL (BRIDGE)	9,000 LBS.
BARRIER RAILING (TYPE 1)	708 L.F.
PIPE BRIDGE RAILING (5'-6")	354 L.F.
RUBBER WATERSTOPS	228 L.F.
JOINT SEALER	225 L.F.

*FINAL QUANTITIES

AS BUILT PLANS
Contract No. 07-031804
Date Completed
Document No. 7000244

THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRICES DATED 5-24-67 AS SUBMITTED BY RESIDENT ENGINEER TRAUTWIG
TRACINGS CORRECTED BY: MRO DATE: 5-31-67

INDEX TO PLANS

SHEET NO.	TITLE
1.	GENERAL PLAN
2.	GRID GRADES
3.	FOUNDATION PLAN
4.	ABUTMENT 1
5.	ABUTMENT 5
6.	BENTS
7.	TYPICAL SECTION
8.	GIRDER LAYOUT
9.	GIRDER LAYOUT (CONT)
10.	GIRDER REINFORCEMENT
11.	LOG OF TEST BORINGS

B.M. #290-A-59 ELEV. 20.77
FD. L & T. IN P.C.C. PVT. 41' LT. OF STA. 353+29 ULT. ℄ RTE. 156 FWY.

B.M. #75-A-59 ELEV. 31.06
FD. L. & T. IN P.C.C. PVT. 34' LT. OF STA. 283+06.54 ULT. ℄ RTE. 179 FWY.

BRIDGE DETAILS

B-1.	BARRIER RAILING SHEET 1
B-2.	BARRIER RAILING SHEET 2
B-3.	PIPE RAILING
B-4.	STANDARD DETAILS NO. 1
B-5.	STANDARD DETAILS NO. 2
B-6.	TYPE 1 CANTILEVER RETAINING WALL
B-7.	RETAINING WALL DETAILS NO. 1
B-8.	CONCRETE PILE DETAILS
B-9.	DRAIN DETAILS

For "General Notes" to this set of Plans, see "Grid Grades"

SAN DIEGO FREEWAY

BRIDGE DEPARTMENT
DESIGN SECTION 9
Project Designer: E. Dietz
Chief Designer: G. Thomsen

DESIGN	T. Trautwig 11-59	Dated E. Dietz 11-59
DETAILS	J. Yamasaki 11-59	Dated E. Dietz 11-59
QUANTITIES	A. R. Lonnstrom	Dated G. C. Thomsen
SPECIFICATIONS	M.	Dated

Approved for Submission to Dist. Engr. [signature]

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

07-031804

BOLSA CHICA ROAD OVERCROSSING
(RTE. ~~179~~ 22)
LOCATED AT THE N.W. CITY LIMITS OF WESTMINSTER IN ORANGE COUNTY

GENERAL PLAN

SCALE AS NOTED | BRIDGE 55-332 | FILE | DRAWING C-6684-1

Disregard prints bearing earlier dates.

PREL. DRAWING No. P-6684

60-07101H0318.0

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 1-16-71 SIGNATURE [signature] TITLE Asst. Engr.

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF PUBLIC WORKS - MICROFILM

SCALE 1" = 20' 200 50 SCALE 1" = 50' 300

Figure C-1a

ClibPDF - www.fastio.com

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	Ora	22,405, 605	Var	77	94

REGISTERED CIVIL ENGINEER

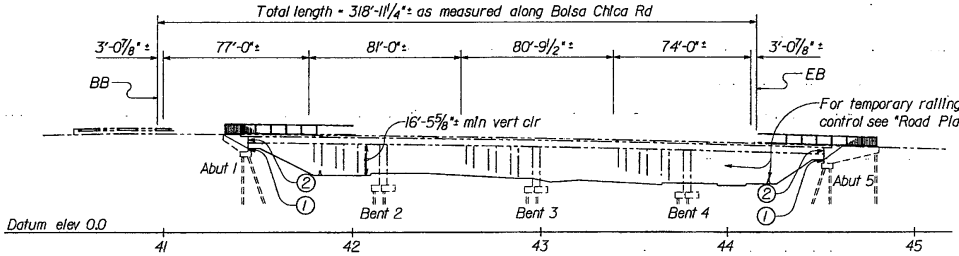
5-23-94
PLANS APPROVAL DATE

JOHN A. MANISCALCO No. C040911 Exp. 3/31/95 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

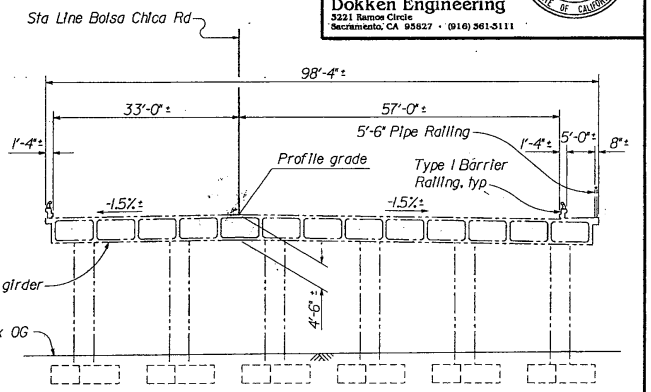
Dokken Engineering
3221 Ramos Circle
Sacramento, CA 95827 · (916) 361-5111

RETROFIT LEGEND

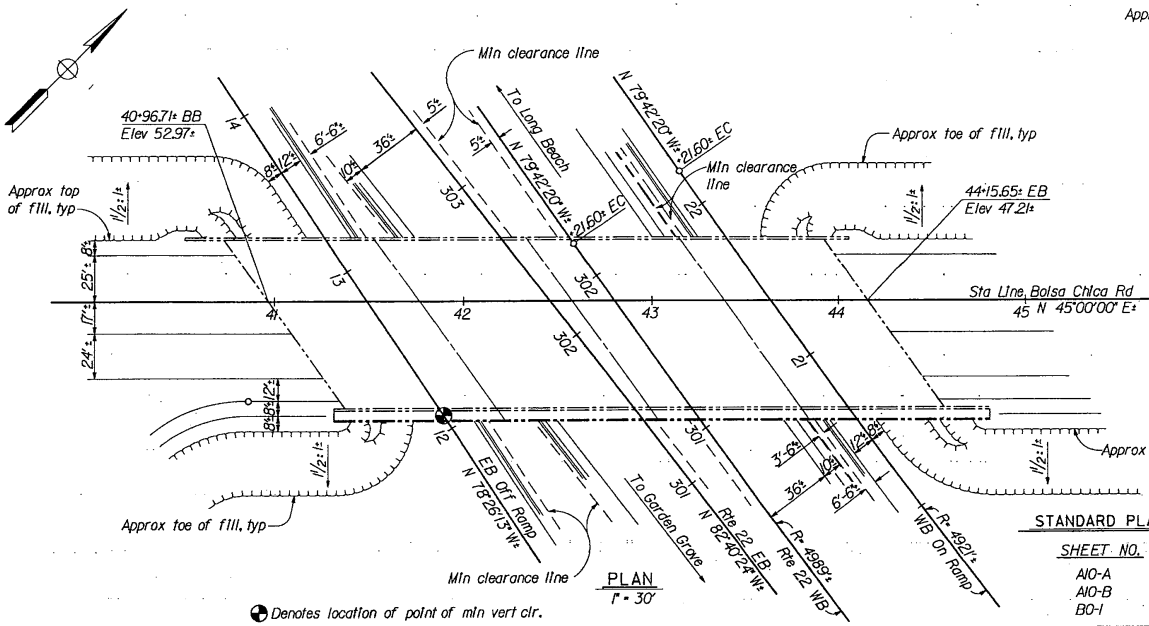
① Concrete catchers
② Treated timber bumpers



ELEVATION
1" = 30'



TYPICAL SECTION
1" = 10'



PLAN
1" = 30'

Denotes location of point of min vert clr.

QUANTITIES

STRUCTURE EXCAVATION (TYPE H)	6	CY
STRUCTURE BACKFILL (BRIDGE)	3	CY
STRUCTURAL CONCRETE, BRIDGE	11	CY
DRILL AND BOND DOWEL	130	LF
BAR REINFORCING STEEL (BRIDGE)	1,300	LB
TREATED LUMBER AND TIMBER	4	MFBM

AS BUILT
Bidding 9/8/95
NO CORRECTIONS BY KKPH
CONTRACT NO. 12-009004
DATE 4/25

INDEX TO PLANS

Sheet No.	Title
1	General Plan
2	Abutment 1 Layout & Details
3	Abutment 5 Layout
4	Abutment Retrofit Details

Notes:
1. For General Notes, see "Abutment 1 Layout & Details" sheet
2. The contractor shall verify all controlling field dimensions before ordering or fabricating any material.
3. Existing structure shown thus: ———
4. New construction shown thus: ———

STANDARD PLANS DATED JULY 1992

SHEET NO.	TITLE
A10-A	Abbreviations
A10-B	Symbols
B0-1	Bridge Details

EARTHQUAKE RETROFIT PROJECT NO. 124

BOLSA CHICA ROAD OVERCROSSING

GENERAL PLAN

Moe Amini — DESIGN OVERSIGHT — 3/94	DESIGN	J. Maniscalco	S. Colacevich	LOAD FACTOR DESIGN			
STOWAY DATE	DETAILS	A. Schudy	S. Colacevich	LAYOUT	V. Mindar	S. Colacevich	
	QUANTITIES	R. Hartzell	B. Meyer	SPECIFICATIONS	J. Maniscalco	N. Tamanaha	PLANS AND SPECS COMPARED

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

John Maniscalco — PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.	55-332
POST MILE	R 0.92
CU	12
EA	009001
	59N763-7

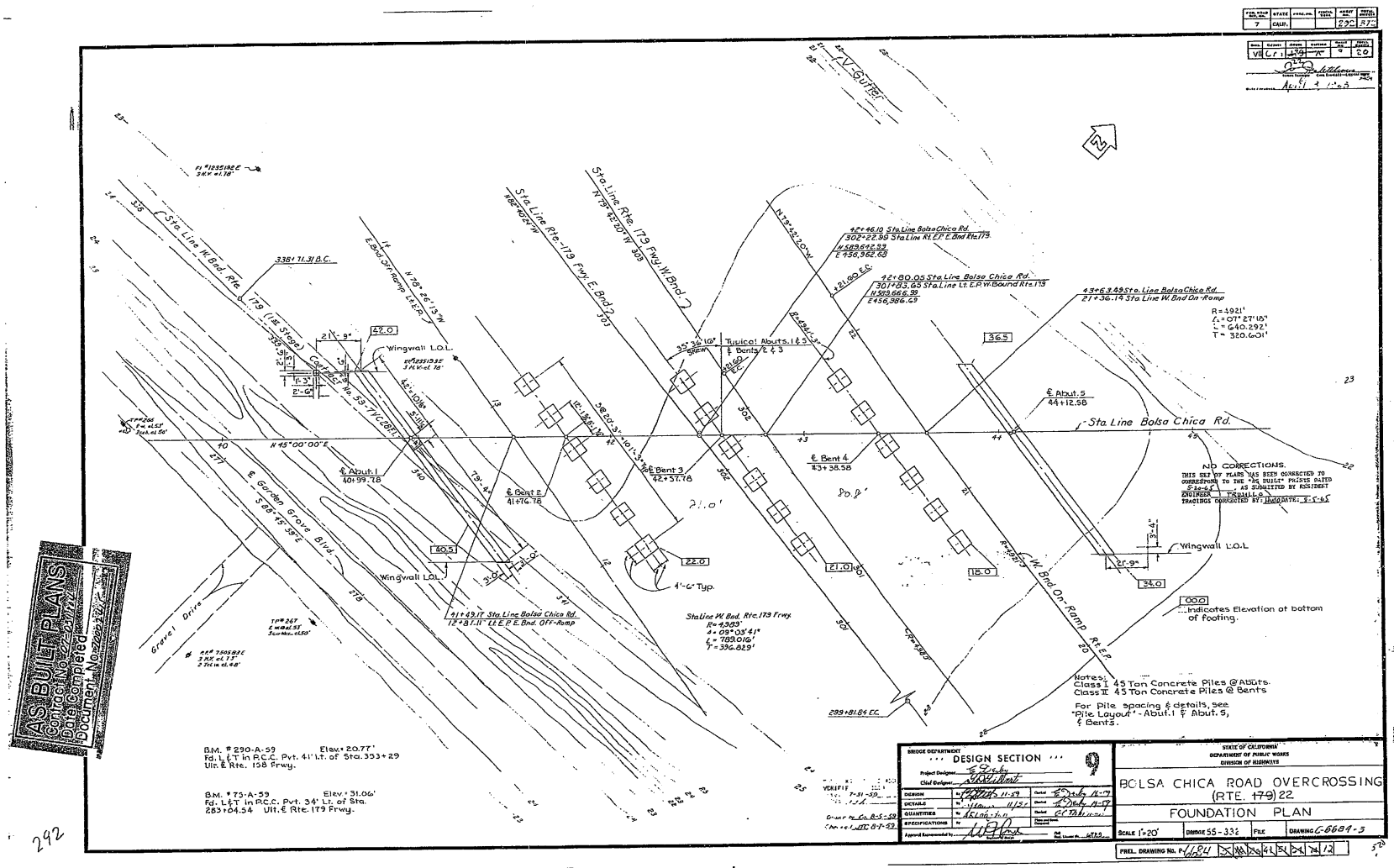
DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 1 OF 4

86ATGPLDGN REV 05 KD 11/03/93

1/92

Figure C-1b



I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.
DATE 2-10-77 SIGNATURE Thomas E. Nozzle TITLE SR ENG

Figure C-2

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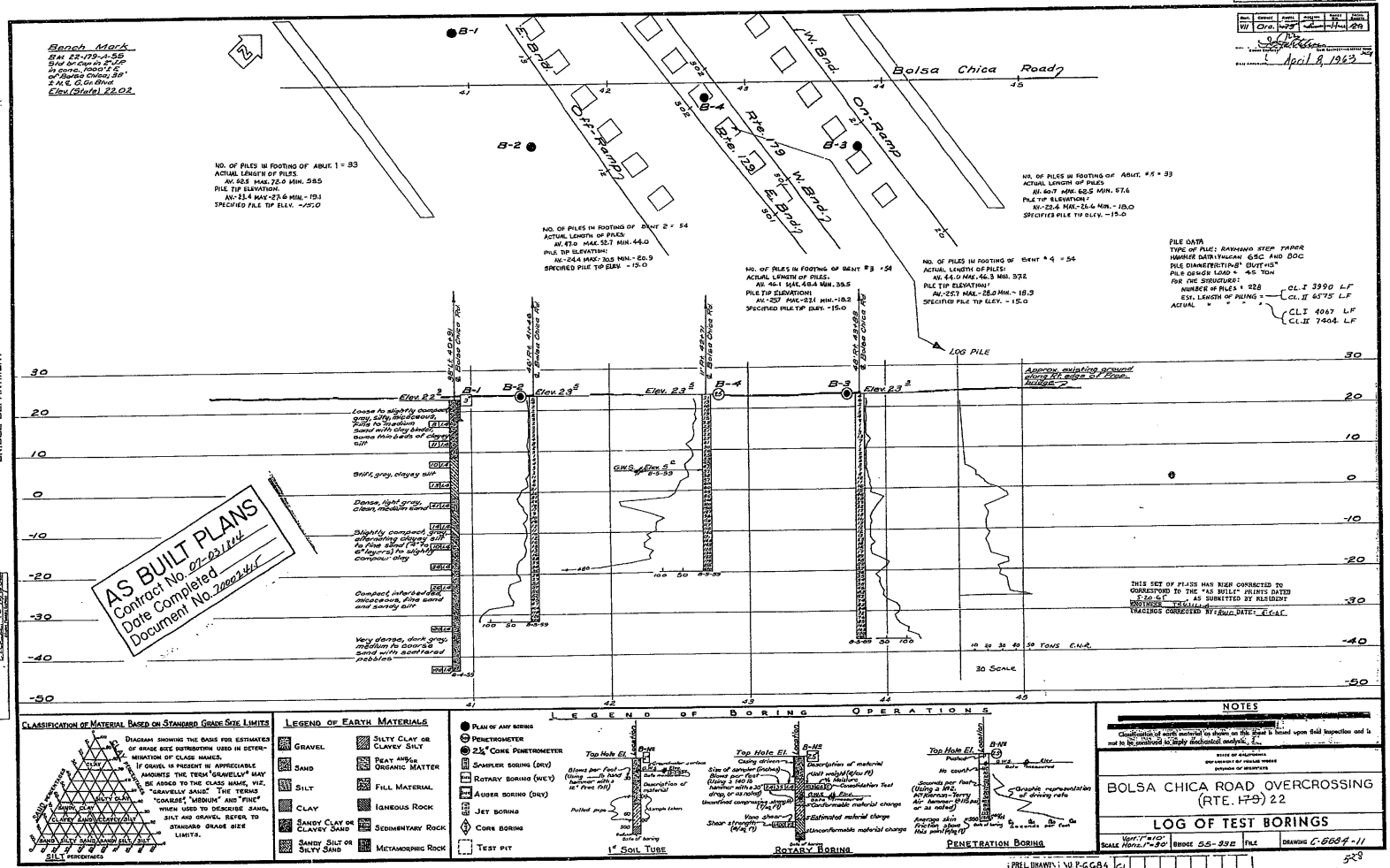


CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

Diagram showing the basis for estimates of grade size distribution used in determination of class names. If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand". The terms "coarse", "medium" and "fine" when used to describe sand, silt and gravel, refer to standard grade size limits.

SILT PERCENTAGES

LEGEND OF EARTH MATERIALS

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

LEGEND OF BORING OPERATIONS

- Plan of any boring
- Penetrometer
- 2½" Core Penetrometer
- Sampler boring (dry)
- Rotary boring (wet)
- Auger boring (dry)
- Jet boring
- Core boring
- Test pit

1st Soil Tube — Rotary Boring — Penetration Boring

NOTES

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed as imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

BOLSA CHICA ROAD OVERCROSSING
(RTE. 179) 22

LOG OF TEST BORINGS

Vert. 1" = 10'
Horiz. 1" = 30'
Bridge 55-932
File
Drawing C-6684-11

PREL. DRAWN: NO. F-6684 G1

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE _____ SIGNATURE _____ TITLE _____

Figure C-3

CRbPDF - www.fastio.com

APPENDIX D
CALTRANS FOUNDATION REVIEW – SEISMIC DESIGN CRITERIA

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)

FAX: (916) 227- 9765

DATE: December 11, 2007

FILE: 12 (District) ORA (County) 22 (Route) (Post Mile)

MEMO BY: Group Delta Consultants DATED: 11/14/2007

SR-22 Phase 2 project: Valley View UC, S405/E22 Connector OC, New SR22/I-405 HOV Connector
Structure Name

GENERAL PLAN DATED: N/A FDN PLAN DATED: N/A

12-071630 (EA Number) 55-var (Bridge Number)

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4Th [ ] Other: _____

The following are our review comments on the memorandum you forwarded with the subject titled "**Seismic Design Criteria for Bridges** (SR 22 Valley View OC Replacement. S405/E-22 Connector OC Replacement, New SR-22/I-405 HOV Connector)", dated November 14, 2007, prepared by Group Delta Consultants.

1. The design ARS for all structures located within the identified limits of the project should be developed based on a design PBA of 0.5g and Maximum Credible Earthquake (MCE) magnitude of 7.0 associated with the Newport-Inglewood fault. This is because, except at very low periods, spectral accelerations for this ARS should be higher than those for the ARS corresponding to a PBA=0.6g and MCE magnitude of 6.0 associated with the Los Alamitos fault. The design ARS shall include modifications due to near-fault effects as specified in the Caltrans Seismic Design Criteria (SDC).
2. The Table 2 in the report should also include estimated median Peak Ground Acceleration (PGA) using Sadigh et al (1997) attenuation relationships. Geotechnical analysis such as liquefaction may need to be performed for more than one fault or combination of PGA and MCE magnitude to determine the controlling case.
3. The "Rated Magnitude" in Table 1 should be replaced with "Maximum Credible Earthquake or MCE Magnitude". The MCE magnitude for the Puente Hills Blind Thrust fault should be 7.25.
4. When available, only the "EQFAULT Fault to Site Distance (km)" in Table 2, which in fact is the closest distance to the fault rupture surface, should be used when using Sadigh et al (1997) attenuation relationships.
5. Due to the limited scope of the memo, the title should be changed from "Seismic Design Criteria for Bridges ", to "Design Ground Motion Criteria for Bridges".
6. "Caltrans seismology department" should be replaced with "Caltrans Geotechnical Services".

Reviewed By: Mohammed Islam, Ph.D., G.E., Senior Transportation Engineer/Seismic Specialist

Tel. 916-983-3328

Geotechnical Design South-1

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)

FAX: (916) 227- 8683

DATE: January 11, 2008

FILE: 12 (District) ORA (County) 405 (Route) (Post Mile)

MEMO BY: Group Delta Consultants (GDC)

DATED: 12/19/2007

SR-22 Phase 2 project: Valley View UC, S405/E22 Connector OC, New SR22/I-405 HOV Connector
Structure Name

GENERAL PLAN DATED: N/A

FDN PLAN DATED: N/A

12-071631
EA Number

405-var
Bridge Number

Submittal (*Check One*): [ ] 1st [x] 2nd [ ] 3rd [ ] 4Th [ ] Other: _____

The following are our review comments on the memorandum with the subject title "**Seismic Memorandum No. 2 – ARS Curves for Bridges Design Criteria for Bridges** (SR 22 Valley View OC Replacement. S405/E-22 Connector OC Replacement, New SR-22/I-405 HOV Connector), to be used in conjunction with our memorandum dated 11-14-07 previous submitted addressing PBA.

1. The report presents two ARS curves in Figure 2. It does not identify the recommended ARS curve. Furthermore, any recommended ARS curve at this time should be identified as preliminary.
2. The suggested design PBA of 0.6g in the memorandum dated 11-14-07 was based on a MCE magnitude M= 6.0. However, the modified ARS curves for PBA=0.6g presented in the subject memorandum for PBA=0.6g were developed based on the standard SDC curve for M=6.5±0.25. There are no standard SDC curves for M=6.0
3. A modified Type E ARS curve for PBA=0.5g and M=7.0 should be recommended as the preliminary design ARS curve for this project.
4. If, after completion of the geotechnical exploration, the soil profile at the site is categorized as Type F due to liquefaction, two different ARS curves, one without liquefaction and the other considering liquefaction should be recommended for structure design. Soil or foundation design parameters used in the structural analysis should correspond to the conditions appropriate for the ARS under consideration.
5. Please see our "Foundation Review" document, dated December 11, 2007 for comments on the GDC memorandum dated 11-14-2007.

Reviewed By:	Mohammed Islam, Ph.D., G.E., Senior Transportation Engineer/Seismic Specialist		
	Geotechnical Design South-1 5900 Folsom Blvd Sacramento, CA 95630		Tel. 916-983-3328; email: mislam@dot.ca.gov

APPENDIX E
ANALYSIS AND CALCULATIONS

(SUBMITTED AS A SEPARATE PACKAGE)

APPENDIX F
CALTRANS COMMENTS AND RESPONSES

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

April 13, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments dated March 26, 2009**
(2nd Submittal)
Foundation Report
BOLSA CHICA ROAD OC (REPLACE)
BRIDGE NO. 55-1102
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated February 12, 2009
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Is LRFD Design Guidelines 4th Edition, dated 2007 used for design? If not, explain.

Yes, geotechnical design is in general accordance. According to the General Notes and Index to Plans the following criteria apply for structural design:

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

Abutment Design:
Caltrans Bridge Design Specifications, April 2000 (LFD) (1996 AASHTO with Interims and Revisions by Caltrans)

Superstructure Design:
2004 AASHTO LRFD Bridge Design Specifications, 3rd Edition with the 2006 Interims and the Caltrans Amendments. vo.06

Dead Load:
Includes 35 psf for future wearing surface.

Live Load:
HL-93 with 'Low-Boy' and Permit Design Vehicle.

Seismic Design:
Caltrans Seismic Design Criteria (SDC), Version 1.4, June 2006 with Modifications.

Seismic Loading:
SDC ARS Curve for Soil Profile D (M = 7.25 $\pm$ 0.25)
(Peak Rock Acceleration = 0.5g)
with Modification for Near Fault Effects.

2. LOTB must have the name of Caltrans OSFP liaison engineer …… .

The requested change has been made in the revised logs. The space will be left blank for Caltrans to insert electronic signature.

3. LOTBs must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to ……..).

The requested change has been made in the revised logs.

4. Include in Tabular form in the Appendix, a summary of laboratory test results ……..

The requested summary is provided in Appendix B.

5. Table 1 summarizes the recommended design properties. Explain in section 3.3.3 of the subject submittal, how strength parameters (both drained and undrained) and internal friction angle were evaluated.

Drained shear strength parameters are primarily obtained from the Consolidated Drained (CD, slow) direct shear test results using peak and ultimate values of cohesion intercept and friction angle. Undrained shear strengths were obtained from the interpreted CPT data which uses $S_u = Q_c / N_k$ in which:

S_u = undrained shear strength, ksf
Q_c = cone tip resistance, tsf, and
N_k = 15.

Interpreted S_u values are shown in the interpreted CPT data in Appendix A. Penetration resistance and pocket penetrometer / torvane data were used to confirm reasonableness of CPT S_u data. Discussion has been added to Section 3.3.3.

6. Are the consolidation coefficients found based on Consolidation tests (direct method) or by correlation (indirect method)? Explain.

C_c and C_r were obtained from consolidation tests (direct method) applying Schmertmann's correction; Cr was approximated by C_e (unloading). C_v, coefficient of consolidation, was based on correlations (Navfac, 1987) Figure 3-6, 7-3-15. Values from the overall project were considered.

7. Explain why no Triaxial tests were performed to assess the strength of the soils. Please refer to 2007 LRFD Design specification Guidelines, Section 10.4.6.2.2.

The local Southern California practice is to use pocket penetrometer and interpreted CPT data for undrained shear strength. A conservative interpretation of the CPT interpreted undrained shear strength is used in the design. Where very soft cohesive soils are present, such as Bay Mud, triaxial tests or vane shear tests may be warranted. However, in our 20 years of experience on Caltrans projects and 38 years experience using CPT data on local generally medium stiff to stiff cohesive soils, no triaxial tests have conventionally been performed.

8. What does Method 2 refer to in the CPT liquefaction calculations? Explain.

Method 2 refers to triggering analysis based on CPT data and settlement calculations based on equivalent SPT blow count. Method 1 refers to triggering analysis and settlement calculations based on equivalent SPT values.

9. Are there any facilities nearby the pile driving activities and if so what is impact of the pile driving vibration on these facilities, both airborne and in ground? Explain.

The closest pile driving operations are more than 100 ft from Abutment 3 of the new bridge to the housing north of the site. Based on published data (Theissen and Wood, 1982), at a distance of 100 ft, peak particle velocities for impact pile driving at firm or soft soil sites are less than 0.5 inches per second, and the safe limit for residential structures is 2 inches per second (see Attachment 2). Therefore, no significant vibration or damage from pile driving is anticipated. Noise will be an issue; however, existing soundwalls are present and will mitigate the sound effects to some extent.

10. How the nominal driving resistance was arrived at?

Factored loads were provided by the Structural Engineer and nominal resistance was obtained by dividing the sum of factored loads by resistance factor. As per Caltrans requirements, a resistance factor of 0.7 was used for strength limit state and 1.0 was used for extreme limit state.

Nominal Resistance = Sum of the Factored Loads / Resistance factor

11. Explain how you are planning to drive the concrete piles through the extremely high blow count material, if piles do not punch through these very dense layers? Elaborate.

It is true that there is a zone of high blow count sand above the specified pile tips (Layer 3A between about El. +2 and -3 feet. However, CPT data show that layer 3A is less than 5 feet thick and experience indicates the piles can punch through, since it takes about 5 diameters above and below the tip to mobilize full end bearing. An indicator pile program is proposed and pile lengths or installation method may be adjusted, if refusal is obtained at shorter penetrations. For example, consideration can be given to undersized pre-drilling as mentioned in Section 4.4.2.5, Pre-Drilling.

12. It is not clear to the reviewer how the settlement was calculated for the piles? Provide calculation and elaborate.

Vesic' (1977) states that "Modern research on pile behavior has established that full mobilization of skin resistance requires a relative displacement between the pile shaft and surrounding soil of 0.25 to 0.4 inches (6 to 10 mm)." Ultimate end bearing was assumed to occur at a movement of 10% of the pile diameter. Based on this, we conservatively assumed a value of 0.4 inch for mobilization of ultimate frictional capacity, and determined mobilized end bearing at that deflection. The pile load vs deflection curve for deflections less than 0.4 inches is generally a straight line. Based on the average pile load for dead plus live load, we calculated the movement required for supporting the pile load by linear interpolation as:

Settlement (inches) = Average pile load *0.4" / Ultimate capacity

Once the settlement under a single pile was estimated, we obtained a group factor using the formula by Vesic' (1977) as follows:

Equivalent Group Width = B = (length x width)$^{1/2}$

Group Factor = (B/b) $^{1/2}$

In which B = equivalent group width and b = pile width.

The appropriate calculations are shown in Attachment E-7 (See Figure 1).

13. Is live load used for pile settlement calculation? If so, explain. Note that LRFD guidelines do not include live load for assessment of consolidation settlement.

We used dead plus 50% live load, since the settlements of the stiff supporting soils are not consolidation / time dependent settlements.

14. LPILE graphic representation does not correspond to the specified pile tip elevation and hence pile depth depicted in Table 3D. Explain and reconcile.

Pile lengths for Abutments 1 and 3 for 14-in. square pre-cast pre-stressed piles are 63 and 58 feet, respectively, and analyses used a pile length of 54 feet. A critical length analysis (pile length versus top deflection in LPILE) indicates that there is no effect of pile length on deflection beyond a length of about 20 feet (See Figure 2). Therefore for abutment piles longer than about 20 feet, there is no effect on the lateral capacity of the pile.

Pile lengths for Bent 2 are 50 feet, and 50 feet was used in analyses. A critical length analysis (pile length versus top deflection in LPILE) indicates that there is no effect of pile length on deflection beyond a length of about 22.5 feet (See Figure 3). Therefore for bent piles longer than about 22.5 feet, there is no effect on the lateral capacity of the pile.

15. Foundation recommendations for abutment piles Tables 3C and 3E show only the design tip elevations for compression and settlement for Abutments 1 and 3 and is missing the design tip elevations for lateral load. Calculate the latter and revise tables accordingly.

A pile length of 1.25 times the critical length or about 25 ft is appropriate for lateral load at abutments (design pile tip elevation of El. +13.3 ft for Abut 1, and El. +7.8 for Abut. 3. For the bent, a pile length of 1.25 times the critical length or 28 feet is appropriate for lateral load (Tip Elevation of El. -7 feet). A revised Table 3C is included as Figure 4, revised Table 3D is in Figure 5, and revised Table 3E is shown as Figure 5.

16. Explain how design tips were calculated for lateral load and elaborate on the apparent inconsistencies between design pile tip elevations and actual calculations.

See response to questions 14 and 15.

17. How the values of group efficiencies for lateral pile capacity arrived at?

Reasonable values of average group p-multiplier (0.5) were selected from Caltrans Research Report GRG, Vol. 1, No. 6 and used for evaluating deflections for both transverse and longitudinal loading. The p-multiplier was taken as 0.75 for the leading row of piles to determine maximum bending moment in the group.

18. Explain why the group efficiency for both transverse and longitudinal loading was not incorporated in the calculation and /or text of the subject report?

See Response to Item 17.

19. What are the construction concerns and issues related to water quality during construction? Elaborate.

No dewatering or groundwater is anticipated in construction. Proper use of standard BMPs will be implemented to keep sediment from entering storm drains during grading.

20. How ground slope was incorporated into the abutment pile lateral analysis in the longitudinal direction and why.

Abutment footings are on a pile cap founded within a 1.5h:1v slope. When the abutment piles are subjected to lateral loads in the downslope (longitudinal) direction, the sloping ground results in reduced passive soil resistance on the side of the piles compared to level ground conditions, and therefore it is appropriate to include this in the analysis model. This is modeled in LPILE p-y curves, using the sloping ground reduction described in the LPILE technical manual. A ground slope of 33.7 degrees was included in the analysis to model the 1.5h:1v slope.

REFERENCES

Caltrans, Research Notes, The GeoReserach Group, May 2003, GRG Vol.1, No.6, "Lateral Load Tests Of Pile Groups Lead to Improved Design Recommendations."

Theissen, J. R. and Wood W. C., "Vibrations in Structures Adjacent to Pile Driving," Engineering Bulletin 60, Dames and Moore, Los Angeles, July 1982.

Vesic', A. S., "Design of Pile Foundations, National Cooperative Highway Research Program, Highway Synthesis of Highway Practice, 42," Transportation Research Board, National Research Council, Washington, D.C., 1977.

The following are attached and completes our response:

Figure 1	Settlement Calculations (from Attachment E-7)
Figure 2	Critical Length for Lateral Deflection, Abutment Piles
Figure 3	Critical Length for Lateral Deflection, Bent Piles
Figure 4	Revised Table 3C
Figure 5	Revised Table 3D
Figure 6	Revised Table 3E

Attachment 1	Caltrans Comments dated March 26, 2009
Attachment 2	Vibrations from Pile Driving (Theissen & Wood, 1982)

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

Distribution: Addressee (1 electronic PDF file via e-mail)

FIGURES

CALCULATION OF PILE GROUP SETTLEMENT

Bolsa Chica Bridge

Abutments

Ultimate Capacity for El. −21 ft tip.

$= 205 * 2 = 410$ Kips

Settlement to mobilize

Ultimate capacity = 0.2 to 0.4 inches

say = 0.4 inches.

Settlement to mobilize

dead + 50% LL (118 Kips) $= \frac{118}{410} * 0.4 = 0.115$

Group Size = $9' * 153'$

Eq. Grp = $\sqrt{9 * 153} = 37'$

Group factor $J = \sqrt{\frac{37}{1.16}} = 5.6$ (Vesić, 1977)

Group Settlement = $5.6 * 0.115 = 0.64 < 1"$

O.K.

Bents

Ult. Cap. = 412 Kips.

settlement to mobilize Ult. Cap = 0.4"

dead + 50% LL. $= \frac{6820 - 5535}{2} + 5535$

$= 6177$ Kips

Per Pile $= \frac{6177}{58} = 107$ Kips.

Settlement to mobilize 107 Kips $= 0.4 \times \frac{107}{412} = 0.10"$

Group Size Widths $= \sqrt{13.5 * 120} = 40.2'$

Group factor $= J = \sqrt{\frac{40.2}{1.16}} = 5.9$

Group settlement $= 0.1 * 5.9$

$= 0.59" < 1"$ OK

FIGURE 1

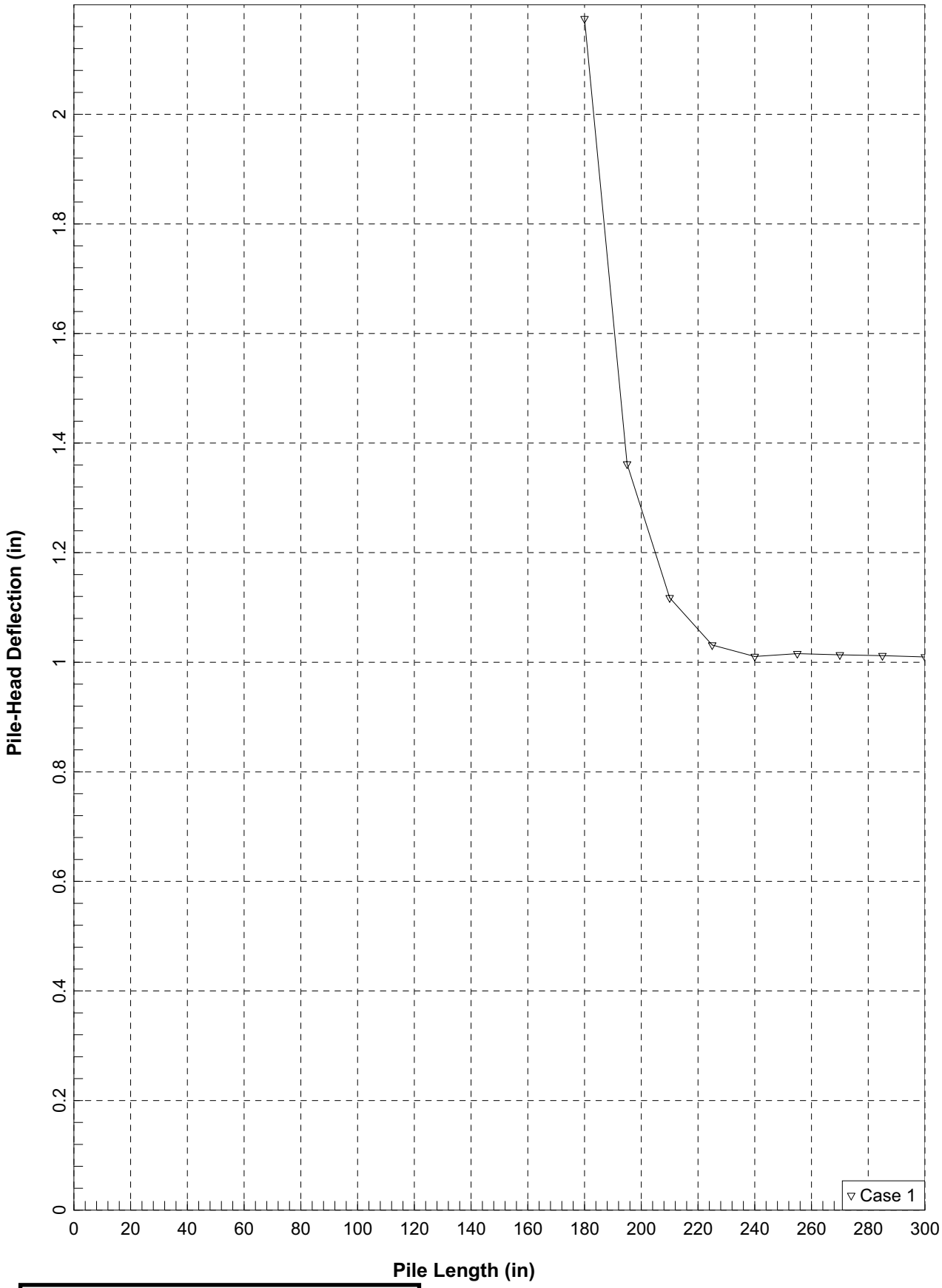


FIGURE 2

Bolsa Chica Abut trans p=0.5 Lcrit.pdf

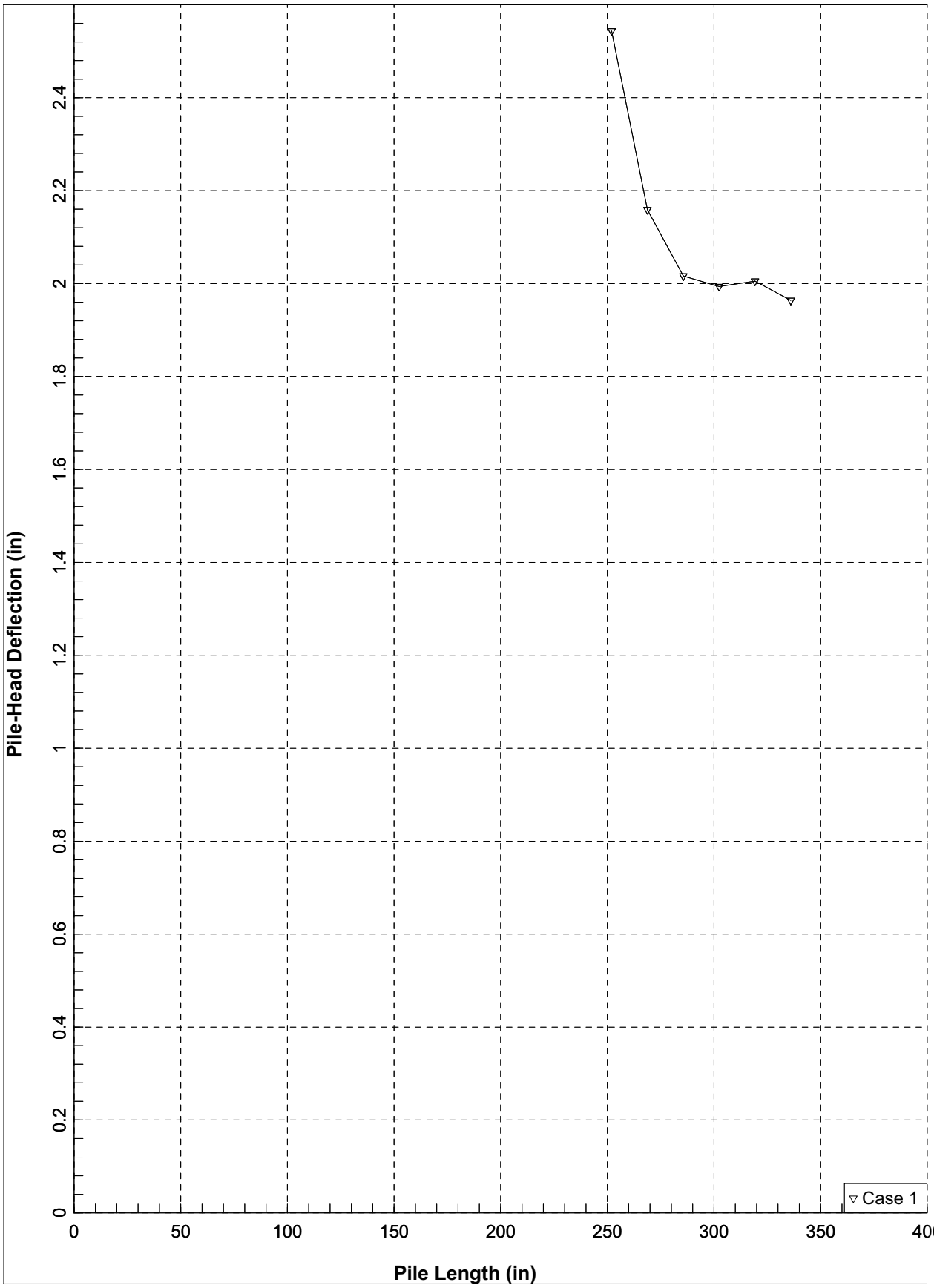


FIGURE 3

Bent 2 Strong Direction p=0.5 Lcrit.pdf

Table 3C. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support	Pile	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required[3] (kips)
			Total	Perma-nent					
Abut 1	Class 200, Alt "X"	38.6	6210	3695	170	340	-25.0 (a), -25.0 (c), +13.3 (d)	-25.0	400
Abut 3	Class 200, Alt "X"	33.1	6080	3635	170	340	-25.0 (a), -25.0 (c), +7.8 (d)	-25.0	400

Notes:

1. Design tip elevations are controlled by: a) compression, (c) settlement, (d) lateral load, respectively. Settlement was verified to be less than 1 in. at design penetration.

2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.

3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (liquefiable) which do not contribute to the design resistance.

4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3D. Foundation Recommendations for Bents

Bent Foundations Design Recommendations												
Support Location	Pile Type	Bottom of Footing Elevation (ft)	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required[3] (kips)
						Strength Limit		Extreme Event				
						Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)			
Bent2L	HP 14x117	21.5	22.0	6820	1	240	0	160	0	-28.4 (a), -28.4 (c), -7.0 (d)	-28.4	400
Bent 2R	HP 14x117	21.5	22.0	6820	1	240	0	160	0	-28.4 (a), -28.4 (c), -7.0 (d)	-28.4	400

Notes:

1. Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) settlement, (d) lateral load. For settlement penetration, it was verified that settlement is less than 1 inch.

2. The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.

3. The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (liquefiable) which do not contribute to the design resistance.

4. Design tip elevation for Lateral Load is typically provided by SD.

Table 3E. Pile Data Table

Pile Data Table						
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 200, Alt "X"	340	0	-25.0 (a), -25.0 (c), +13.3 (d)	-25.0	400
Bent 2	HP 14x117	240	0	-28.4 (a), -28.4 (c), -7.0 (d)	-28.4	400
Abut 3	Class 200, Alt "X"	340	0	-25.0 (a), -25.0 (c), +7.8 (d)	-25.0	400

Notes:

*1. Design tip elevations for **Abutments** are controlled by: (a) Compression, (c) Settlement, (d) Lateral Load.*

*2. Design tip elevations for **Bents** are controlled by: (a) Compression, (b) Tension, (c) Settlement, (d) Lateral Load*

3. Nominal design resistance was selected to obtain required penetration below liquefiable layers.

ATTACHMENT 1
CALTRANS COMMENTS DATED March 26, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: March 26, 2009

FILE: 12 ORA 22 0.92
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: February 12, 2009 Bolsa Chica Road OC (Replace)
Structure Name

GENERAL PLAN DATED: February 23, 2009 FDN PLAN DATED: February 23, 2009 12-071621 55-1102
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Foundation Report, Bolsa Chica Road OC (Replace), Bridge No. 55-1102, Orange County, California", prepared by Group Delta Consultants, Inc, dated February 12, 2009 and submitted to our office on February 26, 2009. In our review, we made reference to the following:

- "Structure Foundation Report, Bolsa Chica Road OC (Replace), Bridge No. 55-1102, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 24, 2008.
- "Caltrans Review Comments Memorandum," prepared by OGDS-1, dated January 16, 2009."

We have the following comments:

1. Is LRFD Design Guidelines 4th edition, dated 2007 used for design? If not, explain.
2. LOTB must have the name of the Caltrans OSFP liaison engineer and the corresponding info, revise accordingly. (Refer to Caltrans Email correspondence on March 13th , 2009)
3. LOTB must have the subsurface conditions Profile and the Plan both included on the same sheet. (Refer to Caltrans Email correspondence on March 13th, 2009).
4. Include in tabulated form in the Appendix a summary of the laboratory tests results, tables should include Boring number, sample number, depth, soil type, Moisture content, dry density, grain size distribution (Gravel Sand, Fine %), Atterberg Limit. A Separate Table for the Strength tests, including boring number, sample type, depth, soil type, strength. Finally a table for consolidation test results that includes boring number, sample number, depth, soil type, t50, t90, Cc, Cr, Ccε, Crε,e0 and σ'p.
5. Table 1 summarizes the recommended design properties. Explain in section 3.3.3 of the subject submittal, how the strength parameters (both drained and undrained) and internal friction angles were evaluated.
6. Are the consolidation coefficients found based on Consolidation tests (direct method) or by correlation (indirect method)? Explain.
7. Explain why no Triaxial tests were performed to assess the strength of the soil. Please refer to 2007 LRFD Design Specification Guidelines, Section 10.4.6.2.2.
8. What does *Method 2* refer to in the CPT liquefaction calculations? Explain.

9. Are there any facilities nearby the pile driving activities and if so, what is the impact of the pile driving vibration on these facilities, both airborne and in ground? Explain.
10. How the Nominal Driving Resistance was arrived at?
11. Explain how you are planning to drive the concrete piles through the extremely high blow count material, if the piles do not punch through these very dense soil layers? Elaborate.
12. It is not clear to the reviewer how the settlement was calculated for the piles. Provide calculation and elaborate.
13. Is live load used for pile settlement calculation? If so, explain. Note that LRFD guidelines do not include live load for assessment of consolidation settlement.
14. LPILE graphic representation does not correspond to the specified tip elevation and hence the pile depth depicted in table 3D. Explain and reconcile.
15. Foundation recommendation for abutment piles, Tables 3C and 3E show only the design tip elevations for compression and settlement for Abutments 1 and 3 and is missing the design tip elevations for lateral load. Calculate the latter and revise the Tables accordingly.
16. Explain how the pile tip elevations were calculated for the lateral load and elaborate on the apparent inconsistencies between the design pile tip elevations and the actual calculations.
17. How the values of group efficiencies for lateral pile capacity were arrived at?
18. Explain why the group efficiency for both transverse and longitudinal loading was not incorporated in the calculation and/or text of the subject report?
19. What are the construction concerns and issues related to the water quality during construction? Elaborate.
20. How ground slope was incorporated into the abutment pile lateral analysis in the longitudinal direction and why?

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, Ph.D.; P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

ATTACHMENT 2
VIBRATIONS FROM PILE DRIVING (THEISSEN & WOOD, 1982)

SCAN + SAVE IN:
N:\ADMIN\Resources\Vibrations in Structures Adjacent to Pile Driving (Thiessen+Wood, 1982).pdf

Toms. 818-996-9738

PDF I-39 Return to Karl

01 Return to my desk. Karl

Vibrations in Structures Adjacent to Pile Driving

Comparison of 10 case histories provides guidelines for gauging potential effects of various pile hammers on soft and firm soil sites.

By John R. Theissen and William C. Wood

INTRODUCTION

The effect of construction activities at a given property on adjacent properties is a significant consideration of environmental impact statements used to obtain construction permits from local governments and agencies. Disruption of business and trade, blocked access, dust and dirt are typical problems associated with construction. In addition, a significant number of large construction projects also involve pile driving, resulting in noise and vibrations. Such vibrations may cause architectural or structural distress to adjacent structures, damage to building contents, and may also result in the densification of cohesionless soils with ompanying settlement of building otings, floor slabs and walls.

This paper provides a discussion of the authors' experience in monitoring construction vibrations adjacent to pile-driving projects in San Francisco and provides a comparison of the data obtained from these projects with published vibration attenuation and damage criteria. The case studies discussed in this article encompass 10 projects for which vibration levels were measured in buried structures, buildings supported on piles and spread footings, and on the ground or pavement at some of the sites. The data obtained are principally for impact pile drivers and concrete piles, but some data for sheet piles driven with vibratory hammers are included.

In each of the 10 case histories, the purpose of vibration monitoring was to assess vibration levels, usually within a structure, and to gauge the potential for damage or distress in adjacent structures or facilities. Most of the structures monitored were supported on piles or on footings on very dense soils and thus were not subject to settlements resulting from soil densification. Therefore, it was assumed that any damage produced during pile driving was probably due to construction vibrations rather than associated settlements.

CASE STUDIES

The 10 projects studied are all located in the City of San Francisco as indicated in Figure 1. Six of the projects are in the downtown area near Market Street, an area of major high-rise construc-

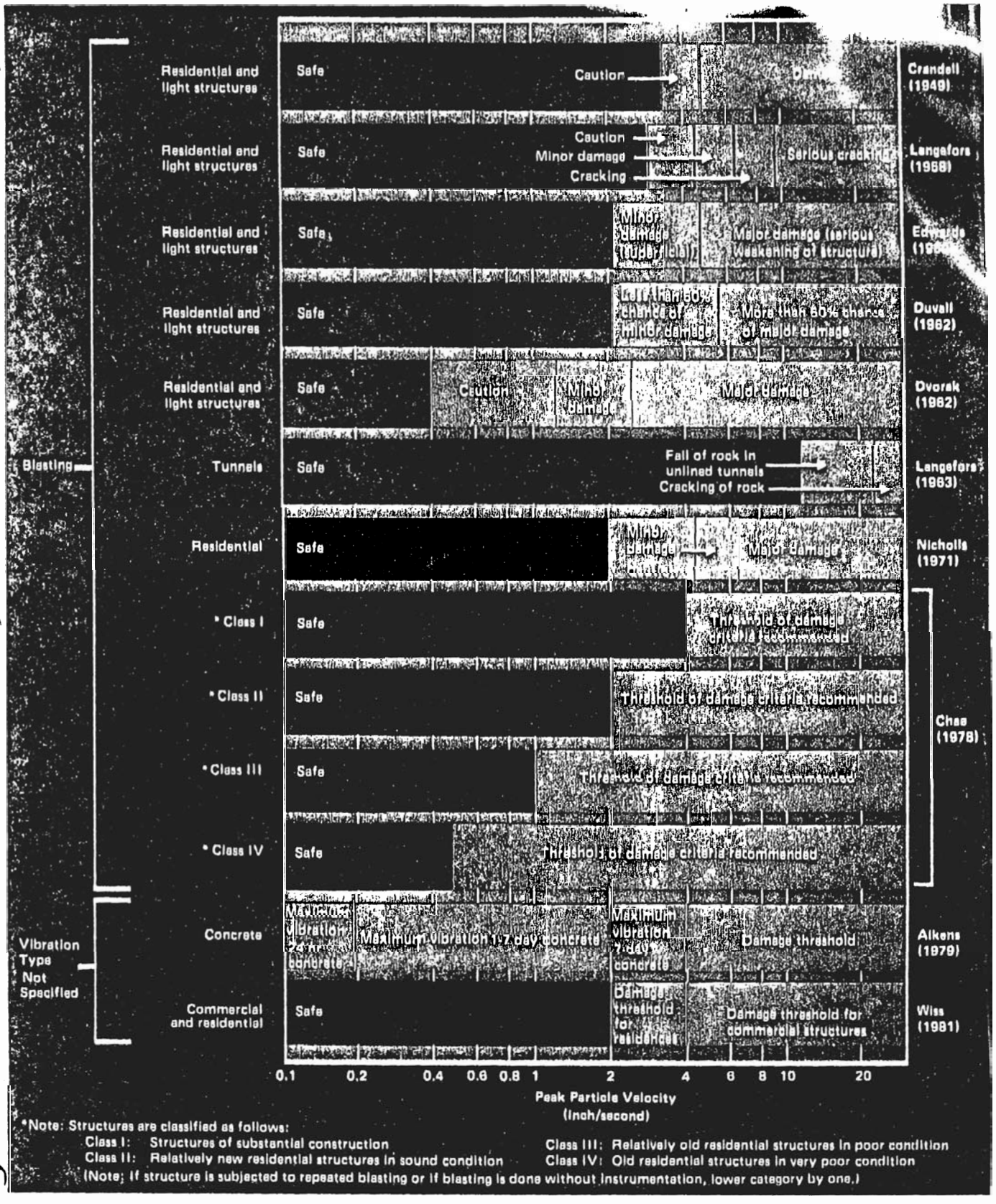


Figure 5. Observed or anticipated damage thresholds.

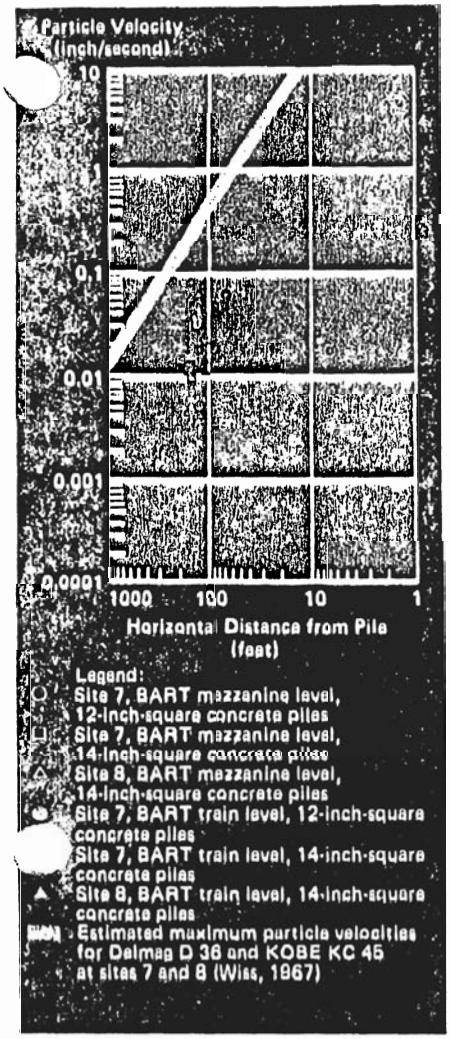


Figure 9. Observed particle velocities in underground structures at soft soil sites, using impact pile drivers.

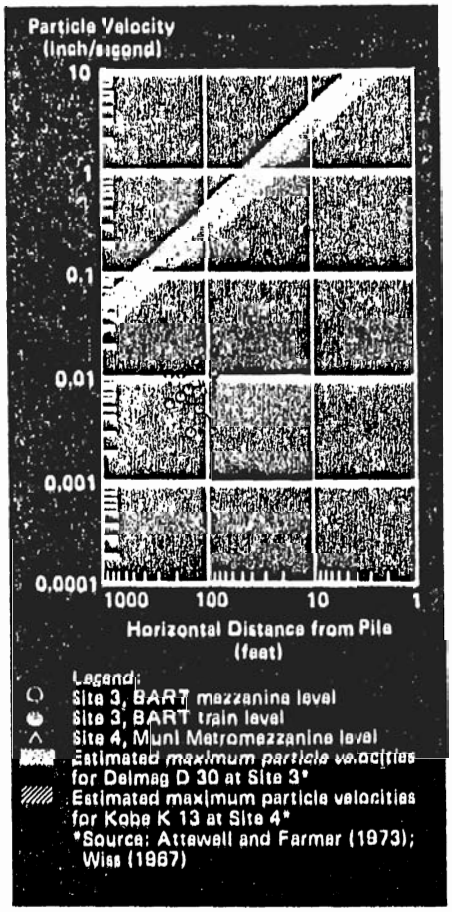


Figure 10. Observed particle velocities in underground structures at firm soil sites, using impact pile drivers.

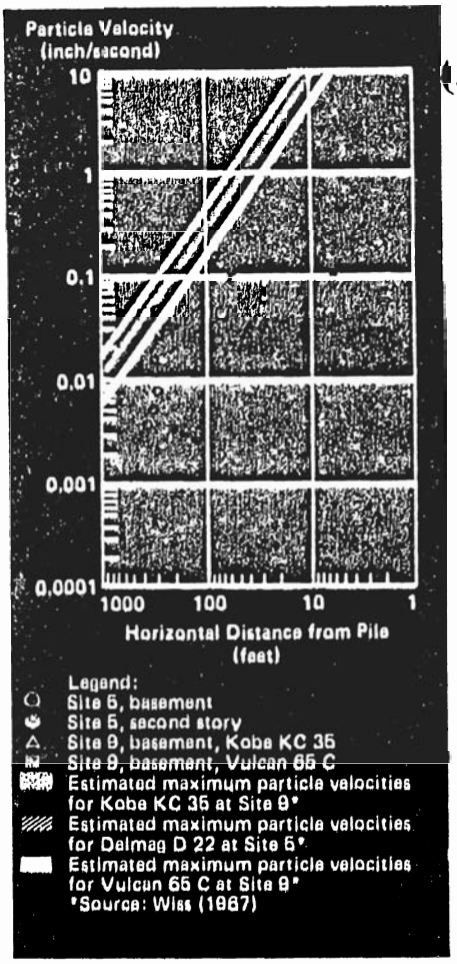


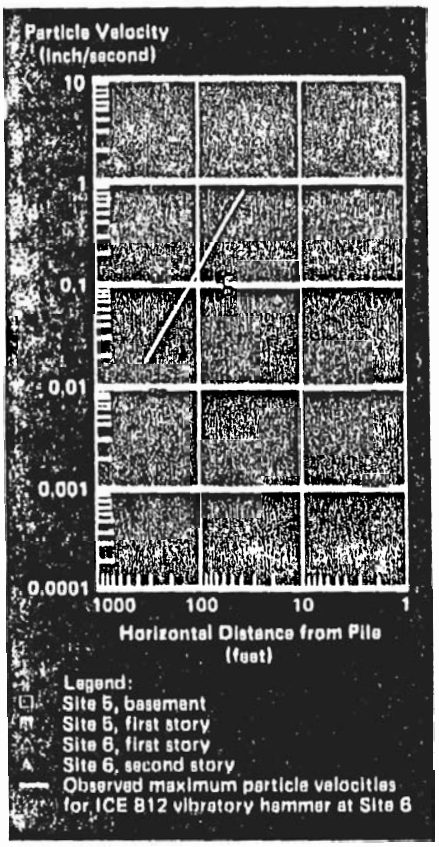
Figure 11. Observed particle velocities in buildings at soft soil sites, using impact pile drivers.

of the observed peak particle velocities may be approximated by a geometrical-damping coefficient having a value of about 0.9. This corresponds with the general attenuation relationship given by Wiss (1967) for dry or wet sands and the damping coefficient of 1 presented by Attewell and Farmer (1973) for firm soil sites. It thus appears that a geometrical-damping coefficient on the order of about 1 would be suitable to model vibration attenuation at similar firm soil sites.

In observing vibrations in relatively massive underground structures, such as BART and Muni-Metro stations, some observations may be made regarding anticipated and observed peak particle velocities. Measured maximum peak particle velocities for underground structures at two soft soil sites are presented in Figure 9. Also shown in this figure are estimated maximum surface particle velocities developed from curves for clays presented by Wiss (1967). Figure 10 presents the peak vibration velocities measured in similar underground structures adjacent to two firm soil sites as well as estimated curves for maximum particle velocities at ground surface developed from information for dry sand presented by Attewell and Farmer (1973) and Wiss (1967).

Comparison of the measured velocity data and predicted particle velocities indicates that use of published velocity/attenuation curves to predict particle velocities in such massive underground facilities may result in an over estimation of velocities by about a factor of 10. Causes for such differences in vibration levels could not be ascertained from the limited data available, but it is suspected that the differences were due to a combination of structural damping and attenuation of the wave energy below ground surface. It should be noted that observed particle velocities in the structures were well below 2 inches per second, and no damage was observed at the monitored locations.

In observing peak particle velocities in commercial structures of varied construction, similar reductions in peak particle velocities were noted. Figures 11 and 12 present observed particle velocities in pile-supported buildings on soft soil sites where impact and vibratory hammers were used, respectively. As with Figures 9 and 10, estimated maximum particle velocities for impact pile drivers have been superimposed on Figure 11, and the velocity attenuation curve for the



gure 12. Observed particle velocities in buildings at soft soil sites, using vibratory pile drivers.

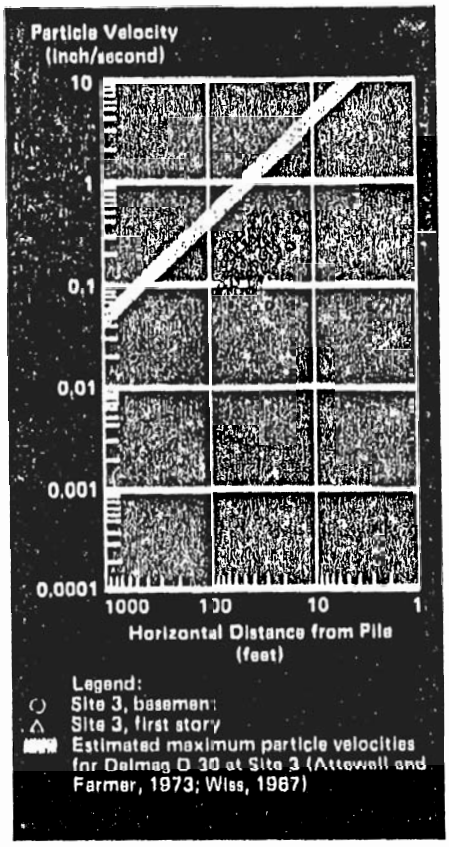


Figure 13. Observed particle velocities in buildings at firm soil sites, using impact pile drivers.

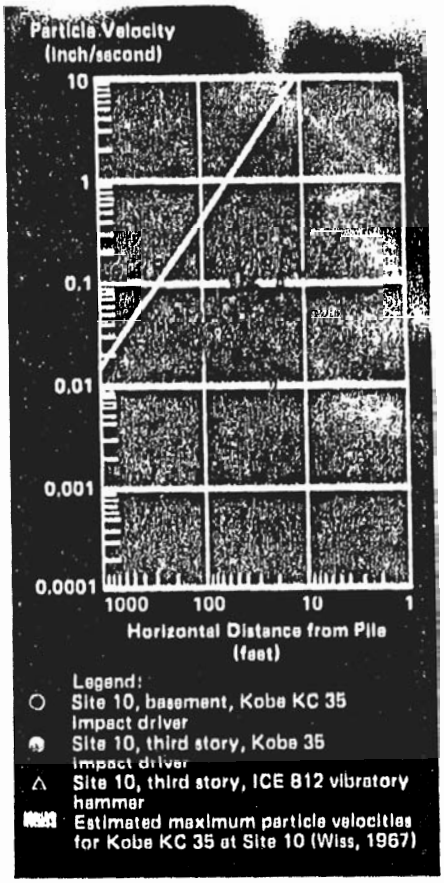


Figure 14. Observed particle velocities in buildings at soft soil sites, using impact and vibratory pile drivers.

ICE 812 Hammer from Figure 7 has been superimposed on Figure 12. Comparison of the observed structural vibrations and observed or estimated ground motions indicates that vibration levels within such substantial buildings may be only one-half of or less than those on surrounding ground surfaces. A similar relationship for such structures located on firm soil sites is shown in Figure 13.

Figure 14 presents observed peak velocities in a reinforced concrete building at Site 10 (a soft soil site), where the greatest number of measurements were obtained. An estimate of maximum peak ground surface accelerations, developed from information presented by Wiss (1967), is also shown for the Kobe KC 35 pile driver used at the site. Figure 14 illustrates the same trends of structure-attenuated velocities as shown in Figures 11, 12, and 13. In addition, there are sufficient data to indicate a rate of attenuation similar to that expected at ground surface. Comparison of vibration data from basement and third-story monitoring locations indicates little discernable difference in vibration levels; this trend is similar to that observed in comparing vibration levels in the basement and first-floor levels in the structure at Site 3.

In addition to the recorded observations, some general observations have also been made during these studies. While general vibration levels did not vary significantly from floor to floor in the monitored structures, as noted previously, significant variations in vibration levels did occur, depending on whether the sensors were placed next to columns or walls. Maximum vibrations were usually observed in the middle of column bays probably due to resonant vibration of the floor slab.

In addition, vibration levels from sheet pile driving were at least as severe as driving of bearing piles with impact hammers and, in some cases, such vibrations were significantly more severe. Due to the continuous nature of such vibrations, they were typically more objectionable to building occupants. Generally, the authors found that vibrations from driving sheet piles could be significantly reduced by driving only one sheet pile at a time or by substituting an impact hammer for a vibratory hammer.

In general, measured vibration levels in these studies were much lower than those predicted for damage, primarily due to the distance from the pile driving to the buildings. At only two sites (Sites 9 and 10) was pile driving sufficiently close to the structure to expect that vibration levels would reach 2 inches per second at the building wall. At Site 9 some damage was observed in the light, reinforced concrete structure, which was noted as being in poor condition initially; however, such damage was relatively minor, consisting of a cracked mirror and tilted door frame. At Site 10, the substantial concrete structure did not suffer any noticeable damage, although paint flaking and some slight cracking of an associated

FIRST ROUND
Response to Caltrans Review Comments
And
Caltrans Comments

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

February 10, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments**
Structure Foundation Report
BOLSA CHICA ROAD OC (REPLACE)
BRIDGE NO. 55-1102
12-ORA-22-PM0.92, EA 12-071621
ORANGE COUNTY, CALIFORNIA
Report Dated October 24, 2008
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Revise the title in the subject report: "Structure Foundation Report…" to "Foundation Report …"

The requested change has been made in the revised report.

2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.

The requested change has been made in the revised report.

3. Section 1.1.5 Design Foundation Sizes and Loads. No need for inclusion of this subsection and Table in the section.

We have deleted this section and the table.

4. Include a Figure describing Site Location Map in Section 1.

The site vicinity map (Figure 1) is included in Figures at the end of report, and is referenced in Section 1.0.

5. Revise section 2 title "Field and Laboratory Investigations" to "Field Investigation and Laboratory Testing"

The requested change has been made in the revised report.

6. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).

The requested table is included in Appendix A, Table A-1. We have added a sentence in the revised report directing the reader to this table.

7. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).

A complete description of the tests, their purpose, and ASTM / CT test numbers are included in Appendix B. The reader is referred to Appendix B in Section 2.2.

8. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.

The Exploration Location Plan (Figure 3) is included in Figures at the end of report, and is referenced in Section 2.1.

9. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.

The borings and CPTs were surveyed and the locations and elevations have been updated in Appendix A and in the LOTB in the revised report and plans.

10. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per comment No.10.

Refer to our response to Comment 9.

11. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

The requested change has been made in the revised report.

12. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?

The requested information is included in Section 3.3.2.2. The high historical groundwater contour map is included in Figure 6 at the end of the report, and is consistent with our recent data at the site. The reference in the text has been changed to CDC.

13. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion, and friction angle.

The tabulated idealized soil profile containing the requested information is included in Table 1 at the end of the report, and is referenced in Section 3.3.3.

14. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.

The graphic soil profile is included in Figure 5B at 11x17" size at the end of the report and is referenced in Section 3.3.3.

15. There is no reference to LRFD and WSD design methods in calculating the Bent and abutment piles respectively, in the subject report, explain.

This was indicated (but not explicitly stated) in the table in Section 1.1.5 (now deleted per Comment 3). We have added a statement clarifying this fact in Section 4.4.2, New Foundations.

16. Refer to 2008 Caltrans Memo to Designers for the LRFD design of piles. The latter information was emailed by Caltrans OGDS-1 to the respective consultant designers and was also discussed during the geotechnical focus and PDT meetings.

At the time of our report this section of MTD had not been updated on the website. We have revised the report to follow the 2008 MTD.

17. Include tables for the Foundation Design Data Sheet, Foundation Design Loads, Foundation Recommendations and Pile Data Sheet, per 2008 LRFD Caltrans Memo to Designers.

Refer to our response to Comment 16.

18. Include the Nominal Driving Resistance in the appropriate section of the tables cited above and explain how it was arrived at.

The requested change has been made in the revised report.

19. Concrete class 200C is recommended in the subject report: Class C piles are no longer part of Caltrans Standard Plans. Project Standard Special Provisions need to discuss the corrosion remediation for the piles.

The reference has been corrected in the revised report. We will coordinate with Parsons to address in the SSPs.

20. Include a section on static settlement criteria during construction and BEFORE commencement of pile driving, where appropriate.

This information was included in the third paragraph of Section 4.5, Approach Fill Earthwork.

21. Settlement monitoring for the embankment should be discussed and included in the construction consideration.

Settlement monitoring was recommended in the third paragraph of Section 4.5, Approach Fill Earthwork. We have added a bullet to Construction Considerations, Section 4.9 in the revised report.

22. Include backup data for the Corrosion in the Appendix.

Corrosion test results are presented in Section B.7, Table B-2 of Appendix B.

23. Discuss the settlement of piles and explain how they were arrived at.

We have added a discussion of pile settlement as Section 4.4.2.4, and changed Pile Installation to Section 4.4.2.5 in the revised report.

24. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report. Included in the CD should also be the input files and output files for LPILE software lateral pile capacity.

The requested items are submitted along with the revised report.

25. Why LPILE version 5 (latest) was not used for the lateral pile capacity calculations and an outdated LPILE 4 is used.

At the time of our report we were using LPILE Plus 4.0. The sand and clay p-y curves and the finite difference beam on elastic foundation model have not changed since the original version of LPILE except some additional features which we have not used. Future calculations will utilize Version 5.0. A sample calculation using both versions 4.0 and 5.0 is provided.

26. Provide the slope stability using SLIDE program, provide the input and output files.

GDC does not currently possess the requested software. We have used PCSTABL5M, which is well documented and appropriate software for slope stability analysis. We have ordered the SLIDE program to meet Caltrans request for future projects.

27. Provide axial pile capacity by sample hand calculation verification or a sample spreadsheet where it can be verified by Caltrans OGDS-1.

The requested information is included in the revised report.

28. The data for the GRLWEAP is not referenced and/or is not made available for our review, include the latter.

The GRLWEAP analysis for an assumed Delmag D36-32 hammer is included with the revised report. Production driving criteria will be developed from the indicator program, using the actual driving equipment selected by the contractor, Pile Driving Analyzer (PDA) measurements, CASE method, and CAPWAP method.

29. Elaborate and expand on drivability of the recommended piles, based on the recommendations of the report cited in comment No. 28.

The requested information is included in the revised report.

30. Pile Data Table shown on the plans, is missing the pile types.

We will coordinate with Parsons so that the pile data table is corrected, including updating to the 2008 Memo To Designers.

31. Why Pile Data Table is not shown on Sheet 4 of 24 and is instead shown on Sheet 5 of the subject submittal bridge plans.

We will coordinate with Parsons to address the question.

The following is attached and completes our response:

Attachment 1 Caltrans Comments dated January 16, 2009

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 609-1020.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: Addressee (1 electronic PDF file via e-mail)

ATTACHMENT 1
CALTRANS COMMENTS DATED JANUARY 16, 2009

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. SUDHAKAR VATTI
Office of Special Funded Projects (OSFP)
Attention: Mr. SUDHAKAR VATTI
Fax: (916) 227-8683

DATE: January 16, 2009

FILE: 12 ORA 22 0.92
District County Route Post mile

FDN REPORT BY: Group Delta Consultants, Inc DATED: October 24, 2008 Bolsa Chica Road OC (Replace)
Structure Name

GENERAL PLAN DATED: October 27, 2008 FDN PLAN DATED: October 27, 2008 12-071621 55-1102
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Structure Foundation Report, Bridge No. 55-1102, Orange County, California", prepared by Group Delta Consultants, Inc, dated October 23, 2008 and submitted to our office on December 9th, 2008.

We have the following comments:

1. Revise the title in the subject report: "Structure Foundation Report…" to "Foundation Report …"
2. Include a paragraph for the total number of bridge structures within the project limit and refer in general to the other structures such as walls, etc…) when describing the project.
3. Section 1.1.5 Design Foundation Sizes and Loads. No need for inclusion of this subsection and Table in the section.
4. Include a Figure describing Site Location Map in Section 1.
5. Revise section 2 title " Field and Laboratory Investigations" to " Field Investigation and Laboratory Testing"
6. Include a table in the "field investigation and laboratory testing section" that includes the boring/CPT information, with station, offset, elevation for top and bottom of the boring, ground water and the exploration method (i.e. rotary wash, etc…).
7. Include a Table in Section 2 to describe the type of laboratory test, the corresponding ASTM or CT test method, its purpose and results location (refer to the appropriate Appendix).
8. Include a Figure in the field investigation and laboratory testing that depicts the boring and CPT Location Map.
9. The elevation for the boring and CPT must be based on field survey, it is indicated in the subject report that the elevations have been approximated and not surveyed. Also, refer to the PDT meeting minutes.
10. Revise the Log of Test Borings (LOTB) sheets in the Bridge Plan accordingly, per comment No.10.
11. Include a Section on Geology that is comprised of Physiography, Geologic Structure, Stratigraphy and Geologic Hazards subsections.

12. Revise and/or complement groundwater information in the subject report by referring to the California Department of Conservation (CDC). Is the information provided in the subject report consistent with CDC?
13. Include an idealized soil profile and strength parameters in a tabulated form in Section 3 of the subject report. The table should have information about elevation, soil type, unit weight, cohesion and friction angle.
14. Include an Idealized Soil Profile Figure (sheet size : 8.5 by 14) in Section 3 that depicts graphically the CPT , boring data, the proposed foundation top and bottom elevation and support locations.
15. There is no reference to LRFD and WSD design methods in calculating the Bent and abutment piles respectively, in the subject report, explain.
16. Refer to 2008 Caltrans Memo to Designers for the LRFD design of piles. The latter information was emailed by Caltrans OGDS-1 to the respective consultant designers and was also discussed during the geotechnical focus and PDT meetings.
17. Include tables for the Foundation Design Data Sheet, Foundation Design Loads, Foundation Recommendations and Pile Data Sheet, per 2008 LRFD Caltrans Memo to Designers.
18. Include the Nominal Driving Resistance in the appropriate section of the tables cited above and explain how it was arrived at.
19. Concrete class 200C is recommended in the subject report: Class C piles are no longer part of Caltrans Standard Plans. Project Standard Special Provisions need to discuss the corrosion remediation for the piles.
20. Include a section on static settlement criteria during construction and BEFORE commencement of pile driving, where appropriate.
21. Settlement monitoring for the embankment should be discussed and included in the construction consideration.
22. Include backup data for the Corrosion in the Appendix.
23. Discuss the settlement of piles and explain how they were arrived at.
24. Provide the calculations in a separate volume. Include a CD a sample for all the actual spread sheets used for calculation. These spread sheets are subject to review and verification by Caltrans to insure the validity of the calculations shown in the spread sheets in the subject report. Included in the CD should also be the input files and output files for LPILE software lateral pile capacity.
25. Why LPILE version 5 (latest) was not used for the lateral pile capacity calculations and an outdated LPILE 4 is used.
26. Provide the slope stability using SLIDE program, provide the input and output files.
27. Provide axial pile capacity by sample hand calculation verification or a sample spreadsheet where it can be verified by Caltrans OGDS-1.
28. The data for the GRLWEAP is not referenced and/or is not made available for our review, include the latter.
29. Elaborate and expand on drivability of the recommended piles, based on the recommendations of the report cited in comment No.28.
30. Pile Data Table shown on the plans, is missing the pile types.
31. Why Pile Data Table is not shown on Sheet 4 of 24 and is instead shown on Sheet 5 of the subject submittal bridge plans.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

FOUNDATION REPORT
OVERHEAD SIGN FOUNDATIONS
NOS. 31,41,72,82,83,103,104,113,115,121,143,152,153,161
PM 22-0.84,405-20.66,20.89,21.08,21.22,21.59,21.52,
21.78,21.91,22.07,22-1.99,1.76,1.81,1.51
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
2-ORA-22 PM R0.7/R2.9: 405 PM 20.4/22.3, EA 071621
ORANGE COUNTY, CALIFORNIA

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
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Prepared By:

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GDC Project No. I-436
February 12, 2009
(Revised April 24, 2009)

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

February 12, 2009 (Revised April 24, 2009)

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Jason Majzoub

Subject: **Foundation Report**
Overhead Sign Foundations
Nos. 31,41,72,82,83,103,104,113,115,121,143,152,153,161
PM 22-0.84, **405-**20.66, 20.89, 21.08, 21.22, 21.59, 21.52, 21.78, 21.91, 22.07, **22-**1.99, 1.76, 1.81, 1.51
West County Connector Project
I-405/SR-22 HOV Connector Segment
12-ORA-22 PM R0.7/R2.9: 405 PM 20.4/22.3, EA 071621
Orange County, California
GDC Project No. I-436

Dear Jason:

We are transmitting with this letter eight copies of our Foundation Report for the proposed overhead sign foundations on the subject project. This report presents the results of our field and laboratory investigations, and provides recommendations for the foundation design of the proposed Signs. This report has been modified to incorporate Caltrans comments (see Appendix E).

We appreciate the opportunity to work with you on this important and challenging project. Should you have any questions, please give us a call at (949) 609-1020.

Very truly yours,
GROUP DELTA CONSULTANTS, INC.

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Distribution: Addressee (8 hard copies and PDF file on CD)

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FOUNDATION REPORT
OVERHEAD SIGN FOUNDATIONS
WEST COUNTY CONNECTOR PROJECT
I-405/SR-22 HOV CONNECTOR SEGMENT
12-ORA-22-PM20.91, EA 071621
ORANGE COUNTY, CALIFORNIA

1.0 INTRODUCTION

1.1 General

Orange County Transportation Authority (OCTA) in cooperation with Caltrans proposes to construct Phase 2 improvements for the SR-22 freeway and interchanges at SR-22 / I-405 / I-605 in Orange County. The overall project name is "West County Connector Project" and the proposed project has been divided into 2 segments. The easterly segment, "I-405/SR-22 HOV Connector Segment," extends from Valley View Street to just east of Seal Beach Boulevard, and the westerly segment, "I-405/I-605 HOV Connector Segment," extends from just east of Seal Beach Boulevard to the I-605 interchange. The overhead sign foundations addressed in this report are part of the easterly segment. The site location and locations of the proposed signs are shown on the Vicinity Map in Figure 1.

1.2 Purpose and Scope of Work

The purpose of our study is to investigate and document site geotechnical conditions and confirm the applicability of the proposed standard plan sign foundations. Our scope of work for this study included:

- Review existing data;
- Perform subsurface investigation including borings and CPTs;
- Perform laboratory testing on selected samples of the subsurface soils;
- Develop geotechnical engineering parameters and profiles at the sign sites;
- Perform geotechnical analyses;
- Develop geotechnical recommendations for design and construction of the signs; and
- Present the results of our investigations and our recommendations in this report.

The design and construction of the project will be performed in accordance with current Caltrans Standard Plans and Specifications. This report is structured in

general accordance with "Caltrans Guidelines for Foundation Investigation and Reports, Version 1.2 (dated June, 2002)."

1.3 Project Description

The length of main portion of the I-405/SR-22 HOV Connector Segment is approximately 2.1 miles along SR-22 and I-405, from just east of Valley View Street to just east of Seal Beach Boulevard (see Figure 1). In addition, from just east of Valley View Street to just east of Springdale Street, several signs are proposed which are outside the main project area. The purpose of the improvements is to improve the capacity of the I-405 / SR-22 Interchange and provide a High Occupancy Vehicle (HOV) direct connection between I-405 and SR-22. The project involves the following primary elements:

- Mass grading (cut and fill earthwork) to widen and re-align I-405, SR-22, local roads, and ramps;
- Replace 2 existing bridges (Bolsa Chica Road OC over SR-22 and 22/405 Connector Separation [to be renamed S405-E22 Connector Separation]), and construct a new HOV Connector bridge (405-22 HOV Connector Separation);
- New pavements for main lines, connectors, local roads, and on-/off-ramps;
- Standard Plan Retaining Walls (RW3311+3312 at east abutment of S405-E22 HOV Connector Separation);
- Pre-cast Lightweight Fill (PCLW) Retaining Walls (RW1325+1326 at west abutment of 405-22 HOV Connector Separation, RW1299+1300 at east abutment of 405-22 HOV Connector Separation, and RW3319+3320 at west abutment of S405-E22 HOV Connector Separation);
- Drainage improvements; and
- Lighting, roadside signs, and overhead signs (Sign Nos. 31, 41, 72, 82, 83, 103, 104, 113, 115, 121, 143, 152, 153, and 161).

This report addresses the overhead sign foundations. An overview of sign foundation locations is shown in Figure 1. A Key Map and Line Index showing overall project stationing and sheet layout is shown in Figure 2, and the sign plan is shown in Figures 2A through 2P.

There are a total of 14 overhead signs. The proposed signs include 12 panel signs and 2 changeable message signs, and the structures are single post or two post truss type. Proposed foundations consist of Cast-in-Drilled-Hole (CIDH) piles in accordance with 2006 Standard Plan Sheets S7, S8, and S14 (Appendix C). The CIDH piles are 5 feet in diameter with a square or round pedestal, and vary in

length based on post type in accordance with the Standard Plans. The sign type and details are shown on the Sign Detail sheets in Figures 3A through 3M. Table 1 presents a summary of the signs, including sign number, plan and detail sheet numbers, project route and station, foundation location in the roadway, sign and post type, CIDH pile details (ground elevation, pedestal type, pile diameter, pile standard length and tip elevation), and exploration numbers of borings and CPTs used for evaluating the subsurface conditions at the sign location.

2.0 FIELD AND LABORATORY INVESTIGATIONS

2.1 Field Investigation

2.1.1 Overall Site

The subsurface conditions at the overall project site were investigated by performing numerous borings and Cone Penetration Tests (CPTs). Details of the overall investigation are provided in the project Geotechnical Design Report (GDR). Borings from the overall site investigation were used to characterize groundwater levels and provide laboratory data for the overall site, and selected CPTs in the vicinity of the sign foundations were utilized for the sign foundation assessment. For this sign report, we utilized a total of 4 CPTs (CPT-08-006, 018, 117, and 118) and 2 soil borings from our overall site investigation (A-08-120 and R-08-004) to characterize sign-specific soil profiles for this report. The complete set of boring and CPT logs for the overall site investigation are presented in Appendix A of the project GDR. Due to the large volume of data, the entire set is not reproduced in this report, only the applicable boring and CPT logs utilized in this study are included. An overall summary of stations, offsets, elevations, and groundwater readings for all the borings and CPTs from the overall site investigation is included in Table A-1 of Appendix A.

2.1.2 Sign Investigation

Due to continued changes in locations of proposed signs, an additional 11 CPTs (CPT-09-122 through 132) were specifically performed for the latest location of sign structures. The locations of these explorations are shown in the sign plans in Figures 2A through 2P, and the boring / CPT logs are presented in Appendix A, and the stations, offsets, elevations, and groundwater data are summarized in Table A-1a of Appendix A. The borings and CPTs are also presented in the Log of Test Borings (LOTB) sheets in Plates 1 through 16.

2.2 Existing Data

One boring performed by GDC during Phase 1 of the SR-22 project near Springdale Street (B101) was utilized for groundwater and general soils data in the area east of the main project site. The boring log is presented in Appendix A.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings in the overall project site. Tests were conducted to develop index, engineering, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

Test	ASTM/CTM Designation	Purpose
• Moisture Content and Dry Density	ASTM D 2216	Soil Classification
• Grain Size Distribution (Sieve Analysis)	ASTM D 422	Soil Classification
• Percent Passing #200 Sieve	ASTM D 1140	Soil Classification
• Atterberg Limits	ASTM D 4318	Soil Classification
• Direct Shear	ASTM D 3080	Shear Strength
• Pocket Penetrometer		Undrained Shear Strength
• Soil Corrosivity (pH, sulfate, and chloride)	CT 422, 443 417, and 643	Corrosion Potential

Moisture content, dry density, percentage passing a No. 200 sieve, and the pocket penetrometer readings are shown on the boring logs in Appendix A. Detailed descriptions of the tests performed for the overall investigation and their results are presented in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Geologic Conditions

3.1.1 Physiography

The site is located in the Los Alamitos 7.5-minute quadrangle in the Orange County coastal plain. The Orange County coastal plain is bound on the north by the inferred trace of the Norwalk Fault Zone and the late Pleistocene fan deposits associated with the adjacent anticlinal hills of the Coyote Hills Uplift (Greenwood and Morton, 1990). The main body of this coastal plain is underlain by the broad, northwest-plunging synclinal Los Angeles Basin, which includes up to 4200 feet of

relatively unconsolidated Pleistocene marine and non-marine sediments (Greenwood, 1980b) and up to 170 feet of unconsolidated non-marine sediments (Fuller, 1980a). The Los Alamitos Quadrangle includes the broad southern margin of the Los Angeles Basin, which culminates abruptly with coastal hills and mesas associated with the Newport-Inglewood Uplift. This uplift of broadly warped coastal mesas, represented by Landing Hill and Alamitos Heights in the Los Alamitos Quadrangle, are composed of late Pleistocene marine terrace deposits which are covered with a veneer of older alluvium. To the southeast in the Newport Beach Quadrangle coastal mesas expose marine-terrace deposits, which are underlain by late Miocene to early Pleistocene marine sediments. The coastal mesas in the Los Alamitos Quadrangle are separated by Alamitos Gap, a deeply incised by antecedent drainage of the latest Pleistocene to earliest Holocene ancestral Rio Hondo and San Gabriel River. [Reference CDC, 1998].

3.1.2 Stratigraphy

The natural site geology consists of alluvial deposits associated with the San Gabriel River and Santa Ana River alluvial systems. The project lies entirely within the Orange County coastal plain of the southern portion of the Central Block of the Los Angeles Basin. The basin is infilled with up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments and up to 170 feet of poorly consolidated non-marine Quaternary and Holocene alluvial sediments consisting of loose to dense sands & gravels and soft to very stiff silts & clays. Stratigraphy consists of alternating layers of sands, silts, and clays. Shallow compacted roadway fills and abutment approach fills up to about 30 feet high have been placed in the area over the natural alluvial deposits, specifically at Springdale St OC, Bolsa Chica Road OC, and 405/22 Connector Separation bridge approaches. Relative density and stiffness of the alluvial soils generally increases with depth.

3.1.3 Geologic Structure

Since the bedrock is more than 4,000 ft deep, geologic structure at the site is not a design issue.

3.1.4 Geologic Hazards

Geologic hazards include landslides, expansive or collapsible soils, and seismic hazards include liquefaction, lateral spreading, seismic slope stability, fault rupture, tsunamis, and seismic shaking. Our assessment of the overall project site indicates that these potential hazards will not have an adverse impact on the

proposed sign foundations (refer to the project GDR for details). A list of nearby faults and seismicity is presented in Table 2.

3.2 Site Conditions

The overhead signs will be installed on the freeway shoulder or median, on relatively level ground or on ground with 2h:1v or flatter slopes less than 10 ft high. Sign No. 153 is in close proximity to an existing retaining wall, and a separate evaluation showed it does not adversely affect the wall (see Appendix F). Sign locations are shown in the sign plan, Figures 2A through 2P, and ground profiles and elevations are shown for each sign in the Sign Detail Sheets in Figures 3A through 3M.

3.3 Subsurface Soil Conditions

CPTs were used to accurately determine stratigraphy at the locations of sign foundations, and were confirmed and supplemented with data from borings. In general, soil conditions above the groundwater are generally stiff to hard clays and silts and medium dense to dense sands and silty sands. Below groundwater, soils are generally clays and silts ranging from firm to very stiff in consistency, interbedded with loose to dense sands and silty sands. Localized zones of soft clay 1 foot to several feet thick are present in the zone extending from the water table to about 15 feet below the water table. Below this clays are generally very stiff.

Plots of Standard Penetration Test blowcounts (N-Values) and Undrained Shear Strength (Su) from CPTs, supplemented where available by blowcounts and pocket penetrometer readings from nearby borings, were made for each sign structure. The SPT N-Value and Su profiles, along with groundwater elevation and the depth range of the CIDH piles, are shown in Figures 6A through 6N. For CPTs 130, 131, and 132, the evaluation of the average blow count was performed by an inspection of the CPT interpretation.

3.4 Groundwater

Based on California Department of Conservation (CDC) Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, historically highest reported groundwater is plotted between the 10 and 20 foot contours (see Figure 4). The reference elevation is not known, but is expected to be near the freeway grades. Data from our investigation is generally consistent with the historically highest levels, indicating that groundwater is generally within about 8 to 12 feet below freeway grade (see Table A-1 and A-1a of Appendix A). Boring B101 from a previous investigation indicates that groundwater is near El. 29 feet near

Springdale Street, where ground surface is near El. 39 feet. Groundwater at Bolsa Chica Rd OC through the I-405 / SR-22 interchange is generally near El. 16 feet, or about 10 feet below freeway grades. Groundwater drops from El. 16 feet near the interchange to El. 12 feet near the west end of the project as elevations drop to the west. Recommended design groundwater elevations at each sign location are listed in Table 3.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Seismic Evaluation

The project is located in a seismically active area. Seismic shaking should be anticipated during the life of the project. Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, and tsunamis / flooding.

4.1.1 Ground Surface Rupture

The site is not located in an Alquist-Priolo Earthquake Fault Zone, and the closest known active faults are the Los Alamitos Fault and Newport Inglewood Fault at closest distances of about 0.9 and 3.1 km from the site, respectively. A listing of site to fault distance at selected locations is shown in Table 2, and a map of regional faults is shown in Figure 5. Due to the distance from the closest faults, ground rupture due to faulting is not considered a significant hazard at the site, and a fault rupture investigation is not needed.

4.1.2 Ground Motion

4.1.2.1 Site Coordinates

Latitude and longitude coordinates of selected locations in the project site are shown in Table 2.

4.1.2.2 Faulting and Seismicity

The site location on Caltrans 1996 Fault and Peak Bedrock Acceleration (PBA) Map is illustrated in Figure 5, and the closest regional faults are summarized in Table 2. The closest faults to the site are Los Alamitos (reverse fault, maximum credible earthquake (MCE) magnitude Mw=6.0), Newport Inglewood (strike slip fault, Mw=7.0), San Joaquin Hills (blind thrust fault, Mw=7.0), and Puente Hills (blind thrust, Mw=7.25).

4.1.2.3 Deterministic Analysis

We performed a deterministic seismic hazard analysis using the computer program EQFAULT (Blake, 2000) and the California Geological Survey (2002) fault data base. Los Alamitos is not in the EQFAULT CGS 2002 data base, so for this fault we estimated fault to site distance from the Caltrans 1996 map (see Figure 5). We used the mean value of the rock and soil attenuation relationships presented by Sadigh et. al. (1997) to estimate peak bedrock accelerations (PBA) and peak ground accelerations (PGA), respectively, based on the MCE magnitude and distance from the site. Results of the deterministic analyses are presented in Appendix D-1, and summarized in Table 2.

4.1.2.4 Design Accelerations

For liquefaction evaluation, it was determined that a Mw=7.0 event on Newport Inglewood was more critical than Mw=6.0 with higher PGA on Los Alamitos. Therefore, we used Mw=7.0 and associated ground accelerations for liquefaction analysis. PGA used for computation of liquefaction varies according to location within the site as summarized in Table 3.

4.1.3 Seismic Compaction

Vibration such as seismic shaking can cause settlement of loose to medium dense dry clean granular soils. No zones of clean loose sand are present above the water table at the site, and therefore seismic compaction is not considered a hazard. Calculations in Appendix D-2 show negligible settlement (less than 0.1 inch) from seismic compaction.

4.1.4 Liquefaction Evalauation

The site is located within a State Liquefaction Hazard Zone (CDC-CDMG, 1999). Groundwater level is near the high historical levels of close to 10 feet below freeway grades. Ground surface and groundwater elevations used for liquefaction analyses are listed in Table 3. Sediments below the groundwater at the site are primarily stiff to very stiff clays (with localized thin soft to firm zones) and dense to very dense sands, but the upper alluvium contains localized interbeds of loose to medium dense sands, silty sands, and sandy silts that are prone to liquefaction in a major seismic event.

We performed liquefaction calculations for CPT-08-006, 018, and 117, and CPT-09-122 through 129. Triggering evaluation was based on the CPT method

from the NCEER 1996/1998 Workshops (Youd and Idriss, 2001). Settlements were calculated using the method of Tokimatsu and Seed (1987), and residual strengths were based on the method of Seed and Harder (1990). Calculations were carried to a depth of 60 feet below existing grades. We determined that use of Magnitude 7.0 and PGA of 0.38 to 0.47g was more critical than using Magnitude 6.0 and PGA of 0.4 to 0.54g, and therefore used the higher magnitude case in our analyses.

The resulting analyses show that limited layers of silty and sandy soils below groundwater may liquefy in the design earthquake. Within the depth range of the sign foundations, the liquefied layers are generally thin and isolated. Potentially liquefiable layers are shown as shaded on the liquefaction calculation sheets in Appendix D-2. Estimated liquefaction-induced ground settlements for all CPTs range between 0 and 1.1 inches with an average value of about 0.5 inches. A summary of the calculated liquefaction settlements for the sign sites is included in Table 3, and calculations are presented in Appendix D-2.

Residual undrained shear strengths of liquefied layers were estimated by the mean value of the relationship of Seed and Harder (1990). For fines and overburden corrected SPT N-Values (N1-60cs) greater than about 12 the mean relationship was straight-line extrapolated to a maximum residual strength of 1,500 psf. Residual undrained shear strengths of liquefied soils less than 1,000 psf occur only in rare isolated 1 ft thick layers, and generally exceed the design undrained shear strength of the site clays. A summary of residual undrained shear strength of liquefied layers is presented in Table 3.

Due to the relatively isolated thin liquefied layers, depth of liquefiable layers and presence of non-liquefiable soils above the groundwater, small ground settlements, and relatively high residual shear strengths, it is our conclusion that liquefaction does not have a significant adverse impact on the sign foundations.

4.1.5 Other Seismic Hazards

The site has no known history of subsidence. Static and seismic stability of the embankments was evaluated in the project GDR, and it was determined that the site slopes (existing and proposed) meet Caltrans criteria for being statically and seismically stable.

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long period waves generated primarily from distant and local offshore earthquakes, landslides, or volcanic eruptions. We checked the

100-yr and 500-yr tsunamis along southern California coast by Ziony, J.I. (1985) and for Seal Beach coast the run-up heights are 6 feet and 10 feet, respectively. These values are predicted as the wave crosses the shoreline and include the effect of astronomical tides. The site elevations are more than 20 feet above mean sea level (MSL) and the site is at least 7 km from the coastline, therefore tsunami hazard at the site is very low.

4.2 Corrosion Evaluation

Based on Caltrans Memo to Designers 3-1 (2008) and Caltrans Corrosion Guidelines (2003) a corrosive area is defined as "an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates, has a minimum resistivity of less than 1000 ohm-cm, or has a pH of less than 5.5."

Representative samples of the fill and alluvial soils obtained from our borings were tested to evaluate the corrosion potential. The tests include pH, electrical resistivity, and soluble chloride and sulfate concentrations. Results of the corrosivity tests are presented in Table B-2, Appendix B.

Based on these test data the site soils classify as corrosive due to locally high chlorides (500-5000 ppm) and high sulfates (between 2,000 and 15,000 ppm) in accordance with Caltrans Corrosion Guidelines (2003). Acidic soils (pH < 5.5) were not encountered.

Design of reinforced concrete for the sign CIDH piles and pedestals in contact with native soils should consider the site corrosion potential in accordance with Bridge Design Specifications (BDS) Section 8.22 (July 2000):

- For 500 to 5000 ppm Chlorides in soil the minimum concrete cover and mix design for protection of reinforcement against corrosion due to chlorides shall be as provided in BDS Table 8.22.1:
    - The maximum water to cementitious material ratio shall not exceed 0.40;
    - Minimum concrete cover for footings, pile caps, walls, columns, and CIDH piles is 3 inches (note that this requirement is met in the Standard Plan CIDH piles, Appendix C);

- For 2000 to 15,000 ppm Sulfates in soil the minimum requirements for protection of concrete against sulfate exposure shall conform to the requirements in BDS Table 8.22.2:
    - Cement shall be Type II modified or Type V;
    - The minimum cementitious material content shall be 658 pounds per cubic yard with a 25% mineral admixture replacement by weight. Maximum water to cementitious material ratio shall not exceed 0.40.

4.3 Scour Evaluation

The signs are not located in a significant flood/drainage or river channel. Surface runoff is by sheet flow and will be collected and conveyed off-site with storm drains. Therefore, scour potential is not significant.

4.4 Foundation Recommendations

4.4.1 Foundation Type

All the signs will be supported on 5 ft diameter CIDH pile foundations in accordance with details shown in the 1996 Standard Plans (see Appendix C).

4.4.2 Axial Capacity and Settlement

The sign foundations lengths are generally based on lateral capacity, and the signs have relatively small vertical loads for piles of this size and length. Therefore, axial capacity is not a controlling factor. The piles develop their lateral capacity primarily in skin friction, and end bearing is not considered. Ultimate axial capacities are mobilized at less than ½ inch settlement, and under working loads static settlements are generally ¼ inch or less.

4.4.3 Lateral Capacity and Foundation Depth

Foundation depth in the standard plans is controlled by lateral capacity and computed using Broms' method and assuming cohesionless soil with friction angle of 30 degrees and unit weight of 120 pcf (Caltrans Standard Plans, 2006, see Appendix C). Where soil is not equal to freeway compacted fill material, a soils investigation is required. Since the piles are installed partially in alluvial materials, soils investigation was conducted at the site. The foundation depth for the CIDH piles was selected based on "Pile Foundation Depth Selection" sheet available from Caltrans website (see Figure 7).

The table allows selection of foundation depth based soil properties and sign post type. The soil property ranges for selection of foundation depth are based on SPT N-Values (for cohesive and granular soils) and undrained shear strength or Su (cohesive soils). Three general ranges of soil properties are listed:

- Relatively Poor Soils (longer pile lengths than standard plans):
  - SPT N-Value = 3 to 6 blows per foot
  - Unconfined Compressive Strength = 0.6-1.2 ksf (Su=0.3-0.6 ksf)
- Fair Soil Conditions (lengths similar to standard plans)
  - SPT N-Value = 6 to 9 blows per foot
  - Unconfined Compressive Strength = 1.2-1.8 ksf (Su=0.6-0.9 ksf)
- More Favorable Soil Conditions (shorter pile lengths than standard plans):
  - SPT N-Value = 9 to 15+ blows per foot
  - Unconfined Compressive Strength = 1.8-3.0 ksf (Su=0.9-1.5 ksf)

We developed plots of N-Value and Su versus elevation for each sign location (Figures 6A through 6N), along with the CIDH pile elevation range. Based on these plots we selected representative design N-Value / Su for use in selecting minimum recommended foundation depth in accordance Figure 7. The recommended minimum foundation lengths for each sign location are presented in Table 3.

It should be noted that at this site, the soil properties are typically more favorable in the upper 6 to 8 feet near the pile head (above the water table) and near the pile tip (where alluvium becomes denser/stiffer). These zones are most critical to the pile lateral capacity, and this was considered in the selection of representative N and Su values. In general, the average soil conditions for the sign design are "Fair Soil Conditions (SPT N value 6-9) with a few cases of "More Favorable Soil Conditions" (SPT N-values 9-15+).

We checked the foundation depth by lateral load analysis as described below.

4.4.4 LPILE Analysis

As an additional check on the design, LPILE calculations were performed to check that the site conditions and proposed lengths meet the minimum requirements of the standard foundation designs. The approach is as follows:

- We developed site specific soil profiles for each sign based on CPT data, including groundwater, ground slope, soil layering, and liquefiable soils as appropriate:
    - P-Y curves in LPILE for cohesive soils were based on "Soft Clay" or "Stiff Clay without Free Water" model using undrained shear strength interpreted from CPT;
    - P-Y curves in LPILE for cohesionless soils were based on "Reese Sand" model with 30 degree friction angle for loose, 32 to 33 degree friction angle for medium dense, and 35 degree friction angle for dense soils;
    - P-Y curves in LPILE for liquefiable soils were based on "liquefiable sand" model in LPILE;
- We then performed LPILE lateral load analysis for: 1) the recommended foundation depth and soil profile at each location, and 2) the corresponding standard sign foundation length and standard soil condition (ϕ=30 degrees and level ground, with no groundwater);
- A range of lateral loads was input in LPILE for the site specific and standard signs, along with a moment based on 25 ft moment arm, up to a value causing deflection of 1 inch for the standard sign (maximum allowed deflection), to determine the highest potential deflections for the site signs;
- Most project signs were stiffer (less deflection) than the standard sign up to 1 inch displacement, with the exception of Signs #41, 103, and 143 (121 similar to 143). For these signs, actual loads were provided by the structural engineer (see Attachment 2);
- Results of the actual load analysis show:
    - The standard signs have a deflection of about ½ inch at the maximum design load;
    - The softest site signs have deflections of about ¼ inch at the maximum design load;
- We conclude the proposed pile lengths accounting for actual site conditions exceed the standard design sign foundation requirements, and are adequate as recommended.

Supporting data are presented in Attachment 2 to Appendix E (Response to Comments).

4.5 Slope Stability Analyses

Slopes in the project area were demonstrated to be statically and seismically stable, so slope stability will not impact the proposed signs. Details of the evaluation are provided in the project GDR.

4.6 Construction Considerations

4.6.1 Quality Control and Standards

Proper construction techniques and quality control are essential to installation of the CIDH piles, particularly where installation below the groundwater table using wet method (slurry) is performed. The following references should be followed:

- Caltrans Standard Specifications: Section 49-4
- Caltrans Standard Special Provisions: 49-310_B04-30-03_DU
- Caltrans Foundation Manual: Section 6
- Bridge Memo to Designers: 3-1, Attachment 2 (July 2008), "Inspection Tubes"
- Caltrans Guidelines for Foundation Investigations and Reports, Version 1.2: June 2002, "Special Considerations for CIDH Piles."

4.6.2 Construction Methods and Soil / Groundwater Conditions

Where piles are installed below water (all signs except for Sign No. 31), the wet slurry method of installation is required, and the drilled piles must have gamma-gamma tubes installed in them for monitoring the integrity of the piles. If temporary casings are used in addition to slurry, they shall be installed/retrieved in accordance with Standard Specifications (Caltrans, 2006) and Special Provisions. All Caltrans guidelines, specifications, and special provisions for the installation, monitoring, and remediation of defects for drilled piles installed by wet method should be followed. GDC should monitor the installation of the piles and review the results of gamma-gamma testing.

A summary of anticipated construction conditions and methods is anticipated for each sign is listed in Table 3 and elaborated below:

- Sign 31 (Figure 6A)
  - SR-22 EB Outside Shoulder
  - Recommended foundation length is 21 feet, top elevation is about El. 42 feet, tip elevation is about El. 21 feet, groundwater is at El. 16 feet
  - Entire pile depth including tip is above the water table
  - Soil conditions in pile length are very stiff to hard clayey fill
  - Caving potential is low, open hole method in dry hole without casing or slurry is feasible
  - Gamma-Gamma inspection tubes and logging are not required
  - If excessive caving occurs, fill with slurry and re-drill per Foundation Manual Section 6

- Sign 41 (Figure 6B)
  - I-405 SB Outside Shoulder
  - Recommended foundation length is 22 feet, top elevation is about El. 26 feet, tip elevation is about El. +5 feet, groundwater is at El. 16 feet or about 10 feet below surface
  - About 10 feet of the pile is above the water table, 12 feet is below
  - Soil conditions in pile length are stiff to very stiff clay/silt in the upper 9 feet, and soft to stiff clay and medium dense silty sand below 9 feet
  - Caving potential is high, use of wet slurry method is required, temporary casing may be used for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 72 (Figure 6C)
  - I-405 SB Outside Shoulder
  - Recommended foundation length is 25 feet, top elevation is about El. 22 feet, tip elevation is about El. -3 feet, groundwater is at El. 16 feet or about 6 feet below surface
  - About 6 feet of the pile is above the water table, 19 feet is below
  - Soil conditions in pile length are stiff to very stiff clay/silt in the upper 6 feet, and stiff to very stiff clay (with limited zones of sandy soils) below 9 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility

- Gamma-Gamma inspection tubes and logging are required
- If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 72 (Figure 6C)
  - I-405 SB Outside Shoulder
  - Recommended foundation length is 25 feet, top elevation is about El. 22 feet, tip elevation is about El. -3 feet, groundwater is at El. 16 feet or about 6 feet below surface
  - About 6 feet of the pile is above the water table, 19 feet is below
  - Soil conditions in pile length are very stiff clay/silt in the upper 6 feet, and stiff to very stiff clay (with zones of sandy soils) below 9 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 82 (Figure 6D)
  - I-405 SB Median and Outside Shoulder
  - Recommended foundation length is 33 feet, top elevation is about El. 25.5 feet, tip elevation is about El. -7.5 feet, groundwater is at El. 16 feet or about 9.5 feet below surface
  - About 9.5 feet of the pile is above the water table, 23.5 feet is below
  - Soil conditions in pile length are stiff to very stiff clay/silt in the upper 9.5 feet, soft to firm clay (with limited zones of sandy soils) between 9.5 and 18 feet depth, and stiff clay interbedded with medium dense sandy soils below 18 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 83 (Figure 6E)
  - I-405 Median
  - Recommended foundation length is 25 feet, top elevation is about El. 24 feet, tip elevation is about El. -1 feet, groundwater is at El. 15 feet or about 9 feet below surface
  - About 9 feet of the pile is above the water table, 16 feet is below
  - Soil conditions in pile length are dense sand and very stiff clay/silt in the upper 8 feet, firm to stiff clay (with limited zones of very stiff clay and medium dense sandy soils) between 8 and 20 feet depth, and stiff to very stiff clay below 20 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 104 (Figure 6F)
  - I-405 Median
  - Recommended foundation length is 25 feet, top elevation is about El. 22 feet, tip elevation is about El. -3 feet, groundwater is at El. 15 feet or about 7 feet below surface
  - About 7 feet of the pile is above the water table, 18 feet is below
  - Soil conditions in pile length are dense sand and stiff to very stiff clay/silt in the upper 8 feet, firm to stiff clay between 8 and 21 feet depth, and stiff to very stiff clay below 21 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 103 (Figure 6G)
  - I-405 Median and SB Outside Shoulder
  - Recommended foundation length is 26 feet, top elevation is about El. 23 feet, tip elevation is about El. -3 feet, groundwater is at El. 15 feet or about 8 feet below surface
  - About 8 feet of the pile is above the water table, 18 feet is below

- Soil conditions in pile length are dense sand and stiff to very stiff clay/silt in the upper 8 feet, stiff clay (with limited zones of very stiff clay and medium dense sandy soils) between 8 and 22 feet depth, and interbedded medium dense sand and very stiff clay below 22 feet depth
- Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
- Gamma-Gamma inspection tubes and logging are required
- If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 113 (Figure 6H)
  - I-405 SB Outside Shoulder
  - Recommended foundation length is 18 feet, top elevation is about El. 19 feet, tip elevation is about El. +1 feet, groundwater is at El. 12 feet or about 7 feet below surface
  - About 7 feet of the pile is above the water table, 11 feet is below
  - Soil conditions in pile length are dense sand and very stiff clay/silt in the upper 7 feet, and firm to stiff clay (with limited zones of medium dense sandy soils) between 7 and 18 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 115 (Figure 6I)
  - I-405 NB Outside Shoulder
  - Recommended foundation length is 18 feet, top elevation is about El. 19 feet, tip elevation is about El. +1 feet, groundwater is at El. 12 feet or about 7 feet below surface
  - About 7 feet of the pile is above the water table, 11 feet is below
  - Soil conditions in pile length are dense sand and stiff to very stiff clay/silt in the upper 7 feet, and stiff clay (with limited zones of medium dense sandy soils) between 7 and 18 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required

- If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 121 (Figure 6J)
  - I-405 Median and SB Outside Shoulder
  - Recommended foundation length is 26 feet, top elevation is about El. 20 feet, tip elevation is about El. -6 feet, groundwater is at El. 125 feet or about 8 feet below surface
  - About 8 feet of the pile is above the water table, 18 feet is below
  - Soil conditions in pile length are dense sand and stiff clay/silt in the upper 8 feet, and firm to stiff clay (with limited zones of very stiff clay and medium dense sandy soils) between 8 and 26 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

- Sign 143 (Figure 6K)
  - SR-22 Median
  - Recommended foundation length is 18 feet, top elevation is about El. 40 feet, tip elevation is about El. +22 feet, groundwater is at El. 29 feet or about 11 feet below surface
  - About 11 feet of the pile is above the water table, 7 feet is below
  - Soil conditions in pile length are medium dense to dense sand and stiff to very stiff clay/silt in the upper 11 feet, and firm to stiff clay/silt interbedded with medium dense sand / silty sand between 11 and 18 feet depth
  - Caving potential is high, use of wet slurry method is required, temporary casing may be advisable for constructibility
  - Gamma-Gamma inspection tubes and logging are required
  - If defects are found, mitigation is required in accordance with the standard special provisions

Sign 152, 153, and 161, CPTs 130, 131, 132 were performed very recently and recommendations are summarized in Table 3.

All Caltrans specifications and special provisions for the installation, monitoring, and remediation of defects for drilled piles installed by wet method should be

followed. GDC should monitor the installation of the piles and review the results off gamma-gamma testing.

4.6.3 Hazardous Waste Considerations

Disposal of spoils and groundwater from the CIDH pile excavations will be required. Environmental investigation was performed in a separate study (GDC, 2009), and handling and disposal of spoils should follow recommendations in that report.

4.6.4 Differing Site Conditions

Our characterization of the site is based on the results of our field explorations, geologic analyses of cross-sections, and interpolation between exploration locations. All cuts, excavations, and foundation areas should be observed continuously during construction are consistent with the recommendations used in the design. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations.

5.0 LIMITATIONS

This report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use in designing the proposed project. The report is not intended to be suitable for reuse on extensions, or modifications of the project, or for use on any other development, as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report is provided to contractors or included in specifications, it should be understood that it is provided for information only.

Our recommendations and evaluations were performed using generally accepted engineering approaches and principles available at this time, and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included in our report. This report is subject to revision.

6.0 REFERENCES

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TABLES

TABLE 1
SUMMARY OF OVERHEAD SIGN FOUNDATIONS

Sign No.	Plan Sheet Nos.	Station	Route	Foundation Location	Sign Type	Standard Plan Post Type	CIDH Pile					Geotechnical Exploration No(s)
							Ground El. (ft)	Pedestal Type	Diameter	Standard Plan Foundation Depth (ft)	Standard Plan Tip Elev. (ft)	
31	S-3, SD-1	"E" 3306+61	SR-22	EB Outside Shoulder	Overhead Sign Single Post Truss	VIII	42.11	5'9"x5'9" Square	5'	25.00	17.11	CPT-08-018
41	S-4, SD-2	"SB405" 310+65	I-405	SB Outside Shoulder	Overhead Sign Single Post Truss	VII	26.37	5'9"x5'9" Square	5'	23.00	3.37	CPT-09-123
72	S-7, SD-3	"SB405" 323+14	I-405	SB Outside Shoulder	Overhead Sign Single Post Truss	VIII	22.35	5'9"x5'9" Square	5'	25.00	-2.65	R-08-004, CPT-08-006
82	S-8, SD-5	"SB405" 332+97	I-405	SB Outside Shoulder & SB Median Shoulder	Overhead Sign Two Post Truss	VI-S	24.90 26.34	5'10"x5'10" Square	5'	27.83	-2.93 -1.49	A-08-120 CPT-09-124
83	S-8, SD-8	"H" 1340+23	I-405	Center Median	Overhead Sign Single Post Truss	IX	13.75	5'9"x5'9" Square	5	25.00	-11.25	CPT-08-117 CPT-08-118
103	S-10, SD-11	"A" 359+75	I-405	SB Outside Shoulder & Center Median	Overhead Sign Two Post Truss	VI-S	21.66 23.22	5'10"x5'10" Square	5'	27.83	-6.17 -4.61	CPT-09-126
104	S-10, SD-10	"A" 365+15	I-405	Center Median	Overhead Sign Single Post Truss	VIII	22.21	5'9"x5'9" Square	5'	25.00	-2.79	CPT-09-125
113	S-11, SD-20	"A" 370+75	I-405	SB Outside Shoulder	Changeable Message Sign Single Post Truss	VI (NPS 24x0.5")	19.23	5'9" Round	5'	22.00	-2.77	CPT-09-127
115	S-11, SD-20	"A" 375+12	I-405	NB Outside Shoulder	Changeable Message Sign Single Post Truss	VI (NPS 24x0.5")	19.28	5'9" Round	5'	22.00	-2.72	CPT-09-128
121	S-12, SD-14	"A" 385+25	I-405	SB Outside Shoulder & Center Median	Overhead Sign Two Post Truss	VI-S	19.26 20.93	5'10"x5'10" Square	5'	27.83	-8.57 -6.90	CPT-09-129
143	S-14, SD-16	"B" 245+50	SR-22	Center Median	Overhead Sign Single Post Truss	VI	40.00	5'9"x5'9" Square	5'	22.00	18.00	CPT-09-122 B101
152	S-15, SD-17	"B" 257+60	SR-22	Center Median	Overhead Sign Single Post Truss	VIII	38.00	5'9"x5'9" Square	5'	25.00	13.00	CPT-09-130
153	S-15, SD-21	"B" 252+30	SR-22	NB Outside Shoulder	Overhead Sign Single Post Truss	VII	38.30	5'9"x5'9" Square	5'	23.00	15.30	CPT-09-132
161	S-16, SD-19	"B" 270+80	SR-22	Center Median	Overhead Sign Single Post Truss	VII	35.40	5'9"x5'9" Square	5'	23.00	12.40	CPT-09-131

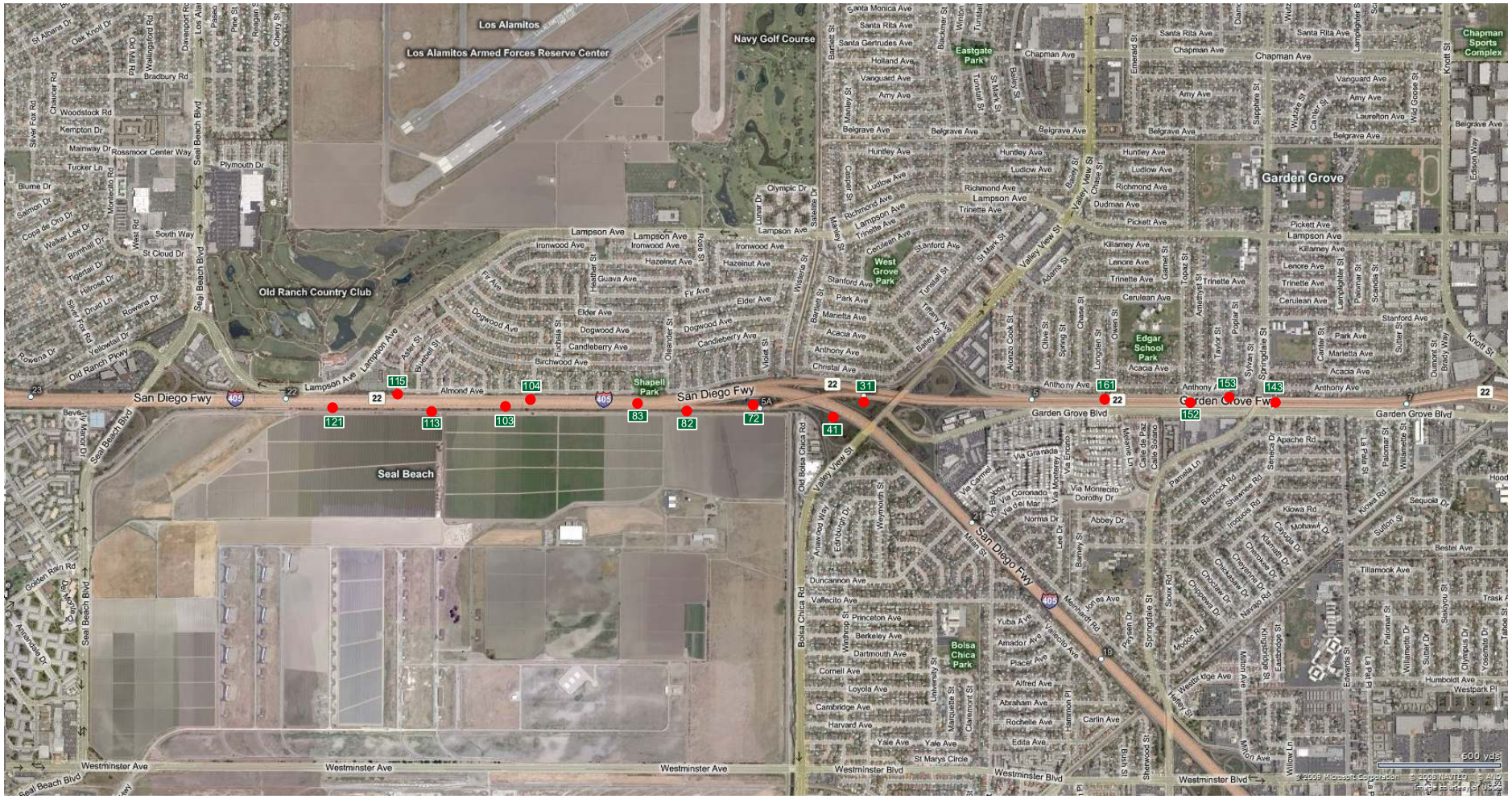
TABLE 2
SUMMARY OF NEARBY FAULTS AND SEISMICITY

Fault Name	Fault Type	Mw	LOCATION																			
			Springdale OC			Bolsa Chica Road OC			405/22 HOV Conn. Separation			Middle RW3319 & 3320			W. End RW1325 & 1326			Closest to Los Alamitos Fault			W. End Project		
			Lat. 33.7741 Lon. 118.0192			Lat. 33.7743 Lon. 118.0380			Lat. 33.7749 Lon. 118.0427			Lat. 33.7741 Lon. 118.0441			Lat. 33.7745 Lon. 118.0475			Lat. 33.7743 Lon. 118.0587			Lat. 33.7743 Lon. 118.0681		
			Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA
Newport-Inglewood	Strike Slip	7.00	6.80	0.46	0.38	5.50	0.50	0.41	5.20	0.51	0.42	5.00	0.52	0.42	4.80	0.53	0.43	4.10	0.56	0.45	3.40	0.59	0.47
Los Alamitos	Reverse	6.00	4.00	0.46	0.40	2.00	0.57	0.48	1.70	0.59	0.50	1.60	0.60	0.50	1.20	0.63	0.52	0.90	0.65	0.54	1.90	0.58	0.49
San Joaquin Hills	Blind Thrust	7.00	12.00	0.40	0.37	13.30	0.37	0.35	13.60	0.36	0.35	13.70	0.36	0.34	13.90	0.36	0.34	14.70	0.34	0.33	15.40	0.33	0.32
Puente Hills	Blind Thrust	7.25	18.10	0.32	0.32	18.20	0.32	0.32	18.10	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.30	0.32	0.31

TABLE 3
SUMMARY OF SIGN FOUNDATION RECOMMENDATIONS

Sign No.	Exploration No.	Ground Elevation (feet)		Soil Profile Figure No.	Design Groundwater Elevation (feet)	Design Parameters for Selection of Foundation Depth			Liquefaction						Sign Post Type for Selection of Foundation Depth	Recommended Minimum Foundation Depth (feet)	Construction Method
		At Exploration Location	At Top of Foundation (per sign details, Figure 3)			SPT N-Value	Undrained Compressive Strength, qu (ksf)	Undrained Shear Strength, Su (ksf)	PGA	MCE Magnitude	Total Settlement (inch)	Residual Undrained Shear Strength (psf)					
												Max	Min	Avg			
31	CPT-08-018	43.59	42.11	6A	16	9-15+	>4	>2	0.42	7.0	0.22	1500+	875	1306	VIII	21	above water, cohesive soil, dry open hole method feasible
41	CPT-09-123	27	26.37	6B	16	6-9	1.2-1.8	0.6-0.9	0.42	7.0	0.90	1500+	589	1378	VII	22	below water, caving soils, wet method / casing required
72	R-08-004	31.21	22.35	6C	16	6-9	1.2-1.8	0.6-0.9	0.43	7.0	0.00	N/A	N/A	N/A	VIII	25	below water, caving soils, wet method / casing required
	CPT-08-006	42.13															
82	A-08-120	25.86	24.90 to 26.34	6D	16	6-9	1.2-1.8	0.6-0.9	0.43	7.0	1.11	1500+	552	1241	VI-S	33	below water, caving soils, wet method / casing required
	CPT-09-124	26															
83	CPT-08-117	22	23.80	6E	15	6-9	1.2-1.8	0.6-0.9	0.44	7.0	0.26	1500+	721	1418	IX	25	below water, caving soils, wet method / casing required
	CPT-08-118	24															
104	CPT-09-125	22	22.21	6F	15	6-9	1.2-1.8	0.6-0.9	0.45	7.0	0.58	1500+	1434	1496	VIII	25	below water, caving soils, wet method / casing required
	CPT-08-113	22.5															
103	CPT-09-126	23	21.66 to 23.22	6G	15	9-15	1.8-3.0	0.9-1.5	0.45	7.0	0.61	1500+	1131	1428	VI-S	26	below water, caving soils, wet method / casing required
113	CPT-09-127	21	19.23	6H	12	6-9	1.2-1.8	.6-.9	0.46	7.0	0.59	1500+	783	1389	VI	18	below water, caving soils, wet method / casing required
115	CPT-09-128	20	19.28	6I	12	6-9	1.2-1.8	0.6-0.9	0.46	7.0	0.04	1500+	1500+	1500+	VI	18	below water, caving soils, wet method / casing required
121	CPT-09-129	20.5	19.26 to 20.93	6J	12	9-15	1.8-3.0	0.9-1.5	0.47	7.0	0.66	1500+	779	1344	VI-S	26	below water, caving soils, wet method / casing required
143	CPT-09-122	39	40	6K	29	6-9	1.2-1.8	0.6-0.9	0.38	7.0	0.65	1500+	544	1361	VI	18	below water, caving soils, wet method / casing required
152	CPT-09-130	37	38	6L	29	6-9	2.0-4.0	1.0-2.0	0.39	7.0					VIII	25	below water, caving soils, wet method / casing required
153	CPT-09-132	38	38	6M	29	6-9	1.6-4.0	0.8-2.0	0.39	7.0					VII	22	below water, caving soils, wet method / casing required
161	CPT-09-131	35	35.40	6N	27	9-15+	>1.5	>3.0	0.4	7.0					VII	19	below water, caving soils, wet method / casing required
										max=	1.11						
										min=	0.00						
										avg-	0.51						

FIGURES



Ref.: The base map is from Microsoft's Virtual Earth

LEGEND

- Sign Location
- 121 Sign Number

GROUP DELTA CONSULTANTS	**GROUP DELTA CONSULTANTS, INC.** ENGINEERS AND GEOLOGISTS 32 MAUCHLY, SUITE B IRVINE , CA 92618 (949) 450-2100
PROJECT NAME 405/22 HOV CONNECTOR SEGMENT OVERHEAD SIGN FOUNDATIONS	PROJECT NUMBER I-436
VICINITY MAP	**Figure 1**

DIST	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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PARSONS
2201 DUPONT DRIVE
SUITE 200
IRVINE, CA 92612

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

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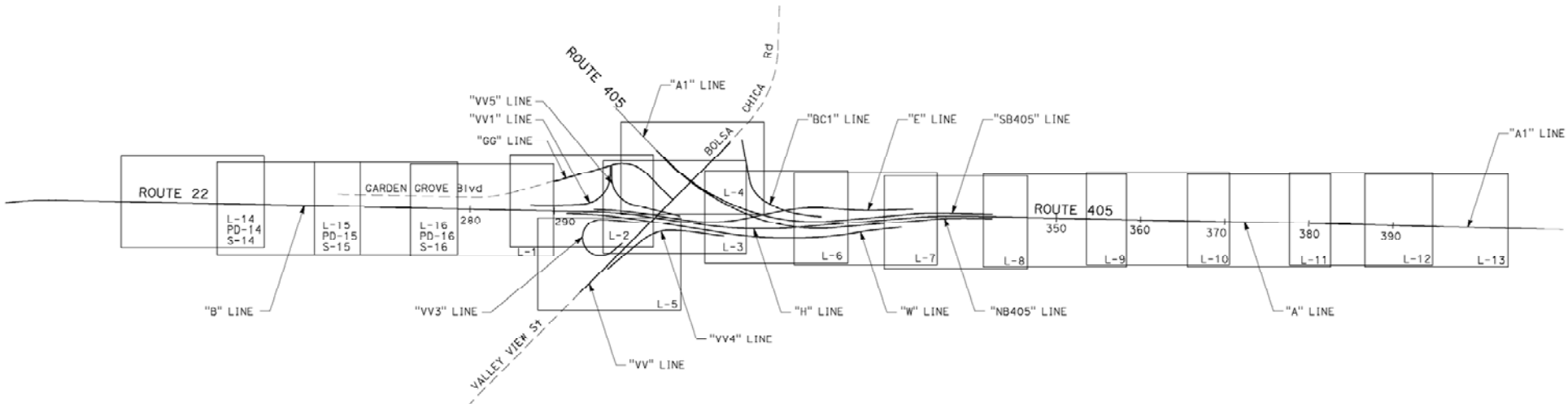

LINE INDEX	DESCRIPTION
"A" LINE	ROUTE 405 CENTERLINE
"NB405" LINE	ROUTE 405 NB STATIONLINE
"SB405" LINE	ROUTE 405 SB STATIONLINE
"B" LINE	ROUTE 22 CENTERLINE
"E" LINE	S405-E22 CONNECTOR STATIONLINE
"W" LINE	W22-N405 CONNECTOR STATIONLINE
"H" LINE	405-22 HOV CONNECTOR CENTERLINE
"GG" LINE	GARDEN GROVE BOULEVARD CENTERLINE
"VV" LINE	VALLEY VIEW STREET/BOLSA CHICA ROAD CENTERLINE
"VV3" LINE	ROUTE 22 WB LOOP ON RAMP FROM VALLEY VIEW STREET
"VV4" LINE	ROUTE 22 WB ON-RAMP FROM VALLEY VIEW STREET
"VV5" LINE	ROUTE 22 EB OFF-RAMP TO GARDEN GROVE BOULEVARD
"BC1" LINE	ROUTE 405 SB OFF-RAMP TO BOLSA CHICA ROAD
"A1" LINE	EXISTING ROUTE 405 CENTERLINE
"VV1" LINE	ROUTE 22 EB LOOP ON-RAMP FROM GARDEN GROVE BOULEVARD

FIGURE 2

KEY MAP AND LINE INDEX

NO SCALE

K-1

LAST REVISION: DATE PLOTTED => 10/25/2008
10-27-08 TIME PLOTTED => 4:04:06 PM

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => p0033148
DGN FILE => c0716201d001.dgn

CU 12235

EA 071621

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

ABBREVIATIONS:

EX	EXISTING TO REMAIN		
BMS	BARRIER MOUNTED SIGN	IBP	INSTALL SIGN ON RAMP METER SIGNAL BACKPLATE (SEE RAMP METER DETAIL SHEET)
IWB	INSTALL ROADSIDE SIGN (LAMINATED WOOD BOX POST)	IS	INSTALL ROADSIDE SIGN
ISS	INSTALL SIGN STRUCTURE	(CA)	STATE OF CALIFORNIA SIGN CODE
ISB	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)		
RSS	REMOVE SIGN STRUCTURE		
RL	RELOCATE ROADSIDE SIGN		
RM	REMOVE ROADSIDE SIGN		

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER ALEXANDER ZUPANSKI No. 59351 Exp. 06/30/09 CIVIL STATE OF CALIFORNIA

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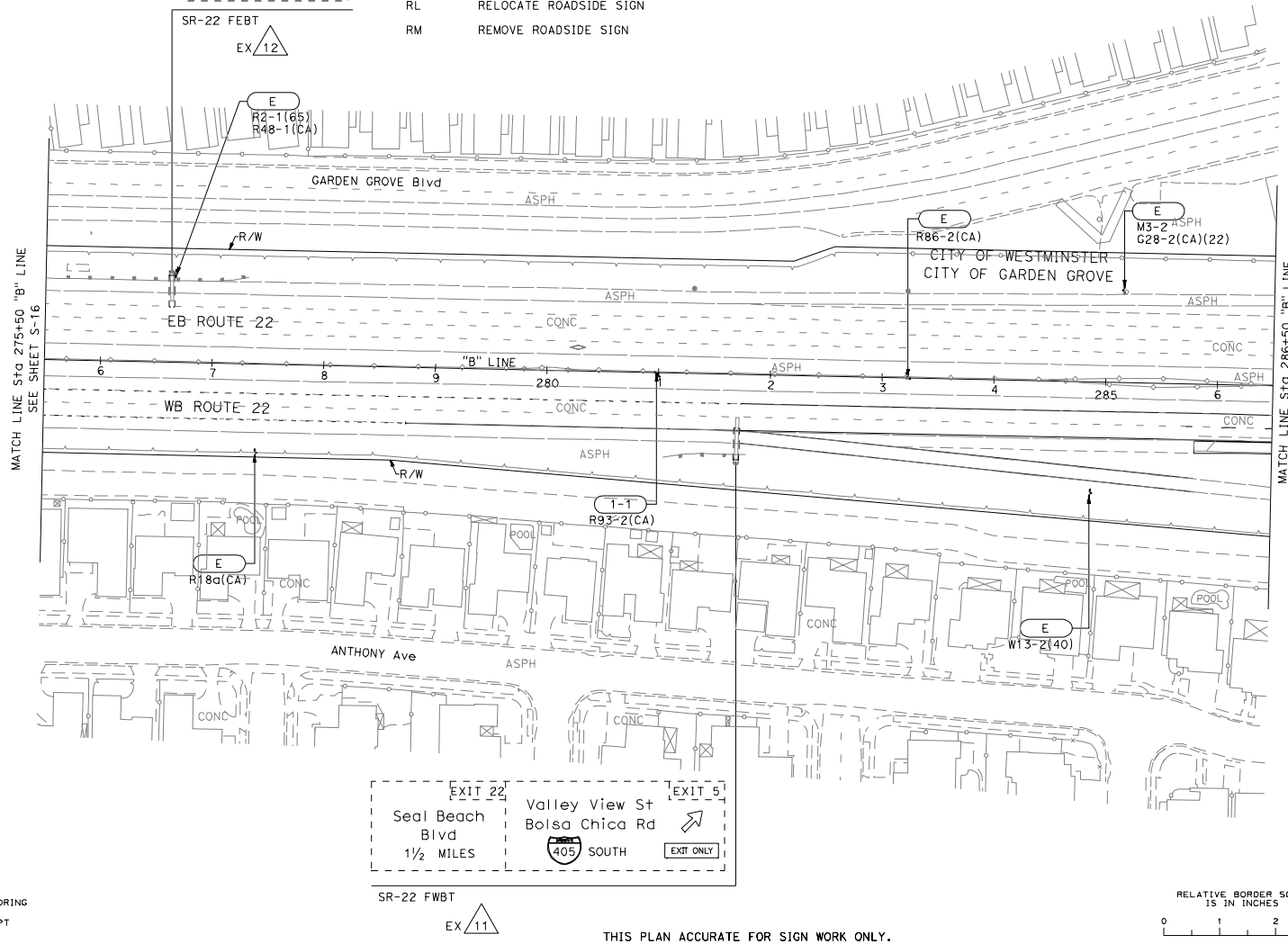
ORANGE, CA 92863



LEGEND:

- (E) EXISTING SIGN
- (No.) ROADSIDE SIGN NUMBER
- △No. OVERHEAD SIGN STRUCTURE NUMBER

GENERAL NOTES:

1. EXACT LOCATIONS AND POSITIONS OF ROADSIDE SIGNS TO BE DETERMINED BY THE ENGINEER.
2. SIGN FORMATS ARE NOT TO SCALE.

LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

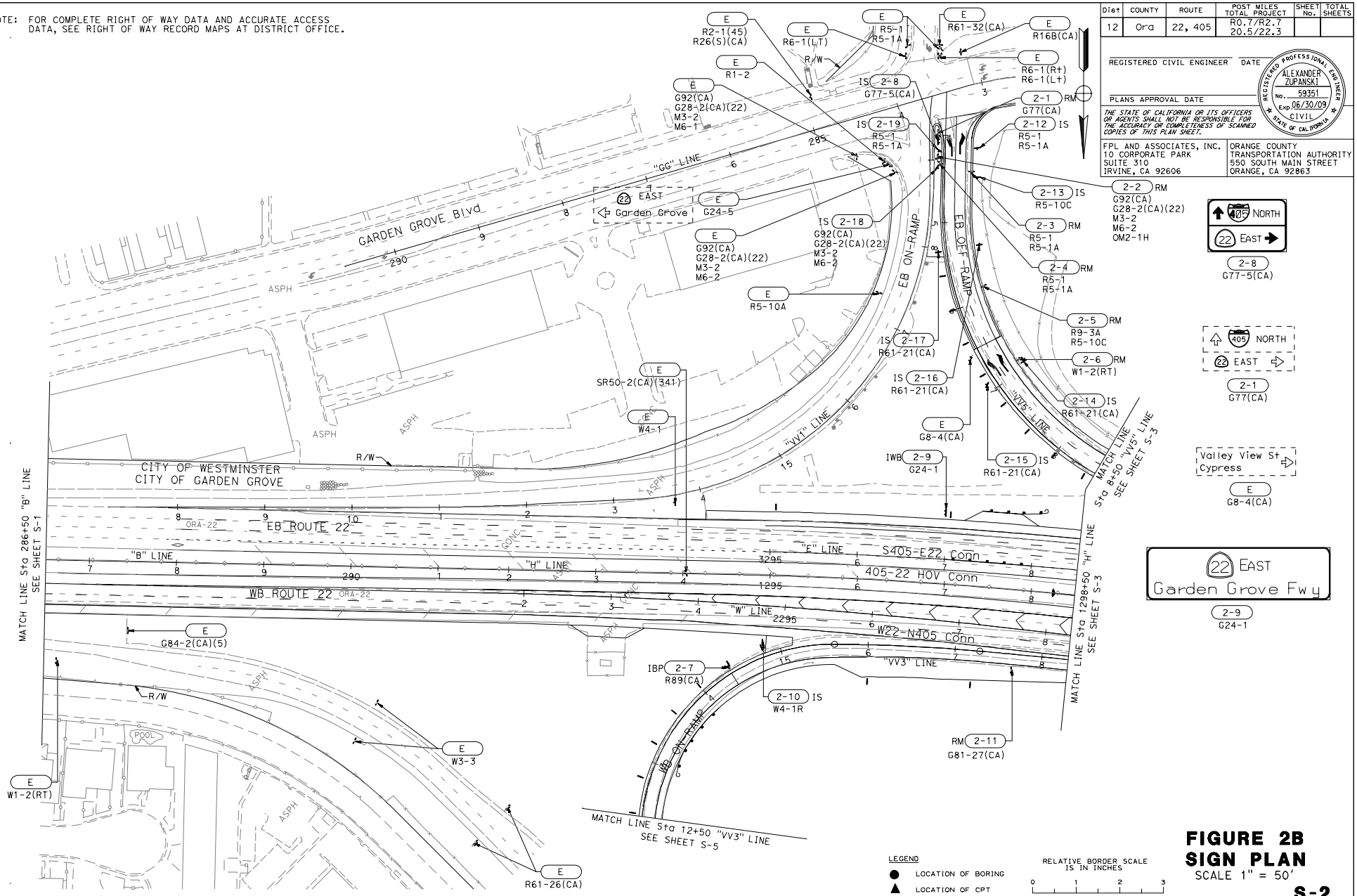
THIS PLAN ACCURATE FOR SIGN WORK ONLY.

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2A
SIGN PLAN
SCALE 1" = 50'

S-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
Caltrans	CARLOS A. CADENA	EDDIE TANG	ALEXANDER ZUPANSKI		



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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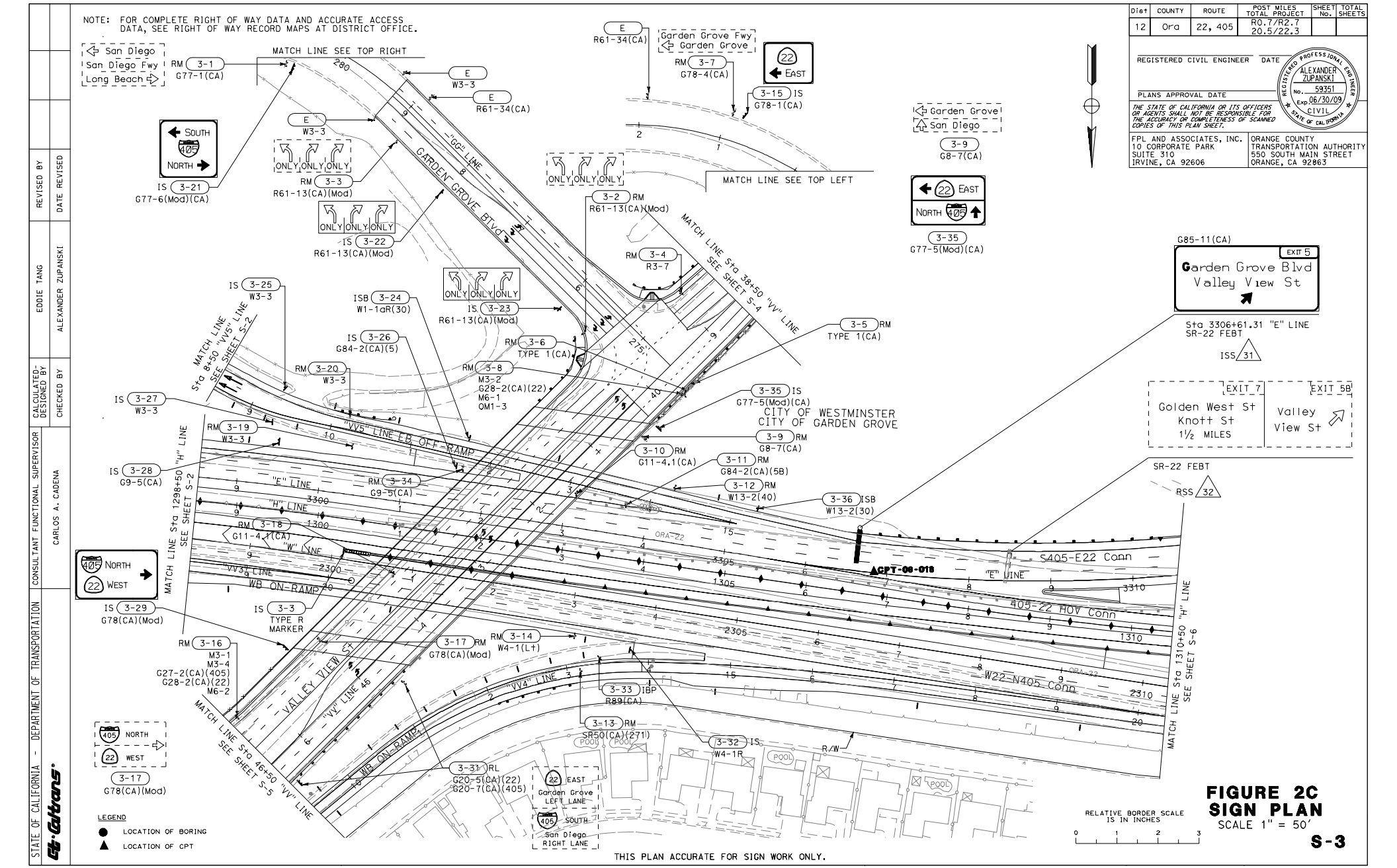
FIGURE 2B
SIGN PLAN
SCALE 1" = 50'

S-2

THIS PLAN ACCURATE FOR SIGN WORK ONLY.



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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ORANGE, CA 92863

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CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

FIGURE 2C
SIGN PLAN
SCALE 1" = 50'

S-3

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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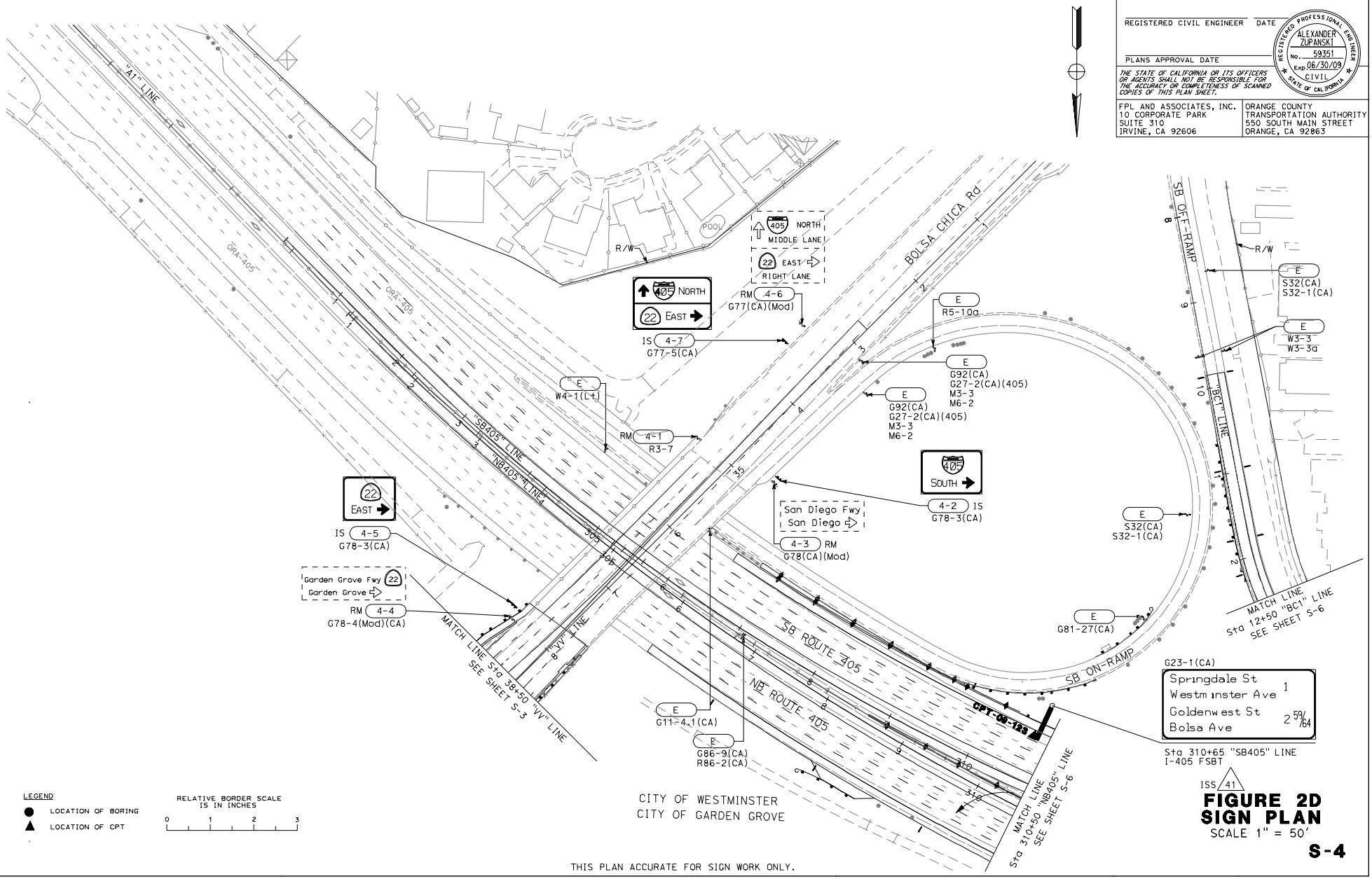

LEGEND
● LOCATION OF BORING
▲ LOCATION OF CPT

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

ISS 41

FIGURE 2D
SIGN PLAN
SCALE 1" = 50'

S-4

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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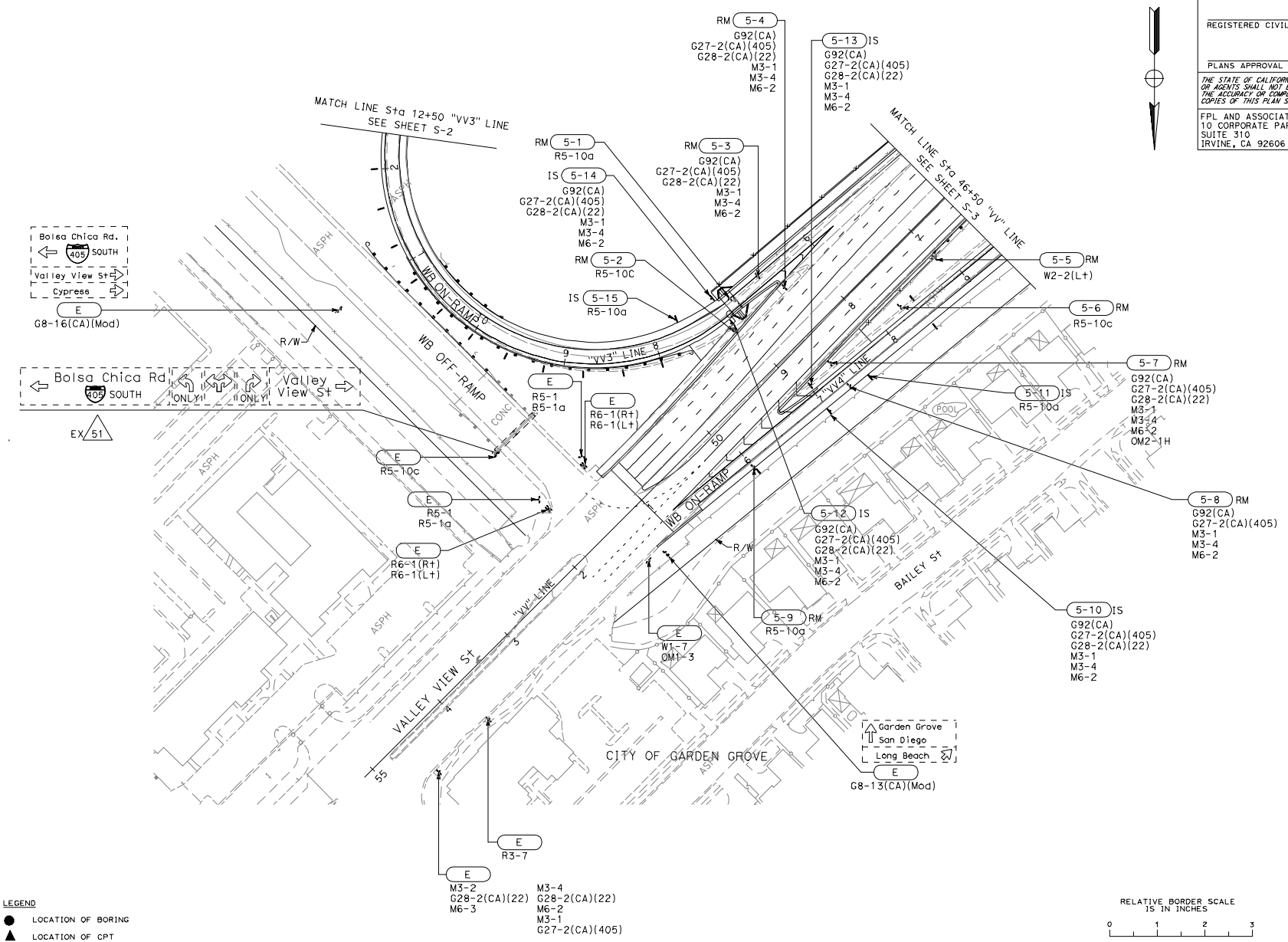

LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2E
SIGN PLAN
SCALE 1" = 50'

S-5

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	EDDIE TANG	REVISED BY	DATE REVISED
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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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ORANGE, CA 92863

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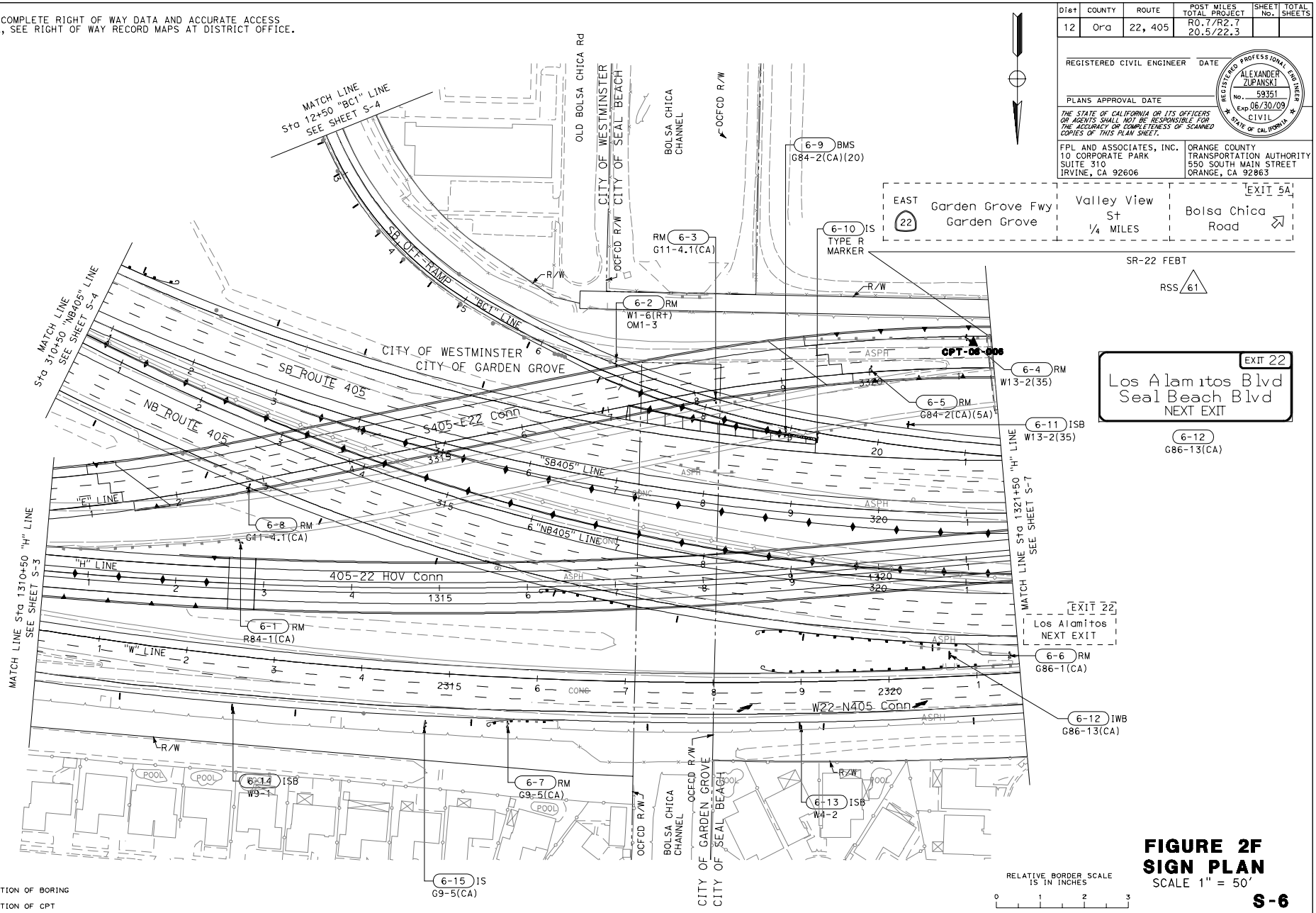

LEGEND
● LOCATION OF BORING
▲ LOCATION OF CPT

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2F
SIGN PLAN
SCALE 1" = 50'

S-6

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER ALEXANDER ZUPANSKI No. 59351 Exp. 06/30/09 CIVIL STATE OF CALIFORNIA

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ORANGE COUNTY
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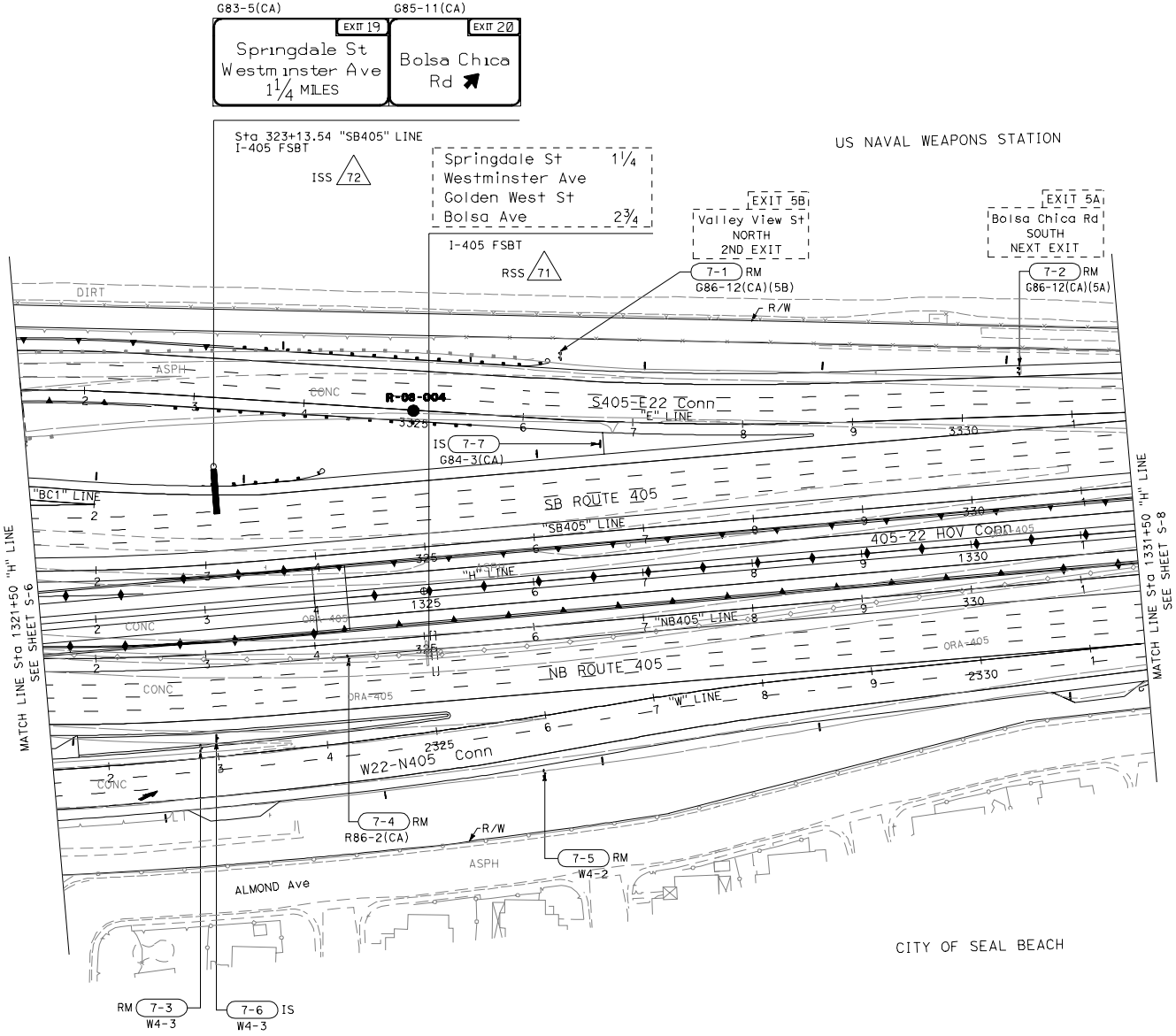

LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2G
SIGN PLAN
SCALE 1" = 50'

S-7

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NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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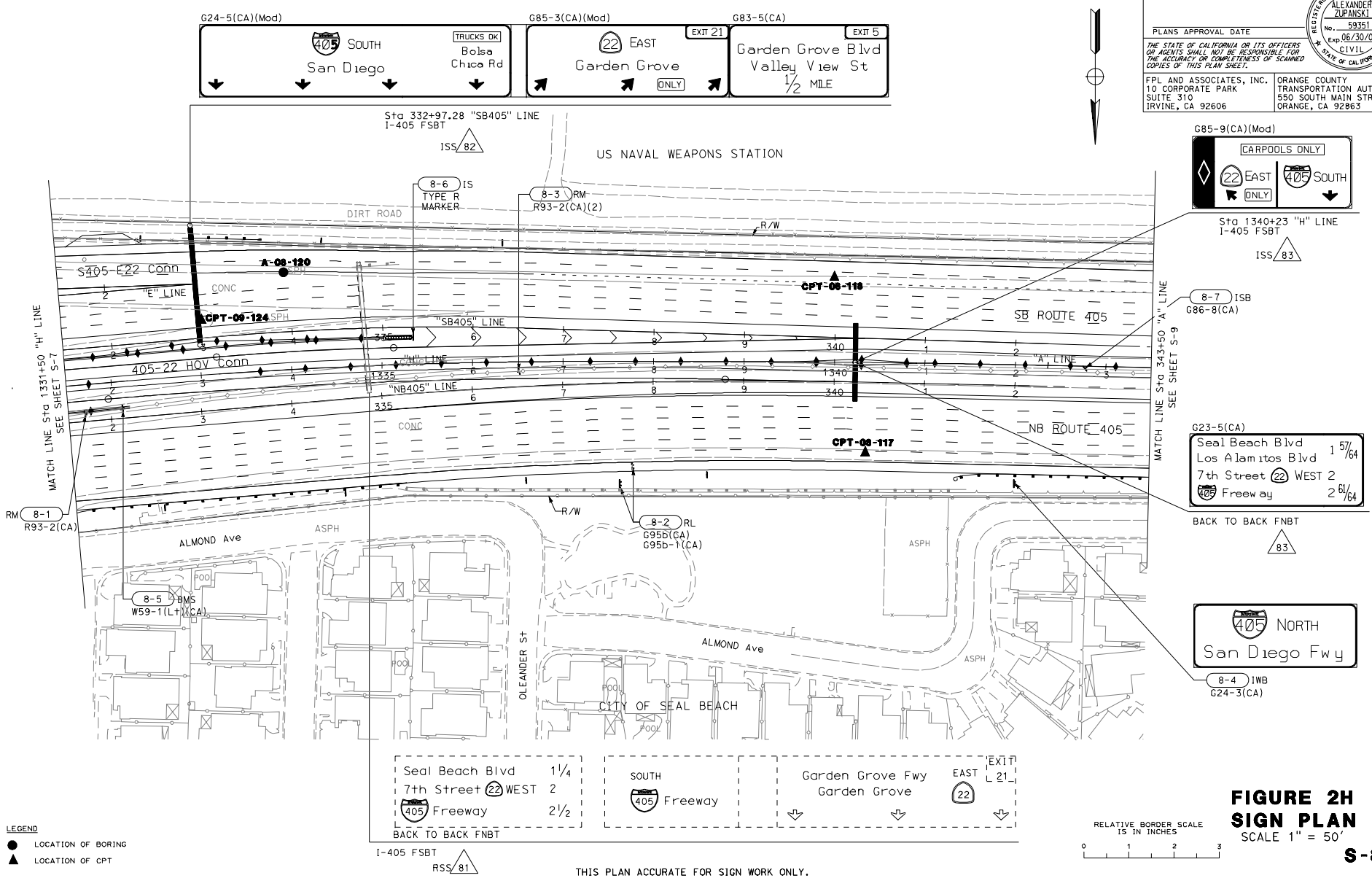

LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2H
SIGN PLAN
SCALE 1" = 50'

S-8

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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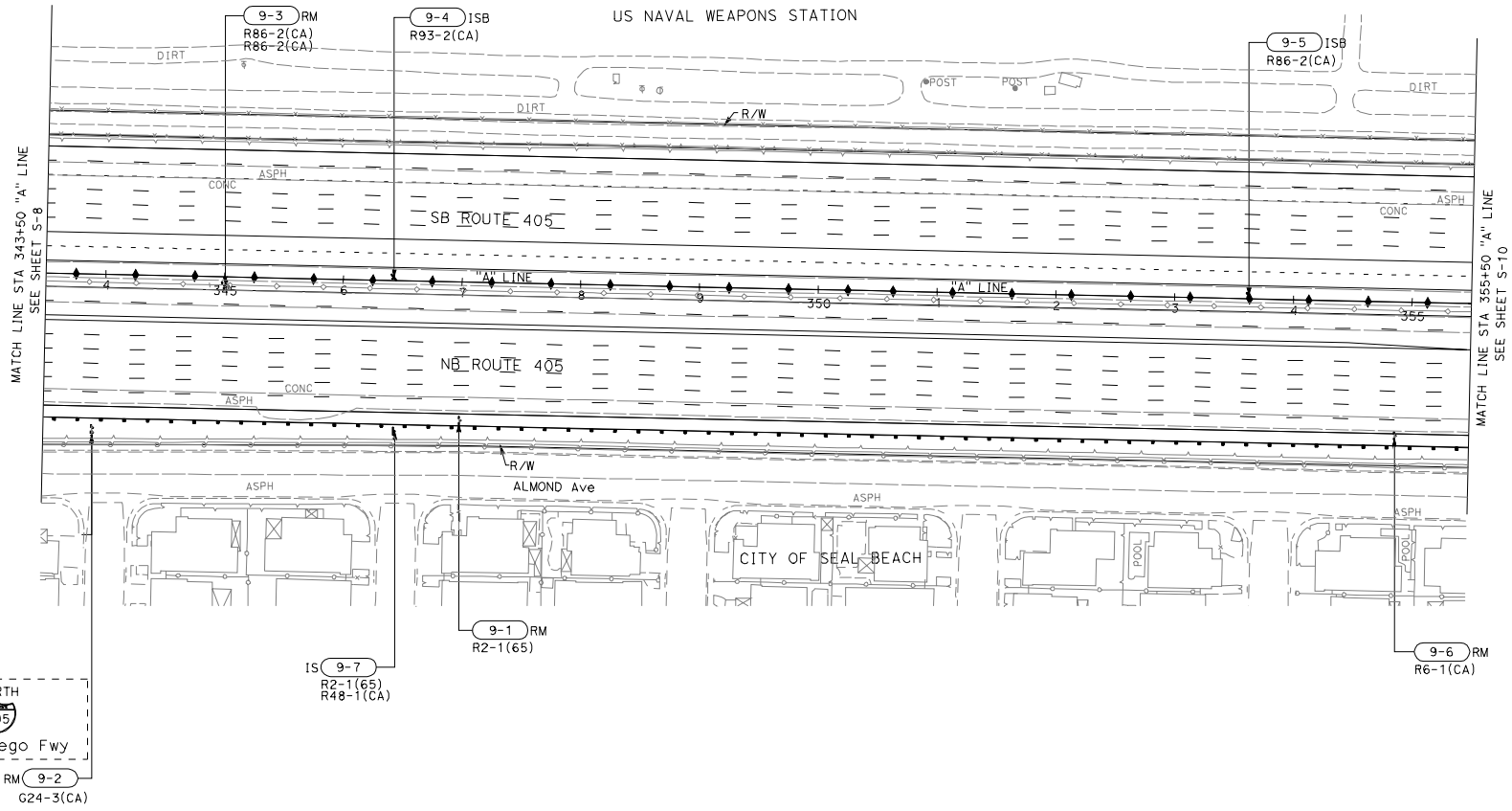

LEGEND
● LOCATION OF BORING
▲ LOCATION OF CPT

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 21
SIGN PLAN
SCALE 1" = 50'

S-9

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REVISED BY
DATE REVISED

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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CARPOOL VIOLATION $ 341 MINIMUM FINE

SOUTH 405 San Diego Fwy San Diego

TRUCKS OK

Garden Grove Fwy Garden Grove EXIT ONLY EAST 22

R87-1(CA) CARPOOLS ONLY 2 OR MORE PERSONS PER VEHICLE

I-405 FSBT RSS 101

G83-3(CA)(Mod) CARPOOLS ONLY 22 EAST ONLY 405 SOUTH

G24-5(CA)(Mod) 405 SOUTH San Diego TRUCKS OK Bolsa Chica Rd 5/64 MILE

G24-5(CA)(Mod) 22 EAST Garden Grove EXIT 21 ONLY

G86-13(CA)(Mod) Garden Grove Blvd Valley View St USE 22 EAST EXIT 5

Sta 356+15 "A" LINE I-405 FNBT
ISS 104

ISB 10-6 R93-2(CA)

Sta 359+75 "A" LINE I-405 FSBT
ISS 103

Bolsa Chica Rd USE 405 SOUTH

10-1 IWB G86(Mod)(CA)

US NAVAL WEAPONS STATION

DIRT

R/W

CPT-06-125 CPT-06-113 CPT-06-126

ORA-405

SB ROUTE 405

NB ROUTE 405

"A" LINE

ASPH CONC

MATCH LINE Sta 355+50 "A" LINE SEE SHEET S-9

MATCH LINE Sta 367+50 "A" LINE SEE SHEET S-11

IS 10-10 R6-3(CA) R48-1(CA)

RL 10-3 G85-8(CA)

RL 10-2 G85-7(CA)

ALMOND Ave

CITY OF SEAL BEACH

POOL

10-7 ISB SR50-2(CA)(341)

10-5 RM G66-21(CA) G66-21b(CA)

10-9 IS G66-21(CA) G66-21b(CA)

10-4 RM SR50-2(CA)(341)

10-8 BMS R86-2(CA)(FNBT) R86-2(CA)(FSBT)

Seal Beach Blvd Los Alamitos Blvd EXIT 22 3/4 MILE

I-405 FNBT
EX 102

LEGEND
- LOCATION OF BORING
- LOCATION OF CPT

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2J
SIGN PLAN
SCALE 1" = 50'

S-10

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NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER ALEXANDER ZUPANSKI No. 59351 Exp. 06/30/09 CIVIL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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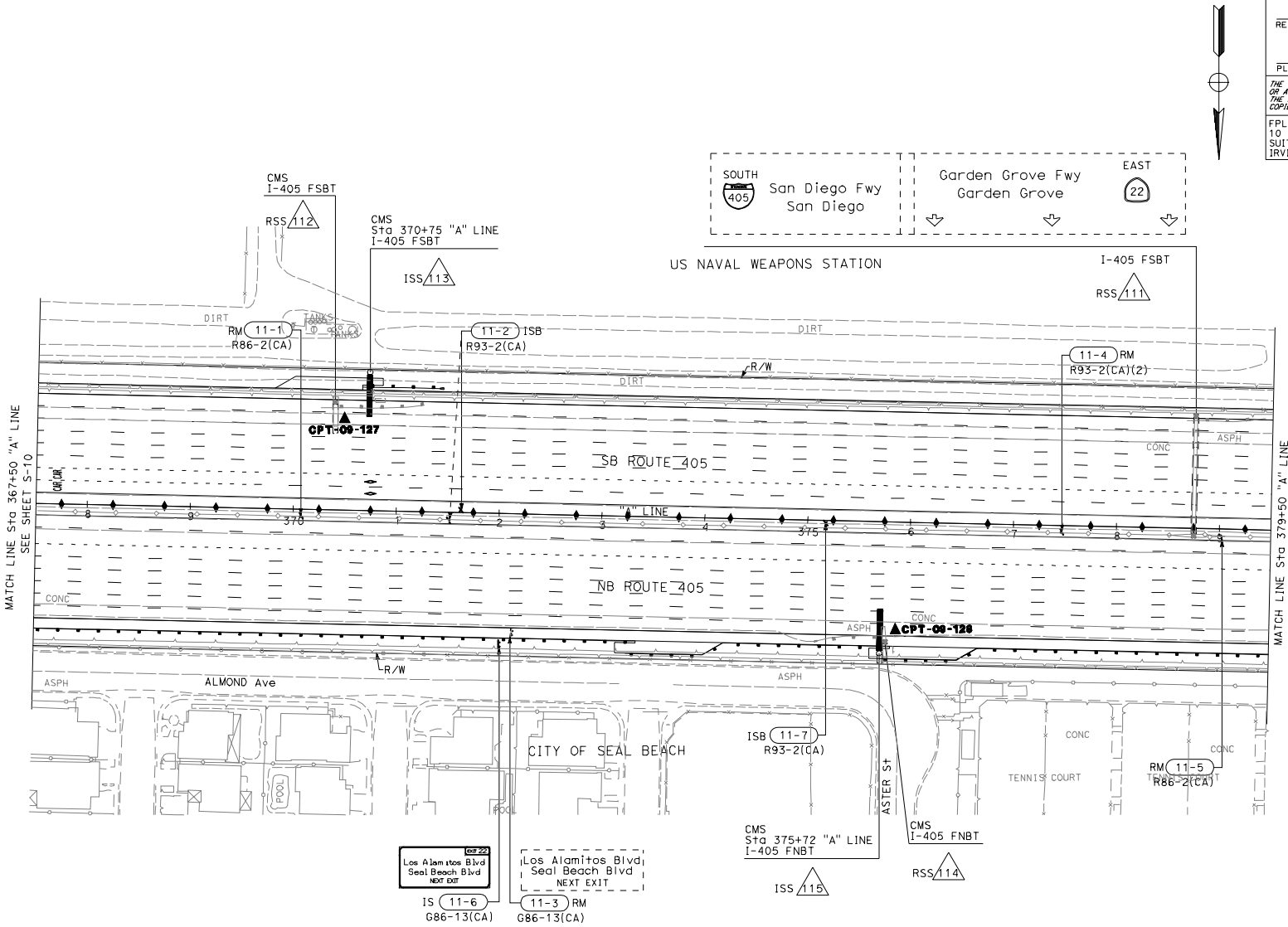
IRVINE, CA 92606

ORANGE COUNTY
TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863

REVISED BY	DATE REVISED
EDDIE TANG	ALEXANDER ZUPANSKI
CALCULATED-DESIGNED BY	CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR	CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans



LEGEND
● LOCATION OF BORING
▲ LOCATION OF CPT

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 2K
SIGN PLAN
SCALE 1" = 50'

S-11

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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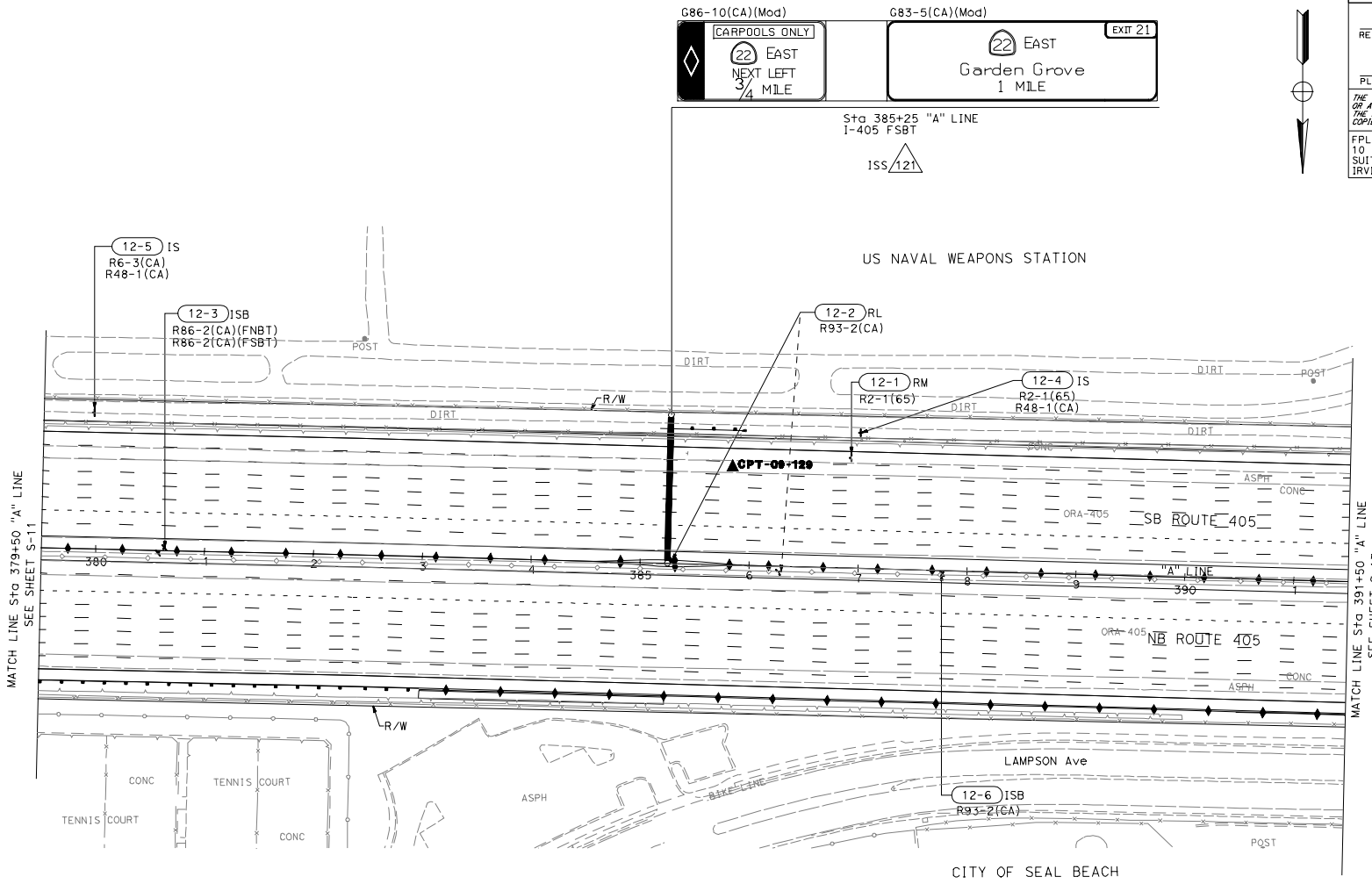

LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

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RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2L
SIGN PLAN
SCALE 1" = 50'

S-12

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NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
ALEXANDER ZUPANSKI
No. 59351
Exp. 06/30/09
CIVIL
STATE OF CALIFORNIA

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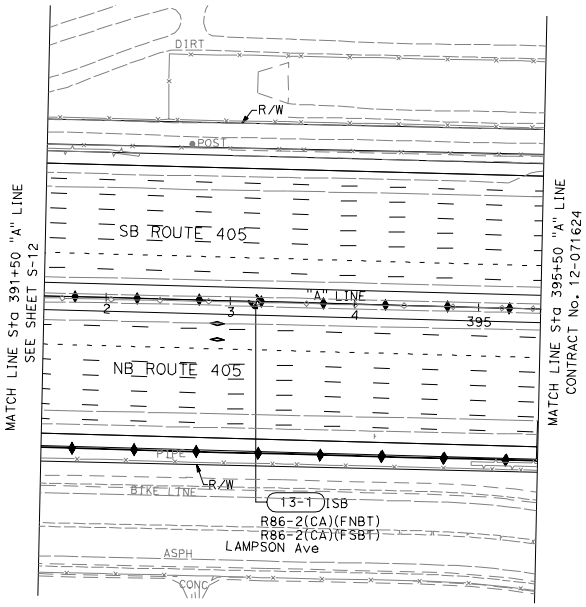
US NAVAL WEAPONS STATION



CITY OF SEAL BEACH

LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

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RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2M
SIGN PLAN
SCALE 1" = 50'

S-13

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISED BY
Caltrans	CARLOS A. CADENA	EDDIE TANG	
		CHECKED BY	DATE REVISED
		ALEXANDER ZUPANSKI	

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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CALCULATED-DESIGNED BY	CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR	CARLOS A. CADENA

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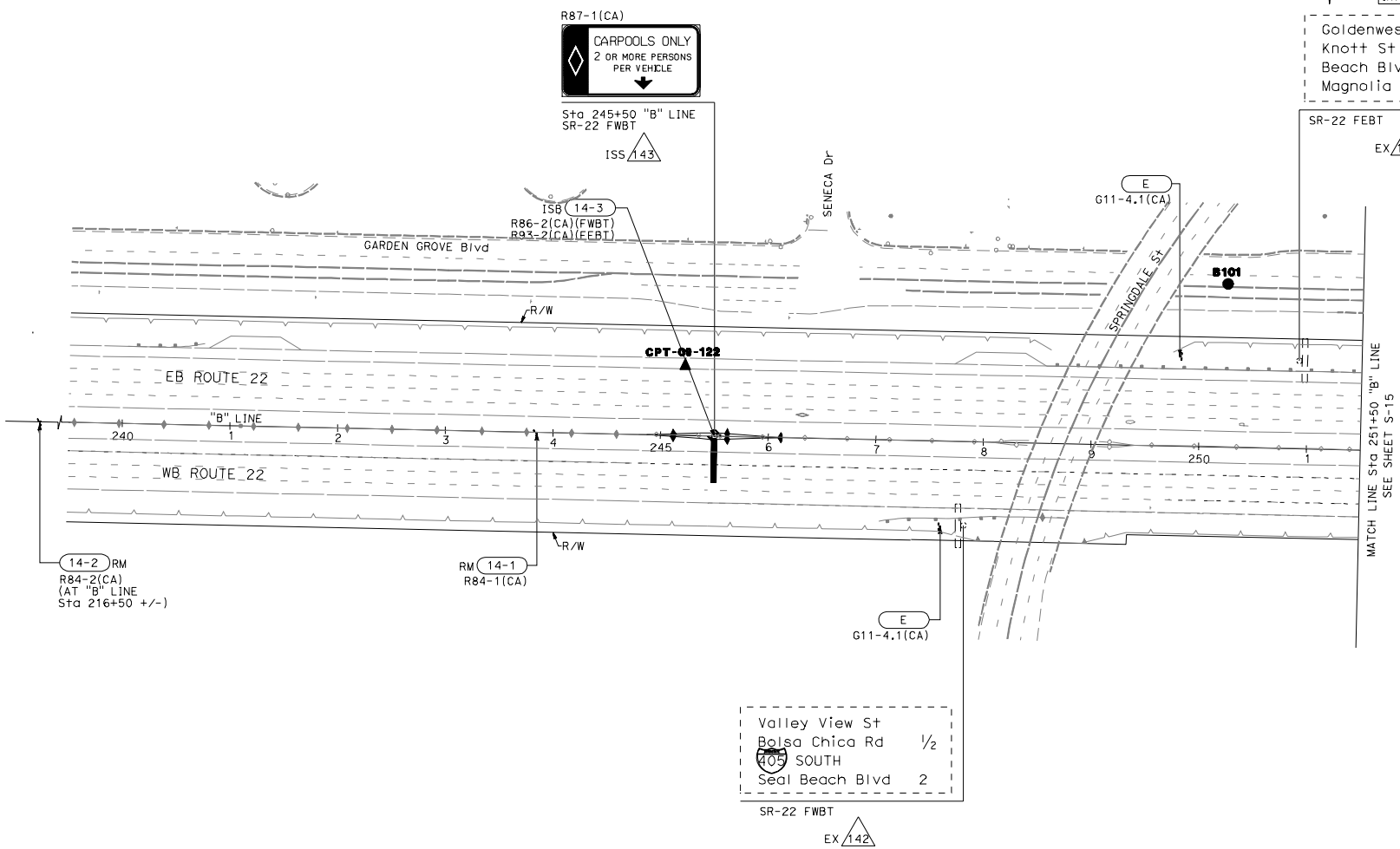
Caltrans



LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2N
SIGN PLAN
SCALE 1" = 50'

S-14

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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CONSULTANT FUNCTIONAL SUPERVISOR	CARLOS A. CADENA

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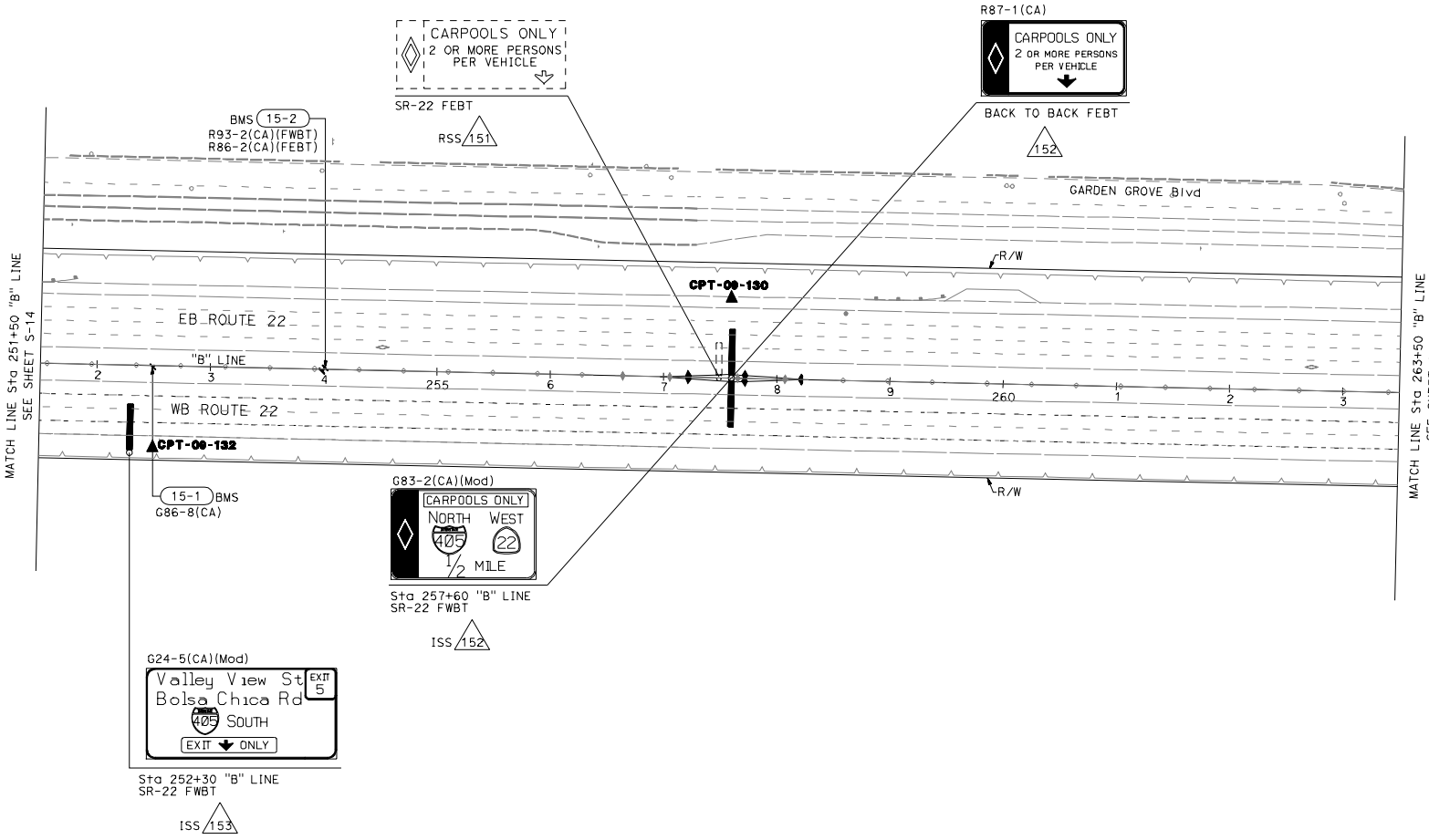

LEGEND

● LOCATION OF BORING

▲ LOCATION OF CPT

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

FIGURE 20
SIGN PLAN

SCALE 1" = 50'

S-15

NOTE: FOR COMPLETE RIGHT OF WAY DATA AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

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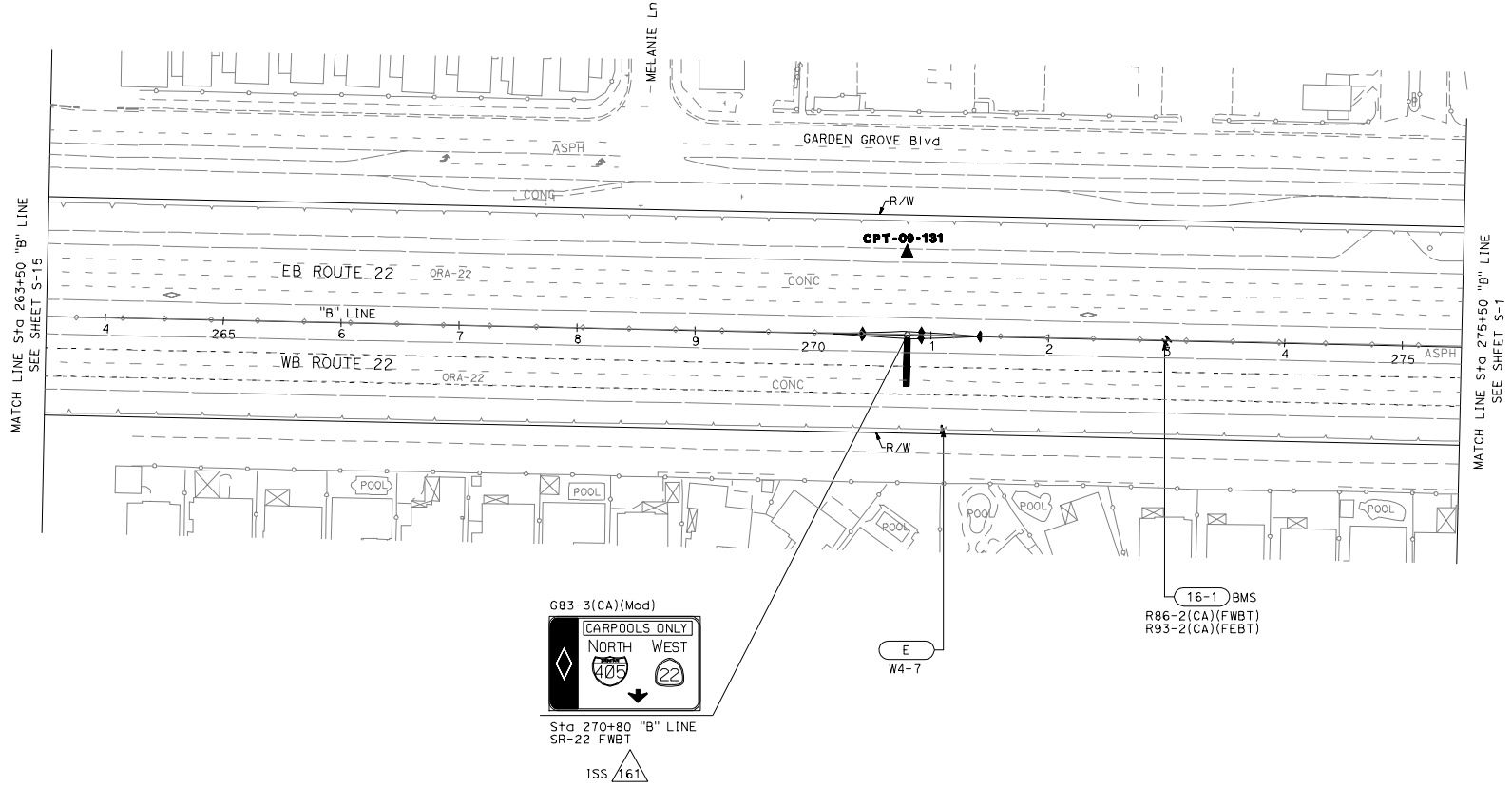

LEGEND
- ● LOCATION OF BORING
- ▲ LOCATION OF CPT

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

RELATIVE BORDER SCALE IS IN INCHES
0 1 2 3

FIGURE 2P
SIGN PLAN
SCALE 1" = 50'

S-16

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

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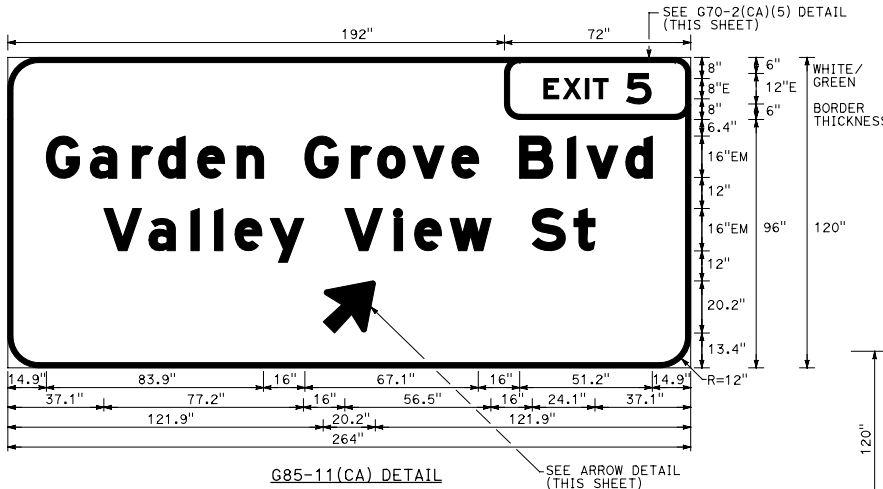
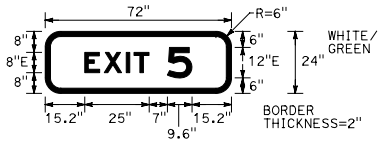
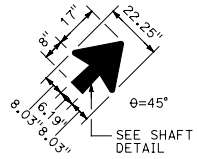
CARLOS A. CADENA	CHECKED BY	ALEXANDER ZUPANSKI	DATE REVISED	



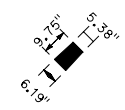
G85-11(CA) DETAIL



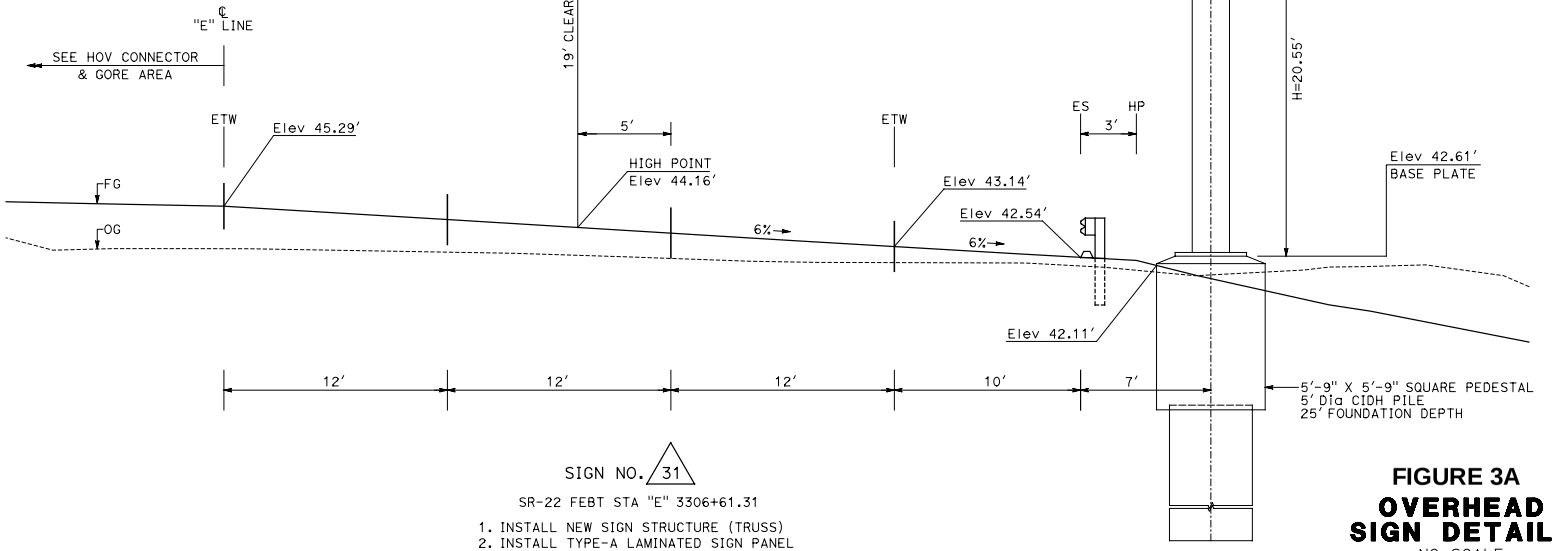
G70-2(CA)(5) DETAIL

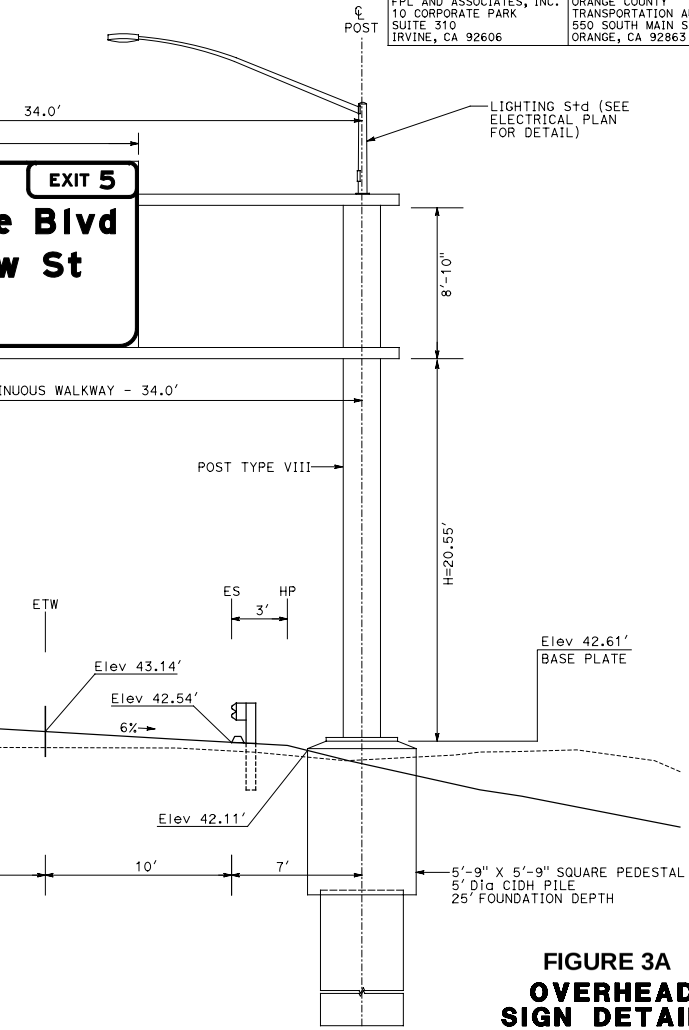


ARROW DETAIL



SHAFT DETAIL





GENERAL NOTES:

1. ALL SIGN ELEVATIONS AND DIMENSIONS ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR. POST LENGTHS "h" SHALL BE ADJUSTED AS REQUIRED TO ACHIEVE SPECIFIED MINIMUM VERTICAL CLEARANCE.
2. INSTALL ELECTRICAL CONDUIT IN SIGN FOUNDATIONS PER THE STANDARD PLANS AND THE ELECTRICAL PLANS.
3. SIGN SUPPORT SPANS SHALL BE LEVEL.

SIGN NO. 31

SR-22 FEBT STA "E" 3306+61.31

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3A

OVERHEAD SIGN DETAILS

NO SCALE

SD-1

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

ALEXANDER ZUPANSKI No. 59351 Exp. 06/30/09 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

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ORANGE COUNTY
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ORANGE, CA 92863

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

CALCULATED-DESIGNED BY: EDDIE TANG

CHECKED BY: ALEXANDER ZUPANSKI

REVISED BY | DATE REVISED

LAST REVISION 01-30-09

DATE PLOTTED => 04DATE

TIME PLOTTED => 09TIME

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => $USER

DGN FILE => &REQUEST

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER — DATE

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IRVINE, CA 92606

ORANGE COUNTY
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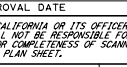
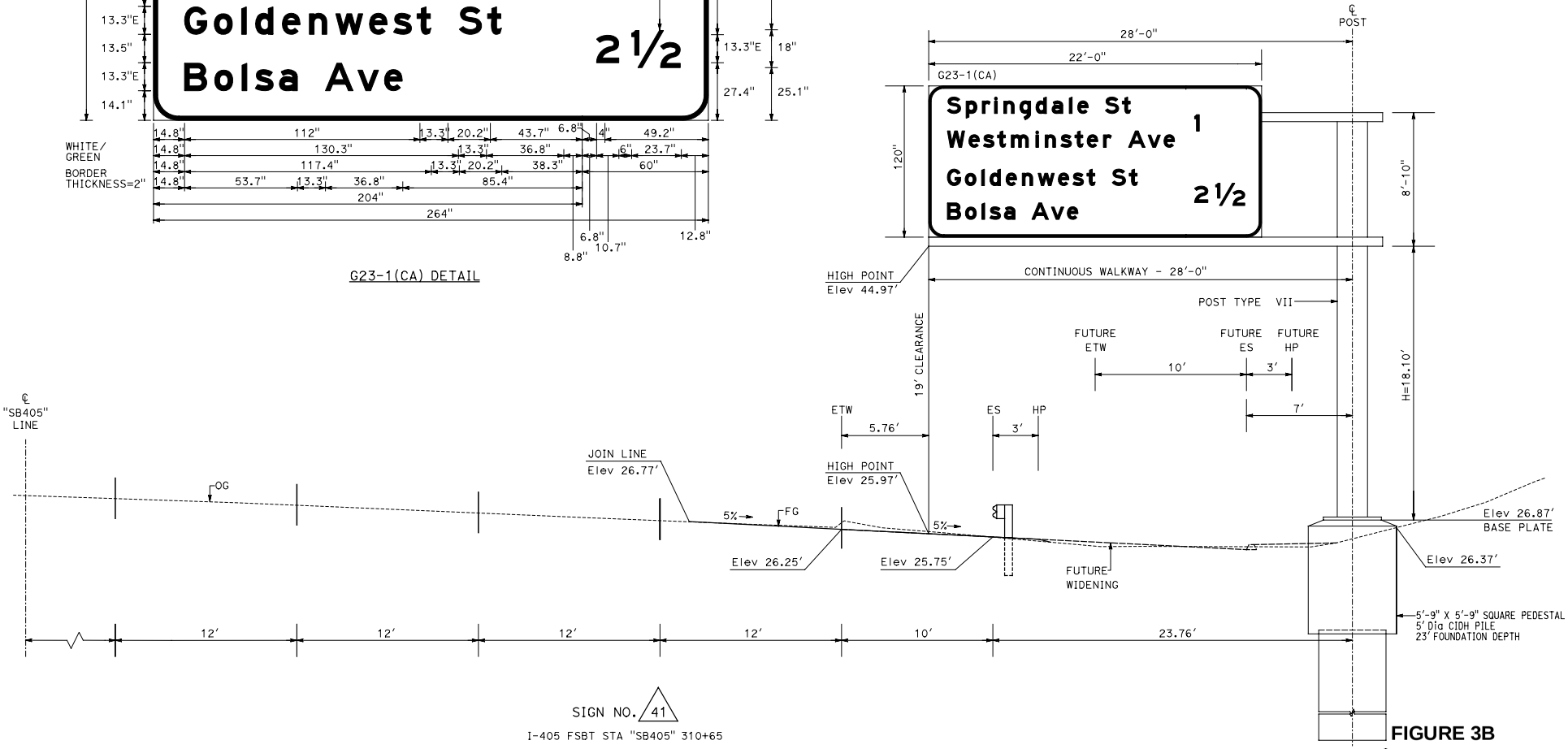
550 SOUTH MAIN STREET
ORANGE, CA 92863

G23-1(CA) DETAIL



FRACTION DETAIL



SIGN NO. 41

I-405 FSBT STA "SB405" 310+65

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3B

OVERHEAD SIGN DETAILS

NO SCALE

SD-2

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CONSULTANT FUNCTIONAL SUPERVISOR	CARLOS A. CADENA

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USERNAME => &USER
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CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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ALEXANDER ZUPANSKI
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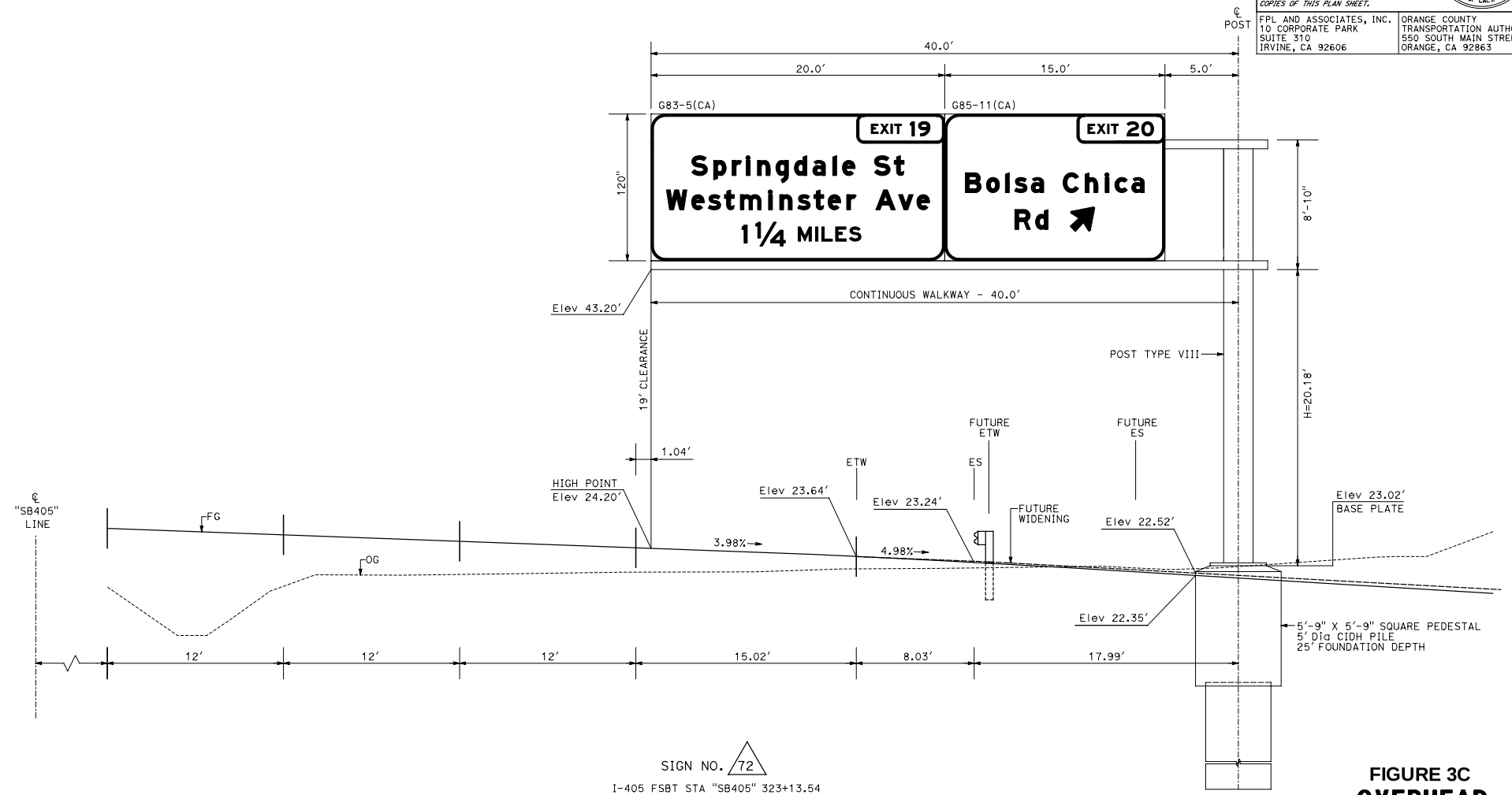

SIGN NO. 72

I-405 FSBT STA "SB405" 323+13.54

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3C
OVERHEAD SIGN DETAILS
NO SCALE

SD-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

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USERNAME => $USER
DGN FILE => &REQUEST

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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ORANGE, CA 92863

REVISED BY	DATE REVISED
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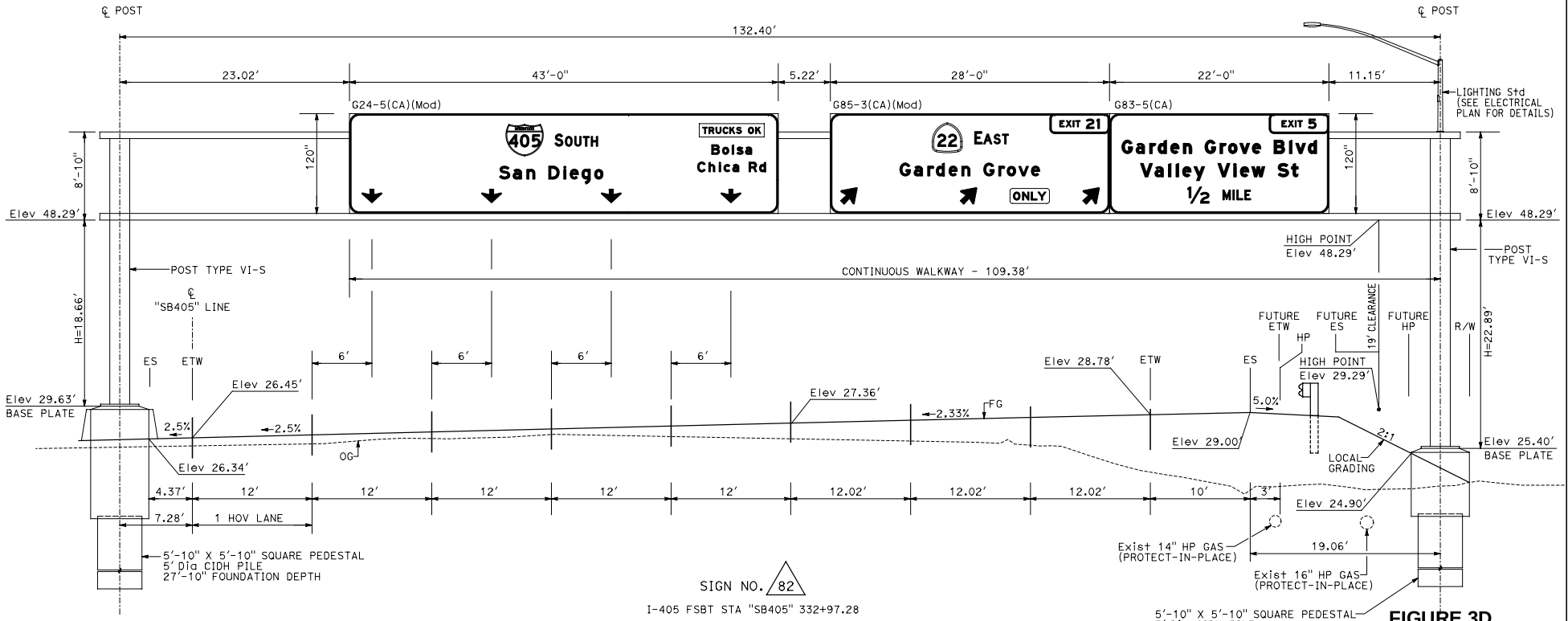
CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans



SIGN NO. 82

I-405 FSBT STA "SB405" 332+97.28

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

FIGURE 3D
OVERHEAD SIGN DETAILS

NO SCALE

SD-5

LAST REVISION 01-30-09
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TIME PLOTTED => &TIME

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USERNAME => $USER
DGN FILE => &REQUEST

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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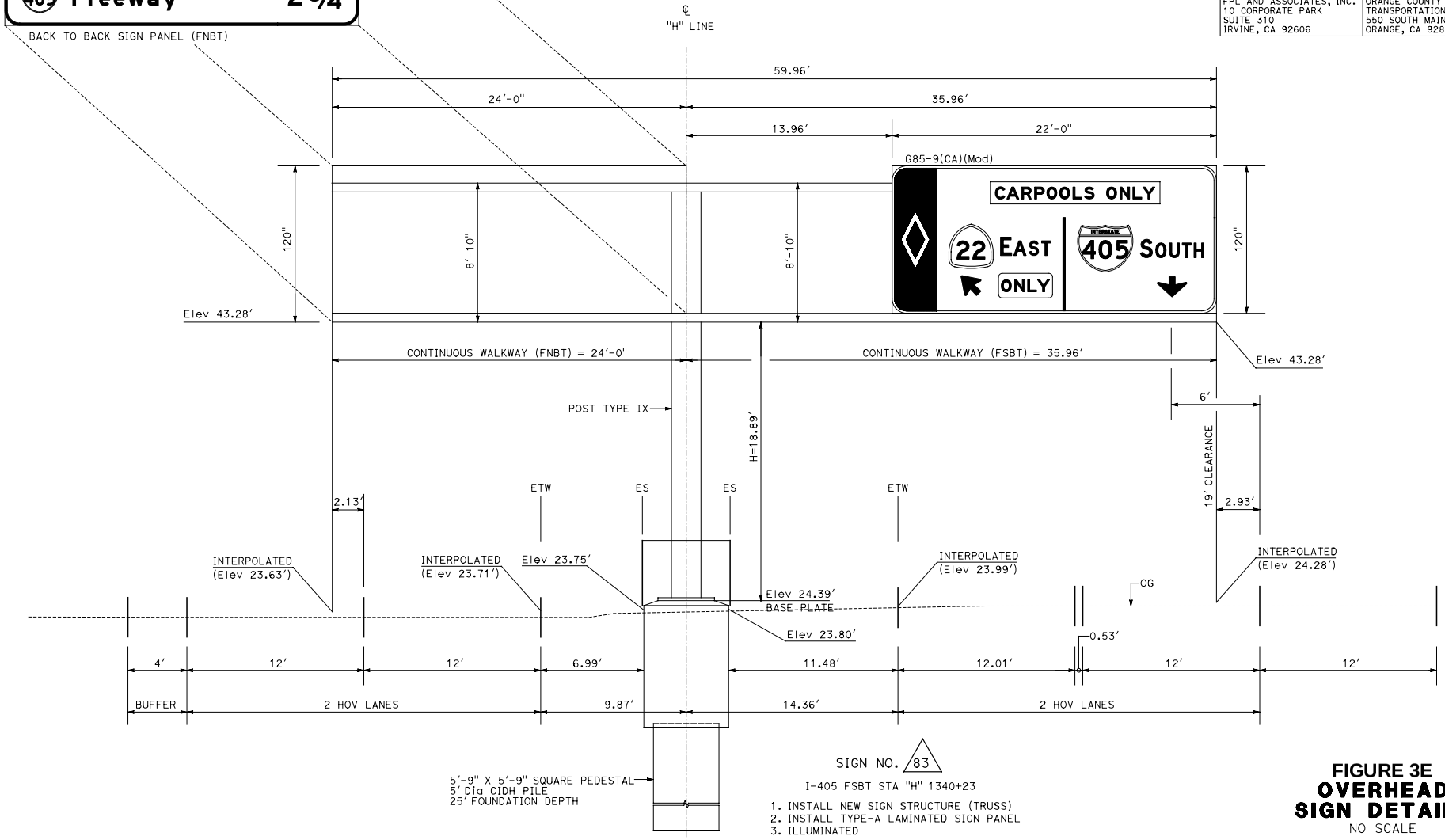
ORANGE, CA 92863

G23-5(CA)

Seal Beach Blvd 1 1/4
Los Alamitos Blvd
7th Street (22) WEST 2
(405) Freeway 2 3/4

BACK TO BACK SIGN PANEL (FNBT)



SIGN NO. 83

I-405 FSBT STA "H" 1340+23

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3E
OVERHEAD SIGN DETAILS

NO SCALE

SD-8

REVISED BY	DATE REVISED
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CALCULATED-DESIGNED BY

CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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TIME PLOTTED => &TIME

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USERNAME => &USER
DGN FILE => &REQUEST

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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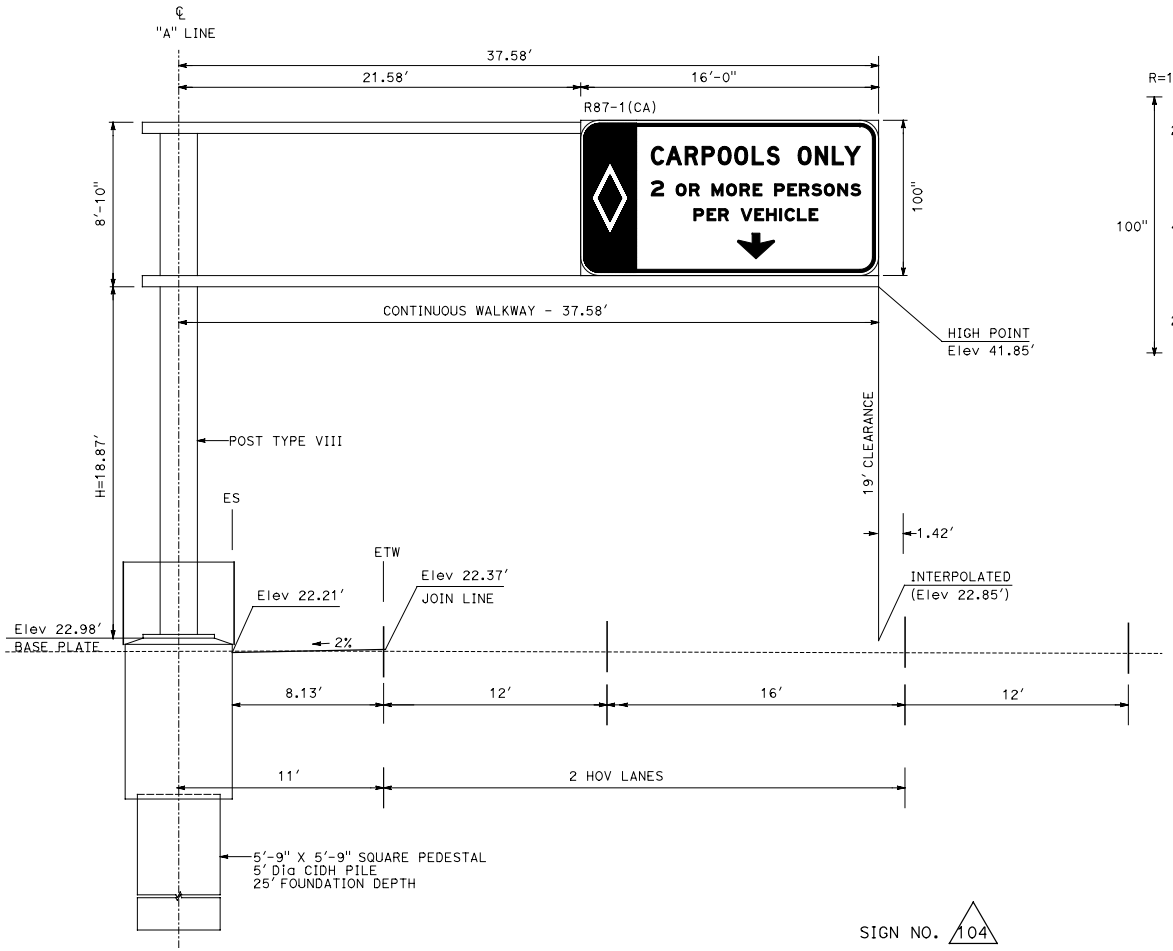
FPL AND ASSOCIATES, INC. 10 CORPORATE PARK SUITE 310 IRVINE, CA 92606	ORANGE COUNTY TRANSPORTATION AUTHORITY 550 SOUTH MAIN STREET ORANGE, CA 92863

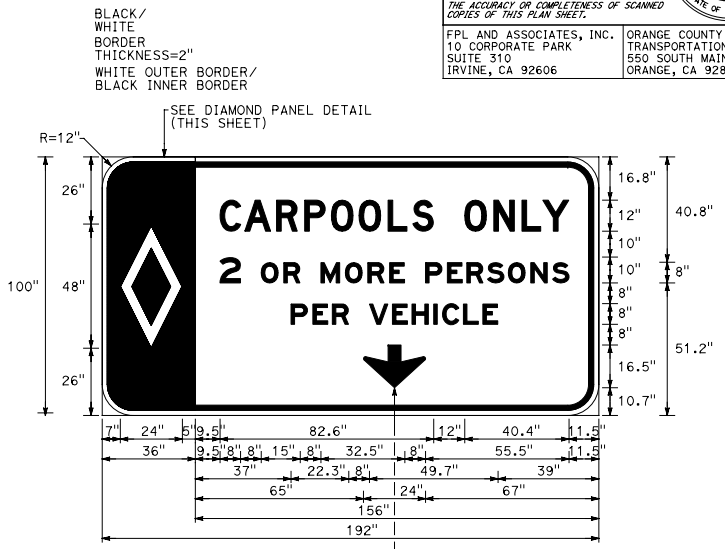


SIGN NO. 104

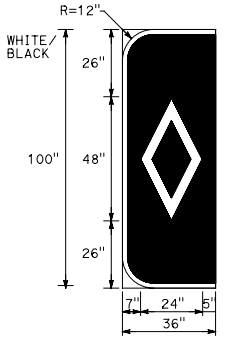
I-405 FNBT STA "A" 356+15

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.



R87-1(CA) DETAIL



DIAMOND PANEL DETAIL

FIGURE 3F
OVERHEAD SIGN DETAILS
NO SCALE

SD-10

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REVISED BY
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LAST REVISION 01-30-09
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TIME PLOTTED => &TIME

BORDER LAST REVISED 4/11/2008
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
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DGN FILE => &REQUEST
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EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
ALEXANDER ZUPANSKI
No. 59351
Exp. 06/30/09
CIVIL
STATE OF CALIFORNIA

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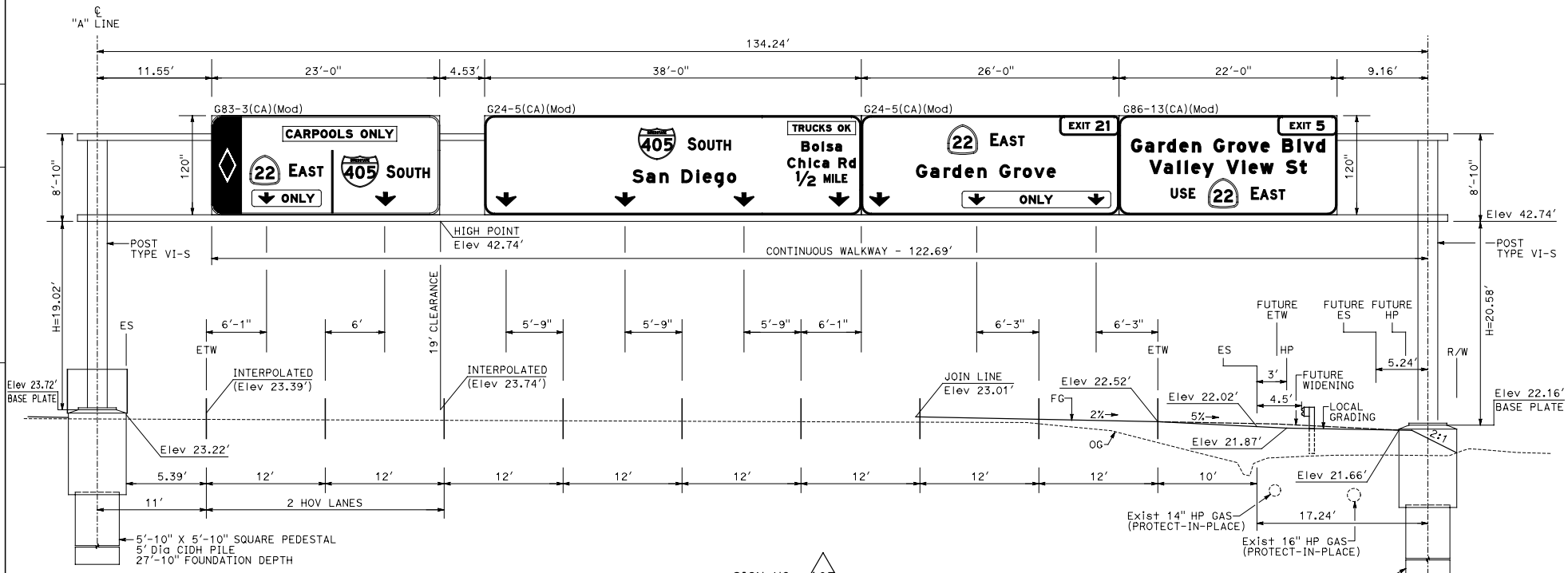
CONSULTANT FUNCTIONAL SUPERVISOR: CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION



SIGN NO. 103

I-405 FSBT STA "A" 359+75

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3G
OVERHEAD SIGN DETAILS
NO SCALE

SD-11

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DATE PLOTTED => &DATE
TIME PLOTTED => &TIME

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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No. 59351
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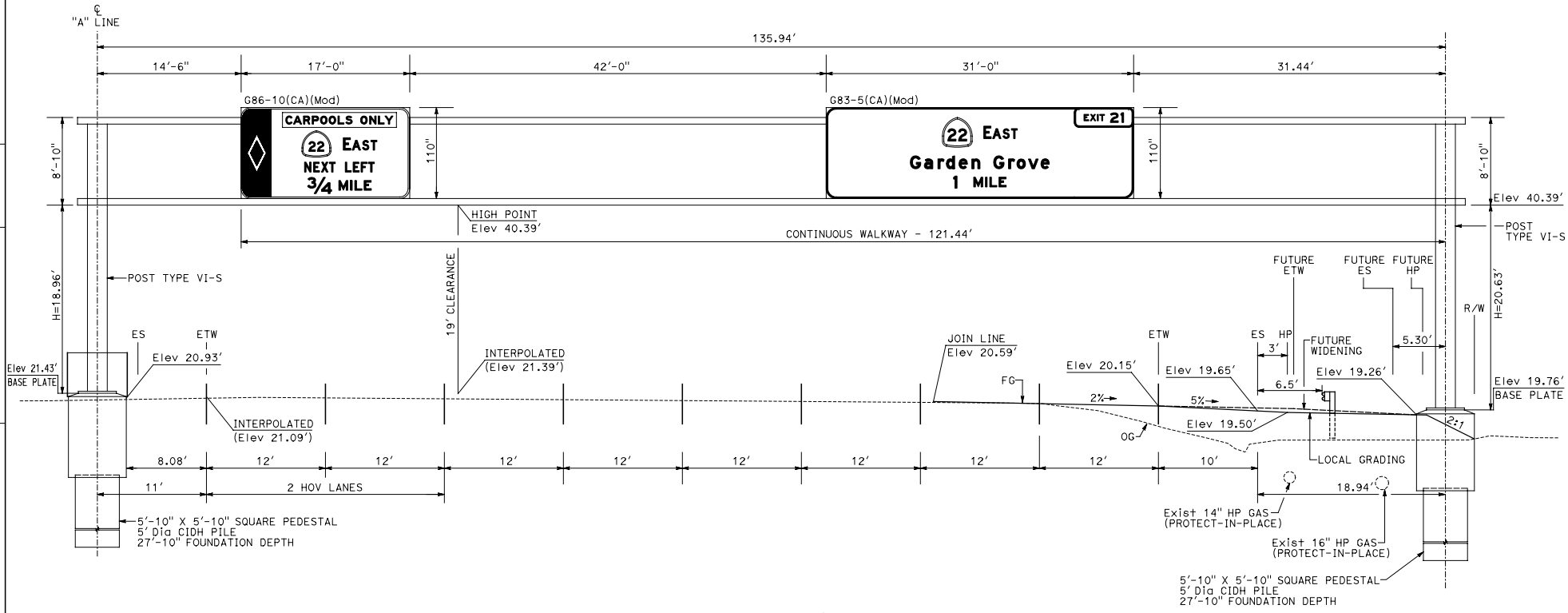
DATE REVISED



SIGN NO. 121

I-405 FSBT STA "A" 385+25

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

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FIGURE 3H
OVERHEAD SIGN DETAILS
NO SCALE

SD-14

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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No. 59351
Exp. 06/30/09
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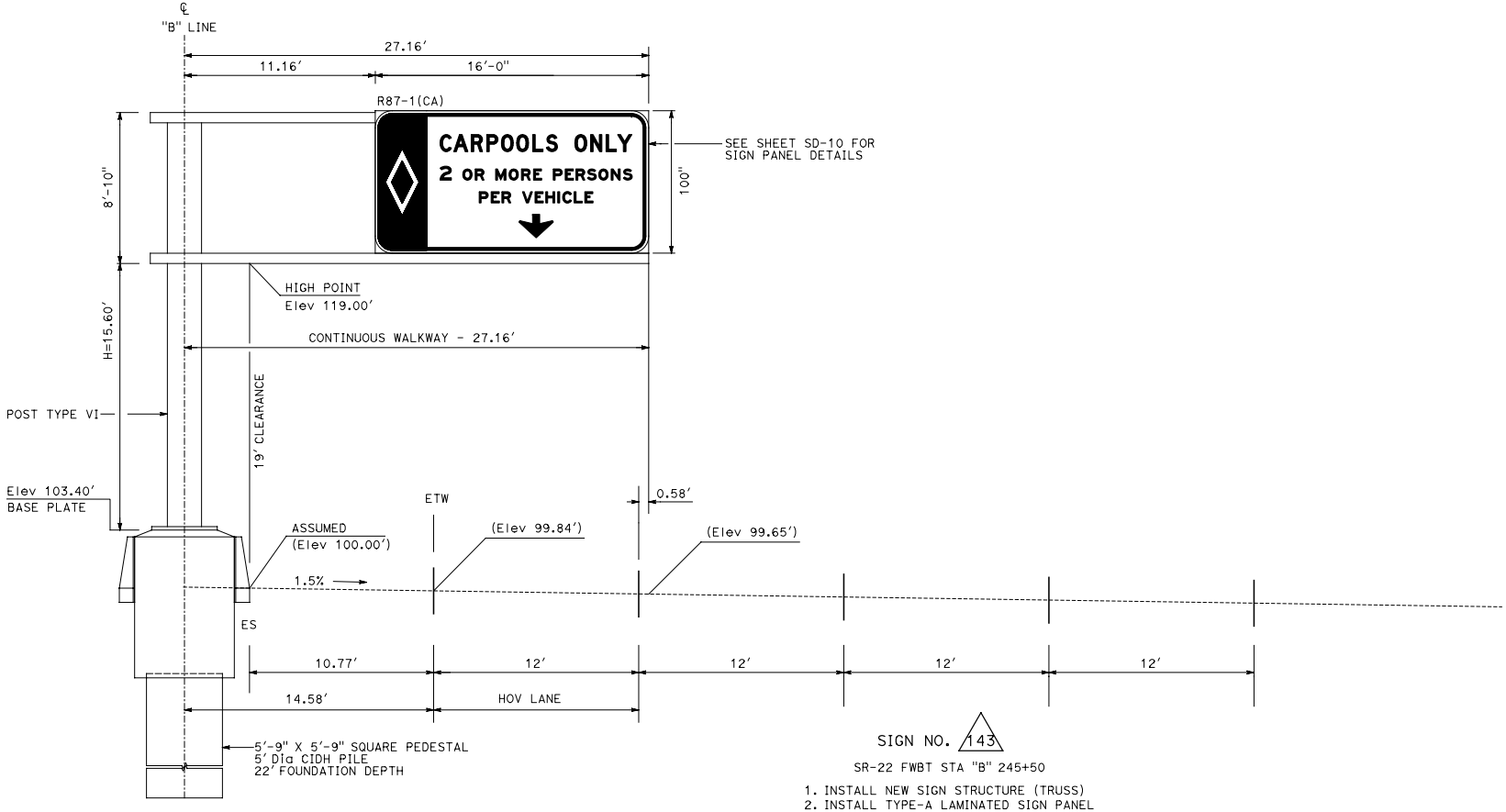

SIGN NO. 143

SR-22 FWBT STA "B" 245+50

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3I
OVERHEAD SIGN DETAILS

NO SCALE

SD-16

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DATE REVISED

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

USERNAME => $USER
DGN FILE => &REQUEST

CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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REVISED BY	DATE REVISED
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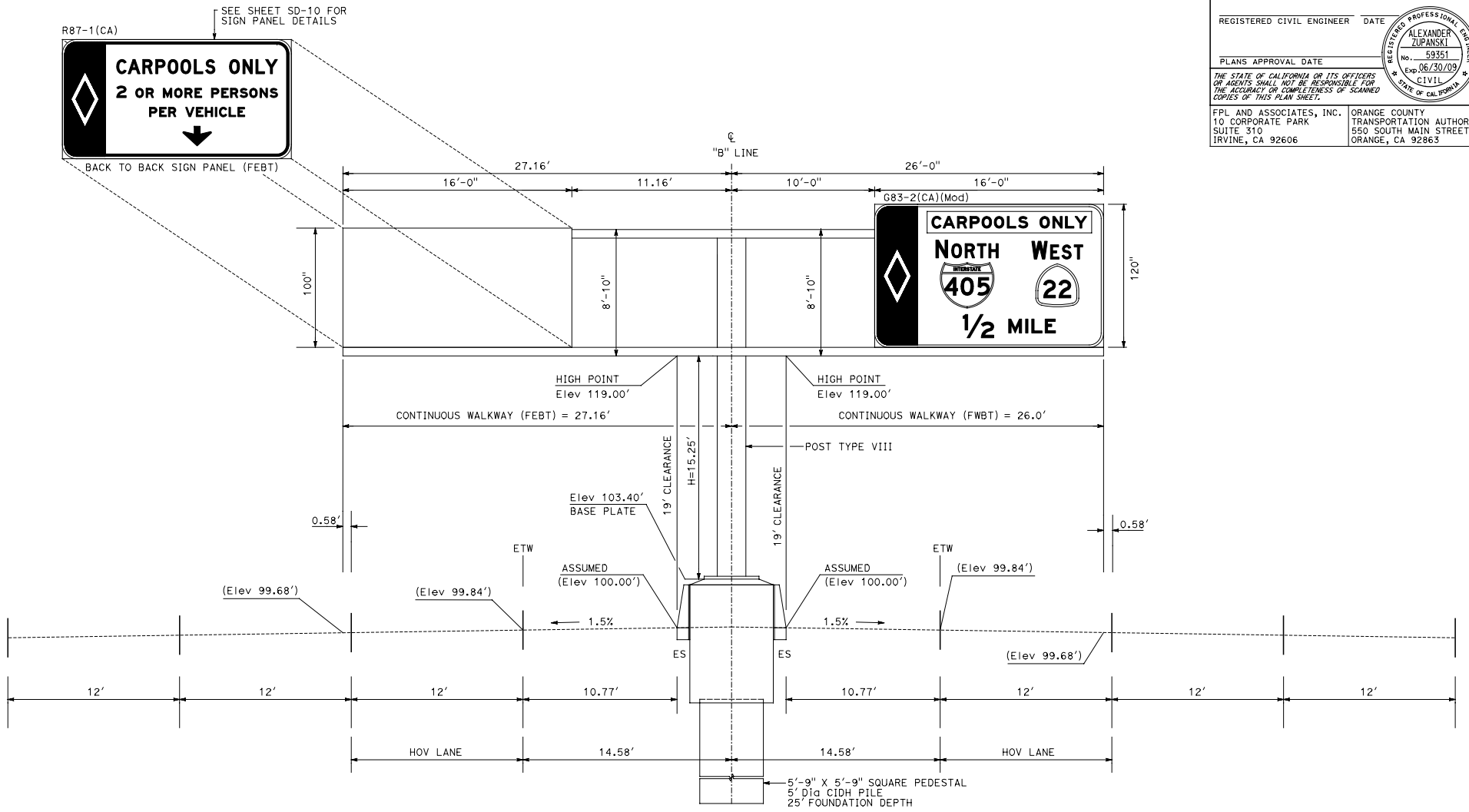
CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR
CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans



SIGN NO. 152

SR-22 FWBT STA "B" 257+60

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3J
OVERHEAD SIGN DETAILS

NO SCALE

SD-17

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TIME PLOTTED => &TIME

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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CU 12235

EA 071621

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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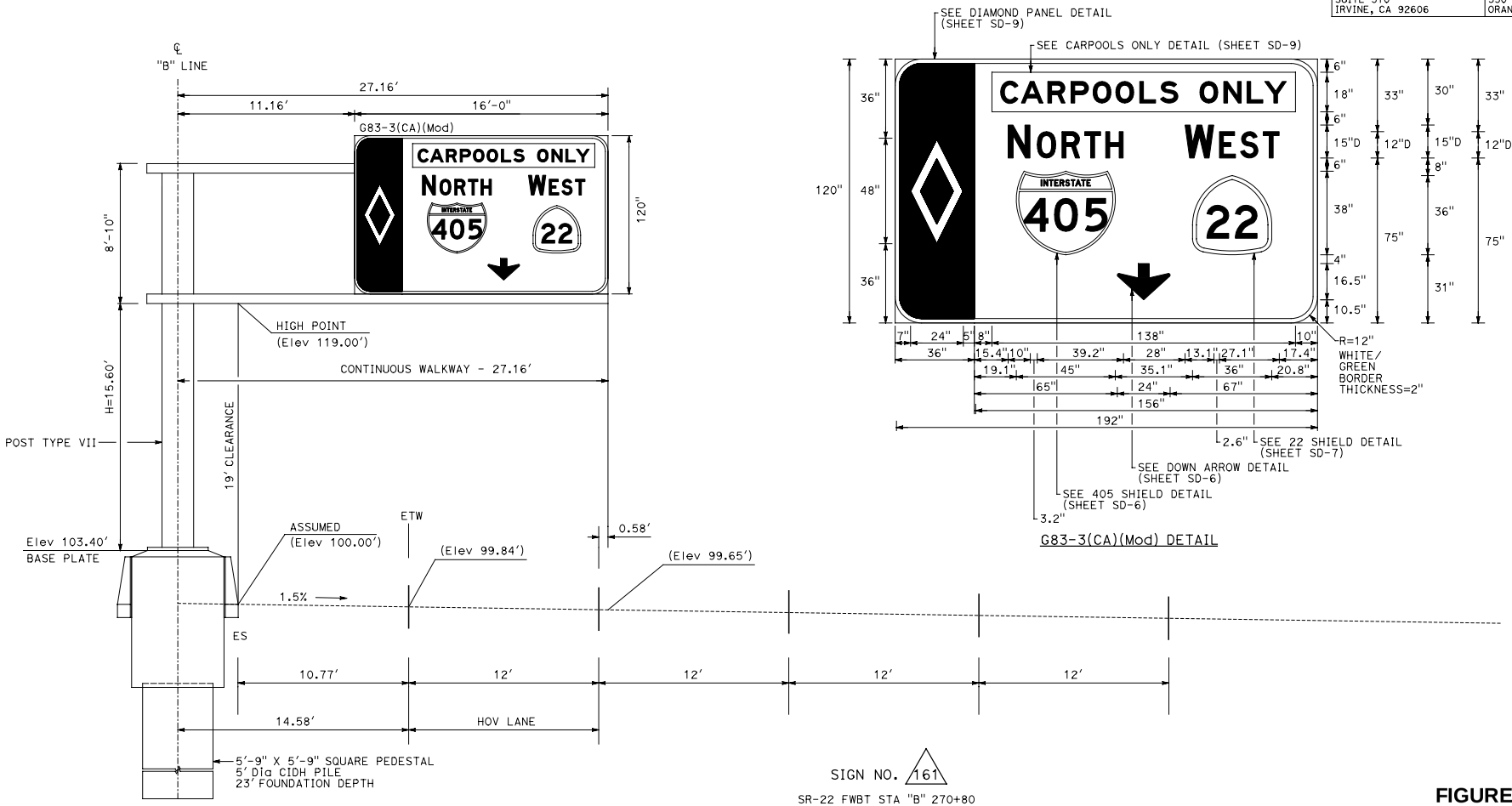

G83-3(CA)(Mod) DETAIL

SIGN NO. 161

SR-22 FWBT STA "B" 270+80

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

FIGURE 3K
OVERHEAD SIGN DETAILS
NO SCALE

SD-19

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Caltrans	CARLOS A. CADENA	EDDIE TANG	ALEXANDER ZUPANSKI		

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TIME PLOTTED => @TIME

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	22, 405	R0.7/R2.7 20.5/22.3		

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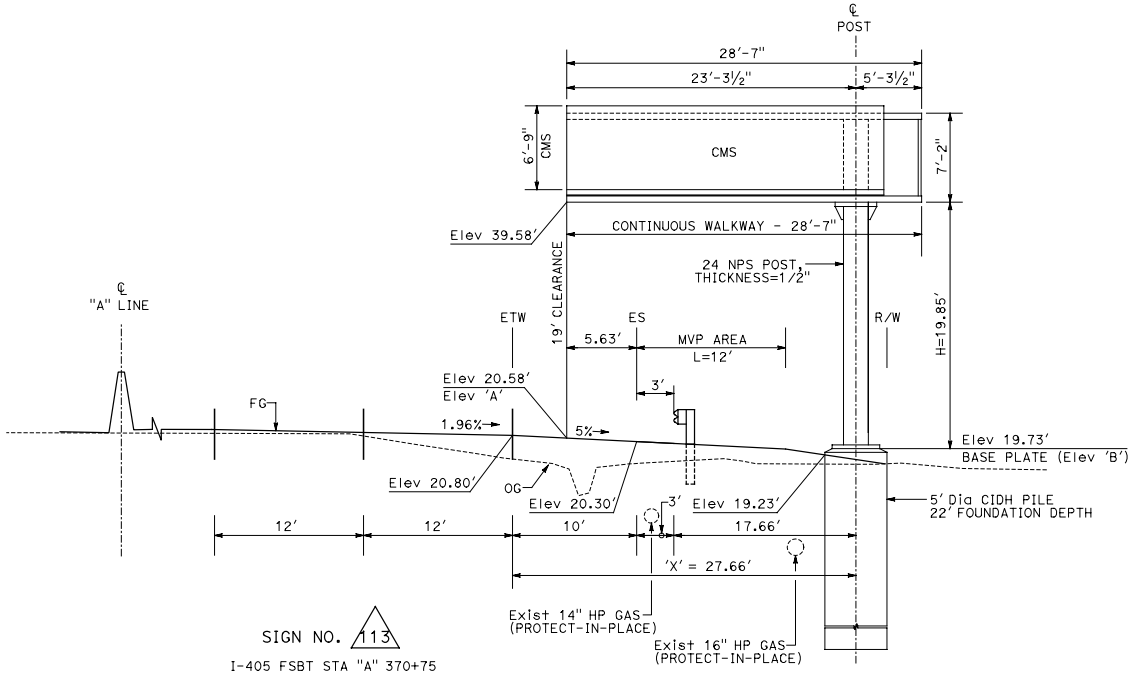
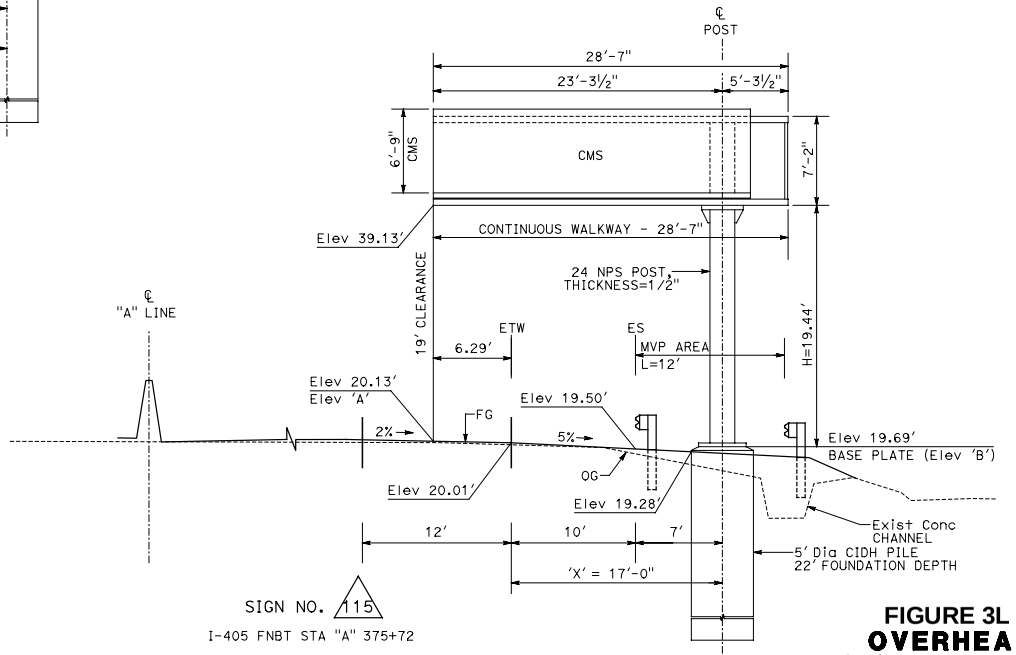


SIGN NO. 113

I-405 FSBT STA "A" 370+75

1. INSTALL OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, UNBALANCED BUTTERFLY, CHANGEABLE MESSAGE SIGN MODEL 500.
2. SEE CHANGEABLE MESSAGE SIGN SYSTEM (LOCATION 1) PLANS.



SIGN NO. 115

I-405 FNBT STA "A" 375+72

1. INSTALL OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, UNBALANCED BUTTERFLY, CHANGEABLE MESSAGE SIGN MODEL 500.
2. SEE CHANGEABLE MESSAGE SIGN SYSTEM (LOCATION 2) PLANS.

FIGURE 3L
OVERHEAD SIGN DETAILS
NO SCALE

SD-20

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

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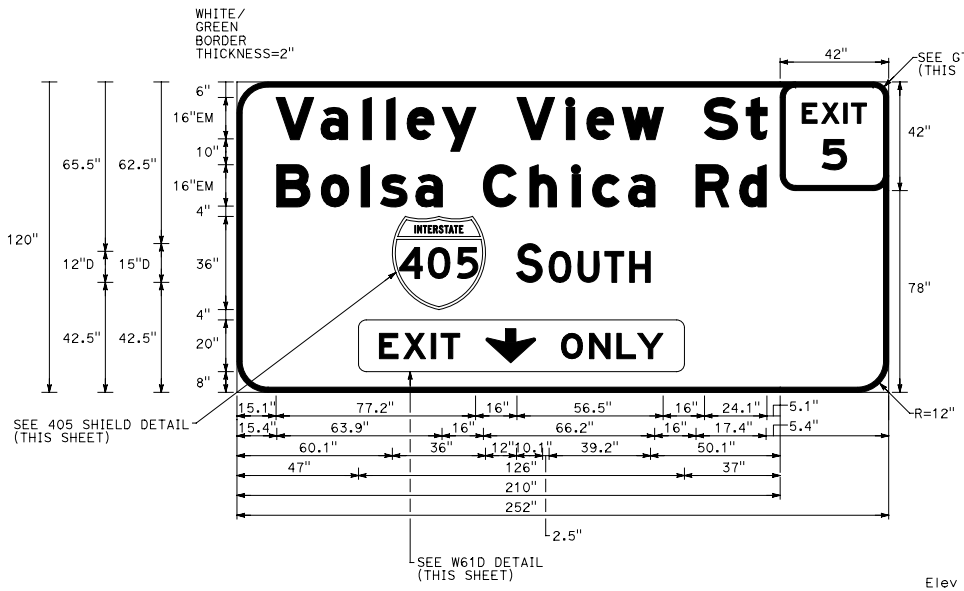
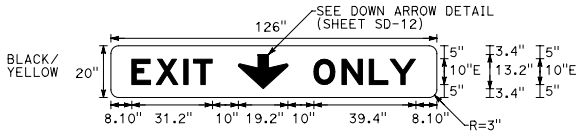
CONSULTANT FUNCTIONAL SUPERVISOR	CARLOS A. CADENA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 01-30-09 | DATE PLOTTED => &DATE | TIME PLOTTED => &TIME

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => $USER | DGN FILE => &REQUEST | CU 12235 | EA 071621





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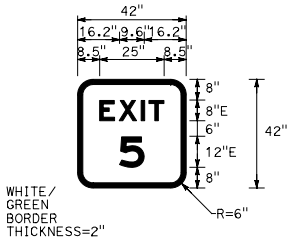
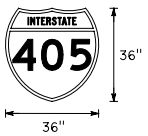
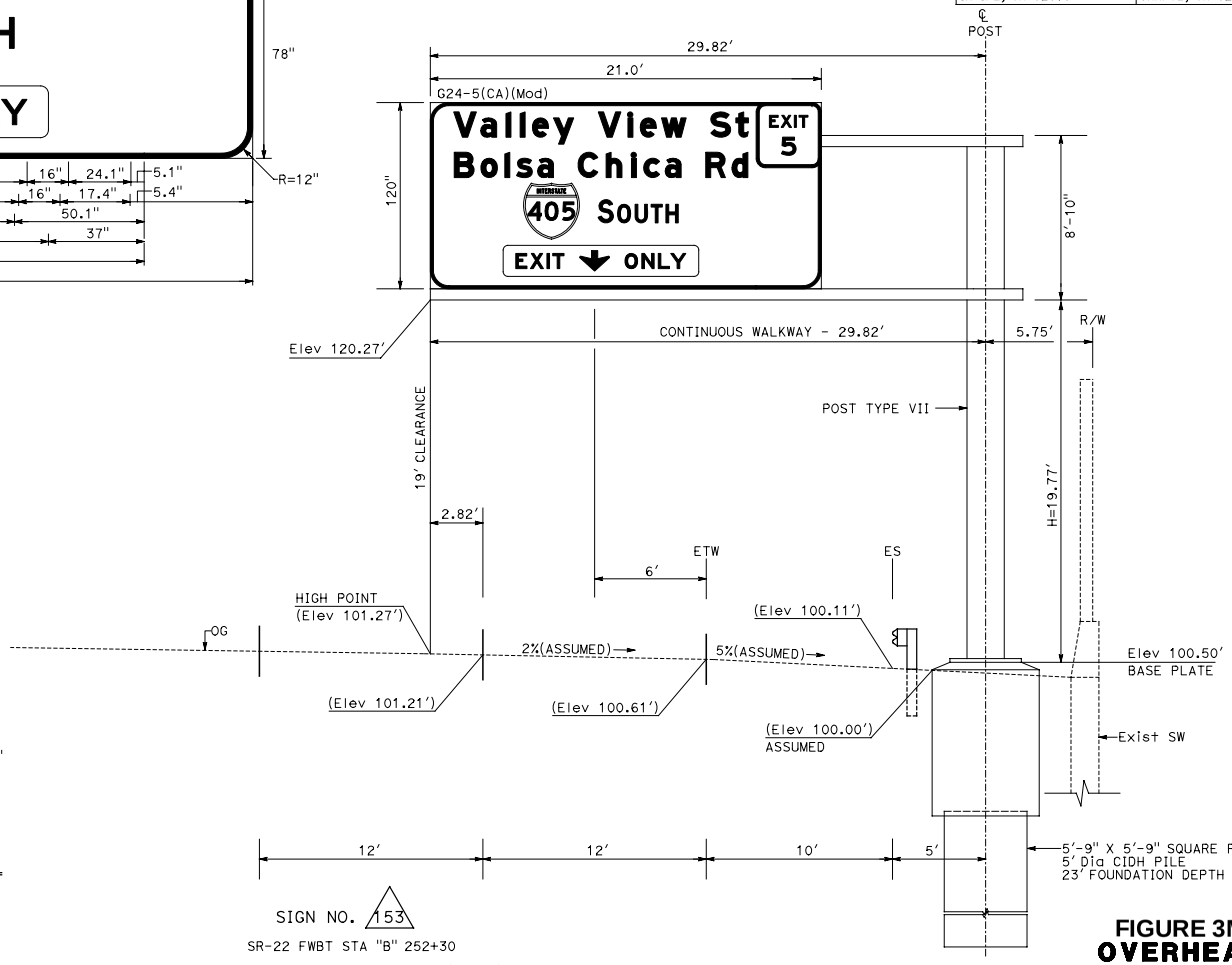


G70-4(CA)(5) DETAIL



405 SHIELD DETAIL



SIGN NO. 153

SR-22 FWBT STA "B" 252+30

1. INSTALL NEW SIGN STRUCTURE (TRUSS)
2. INSTALL TYPE-A LAMINATED SIGN PANEL
3. ILLUMINATED

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FIGURE 3M
OVERHEAD SIGN DETAILS
NO SCALE

SD-21

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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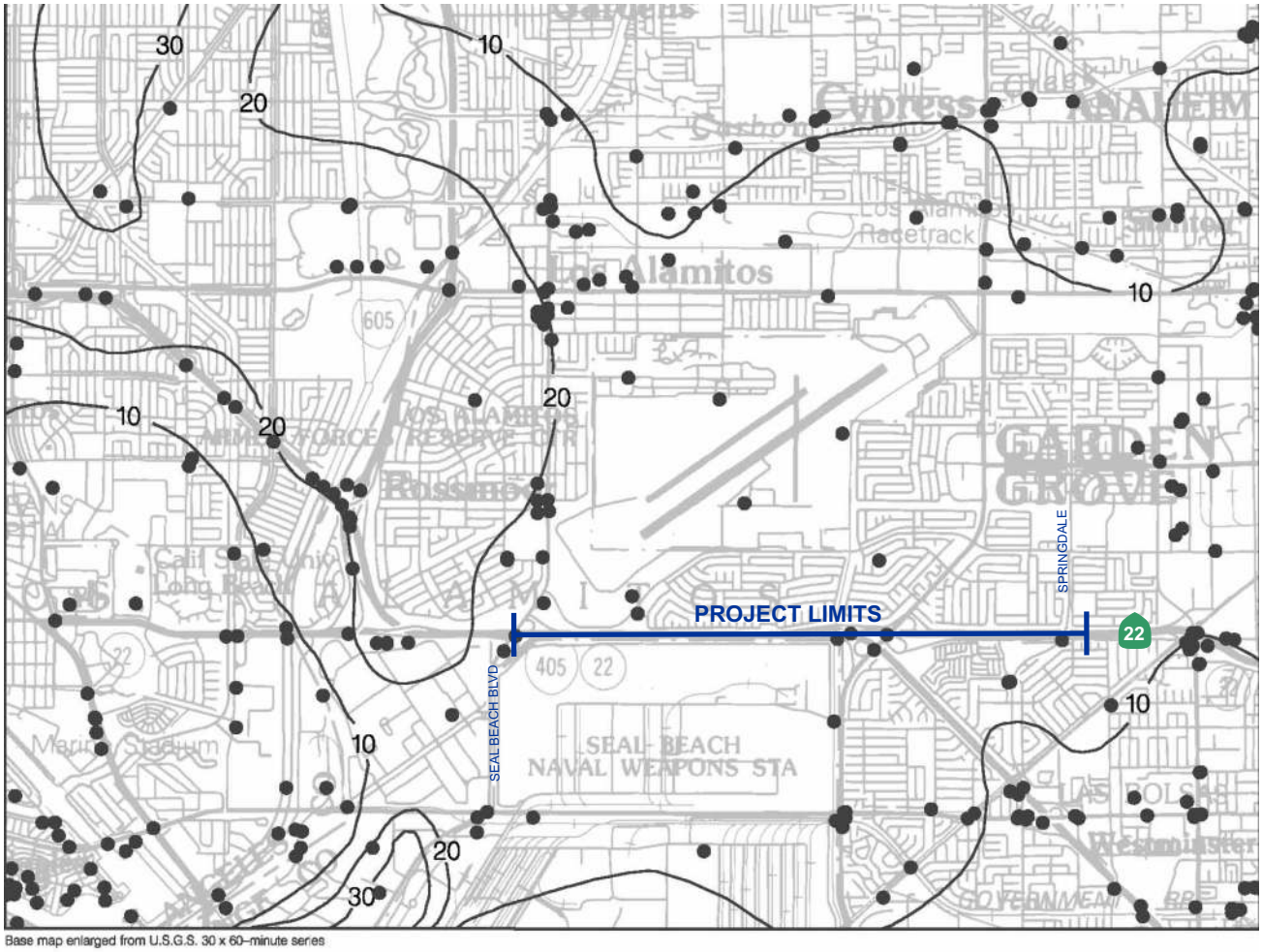
DGN FILE => &REQUEST

CU 12235

EA 071621



Base map enlarged from U.S.G.S. 30 x 60–minute series

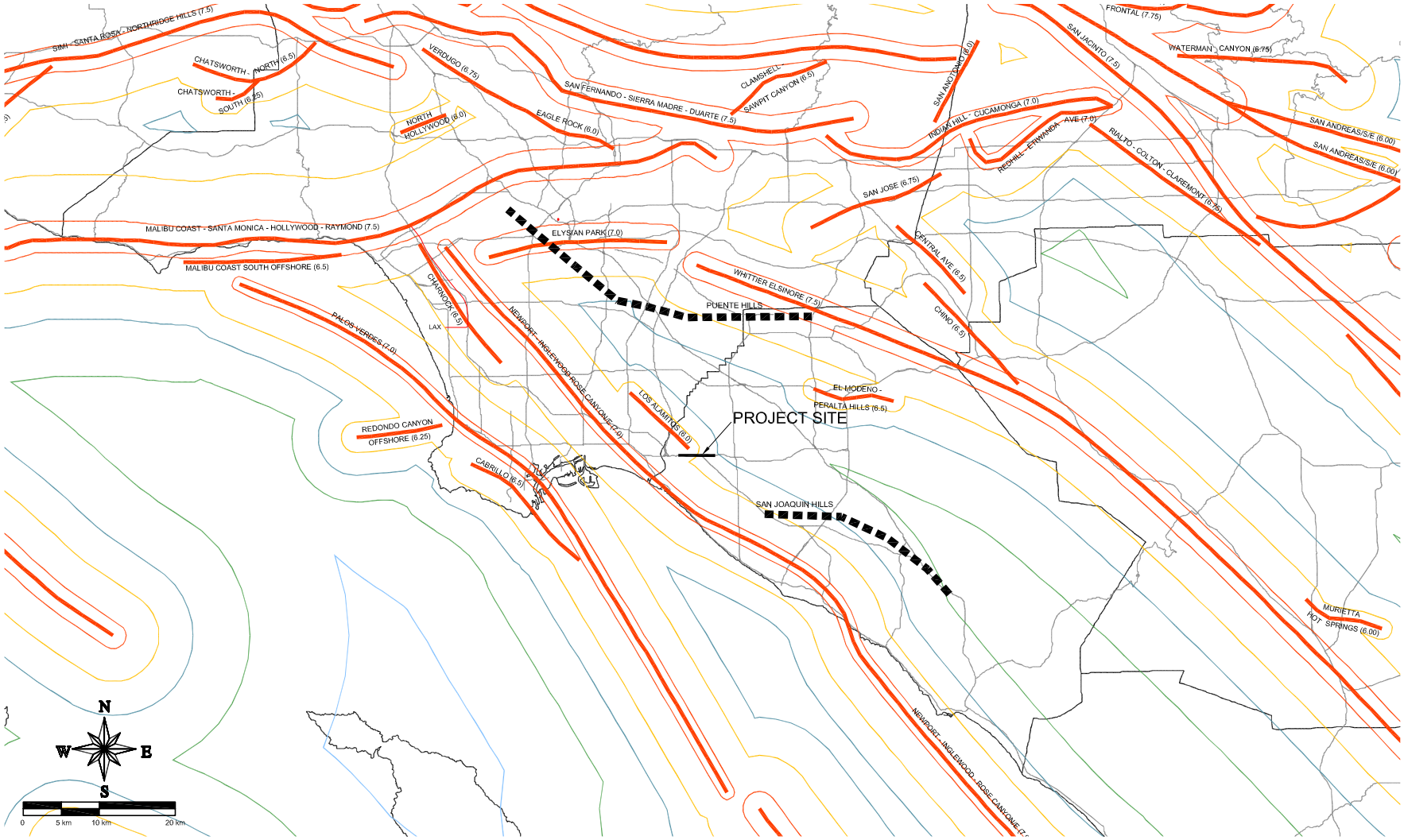
Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, Los Alamitos Quadrangle.

● Borehole Site 30 Depth to ground water in feet ONE MILE SCALE

GROUP DELTA CONSULTANTS

GROUP DELTACONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 32 MAUCHLY, SUITE B IRVINE , CA 92618 (949) 450-2100	FIGURE NUMBER **4**
PROJECT NAME 405/22 HOV CONNECTOR SEGMENT OVERHEAD SIGN FOUNDATIONS	PROJECT NUMBER I-436

HISTORICALLY HIGHEST GROUNDWATER



LEGEND

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour

NOTES: The San Joaquin Hills and the Puente Hills faults in Orange County are currently under investigation by the Office of Earthquake Engineering

REF. : MUALCHIN, L. 1996, "CALIFORNIA SEISMIC HAZARD MAP 1996" CALIFORNIA DEPARTMENT OF TRANSPORTATION

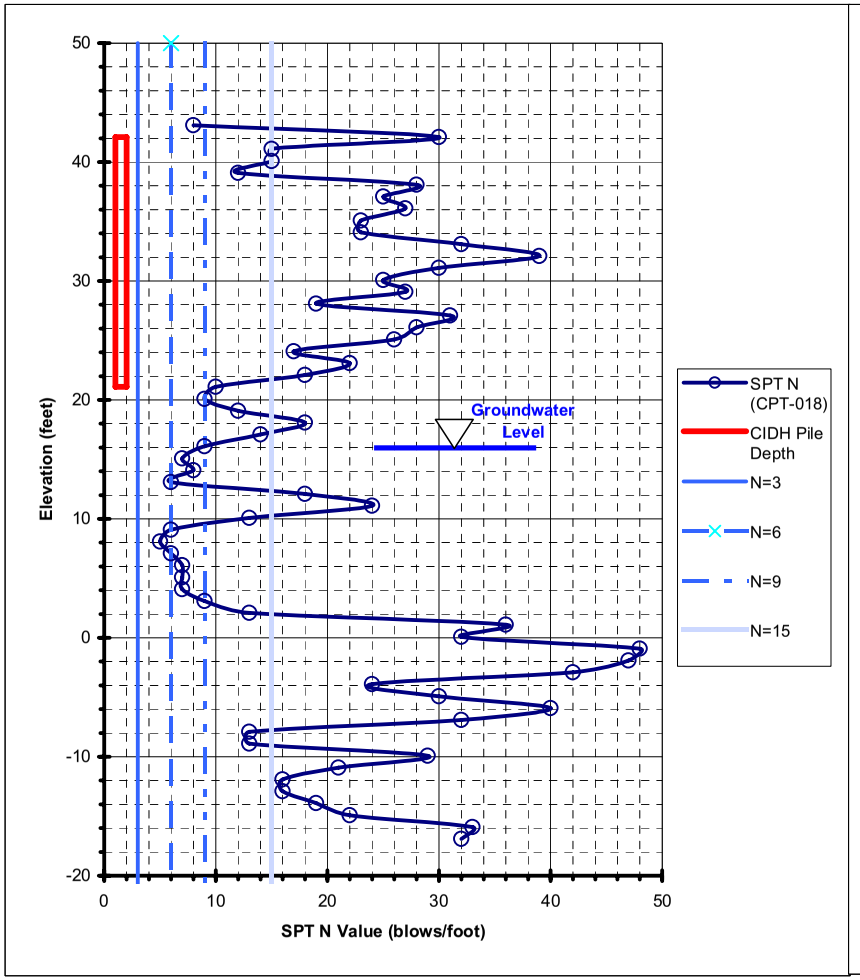
GROUP DELTA

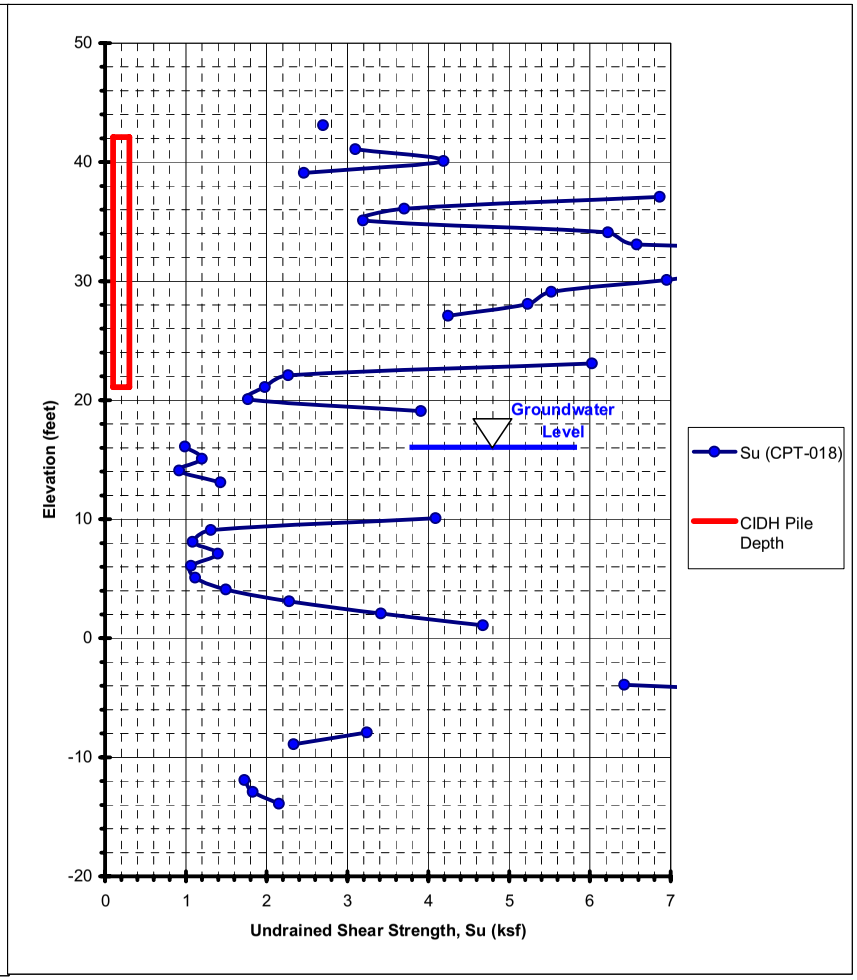
GDC PROJECT NO. I-436

405/22 HOV CONNECTOR SEGMENT
OVERHEAD SIGN FOUNDATIONS

Caltrans Fault and PBA Map

Figure 5



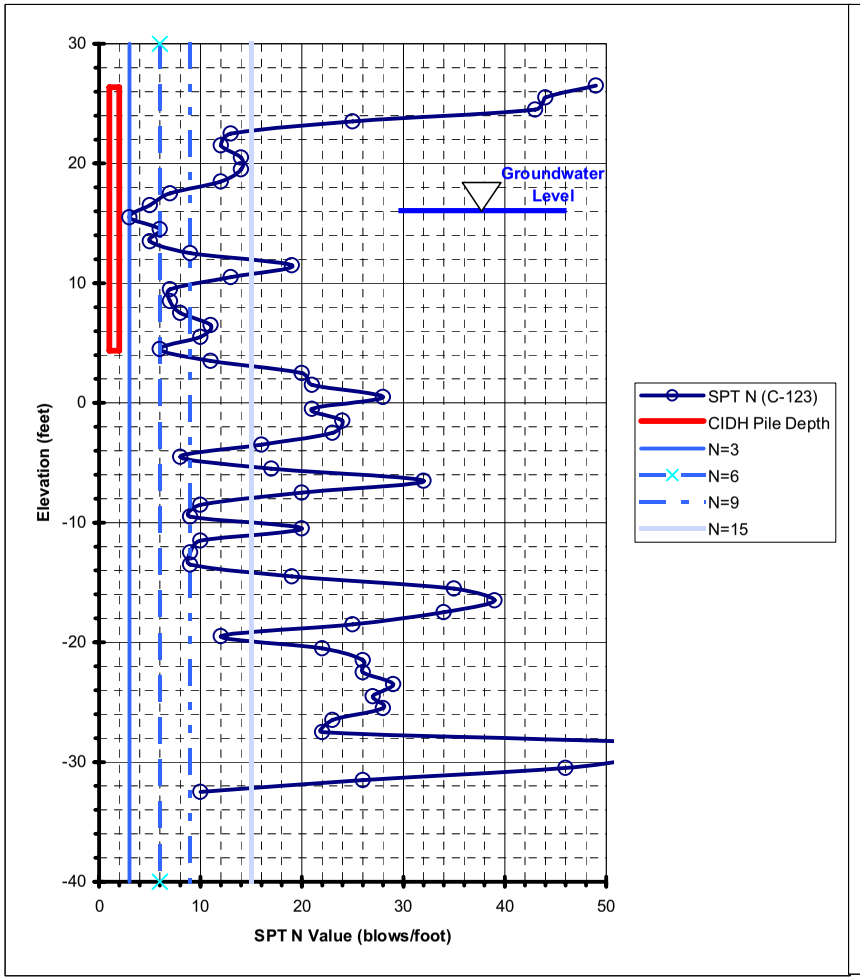


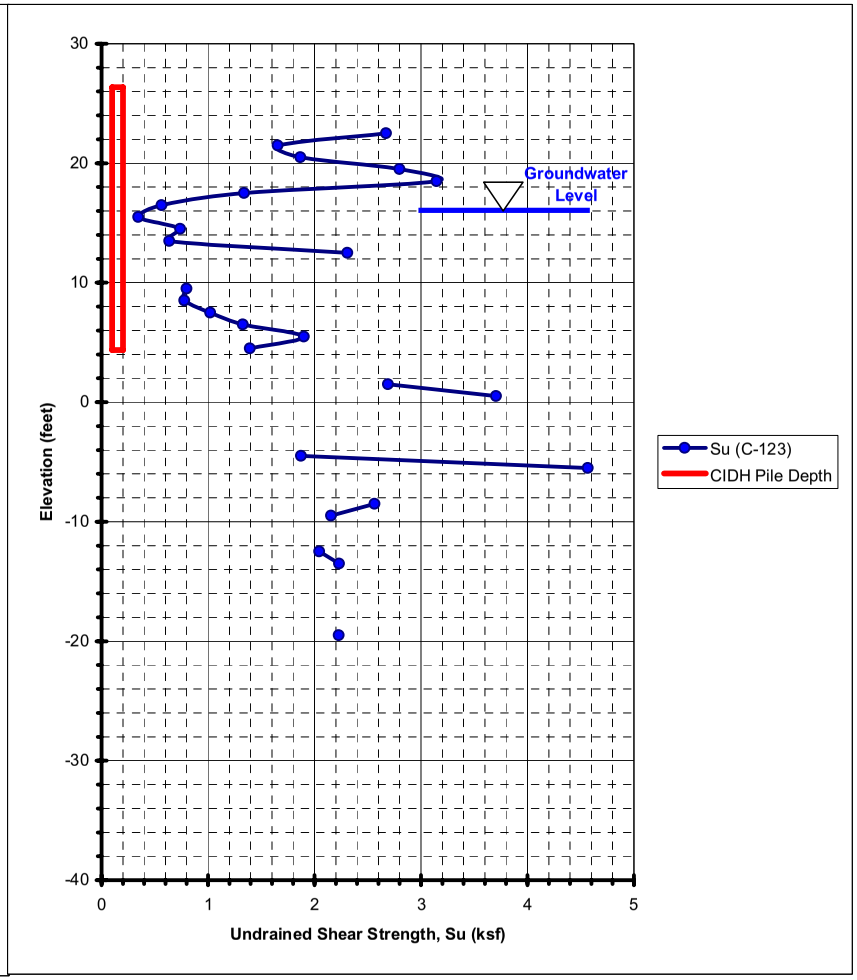
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE

SIGN NO. 31 (CPT-08-018)

WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436

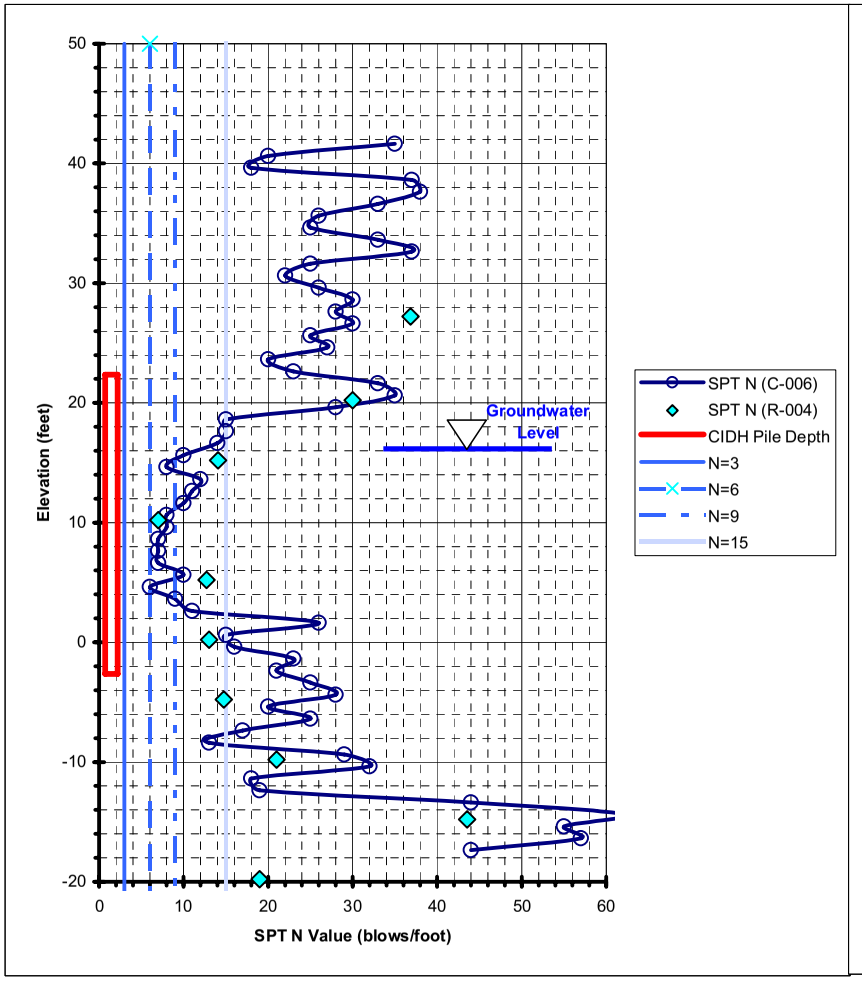
FIGURE 6A

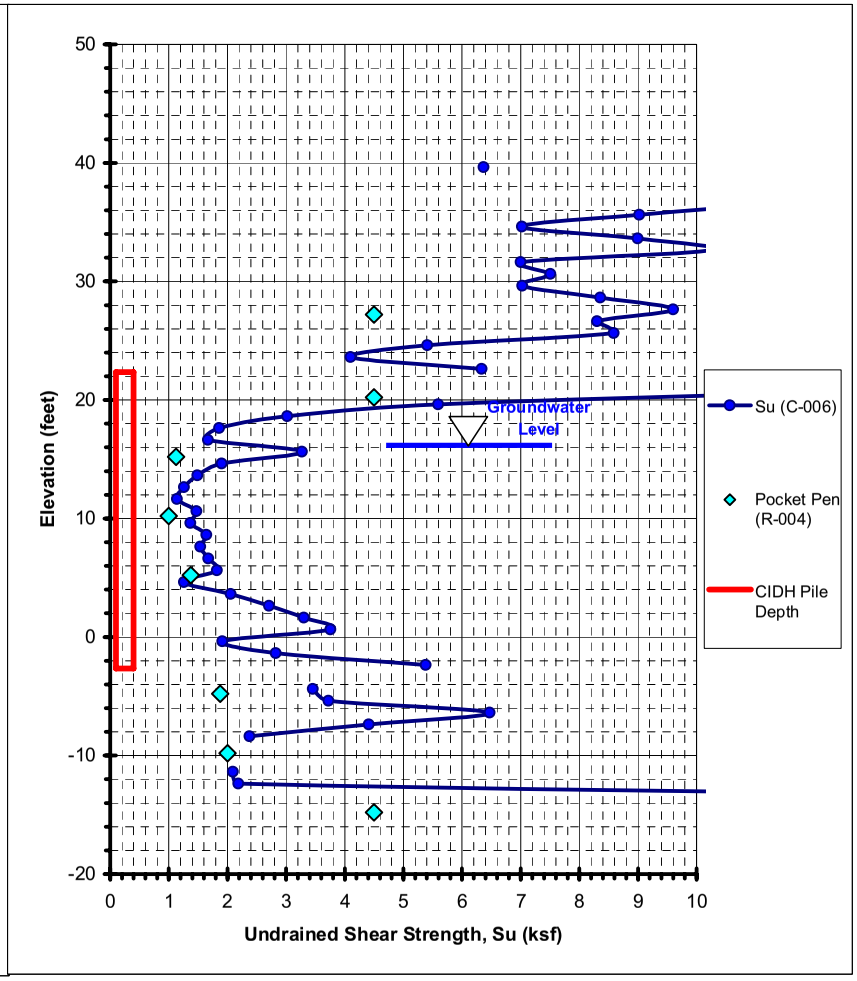




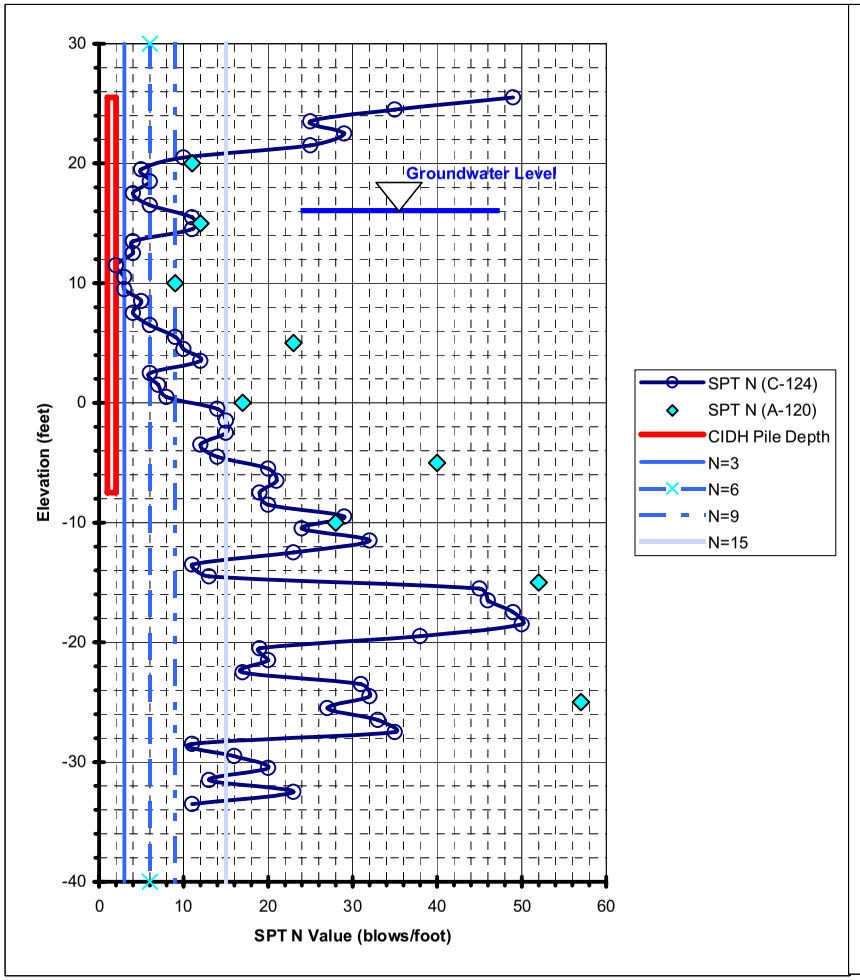
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 41 (CPT-09-123)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6B**

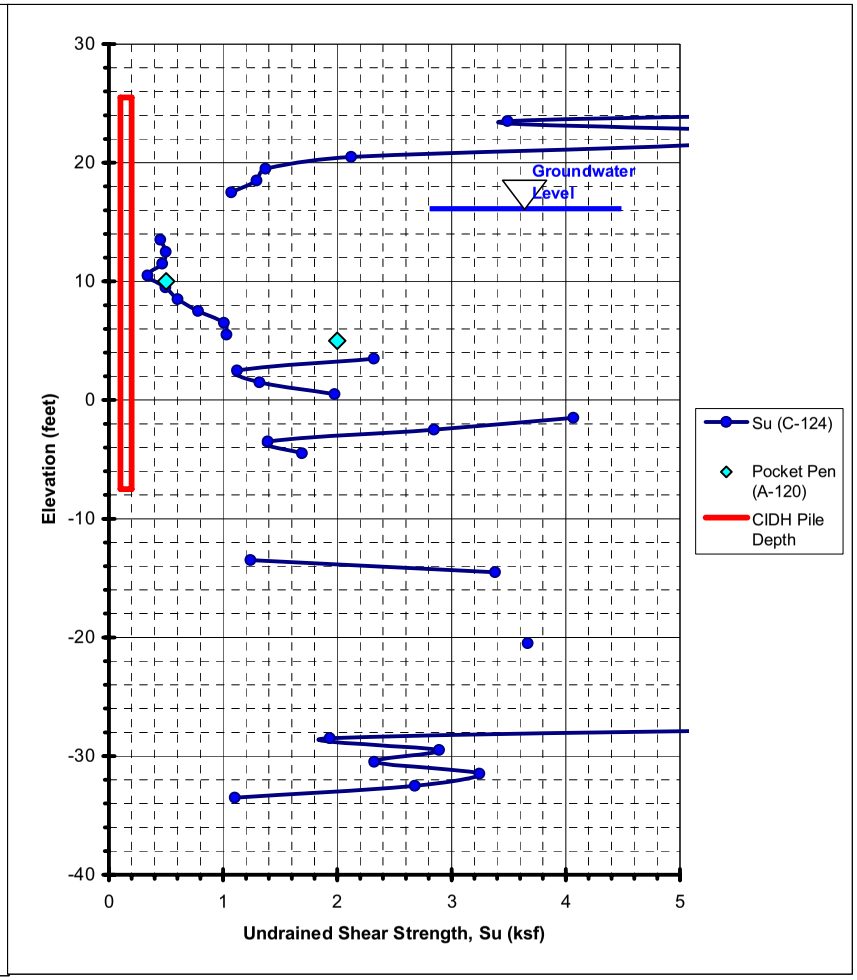
N:\Projects_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign Foundations\CPT Data\CPT N + Su Plots (C-123).xls



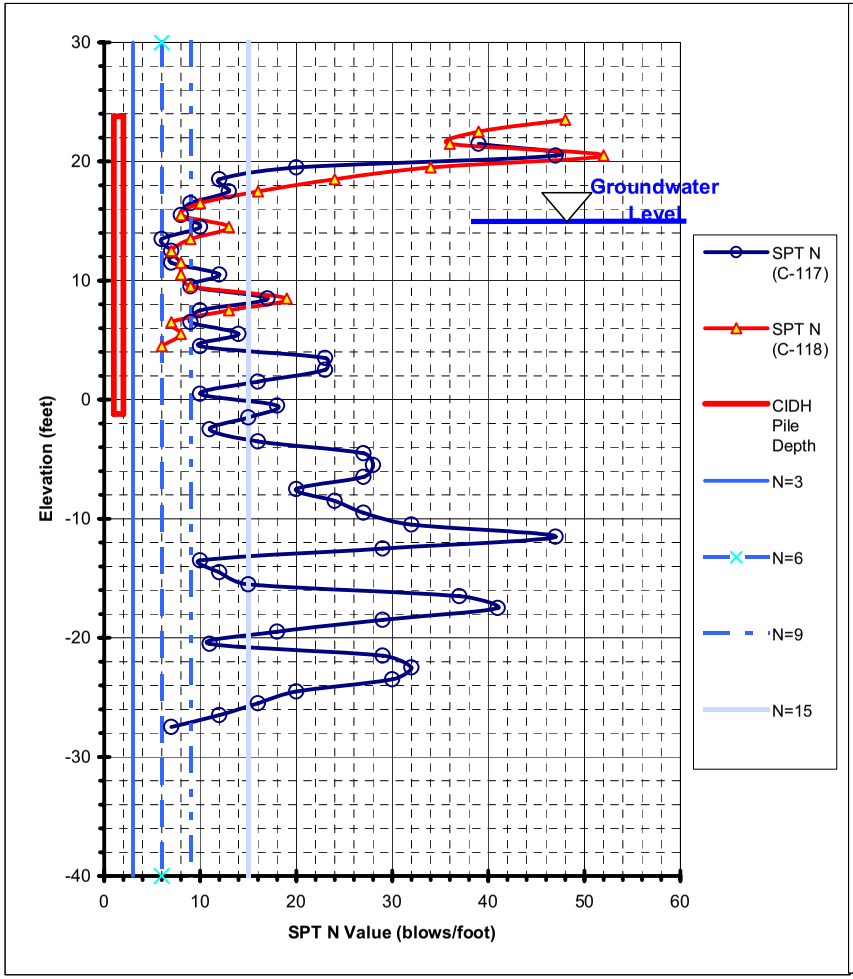


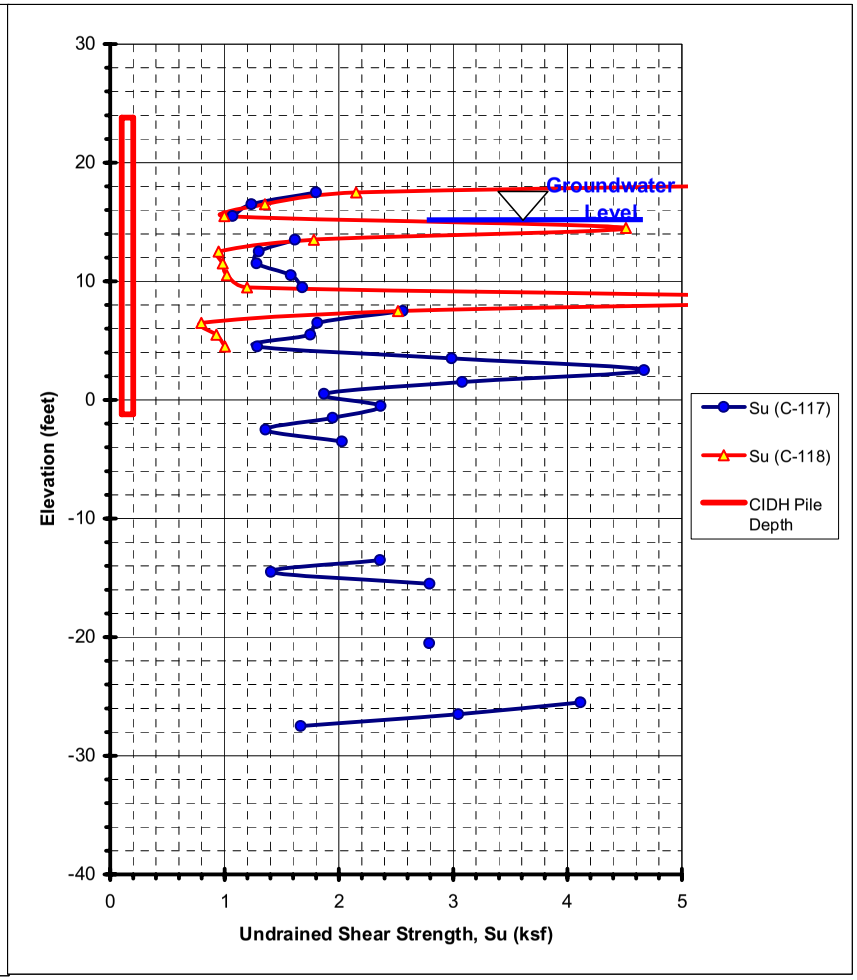
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 72 (CPT-08-006 & R-08-004)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6C**



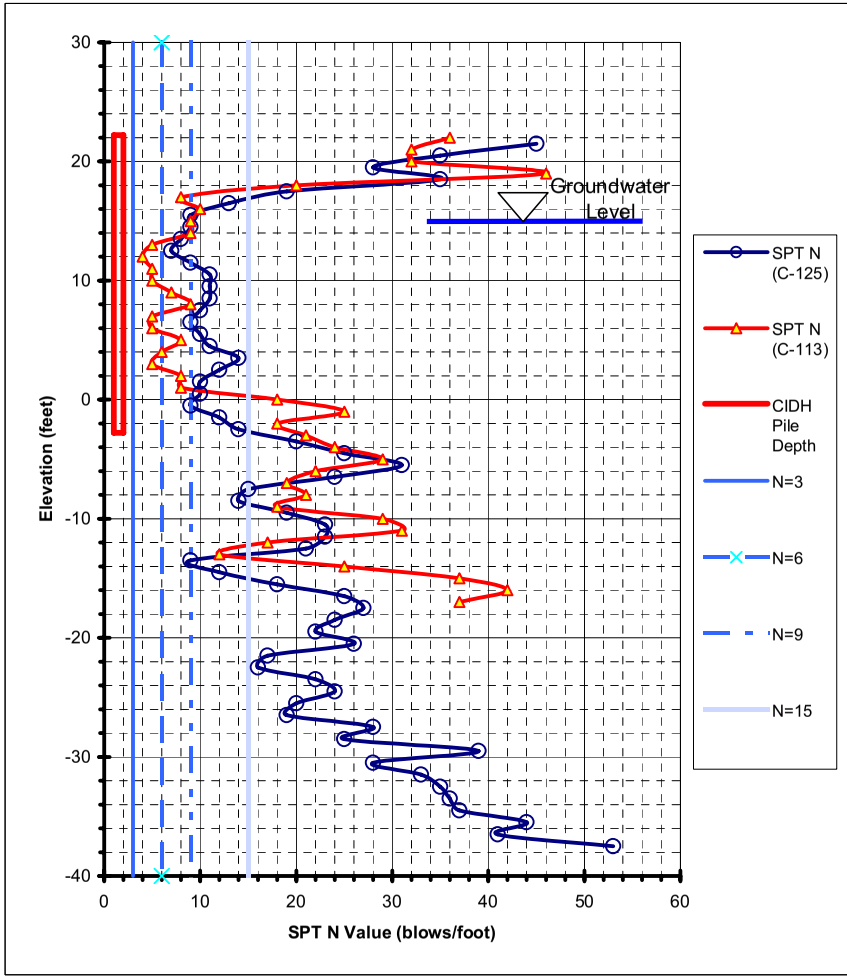


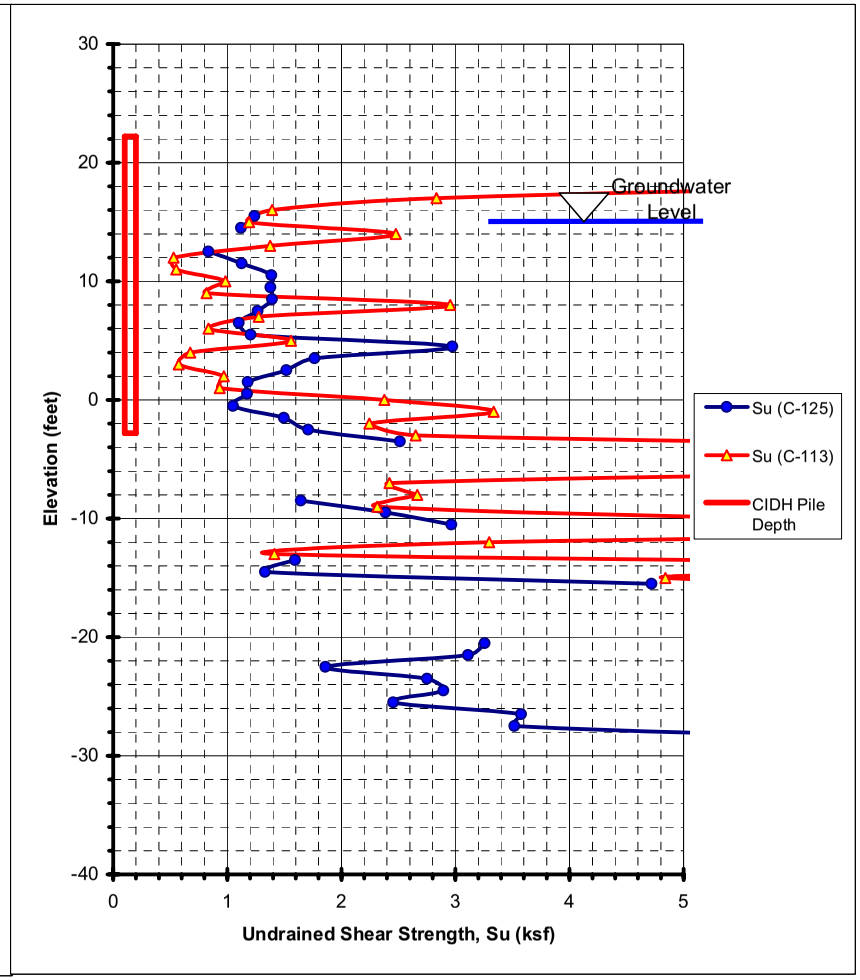
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 82 (CPT-09-124 & A-08-120)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6D**





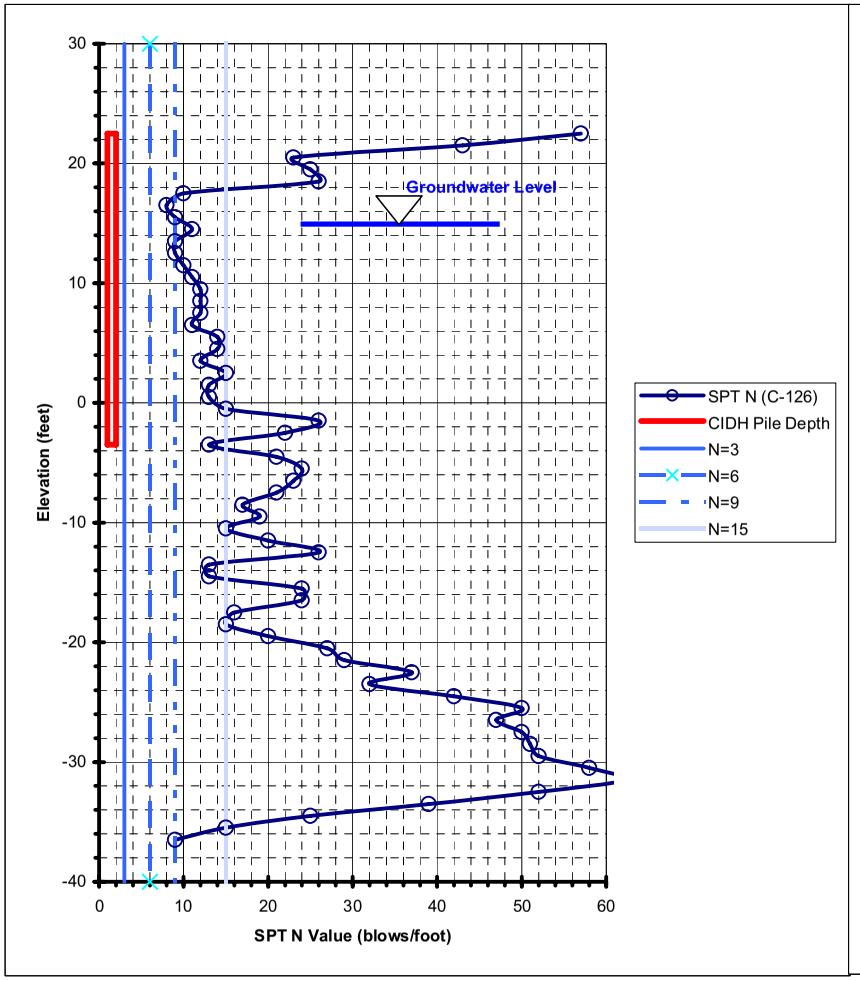
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 83 (CPT-08-117 & CPT-08-118)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6E**

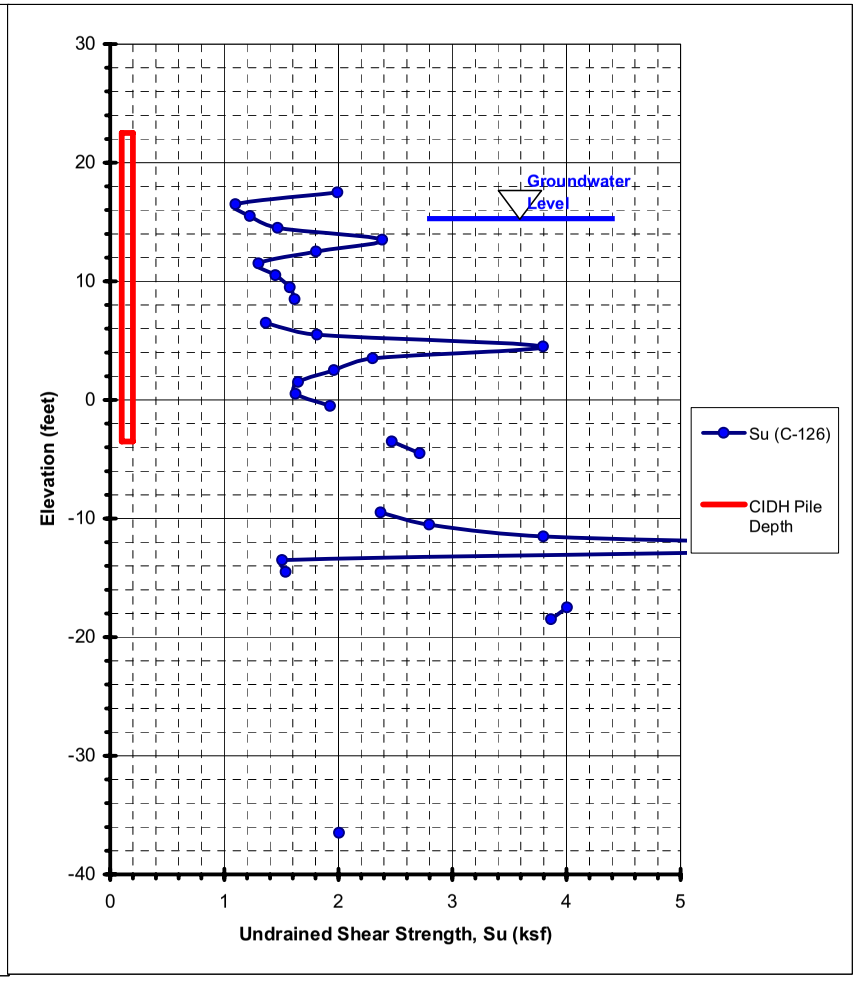




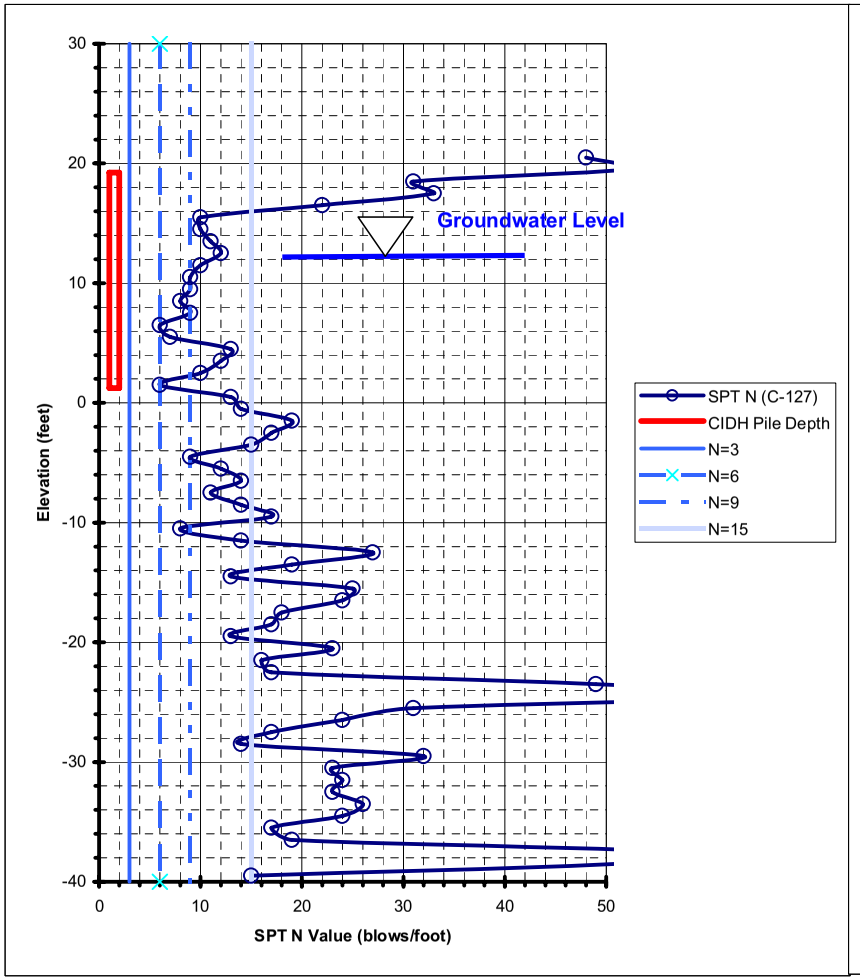
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 104 (CPT-09-125 & CPT-08-113)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6F**

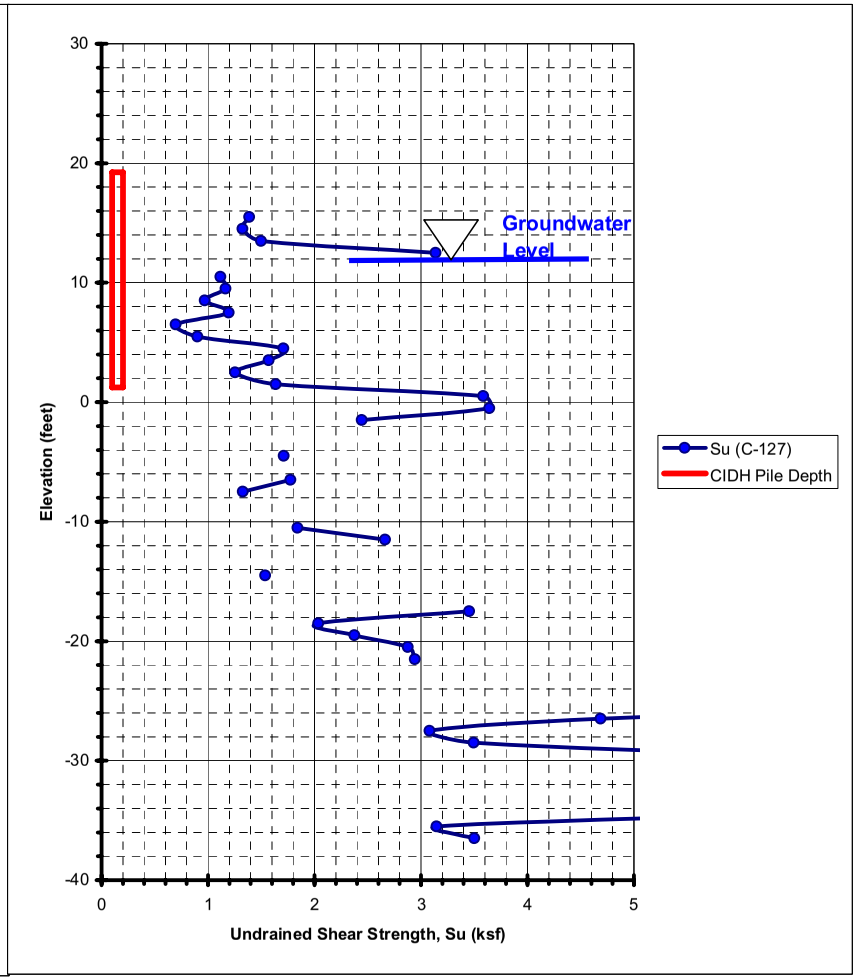
N:\Projects_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign Foundations\CPT Data\CPT N + Su Plots (C-125+113).xls



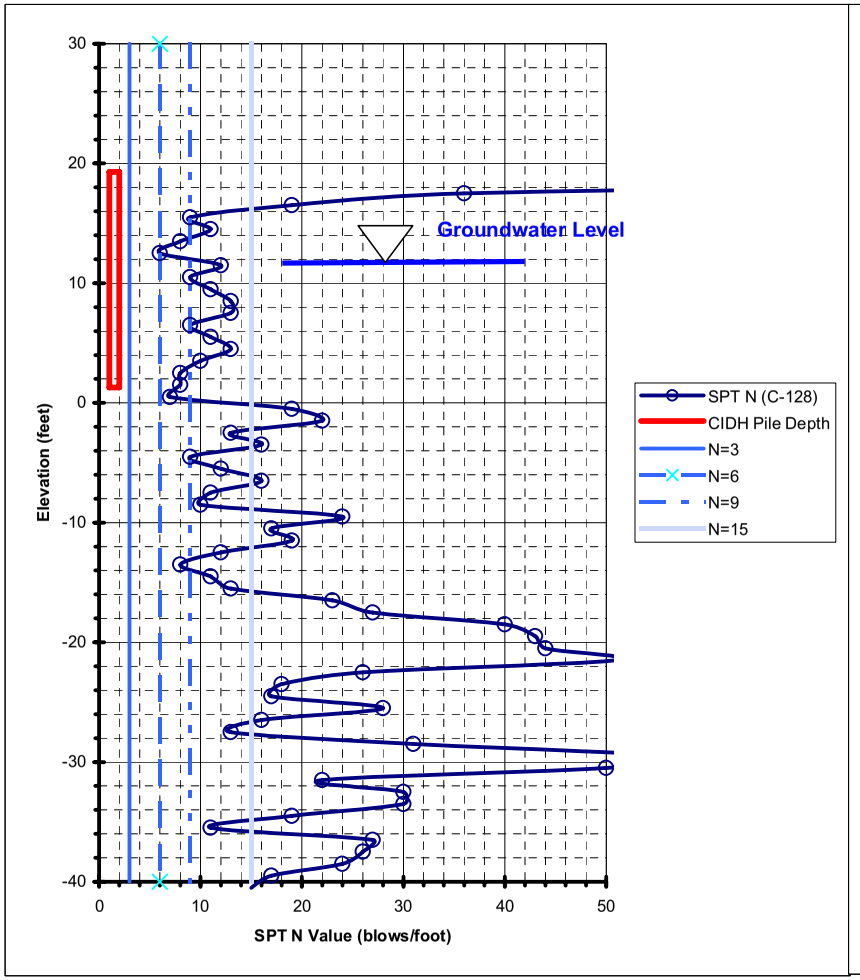


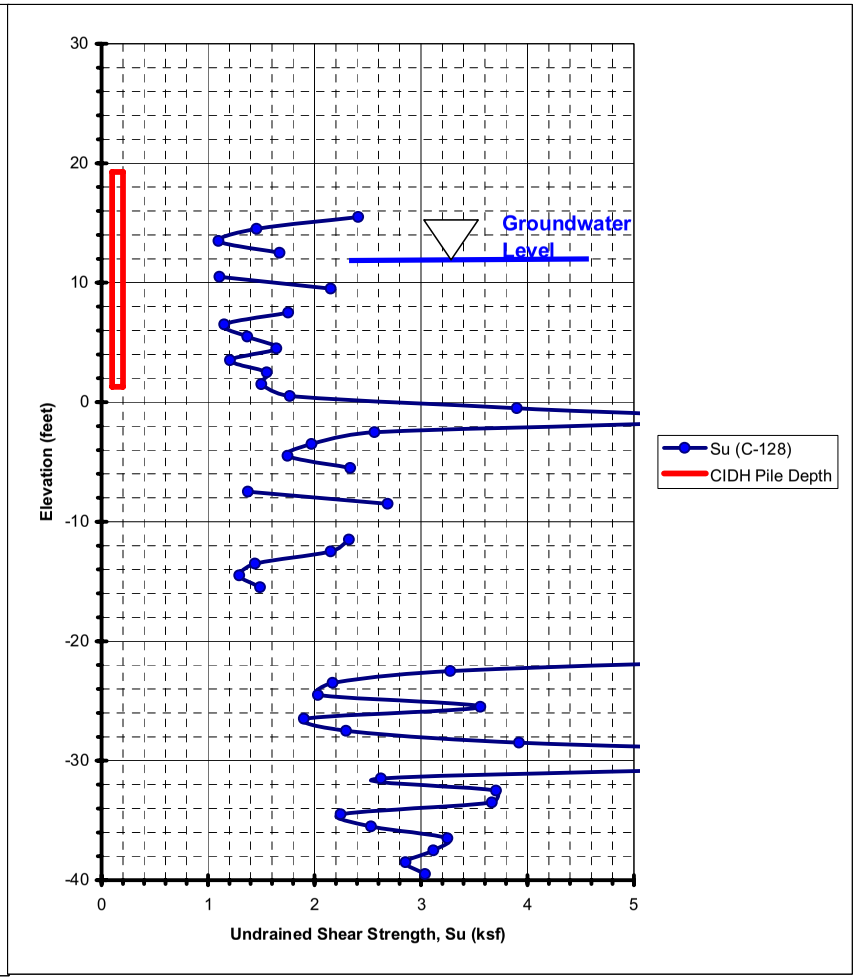
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 103 (CPT-09-126)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6G**



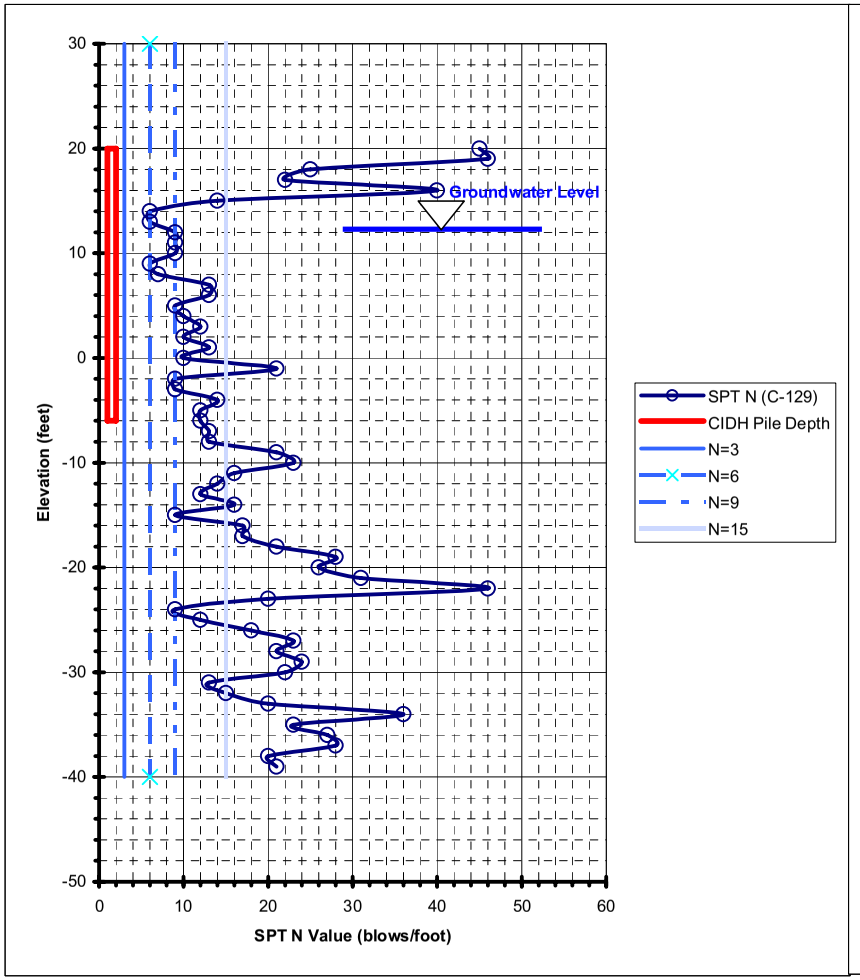


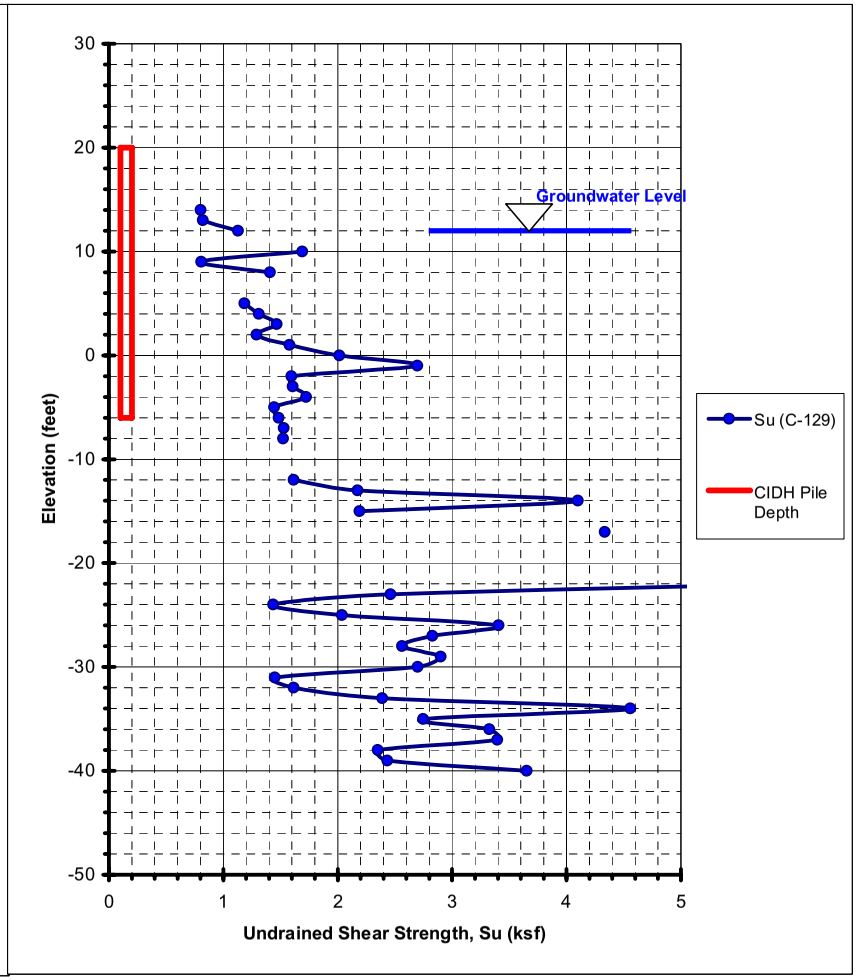
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 113 (CPT-09-127)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6H**



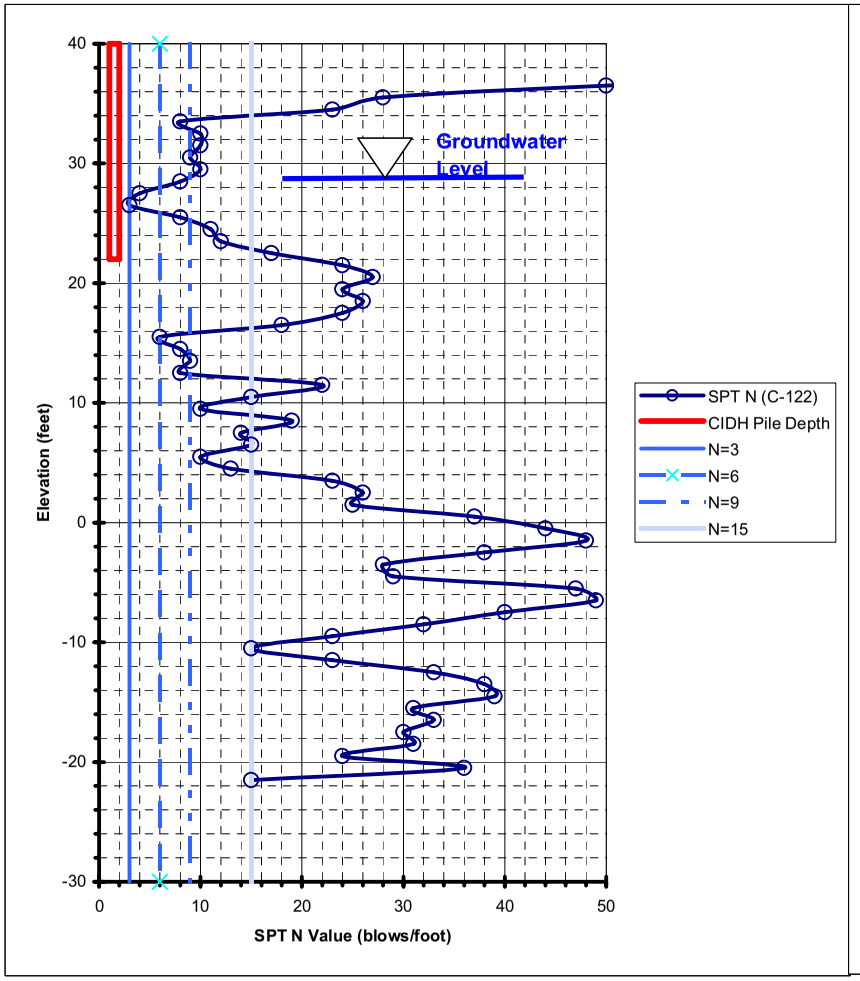


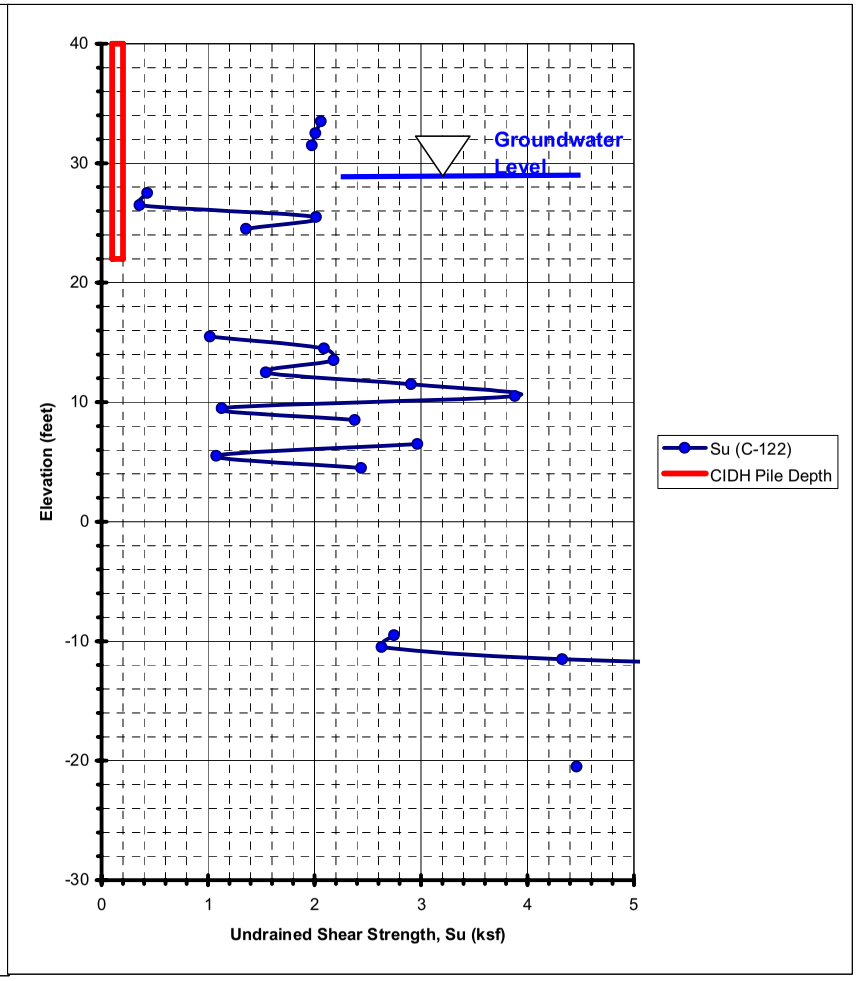
STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 115 (CPT-09-128)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6I**





STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 121 (CPT-09-129)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6J**





STANDARD PENETRATION TEST N VALUE AND UNDRAINED SHEAR STRENGTH PROFILE **SIGN NO. 143 (CPT-09-122)**	**WEST COUNTY CONNECTOR 405/22 HOV SEGMENT PROJ. NO. I-436**	**FIGURE** **6K**

N:\Projects_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign Foundations\CPT Data\CPT N + Su Plots (C-122).xls

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED ENGINEER - CIVIL

REGISTERED PROFESSIONAL ENGINEER — No. ____ Exp. ____ CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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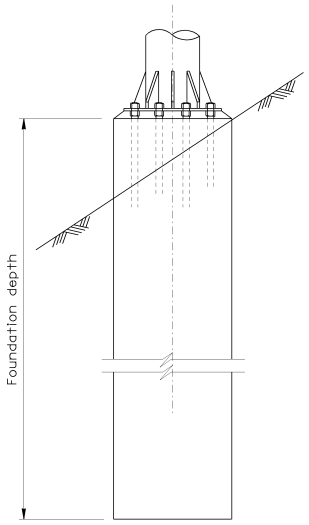
OVERHEAD TRUSS - PILE FOUNDATION DEPTH (ft)

SOIL RANGE	Unconfined compression, ksf (Clay soil only)	Standard penetration, blows per foot of penetration, (Both clay and sandy soils)	Direct shear, ksf	POST TYPE	SINGLE POST TYPE								TWO POST TYPE						
					II	III	IV	V	VI	VII	VIII	IX	I-S	II-S	III-S	IV-S	V-S	VI-S	VII-S
	3.0	15	1.5	FOUNDATION DEPTH	13′	14′	14′	15′	15′	19′	21′	21′	16′	16′	18′	19′	20′	26′	26′
	1.8	9	0.9		15′	16′	17′	18′	18′	22′	25′	25′	19′	19′	21′	22′	25′	33′	33′
	1.2	6	0.6		16′	18′	19′	20′	20′	26′	30′	30′	22′	22′	24′	26′	29′	39′	39′
	0.6	3	0.3	PILE DIA.	4′-6"	4′-6"	4′-6"	4′-6"	5′-0"	5′-0"	5′-0"	5′-0"	4′-6"	4′-6"	4′-6"	4′-6"	5′-0"	5′-0"	5′-0"
Lower values require special investigation				PILE REINF	See Standard Plans - Sign Plans														



PILE FOUNDATION

NOTE: For details of pile not shown, see Standard Plans

NOTE:

The purpose of this chart is to aid the designer in selecting a CIDH pile foundation depth at locations where a soil investigation has been made. A soil investigation is required when the existing soil is not equal to freeway fill material. For weak soil conditions such as bay mud, the usual foundation is a driven pile type. This foundation should be designed by the Division of Structures. Special soil investigations to provide shorter CIDH piles are usually not economical.

FIGURE 7

THIS SHEET NOT A PART OF CONTRACT PLANS

OVERHEAD SIGNS-TRUSS

PILE FOUNDATION DEPTH SELECTION | **13**

PLATES

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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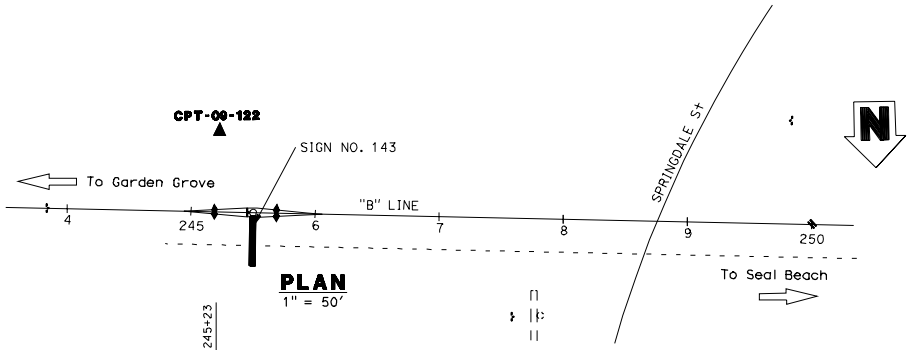
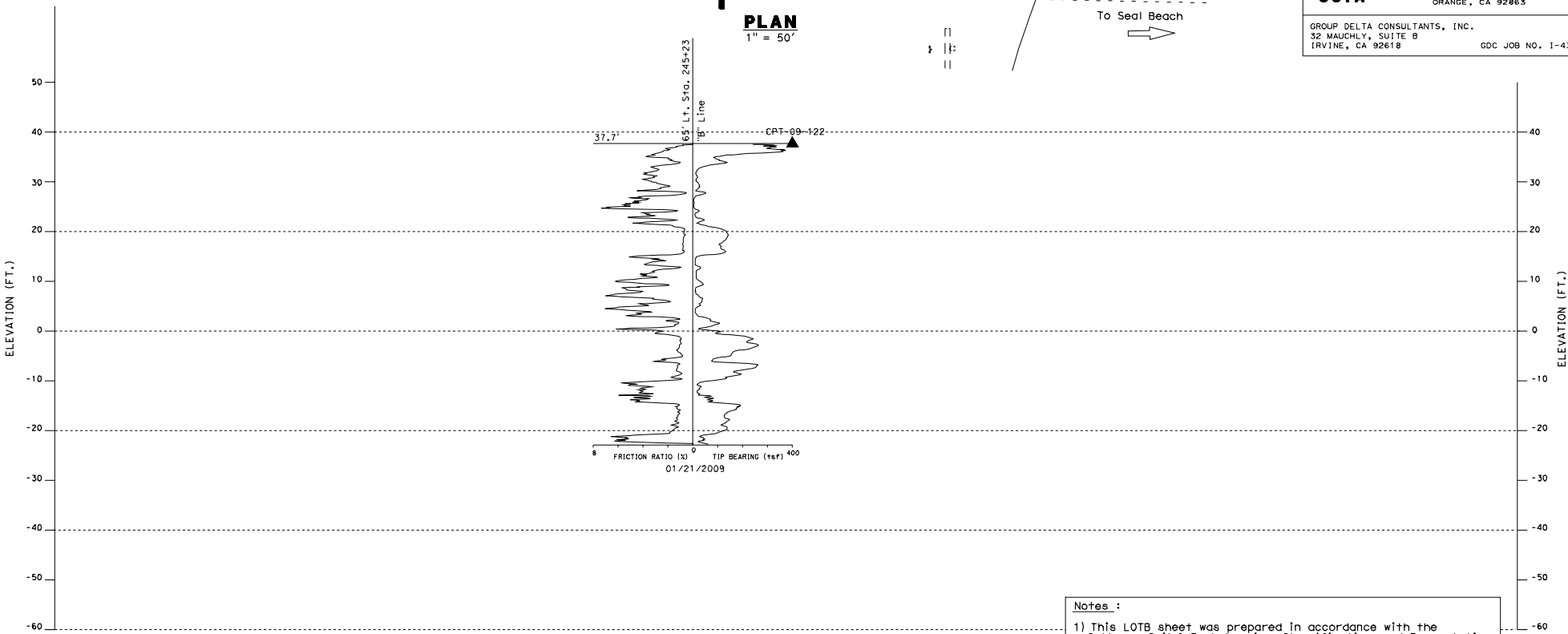
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



PLAN
1" = 50'



Notes :
1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

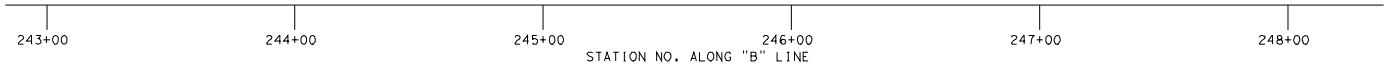


PLATE 1

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO.	OVERHEAD SIGN NO. 143
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		POST MILES	LOG OF TEST BORINGS NO. 1 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM			

OGS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU EA — FILE => $REQUEST — DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 02/23/09 — SHEET OF

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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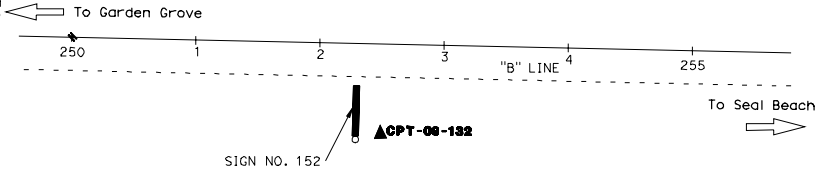
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



PLAN
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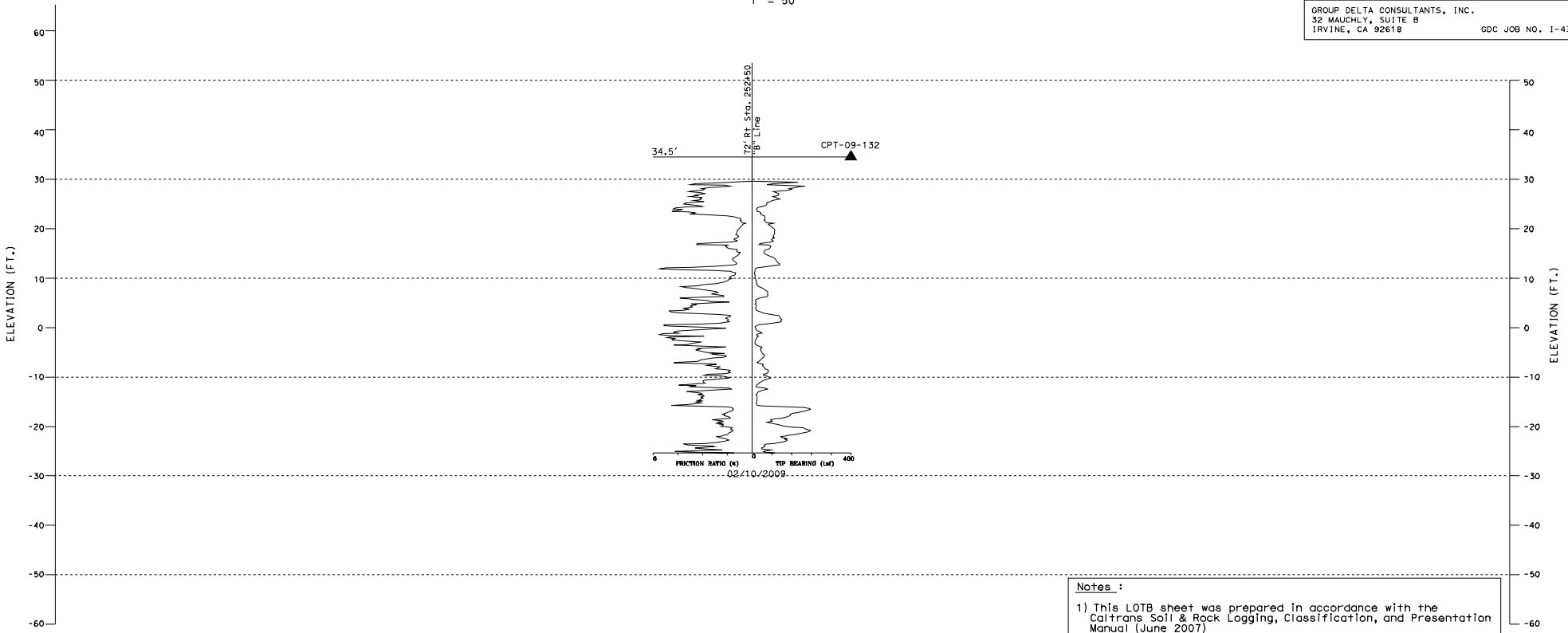

Notes :

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PROFILE
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VER. 1" = 10'

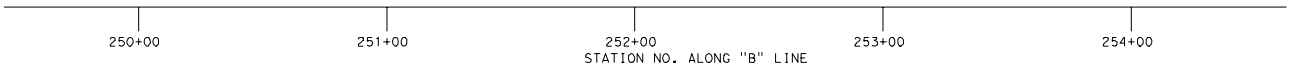

PLATE 2

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 152
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI		
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 2 OF 16

OGS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU EA — FILE => &REQUEST — DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 02/23/09 — SHEET OF

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
EXP. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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PARSONS 2201 DUPONT DRIVE
SUITE 200
IRVINE, CA 92612

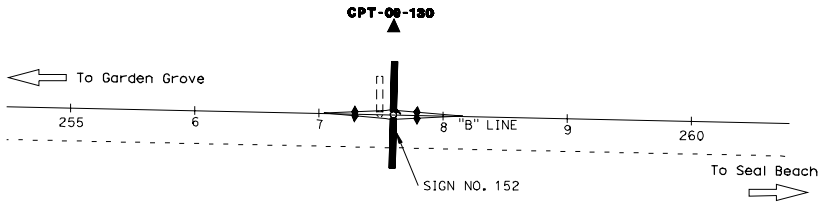
OCTA 550 SOUTH MAIN STREET
ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

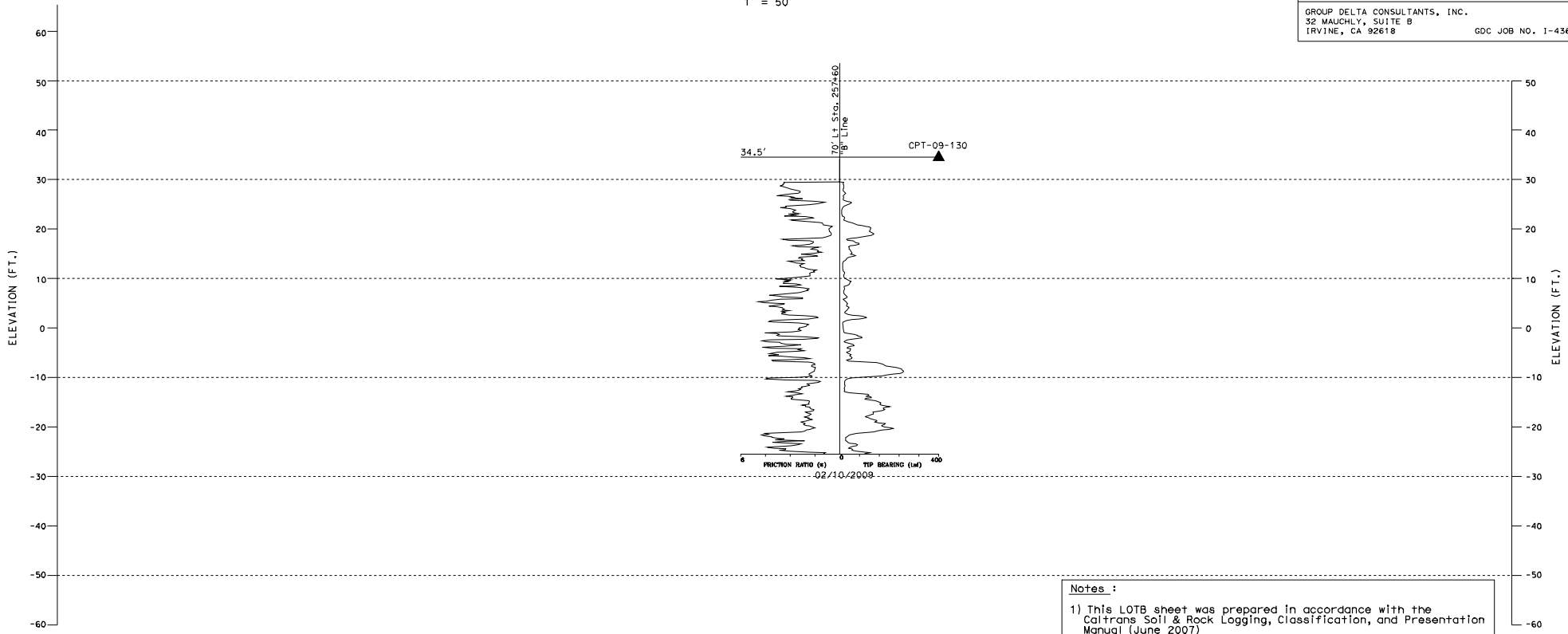
DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



PLAN
1" = 50'



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

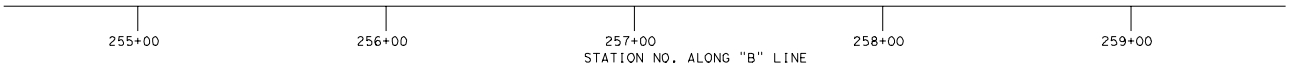


PLATE 3

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 152
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI		
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 3 OF 16

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

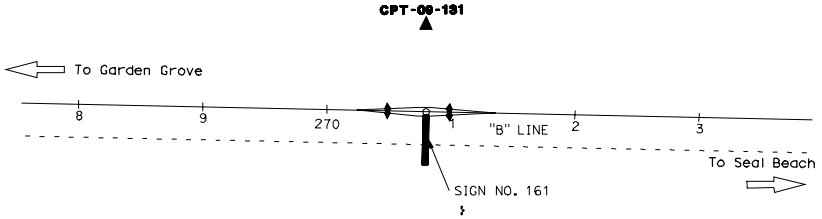
REVISION DATES | SHEET | OF
02/23/09

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS:

Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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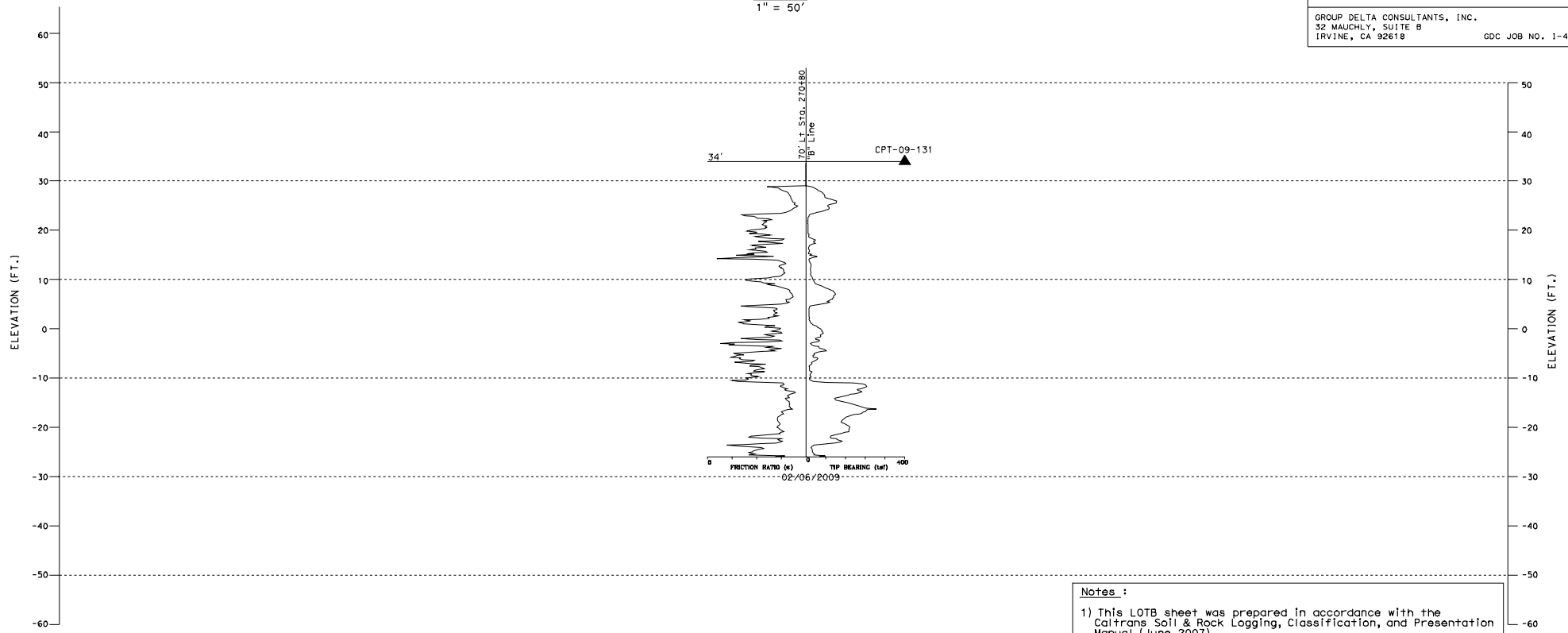
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

PLAN
1" = 50'



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

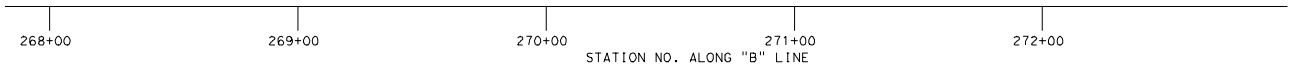


PLATE 4

ENGINEERING SERVICES	GEOTECHNICAL SERVICES		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 161
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 4 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM				

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

FILE => &REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES										SHEET	OF
02/23/09											

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

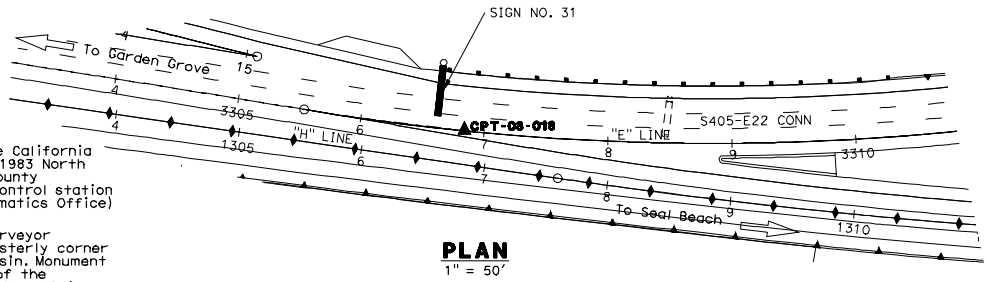
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

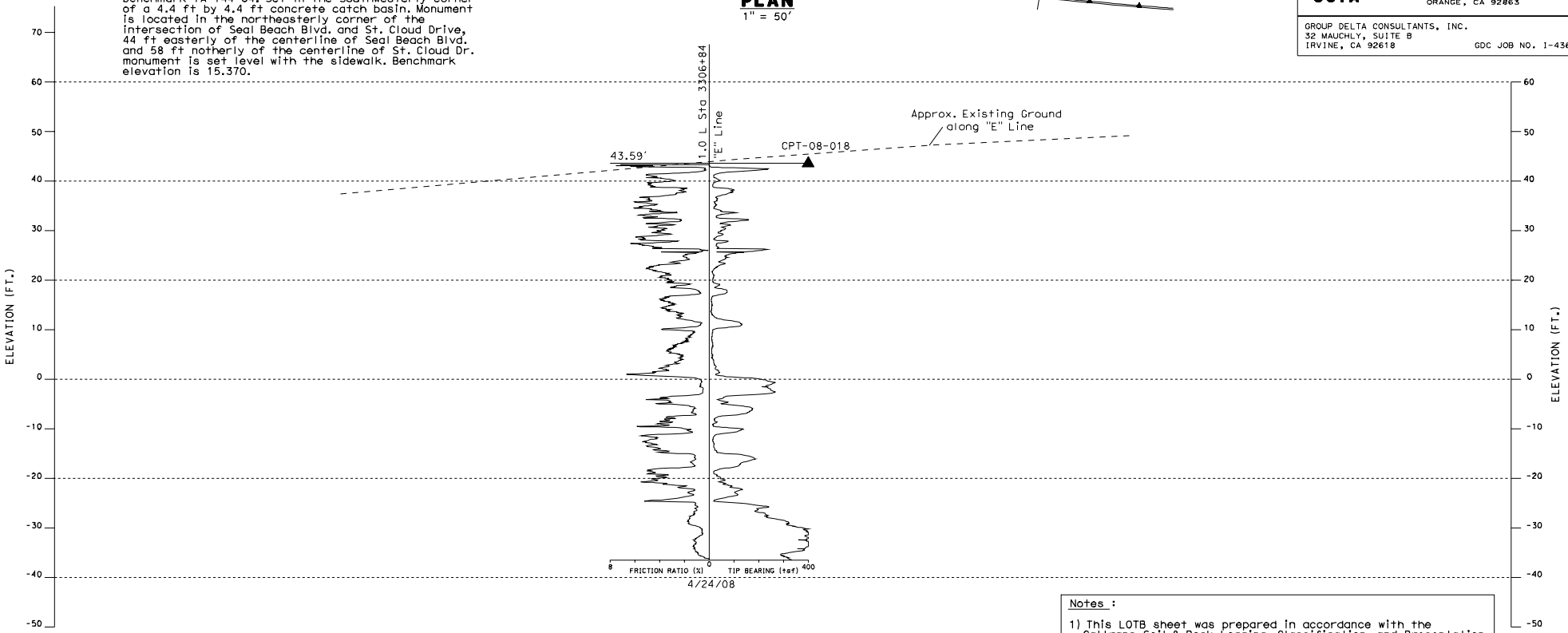
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



PLAN
1" = 50'



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

3305+00 3306+00 3307+00 3308+00 3309+00
STATION NO. ALONG "E" LINE

PLATE 5

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 31
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 5 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM				

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA
FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 02/23/09 | SHEET | OF

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS:

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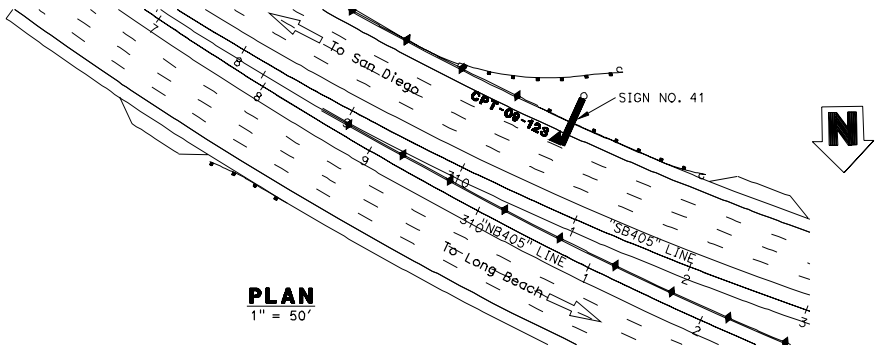

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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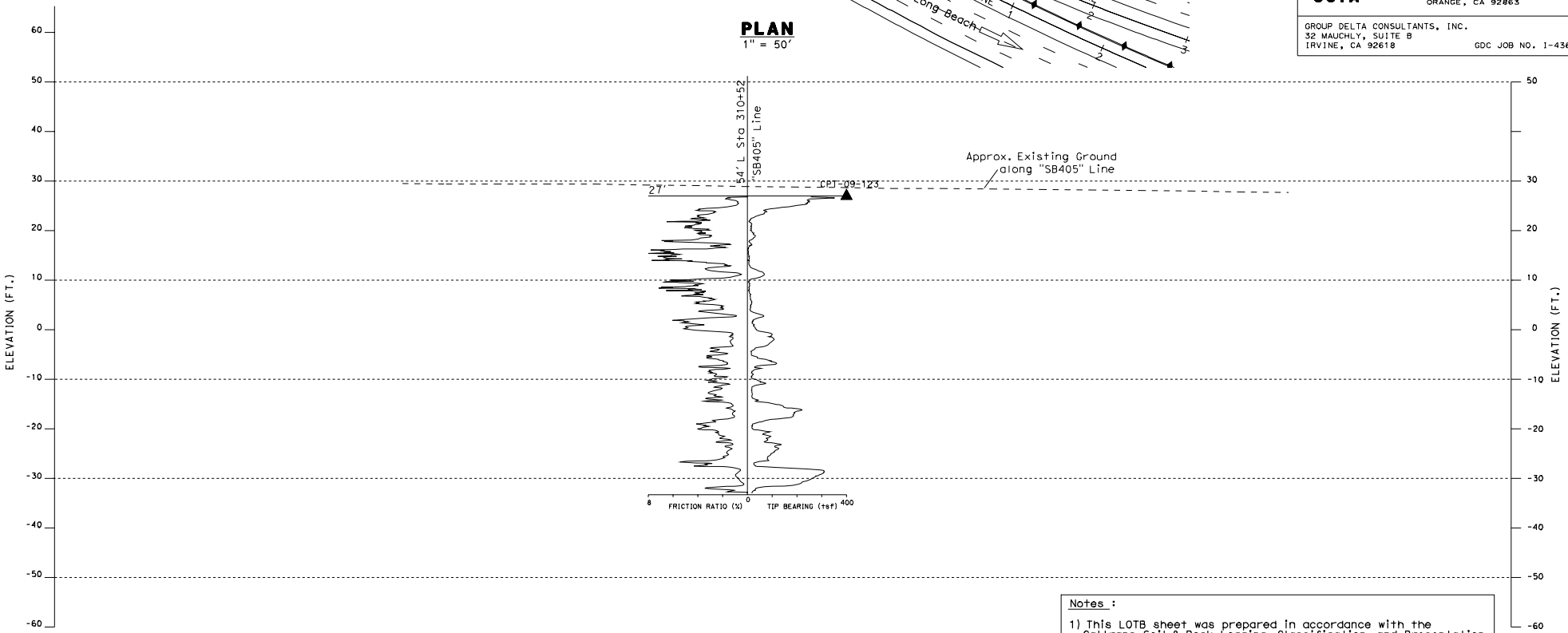
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

308+00 309+00 310+00 311+00 312+00 313+00
STATION NO. ALONG "SB405" LINE

PLATE 6

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 41
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI		
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 6 OF 16

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

FILE => &REQUEST

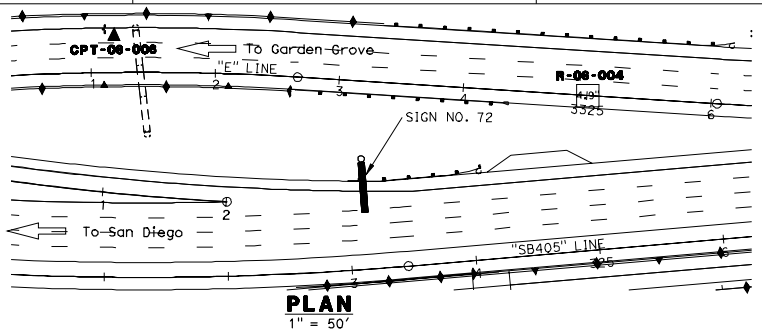
DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES										SHEET	OF
02/23/09											

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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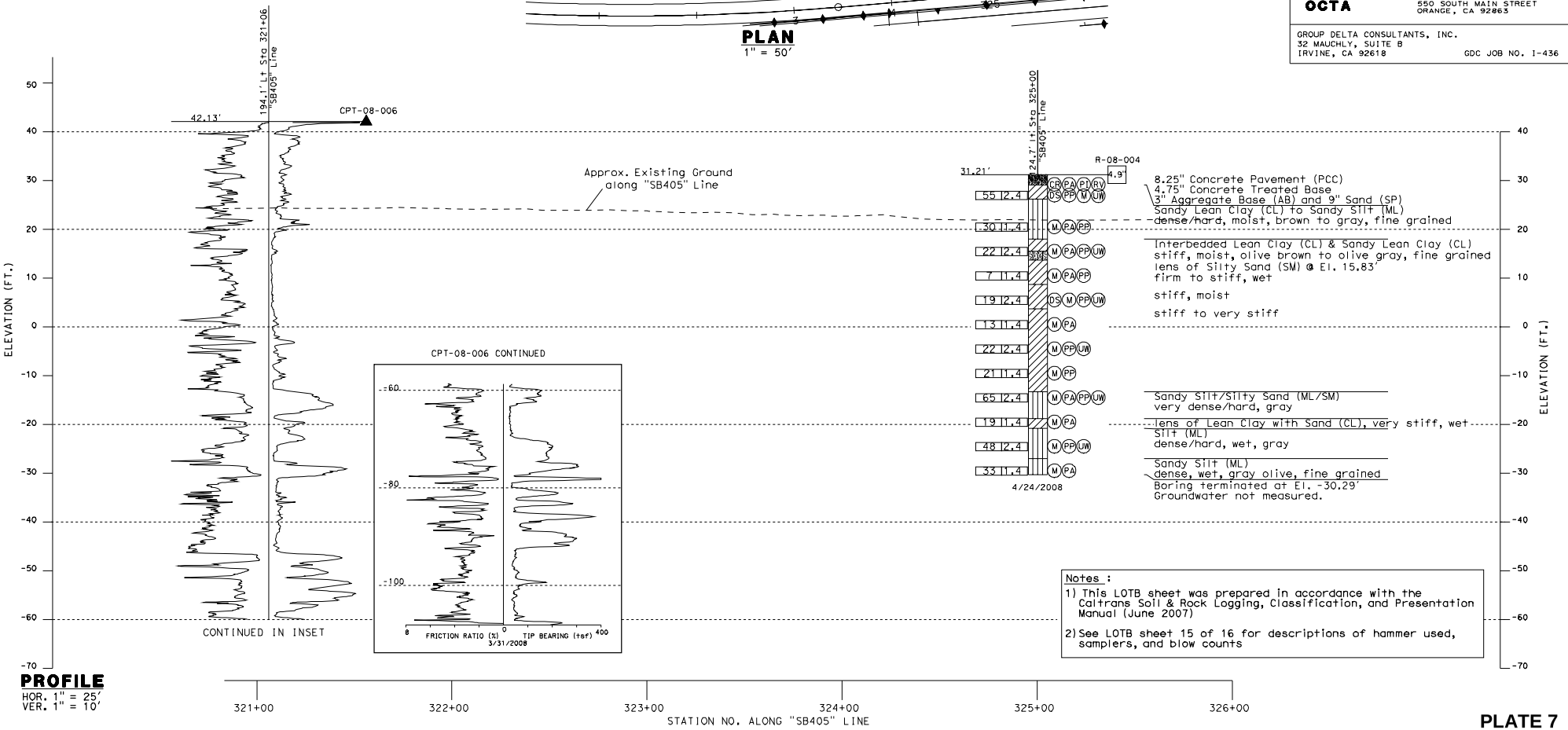
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



PROFILE
HOR. 1" = 25'
VER. 1" = 10'

Notes :
1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See LOTB sheet 15 of 16 for descriptions of hammer used, samplers, and blow counts

PLATE 7

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO.	OVERHEAD SIGN NO. 72
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		POST MILES	LOG OF TEST BORINGS NO. 7 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM			

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA
FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 2/23/09

SHEET OF

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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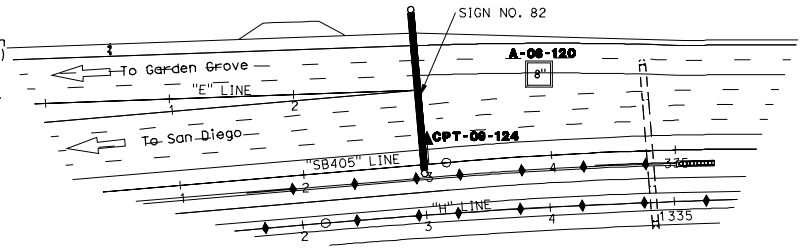
BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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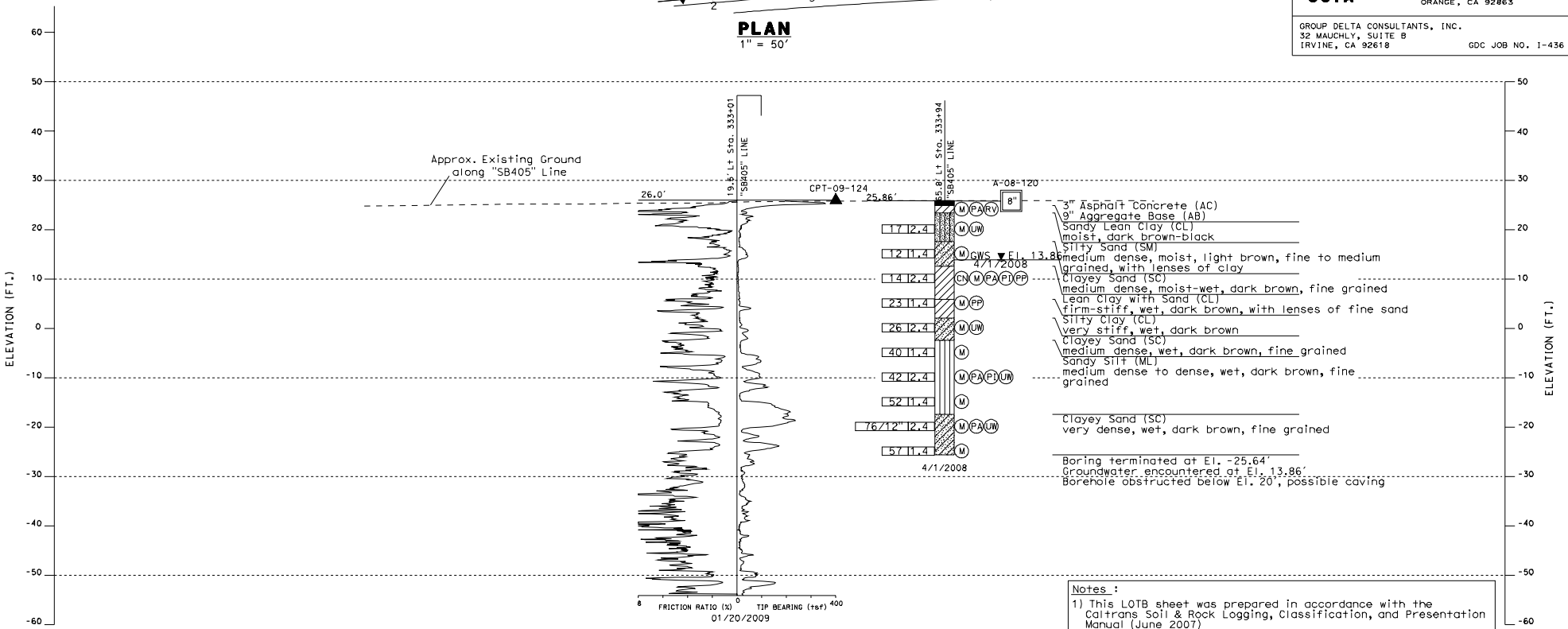
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



Notes :
1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)
2) See LOTB sheet 15 of 16 for descriptions of hammer used, samplers, and blow counts

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

331+00 332+00 333+00 334+00 335+00
STATION NO. ALONG "SB405" LINE

PLATE 8

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO.	OVERHEAD SIGN NO. 82
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		POST MILES	LOG OF TEST BORINGS NO. 8 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM			

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 02/23/09 — SHEET — OF

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI, 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS:

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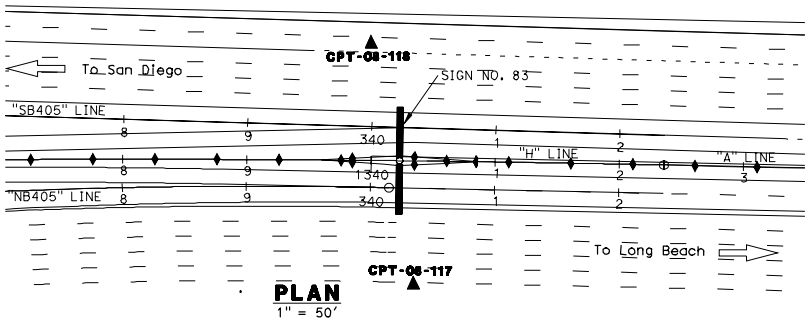

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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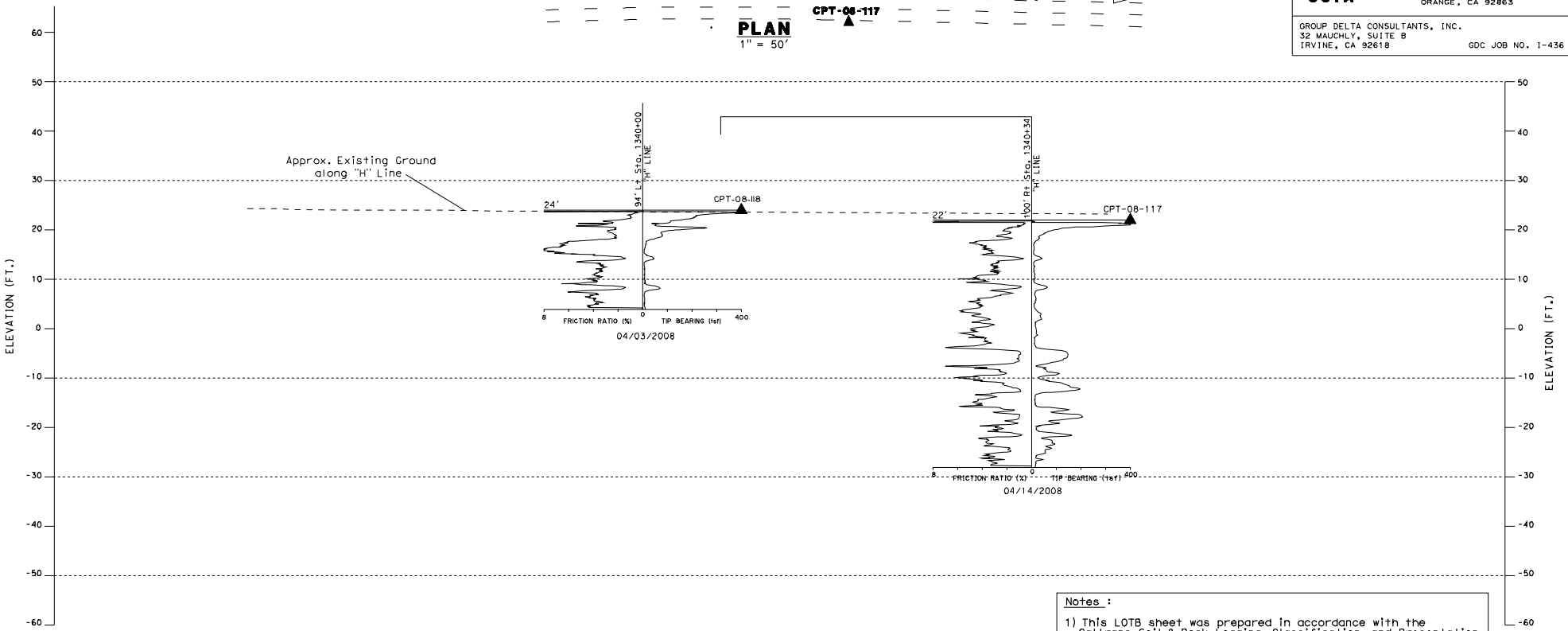
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618
GDC JOB NO. I-436



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

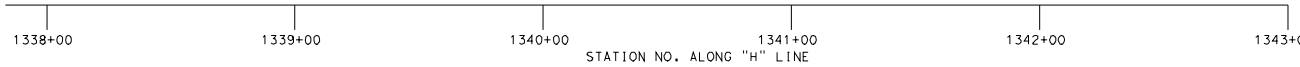


PLATE 9

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. MOHSENI PROJECT ENGINEER	BRIDGE NO.	OVERHEAD SIGN NO. 83
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		POST MILES	LOG OF TEST BORINGS NO. 9 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM			

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

FILE => &REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 2/23/09

SHEET OF

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

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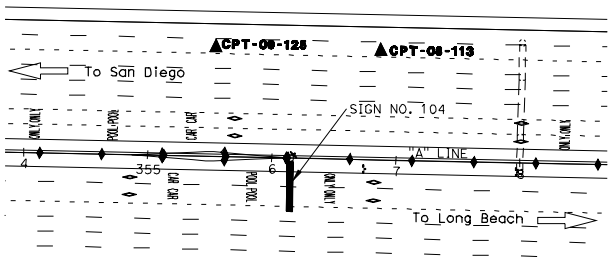

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

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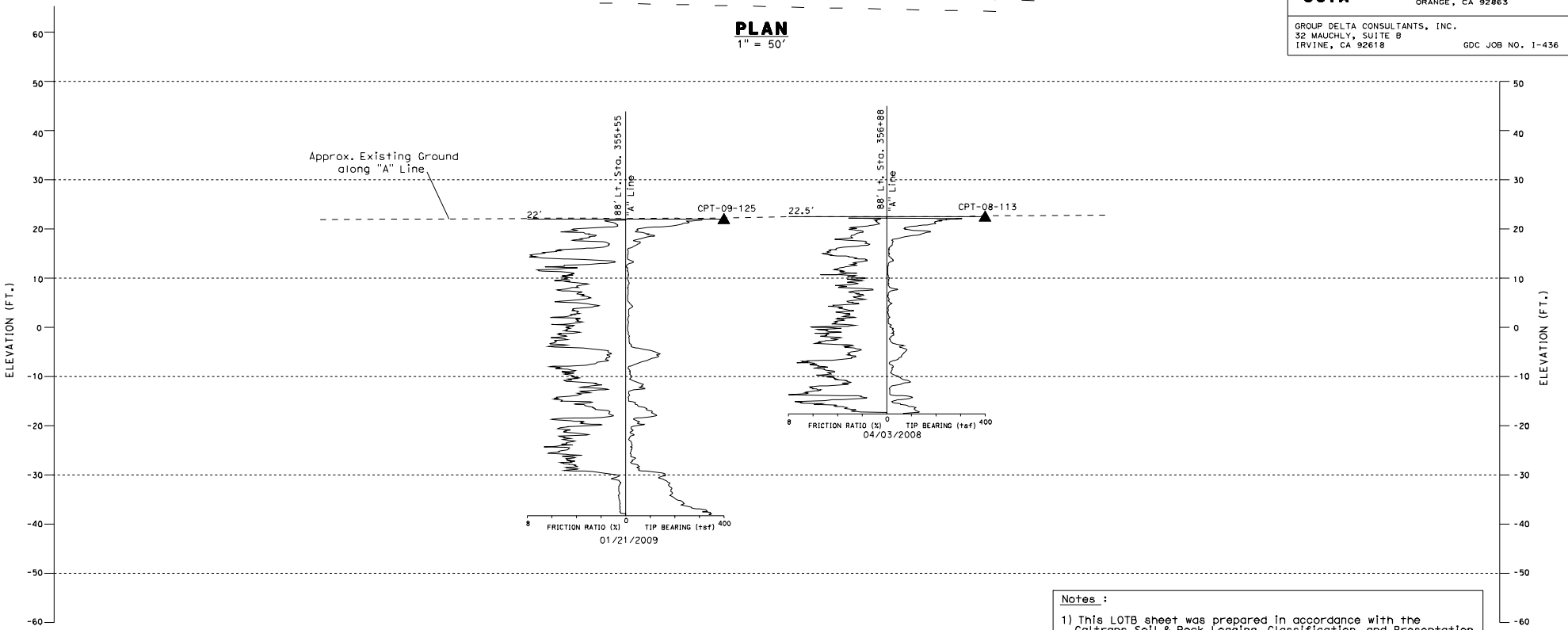
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



Notes :

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PROFILE
HOR. 1" = 25'
VER. 1" = 10'

354+00 355+00 356+00 357+00 358+00
STATION NO. ALONG "A" LINE

PLATE 10

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 104
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI	POST MILES	LOG OF TEST BORINGS NO. 10 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER		

OGS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU EA — FILE => $REQUEST — DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 02/23/09 — SHEET OF

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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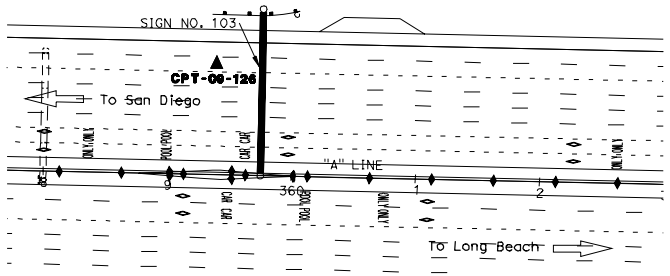

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — Exp. 06-30-09 geotechnical — STATE OF CALIFORNIA

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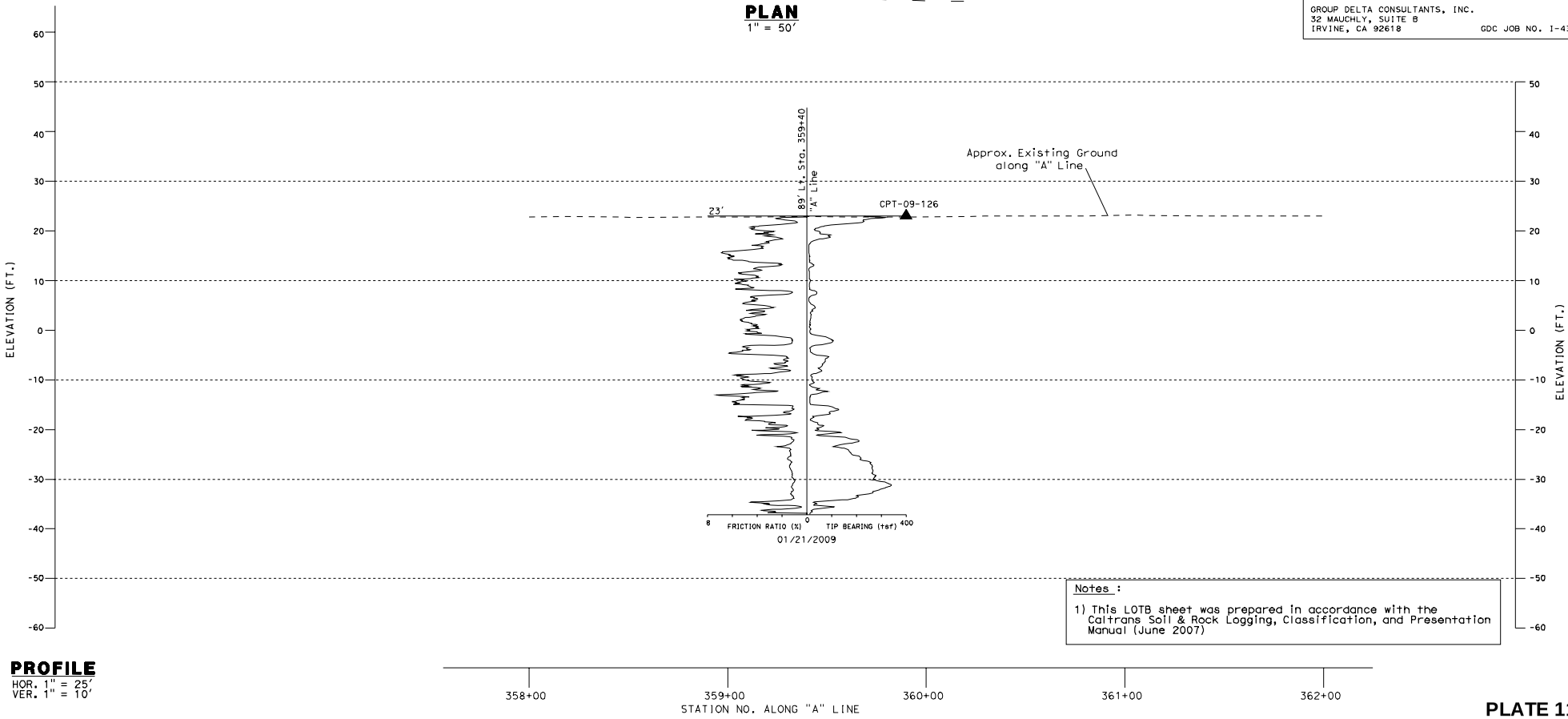
OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

358+00 359+00 360+00 361+00 362+00
STATION NO. ALONG "A" LINE

PLATE 11

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 103
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 11 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM				

OGS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU EA — FILE => &REQUEST — DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 02/23/09 — SHEET OF

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS:

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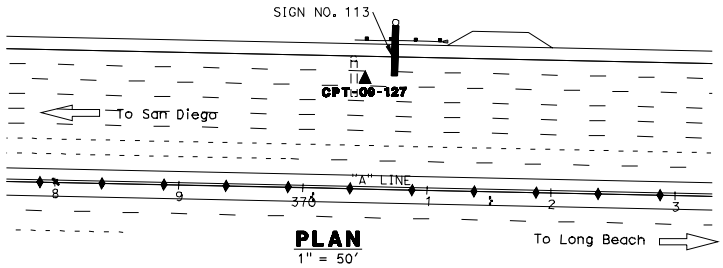

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
EXP. 06-30-09 geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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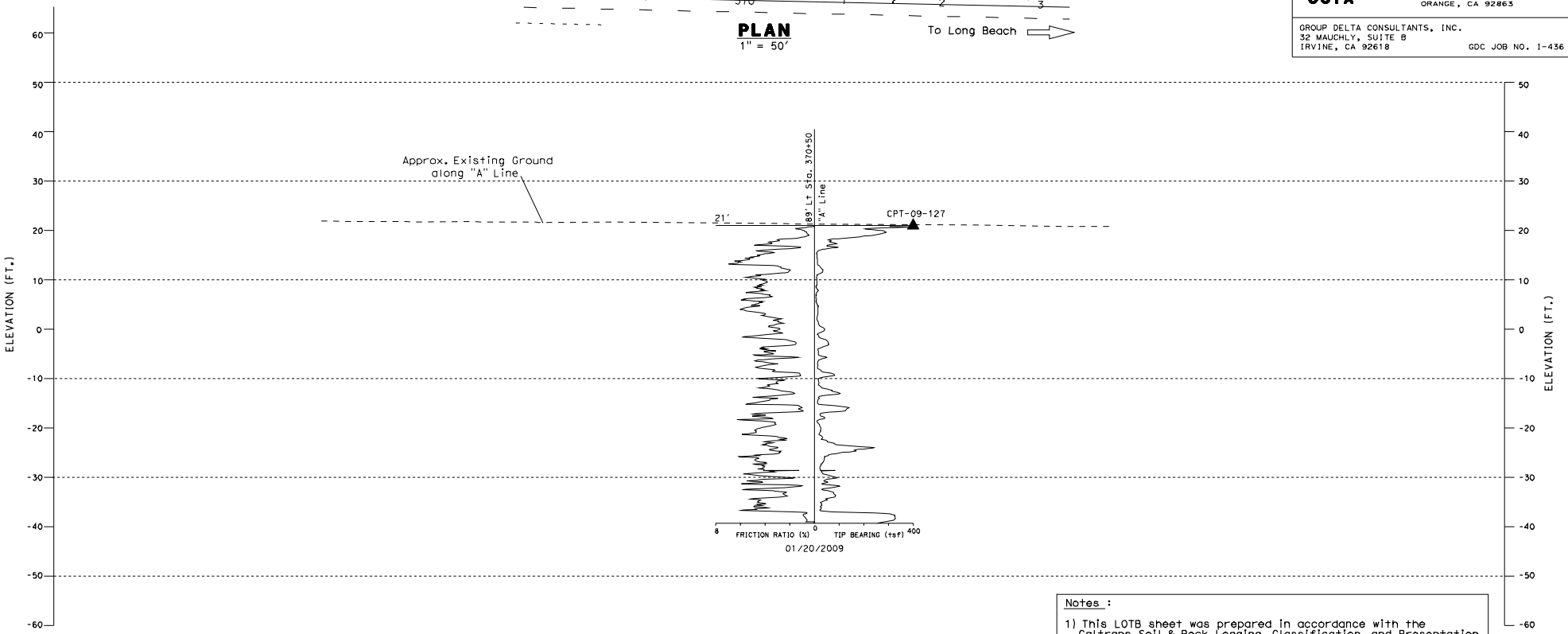
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

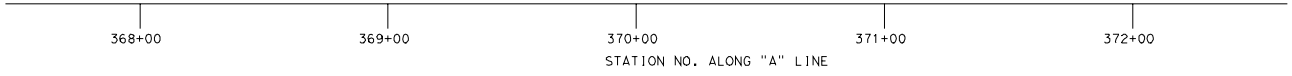


PLATE 12

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	CHANGEABLE MESSAGE SIGN NO. 113
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI		
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 12 OF 16

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

FILE => &REQUEST

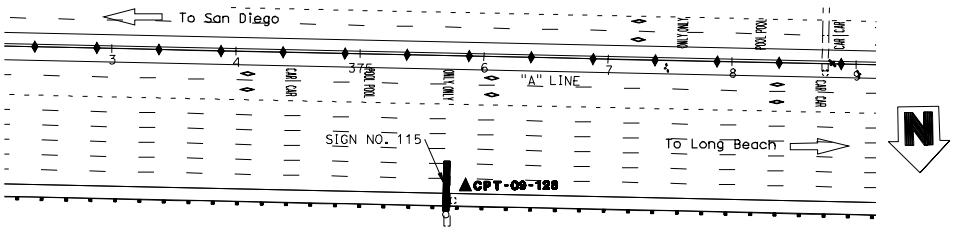
DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES									SHEET	OF
02/23/09										

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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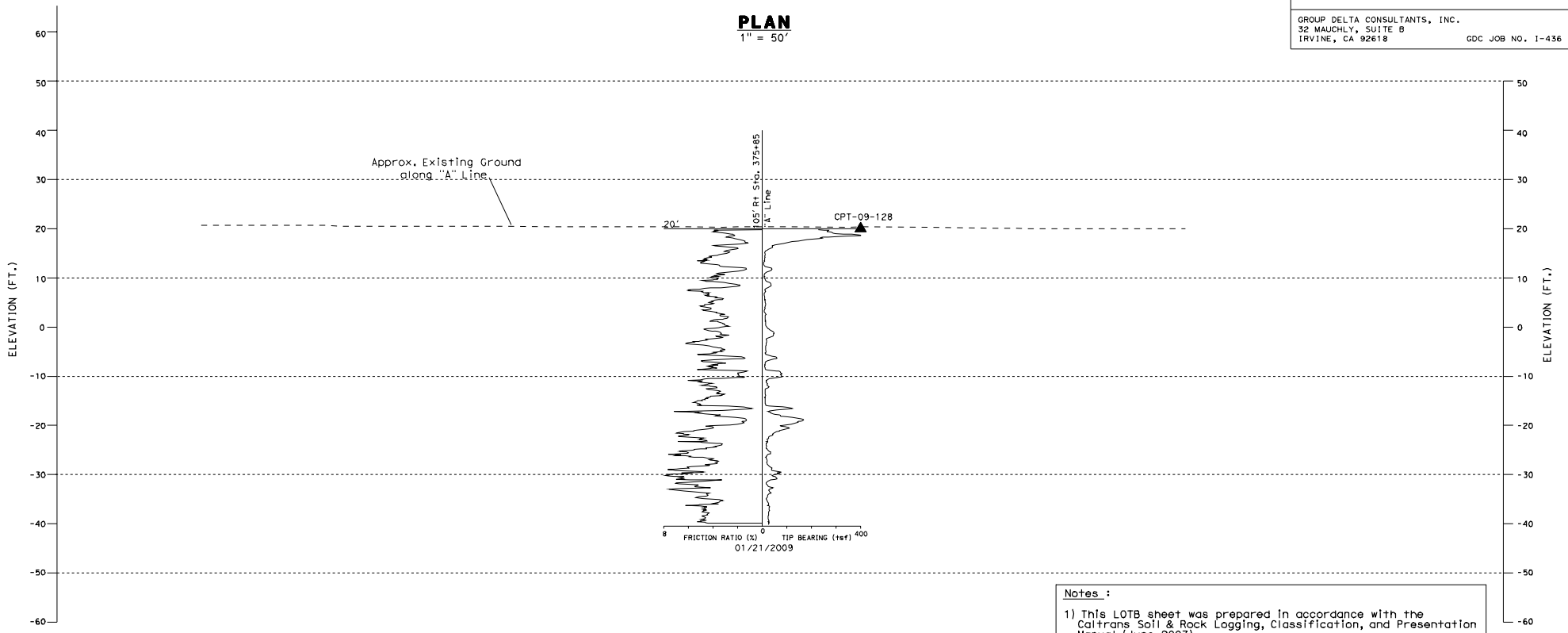
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

PLAN
1" = 50'



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

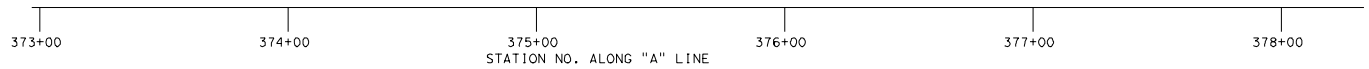


PLATE 13

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	CHANGEABLE MESSAGE SIGN NO. 115
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI		
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER	POST MILES	LOG OF TEST BORINGS NO. 13 OF 16

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

FILE => &REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: 02/23/09 | SHEET | OF

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. G.E. 2766
EXP. 06-30-09 Geotechnical
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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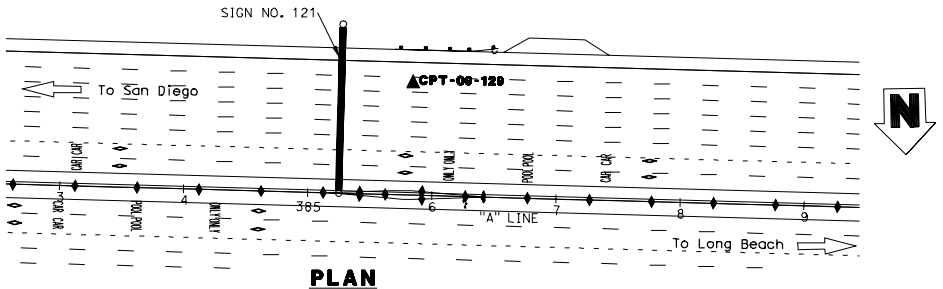
PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

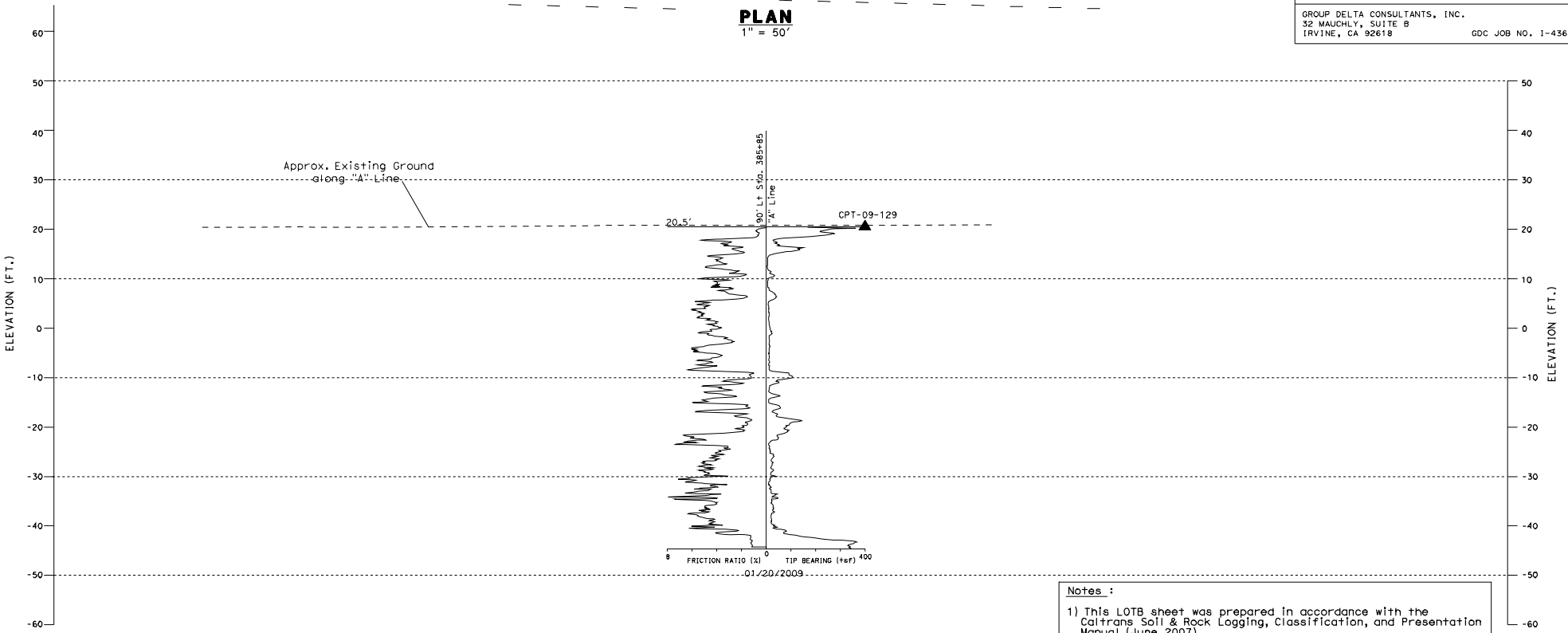
GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4 ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.



PLAN
1" = 50'



Notes :

1) This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

PROFILE
HOR. 1" = 25'
VER. 1" = 10'

383+00 384+00 385+00 386+00 387+00
STATION NO. ALONG "A" LINE

PLATE 14

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	OVERHEAD SIGN NO. 121
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI	POST MILES	LOG OF TEST BORINGS NO. 14 OF 16
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER		

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA

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USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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PARSONS 2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612

OCTA 550 SOUTH MAIN STREET ORANGE, CA 92863

GROUP DELTA CONSULTANTS, INC.
32 MAUCHLY, SUITE B
IRVINE, CA 92618 GDC JOB NO. I-436

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
[ ]	O	Other

Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

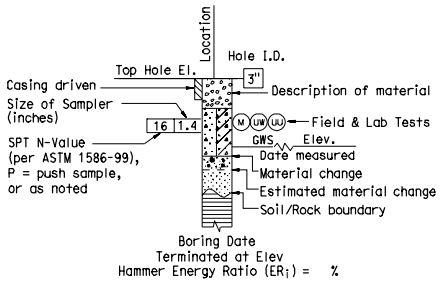
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Notes :

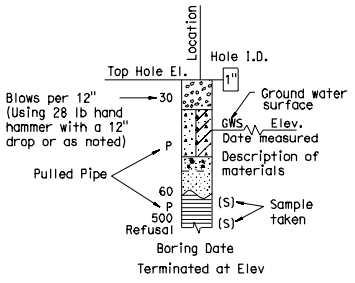
1) 2.4" samples were taken using a 3.0" O.D. 2.42" I.D. California Modified Sampler. A factor of 0.67 may be applied to California Modified Sample blow counts to estimate SPT equivalent blow count.

2) A rope and cat-head hammer system for rotary wash borings, and an automatic trip hammer for the hollow stem auger boring consisting of a hammer weight of 140 lbs. falling a distance of 30" were used to advance the drive samplers.

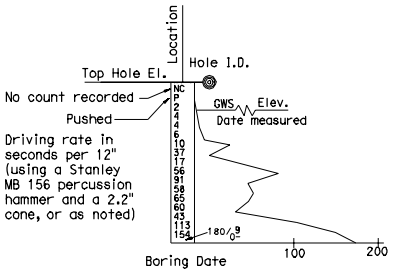
3) For drive sample blow counts the following convention is used:
38 = 38 blows required to produce 12" penetration after the initial 6" seating
80/9" = 80 blows required to produce 9" penetration after the initial 6" seating
REF/2" = 50 blows produced 2" penetration during the initial 6" interval



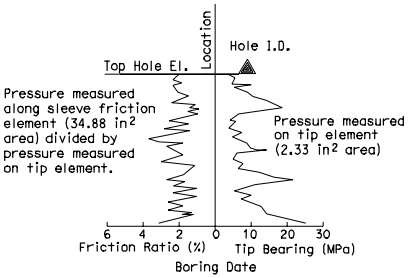
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

PLATE 15

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	SOIL LEGEND
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:		M. MOHSENI		
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM		PROJECT ENGINEER	POST MILE	LOG OF TEST BORINGS NO. 15 OF 16

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

FILE => &REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 02/23/09 SHEET OF

USERNAME => &USER DATE PLOTTED => &DATE TIME PLOTTED => &TIME

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166)
Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	22,405	R0.7/R2.7 20.5/22.3		

Curt Scheyhing 02/23/09
CERTIFIED GEOTECHNICAL ENGINEER

REGISTERED PROFFESIONAL ENGINEER — CURT SCHEYHING — No. G.E. 2766 — EXP. 06-30-09 Geotechnical — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

PLATE 16

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE		BRIDGE NO.	SOIL LEGEND
FUNCTIONAL SUPERVISOR	DRAWN BY: K. FERNANDES	FIELD INVESTIGATION BY:	STATE OF CALIFORNIA	M. MOHSENI		
NAME: C. SCHEYHING	CHECKED BY: C. SCHEYHING	S. NAVARATNARAJAH, H. KIM	DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	POST MILE	LOG OF TEST BORINGS NO. 16 OF 16

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

FILE => @REQUEST

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APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the project site were investigated by Group Delta Consultants, Inc. (GDC) by performing sixteen (16) soil borings (9 hollow-stem auger borings, and 7 rotary wash borings), and thirty-two (32) Cone Penetration Tests (CPTs) during the period of March 26 to May 9th, 2008. The borings were performed to depths of 16.5 feet to 137 feet below ground surface (bgs) and the CPTs were performed to depths of 20 to 164 feet bgs. In addition, on October 8th, 2008, eight (8) hand auger borings were advanced to depths of 5 feet bgs to collect supplemental near-surface samples for R-Value and index tests for pavement design. The CPT and boring locations were selected such that representative profiles of the site subsurface conditions could be developed at selected undercrossing, overcrossing, overhead sign, retaining wall, and new pavement locations. Locations of the borings and CPTs are presented in Figures 2A through 2N of the main report. The subsurface exploration program including location and depth of borings and CPTs is summarized in Table A-1.

14 hollow stem auger and rotary wash borings and 32 CPTs were performed from the freeway lanes, connector ramps, and shoulders of SR-22/I-405. 8 hand auger borings were performed from the freeway shoulders of SR-22/I-405 in or adjacent to proposed pavement areas. 2 borings were performed from surface streets in the vicinity of the Bolsa Chica Rd. OC. All of the exploration locations were within the Caltrans Right-of-Way (ROW), with the exception of R-08-019, and R-08-023, which were located within the Cities of Westminster and Garden Grove ROWs respectively.

Prior to beginning the exploration program, access/drilling permits were obtained from Caltrans and other jurisdictional agencies as needed. Subsurface utility maps were reviewed prior to picking potential locations for subsurface investigations. Underground Service Alert (USA) was notified of the impending exploration activities and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented during field activities. Subsurface explorations from the freeway lanes were performed at night. The exploration methods are described in the following sections.

A.2 Soil Drilling and Sampling

A total of sixteen (16) soil borings; seven (7) rotary wash (R-08-004, R-05-005, R-08-011, R-08-012, R-08-017, R-08-019, and R-08-023), and nine (9) hollow-stem auger borings (A-08-101, A-08-103, A-08-105, A-08-112, A-08-115, A-08-116, A-08-119, A-08-120 and A-08-122) were drilled and sampled during this project. C & L Drilling, Inc. of La Habra, California drilled and sampled the rotary wash

borings. R & C Drilling, Inc. of Van Nuys, California drilled and sampled the hollow stem auger borings. All drilling companies acted as subcontractors to GDC. All borings were performed under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, maintained detailed logs of the borings, and visually classified the soils in accordance with the Unified Soil Classification System (USCS) and were assigned a group name and group symbol, as described in Caltrans' "Soil and Rock Logging Classification Manual". A key for soil classification and boring log legend are presented in Figures A-1a and A-1b, respectively. The rotary wash and hollow stem auger boring logs are presented in Figures A-2 through A-17d.

The rotary wash borings were drilled using a Mayhew 1000 drill rig. The hollow-stem auger borings were drilled using a Mobile B-61 drill rig. All drill rigs were truck mounted. The Mayhew 1000 used a 4.875-inch drill bit in conjunction with bentonite slurry to drill to desired depths. The Mobile B-61 used an 8-inch auger to bore to desired depths.

Additionally, eight (8) hand auger borings (HA-08-01 through HA-08-08) were advanced by GDC personnel using a nominal 3-inch diameter hand auger. The hand auger boring logs are presented in Figures A-50 through A-57.

Boring 101 from the Post-Advanced planning study for the Springdale Street Overcrossing (2002) is also included.

Bulk samples of the near-surface soils were collected along the project alignment. Drive samples were collected from the borings generally at a typical interval of 5 to 10 feet. The sampling utilized Standard Penetration Test (SPT) and California samplers. SPT drive samples were obtained in accordance with ASTM D1586 using a 2-inch outside diameter and 1.38-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to retain the natural moisture content. The California sampler is a 3-inch outside diameter split barrel sampler lined with a 2.42-inch inside diameter metal rings. Compared to the SPT, the California sampler provides relatively undisturbed samples. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven with a 140-lb hammer free-falling a height of 30-inches using either an automatic or downhole hammer. SPT blow counts are often used as an index of the relative density and resistance of the sampled materials. The number of blows to drive the sampler each 6-inch increment into the soil was recorded on the boring logs and it was used to estimate relative soil density or consistency. For purposes of estimating relative densities or consistency,

California drive sampler blow counts can be approximately converted to equivalent SPT blow counts by multiplying the field blow counts by a factor of 0.67 to correct for larger sampler end-area if driven with a 140-lb/30-in hammer. Drive sample blow counts and corresponding density/consistency classifications are presented on the boring logs. At the completion of drilling, groundwater was measured using a well sounder.

The hollow stem auger and hand auger borings were abandoned by backfilling the borehole with drill cuttings and cement grout mix as needed to the ground surface. The rotary wash borings were abandoned by backfilling the borehole with cement grout mix as needed to the ground surface. In paved areas, the upper 0.75 ft of the borehole was filled with either asphalt patch or quickset cement.

Rotary wash borings drill cuttings and drilling mud was placed in 55-gallon drums near the work area for temporary storage. The drums were labeled with the contents, boring ID, dates, company name and contact name and phone number. Environmental samples were obtained from each boring location for laboratory testing to profile the waste for disposal purposes. Upon completion of the fieldwork, the samples were sent to American Environmental Testing Laboratory, Inc. of Burbank, California. for hazardous waste testing. Laboratory tests included California Title 22 Metals (EPA Methods 6010, 7196 and 7470), volatile organics (EPA Method 8260) and TPH gas/diesel (EPA Test Methods 418 and 8015). The drums were then transported to an appropriate disposal area by Environmental Recovery Services, Inc. of Gardena, California based on the test results.

Geotechnical samples were sealed to prevent moisture loss, and transported to the geotechnical laboratory for further inspection and geotechnical testing. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (see Figure A-1a). Field classifications were modified where necessary on the basis of laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 Cone Penetration Tests

A total of thirty-two (32) CPT soundings (CPT-08-001 through CPT-08-003, CPT-08-006 through CPT-08-009, CPT-08-013 through CPT-08-014B, CPT-08-015, CPT-08-016, CPT-08-018, CPT-08-020 through CPT-08-022, CPT-08-102 through CPT-08-111, CPT-08-113, CPT-08-114, CPT-08-117 through CPT-08-119, and CPT-08-121) were completed during the current project to depths ranging from 20 to 164 feet below ground surface. Kehoe Testing and Engineering, Inc. of Long Beach, California performed the CPT soundings as a subcontractor to GDC.

Additional eleven CPT soundings were performed for the sign structures. Eight CPT soundings (CPT-09-122 through CPT-129) were completed by Kehoe Testing on January 19 and 20, 2009 and three CPT soundings (CPT-09-130 through CPT-09-132) were performed by Gregg Drilling and Testing on February 6 and10, 2009.

The CPT soundings were conducted in general accordance with the ASTM D5778 test standard using an electronic cone penetrometer. A 2.32-inch^2 (15-cm^2) cone penetrometer was deployed using a 30-ton CPT rig. The test consists of pushing a cone-tipped probe into a soil deposit while simultaneously recording the end bearing and side friction resistance of the soil to penetration. Parameters measured nearly continuously during the CPT are soil bearing resistance at the cone tip (q_c), soil frictional resistance along the cylindrical friction sleeve (f_s), and pore water pressure directly behind the cone tip (U). These measured values are then used to estimate the type and engineering properties of soils being penetrated using relationships between q_c, f_s, and U (Robertson et al., 1986).

The CPT data in graphical form and accompanying data interpretation by GDC and based on correlations and charts by Jamiolkowski et. al (1985) and Robertson and Campanella (1983) are presented in Appendix A on Figures A-18a through A-49b and Figure A-58a to A-68c. Soil behavior type and other interpretations of the CPT data provided by Kehoe and are in our files.

At the completion of the sounding groundwater was measured using a well sounder and the CPT probe holes were abandoned following each test by backfilling bentonite into the hole, to within 0.75 feet of the ground surface. The remaining 0.75 feet of the hole was filled with either asphalt patch or quickset cement patch as needed.

A.4 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1	Summary of Field Explorations
Table A-1a	Additional CPTs for the Sign Foundations
Table A-2	Borehole / CPT Survey Data

List of Figures

Figure A-1a	Key for Soil Classification
Figure A-1b	Boring Legend
Figures A-2 through A-17d	Hollow Stem and Rotary Wash Boring Logs (only selected borings are included)
Figures B1-A1 through B1-A3	Boring Log (B-101)
Figures A-18a through A-49b	Cone Penetration Test Results (only selected CPTs are included)
Figure A-50 to A-57	Hand Auger Boring Logs (not included)
Figure A-58a to A-68c	CPTs for Sign Foundations

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
A-08-101	"A Line" 391+12 94 L	4/3/2008	A	19.5	21.5	L-12	15.5	4	
A-08-103	"A Line" 381+63 100 L	4/3/2008	A	19.5	31.5	L-12	13.2	6.3	
A-08-105	"A Line" 376+62 90 L	4/3/2008	A	19.8	41.5	L-11	18.3	1.5	
A-08-112	"A Line" 358+50 102 R	4/14/2008	A	23	41.5	L-10	Hole obstructed at 7.75 ft (dry)	NA	GW is below Elev. 15.3 feet
A-08-115	"A Line" 348+52 102 R	4/14/2008	A	21.5	16.5	L-9	Hole obstructed at 7.5 ft (dry)	NA	GW is below Elev. 14 feet
A-08-116	"A Line" 345+34 86 L	4/3/2008	A	22	16.5	L-9	11.4	10.6	
A-08-119	1335+66 105 R	4/14/2008	A	23	31.5	L-8	Hole obstructed at 5.7 ft (dry)	NA	GW is below Elev. 17 feet
A-08-120	1333+97 108 L	4/1/2008	A	25.86	51.50	L-8	12	13.86	
A-08-122	1322+20 176 R	4/14/2008	A	31.94	51.5	L-7	16.5	15.44	
CPT-08-001	1330+95 41 L	4/11/2008	CPT	24.92	163.5	L-7	Hole obstructed at 10' (dry)	NA	GW is below Elev. 14.92 feet
CPT-08-002	1328+67 53 R	3/26/2008	CPT	25.74	107.6	L-7	7	18.74	Inclination Refusal at 107.6'
CPT-08-003	1328+35 168 L	4/1/2008	CPT	27.74	150.0	L-7	Hole obstructed at 10' (dry)	NA	GW is below Elev. 17.74 feet

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
CPT-08-006	1321+35 243 L	3/31/2008	CPT	42.13	150.3	L-6	Hole obstructed at 20' (dry)	NA	GW is below Elev. 22.13 feet
CPT-08-007	1320+67 21 R	3/27/2008	CPT	27.27	105.5	L-6	Hole obstructed at 7' (dry)	NA	GW is below Elev. 20.27 feet
CPT-08-008	1319+18 200 L	4/1/2008	CPT	48.39	150.2	L-6	Hole obstructed at 34' (dry)	NA	GW is below Elev. 14.39 feet
CPT-08-009	1318+62 43 R	4/15/2008	CPT	29.33	130.3	L-6	Hole obstructed at 17' (dry)	NA	GW is below Elev. 12.33 feet
CPT-08-013	1314+50 71 L	4/15/2008	CPT	30.22	130.3	L-6	Hole obstructed at 16' (dry)	NA	GW is below Elev. 14.22 feet
CPT-08-014	1314+34 142 L	3/27/2008	CPT	27.93	61.0	L-6	Hole obstructed at 10' (dry)	NA	Inclination Refusal at 61 feet GW is below Elev. 17.93 feet
CPT-08-014B	1314+25 145 L	3/27/2008	CPT	27.94	79.9	L-6	Hole obstructed at 7' (dry)	NA	Inclination Refusal at 80 feet GW is below Elev. 20.94 feet
CPT-08-015	1313+33 73 R	3/31/2008	CPT	28.57	150.2	L-6	Hole obstructed at 12' (dry)	NA	GW is below EL. 16.57 feet
CPT-08-016	1312+20 146 L	4/15/2008	CPT	30.72	130.3	L-6	Hole obstructed at 15' (dry)	NA	GW is below Elev. 15.72 feet
CPT-08-018	"W Line" 2306+56 83 L	4/24/2008	CPT	43.59	80.1	L-3	Hole obstructed at 24' (dry)	NA	GW is below Elev. 19.59 feet
CPT-08-020	"W Line" 2301+43 102 L	4/1/2008	CPT	28.35	124.6	L-3	Hole obstructed at 12' (dry)	NA	GW is below Elev. 16.35 feet
CPT-08-021	"W Line" 2302+53 40 L	3/31/2008	CPT	25.97	150.2	L-3	Hole obstructed at 7' (dry)	NA	GW is below Elev. 18.97 feet

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
CPT-08-022	"W" Line 2301+98 2 R	4/24/2008	CPT	25.20	118.5	L-3	Hole obstructed at 5' (dry)	NA	Tip Refusal to 118.5' GW is below Elev. 20.2 feet
CPT-08-102	"A Line" 386+73 94 L	4/3/2008	CPT	20	50.0	L-12	8	12	
CPT-08-103	"A Line" 381+73 100 L	4/3/2008	CPT	19.5	30.1	L-12	Hole obstructed at 9' (dry)	NA	GW is below Elev. 10.5 feet
CPT-08-104	"A Line" 378+20 108 R	4/14/2008	CPT	19.5	50.3	L-11	Hole obstructed at 7' (dry)	NA	GW is below Elev. 12.5 feet
CPT-08-105	"A Line" 376+72 90 L	4/3/2008	CPT	19.8	40.3	L-11	Hole obstructed at 8' (dry)	NA	GW observed at 18.3' (El. 1.5 ft) in nearby A-08-105
CPT-08-106	"A Line" 373+20 104 R	4/14/2008	CPT	20	40.4	L-11	Hole obstructed at 5' (dry)	NA	GW is below Elev. 15 feet
CPT-08-107	"A Line" 371+74 90 L	4/3/2008	CPT	20.5	50.1	L-11	Hole obstructed at 9' (dry)	NA	GW is below Elev. 11.5 feet
CPT-08-108	"A Line" 368+16 104 R	4/14/2008	CPT	21	30.2	L-11	Hole obstructed at 11' (dry)	NA	GW is below Elev. 10 feet
CPT-08-109	"A Line" 366+70 90 L	4/3/2008	CPT	22	30.1	L-10	Hole obstructed at 8' (dry)	NA	GW is below Elev. 12 feet
CPT-08-110	"A Line" 363+24 106 R	4/14/2008	CPT	23	50.2	L-10	Hole obstructed at 5' (dry)	NA	GW is below Elev. 18 feet
CPT-08-111	"A Line" 361+62 88 L	4/3/2008	CPT	23	40.4	L-10	Hole obstructed at 9' (dry)	NA	GW is below Elev. 14 feet
CPT-08-113	"A Line" 356+88 88 L	4/3/2008	CPT	22.5	40.1	L-10	Hole obstructed at 7' (dry)	NA	GW is below El. 15.5 feet

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
CPT-08-114	"A Line" 353+82 105 R	4/14/2008	CPT	21.5	30.2	L-9	Hole obstructed at 5' (dry)	NA	GW is below El. 16.5 feet
CPT-08-117	1340+34 100 R	4/14/2008	CPT	22	50.1	L-8	Hole obstructed at 7' (dry)	NA	GW is below Elev. 15 feet
CPT-08-118	1340+00 94 L	4/3/2008	CPT	24	20.1	L-8	Hole obstructed at 9' (dry)	NA	GW is below Elev. 15 feet
CPT-08-119	1335+56 105 R	4/14/2008	CPT	23	50.3	L-8	Hole obstructed at 6' (dry)	NA	GW is below Elev. 17 feet
CPT-08-121	1327+42 159 R	4/14/2008	CPT	28.41	30.1	L-7	Hole obstructed at 9' (dry)	NA	GW is below Elev. 19.41 feet
HA-08-01	"B" 293+60 95R	10/8/2008	HA	26	5.0	L-2	NE	NA	GW is below Elev. 21
HA-08-02	"E Line" 3299+42 51L	10/8/2008	HA	27	5.0	L-3	NE	NA	GW is below Elev. 22
HA-08-03	"W Line" 2302+04 84L	10/8/2008	HA	28	5.0	L-3	NE	NA	GW is below Elev. 23
HA-08-04	"E Line" 3307+28 74R	10/8/2008	HA	43	5.0	L-3	NE	NA	GW is below Elev. 38
HA-08-05	"NB 405" 1310+50 128R	10/8/2008	HA	24.9	5.0	L-6	NE	NA	GW is below Elev. -19.9
HA-08-06	"W" 51+08 61L	10/8/2008	HA	29	5.0	L-5	NE	NA	GW is below Elev. 24
HA-08-07	"NB405" 314+20 90L	10/8/2008	HA	28.5	5.0	L-6	NE	NA	GW is below Elev. 23.5

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 HOV SEGMENT

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Notes
HA-08-08	"W Line" 374+70 104L	10/8/2008	HA	20	5.0	L-11	NE	NA	GW is below Elev. 15
R-08-004	1325+03 165 L	4/24/2008	R	31.21	61.5	L-7	NA	NA	
R-08-005	1324+48 63 R	3/27/2008	R	27.83	137.0	L-7	NA	NA	
R-08-011	1316+25 20 L	4/15/2008	R	29.54	121.5	L-6	NA	NA	
R-08-012	1315+94 196 L	4/11/2008	R	24.10	101.5	L-6	9	15.1	
R-08-017	1310+93 76 L	4/1/2008	R	52.50	101.5	L-6	NA	NA	
R-08-019	"V V Line" 38+33 47 R	4/23/2008	R	53.62	86.5	L-4	NA	NA	
R-08-023	"V V Line" 44+88 28 L	5/8/2008	R	46.16	96.5	L-3	31	15.16	

Notes:

1. Stationing relative to SR-22 "H" line, except where noted otherwise. Right and left offsets defined by looking along station line in direction of increasing station.

2. Elevations based upon topographic contours in Figure 2 of main report, except for borings/CPTs reported to 0.01 ft., which were surveyed

NA = Not Available
NE = Not encountered

A = Auger Boring
CPT = Cone Penetration Test
HA = Hand Auger Boring

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS
WEST COUNTY CONNECTORS PROJECT-405/22 SIGNS

Exploration No.	Approximate Exploration Station and Offset (ft) [1]	Date Performed	Exploration Type	Exploration Elevation (ft) [2]	Total Depth (ft)	Figure No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)
CPT-09-122	"B" 245+23 65L	1/21/2009	CPT	37.7	60.0	2N	Hole obstructed at 4 (dry)	GW is below EL. 33.7
CPT-09-123	"SB405" 310+52 54L	1/20/2009	CPT	27	60.0	2D	Hole obstructed at 10' (dry)	GW is below EL. 17
CPT-09-124	"SB405" 333+00 20L	1/20/2009	CPT	26	80.0	2H	Hole obstructed at 8 (dry)	GW is below EL. 18
CPT-09-125	"A " 355+55 88L	1/21/2009	CPT	22	60.0	2J	Hole obstructed at 8' (dry)	GW is below EL. 14
CPT-09-126	"A" 359+40 89L	1/21/2009	CPT	23	60.0	2J	Hole obstructed at 10' (dry)	GW is below EL. 13
CPT-09-127	"A" 370+50 89L	1/20/2009	CPT	21	60.0	2K	GROUNDWATER AT 10'	11
CPT-09-128	"A" 375+85 105 R	1/21/2009	CPT	20	60.0	2K	Hole obstructed at 8' (dry)	GW is below EL. 12
CPT-09-129	"A" 385+85 90 L	1/20/2009	CPT	20.5	65.0	2L	Hole obstructed at 9' (dry)	GW is below EL. 11.5
CPT-09-130	"B" 257+60 70 L	2/10/2009	CPT	34.5	60.0	2O	NA	
CPT-09-131	"B" 270+80 70 L	2/6/2009	CPT	34	60.0	2P	NA	
CPT-09-132	"B" 252+50 72R	2/10/2009	CPT	74.5	60.0	2O	NA	

Notes:
NA = Not Available NE=Not Encountered CPT=Cone Penetration Test

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			**GROUP SYMBOL**	**SECONDARY DIVISIONS**
COARSE-GRAINED SOILS (< 50% fines content)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE-GRAINED SOILS (> 50% fines content)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart
Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Firm	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

DRY - Absence of moisture, dusty, dry to the touch
MOIST- Damp but no visible water
WET- Visible free water, usually soil is below water table

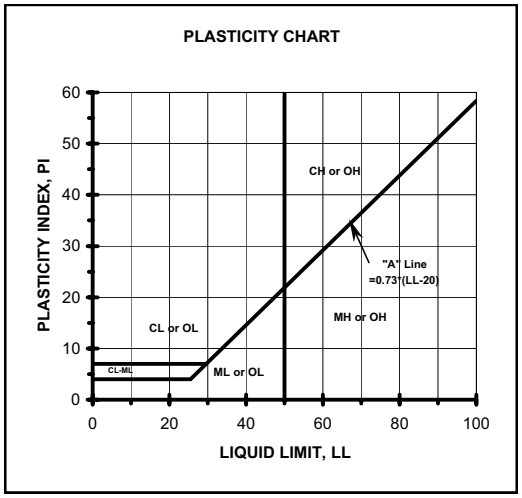
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375 inch I.D.) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		
US Std Sieve → **No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**	**12"**	
Grain Size (mm) → 0.075	0.425	2	4.75	19.1	76.2	304.8	



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{60}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

Metric Unit Conversion: 1" = 25.4 mm, 1.0 ksf = 47.88 kPa

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	3/27/2008	4/15/2008	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	25	VAR	▼ 11.4 / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG
5			B1								
10			R2								
15			S3								
20											

DESCRIPTION AND CLASSIFICATION

GRAB, CAL, SPT - Refers to the sampling method as described below

GRAB - Refers to collecting sample by method of placing disturbed soil cuttings into a plastic bag

CAL (CALIFORNIA MODIFIED) - A 3.0-inch o.d. split tube sampler lined with 2.41-inch i.d. metal sample rings generally driven into the soil by a 140-lb. hammer free falling a height of 30-inches.

SPT (STANDARD PENETRATION TEST) - A 2.0-inch o.d. split spoon sampler with a 1.3-inch i.d. generally driven into the soil by a140-lb. hammer free falling a height of 30-inches.

ABBREVIATIONS FOR OTHER TESTS:

PI = Atterberg Limits	PA = Grain Size Analyses
CN = Consolidation	PP = Pocket Pen
CR = Corrosivity	RV = R-Value
DS = Direct Shear	CP = Laboratory Compaction

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-120**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	S. Navaratnarajah	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	25.86	▼ 12.0 / *13.9*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	25											**3" Asphalt Concrete (AC)** **9" Aggregate Base (AB)**
												Sandy Lean Clay (CL) moist, dark brown-black
			B1			9	RV	27				**Silty Sand (SM)** moist, light brown, fine to medium grained, with lenses of clay
5												
	20		R2	4 6 11	103.7	11						medium dense
												Clayey Sand (SC) medium dense, moist-wet, dark brown, fine grained
10												
	15		S3	2 4 8		21						
												Lean Clay with Sand (CL) firm-stiff, wet, dark brown, with lenses of fine grained sand
15												
	10		R4	4 6 8		29	CN	72	36:17	0.5		
20												
	5		S5	9 8 15		26				2.0-2.25		**Silty Clay (CL)** very stiff, wet, dark brown
												Clayey Sand (SC) medium dense, wet, dark brown, fine grained

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-9 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-120**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	S. Navaratnarajah	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	25.86	▼ 12.0 / *13.9*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0		R6	7 13 13	99.2	25						**Clayey Sand (SC)** medium dense, wet, dark brown, fine grained
30	-5		S7	6 17 23		24						**Sandy Silt (ML)** medium dense to dense, wet, dark brown, fine grained
35	-10		R8	9 20 22	100.3	25		55	NP			
40	-15		S9	20 22 30		21						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
45	-20		R10	26 50/6"	97.1	27		19				

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-9 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**A-08-120**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/1/2008	4/1/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
R & C Drilling Inc.	Hollow Stem Auger	S. Navaratnarajah	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mobile B-61	8	51.5	25.86	▼ 12.0 / *13.9*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES
Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-25		S11	20 27 30		28						**Clayey Sand (SC)** very dense, wet, dark brown, fine grained
55	-30											*Boring terminated at 51.5 feet below ground surface (bgs).* *Groundwater encountered at 12 feet bgs.* *Borehole obstructed below 5 feet bgs, possible caving.* *Borehole backfilled with soil cuttings and patched with asphalt.*
60	-35											
65	-40											
70	-45											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-9 c

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-004

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	30											**8.25" Concrete Pavement (PCC)** **4.75" Concrete Treated Base** **3" Aggregate Base (AB)**
												9" Poorly Graded Sand (SP) moist, red-yellow, fine grained
			B1			16	CR RV	66	29:12			**Sandy Lean Clay (CL)** firm, moist, dark brown, in chunks up to 1.5"
			R2	13 25 30	117.1	16	DS			4.5+		hard, dry, dark gray, fine grained
5	25											**Sandy Silt (ML)** dense/hard, dry-moist, brown, fine grained, trace of clay
10	20		S3	6 12 18		22		66		4.5+		
												Lean Clay (CL) stiff, moist, olive brown
15	15		R4	5 9 13	100.5	24		27				pocket penetrometer = 1.0-1.25 **Silty Sand (SM)** medium dense, wet, light brown gray, fine grained with occasional coarse grains and few fine gravel, with clay
												Sandy Lean Clay (CL) firm to stiff, wet, olive light brown, very fine grains barely visible with some to trace of silt
20	10		S5	2 3 4		31		66		1.0		
												Lean Clay (CL) stiff, moist, gray olive brown

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-11 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	R-08-004

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	5		R6	5 7 12	91.1	31	DS			1.25-1.5		**Lean Clay (CL)** stiff, moist, gray olive brown, no visible sand grains, with fine to 3/4" angular light gray fine grained sandstone gravel in sampler shoe
30	0		S7	2 5 8		29		55				**Sandy Lean Clay (CL)** stiff, moist, olive gray, trace fine grains, with some silt
35	-5		R8	8 8 14	92.3	30				1.5-2.2		stiff to very stiff, less silt, occasional fine grain
40	-10		S9	2 7 14		32				2.0		
45	-15		R10	20 27 38	105.2	22		51		4.5		**Sandy Silt/Silty Sand (ML/SM)** very dense/hard, gray, trace of clay

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-11 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
SR-22 West Orange County Connectors	I-436	**R-08-004**

SITE LOCATION	START	FINISH	SHEET NO.
Cities of Seal Beach, Westminster, and Garden Grove, California	4/24/2008	4/24/2008	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
C & L Drilling	Rotary Wash	A. Tucker	C. Scheyhing

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Mayhew 1000	4.875	61.5	31.21	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	Surveyed 01/09

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-20		S11	10 8 11		32		86				**Lean Clay with Sand (CL)** very stiff, wet, olive gray, little to no silt, rolls very good thread
55	-25		R12	12 23 25	109.6	19				4.5+		**Silt (ML)** dense/hard, wet, gray,with some fine grains and clay
60	-30		S13	9 13 20		26		56				**Sandy Silt (ML)** dense, wet, gray olive, fine grains barely visible
65	-35											*Boring terminated at 61.5 feet below ground surface (bgs).* *Groundwater unable to be measured.* *Borehole backfilled with grout mix and patched with concrete.*
70	-40											

GDC_LOG_BORING_1A I-436 BORING LOGS.GPJ GDCLOG.GDT 01/23/09

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FIGURE A-11 c

LOG OF TEST BORING

PROJECT NAME: S.R. 22 Orange County, California	PROJECT NUMBER: I-298	BORING: B-101	
SITE LOCATION: S.R. 22 and Springdale Street O.C.	START: 7/15/2002	FINISH: 7/17/2002	SHEET NO.: 1 of 3
DRILLING COMPANY: J.E.T. Drilling	DRILLING METHOD: Rotary Wash	LOGGED BY: M. Shafiyoon	CHECKED BY: Y. Fahmy/K.S.K
DRILLING EQUIPMENT: CME 75	BORING DIA. (mm): 152.4	TOTAL DEPTH (m): 23.3	BORING ELEV (m): 10.8
HAMMER INFORMATION: Hammer: 64 kg., Drop: 762mm	NOTES: Coordinates: 679,638.85 N 1,835,983.13 E		DEPTH/ELEV. GROUND WATER (m): ▼ 2.0 / 8.8

DEPTH (meters)	DEPTH (feet)	ELEVATION (meters)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/0.15m)	N VALUE	POCKET PEN (kPa)	DRY DENSITY (kN/m³)	MOISTURE (%)	% PASSING #200	ATTERBERG LIMITS (LL/PI)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
														AC thickness = 152.4mm Base thickness = 152.4mm
1	5	10												LEAN CLAY (CL); firm, olive brown, moist
2		9	X	S-1	3 6 8	14			23.5					POORLY GRADED SAND with SILT (SP-SM) interbedded with SILTY SAND (SM); medium dense, olive grey, wet
3	10	8												
			X	R-2	4 6 11			17.2	20.0			DS		
4		7												
5	15	6	X	S-3	5 7 8	15			24.6					
6		5												
	20													
7		4	X	R-4	5 7 9				29.2		33/15	AL CO		LEAN CLAY (CL) interbedded with SILT (ML) and occasional layers of FAT CLAY (CH); stiff, olive grey, wet
	25	3												
8														
		2	X	S-5	5 4 7	11	383		29.0					
9	30													
			X	R-6	5 10 17			16.8	21.2	36	NP	AL CS FC		SILTY SAND (SM) interbedded with SANDY SILT (ML); medium dense, dark olive grey, wet
10		1												

AES_BORING_LOG 02-107.GPJ BAT.GDT 3/4/03

ADVANCED INFRASTRUCTURE GROUP
20 Fairbanks, Suite 178
Irvine, CA 92618

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LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
S.R. 22 Orange County, California	I-298	B-101

SITE LOCATION	START	FINISH	SHEET NO.
S.R. 22 and Springdale Street O.C.	7/15/2002	7/17/2002	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
J.E.T. Drilling	Rotary Wash	M. Shafiyoon	Y. Fahmy/K.S.K

DRILLING EQUIPMENT	BORING DIA. (mm)	TOTAL DEPTH (m)	BORING ELEV (m)	DEPTH/ELEV. GROUND WATER (m)
CME 75	152.4	23.3	10.8	▼ 2.0 / 8.8

HAMMER INFORMATION
Hammer: 64 kg., Drop: 762mm

NOTES
Coordinates: 679,638.85 N 1,835,983.13 E

DEPTH (meters)	DEPTH (feet)	ELEVATION (meters)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/0.15m)	N VALUE	POCKET PEN (kPa)	DRY DENSITY (kN/m³)	MOISTURE (%)	% PASSING #200	ATTERBERG LIMITS (LL/PI)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
11		0	X	S-7	8 12 16	28	430		19.4					SILTY SAND (SM) interbedded with SANDY SILT (ML); medium dense, dark olive grey, wet
12	40	-1												
		-2	■	R-8	12 20 24		120	14.5	31.2	88		DS		
13														
	45	-3	X	S-9	3 7 12	19	430		17.3	65	30/11	AL GS		SANDY LEAN CLAY (CL); stiff, dark olive grey, moist
14		-4												
15	50		■	R-10	19 36 50			17.5	10.8	7		GS		POORLY GRADED SAND with SILT (SP-SM); very dense, dark grey, moist
16		-5												
	55	-6	X	S-11	5 5 6	11			24.7					SILTY SAND (SM); loose to medium dense, dark grey, wet
17														
		-7												
18	60		■	R-12	20 40 50/127mm		240	14.9	29.2					SANDY SILT (ML); very stiff to hard, interbedded with SILTY SAND (SM); very dense, dark grey, wet
		-8												
19														
	65	-9	X	S-13	14 17 12	29	287		29.0					
20														
21		-10												

AES_BORING_LOG 02-107.GPJ BAT GDT 3/4/03

ADVANCED INFRASTRUCTURE GROUP
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LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
S.R. 22 Orange County, California	I-298	B-101

SITE LOCATION	START	FINISH	SHEET NO.
S.R. 22 and Springdale Street O.C.	7/15/2002	7/17/2002	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
J.E.T. Drilling	Rotary Wash	M. Shafiyoon	Y. Fahmy/K.S.K

DRILLING EQUIPMENT	BORING DIA. (mm)	TOTAL DEPTH (m)	BORING ELEV (m)	DEPTH/*ELEV.* GROUND WATER (m)
CME 75	152.4	23.3	10.8	▼ 2.0 / 8.8

HAMMER INFORMATION
Hammer: 64 kg., Drop: 762mm

NOTES
Coordinates: 679,638.85 N 1,835,983.13 E

DEPTH (meters)	DEPTH (feet)	ELEVATION (meters)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/0.15m)	N VALUE	POCKET PEN (kPa)	DRY DENSITY (kN/m³)	MOISTURE (%)	% PASSING #200	ATTERBERG LIMITS (LL/PI)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
22	75	-12		S-15	3 5 7	12								FAT CLAY (CH); stiff, dark greenish grey, moist
		-11		R-14	15 24 32			15.7	21.5					SANDY SILT (ML); very stiff to hard, interbedded with SILTY SAND (SM); very dense, dark grey, wet
23														
24	80	-13												Bottom of boring @ 23.3m Installed Piezometer
25		-14												
26	85	-15												
		-16												
27	90													
28		-17												
29	95	-18												
30		-19												
	100	-20												
31		-21												

AES_BORING_LOG 02-107.GPJ BAT.GDT 3/4/03

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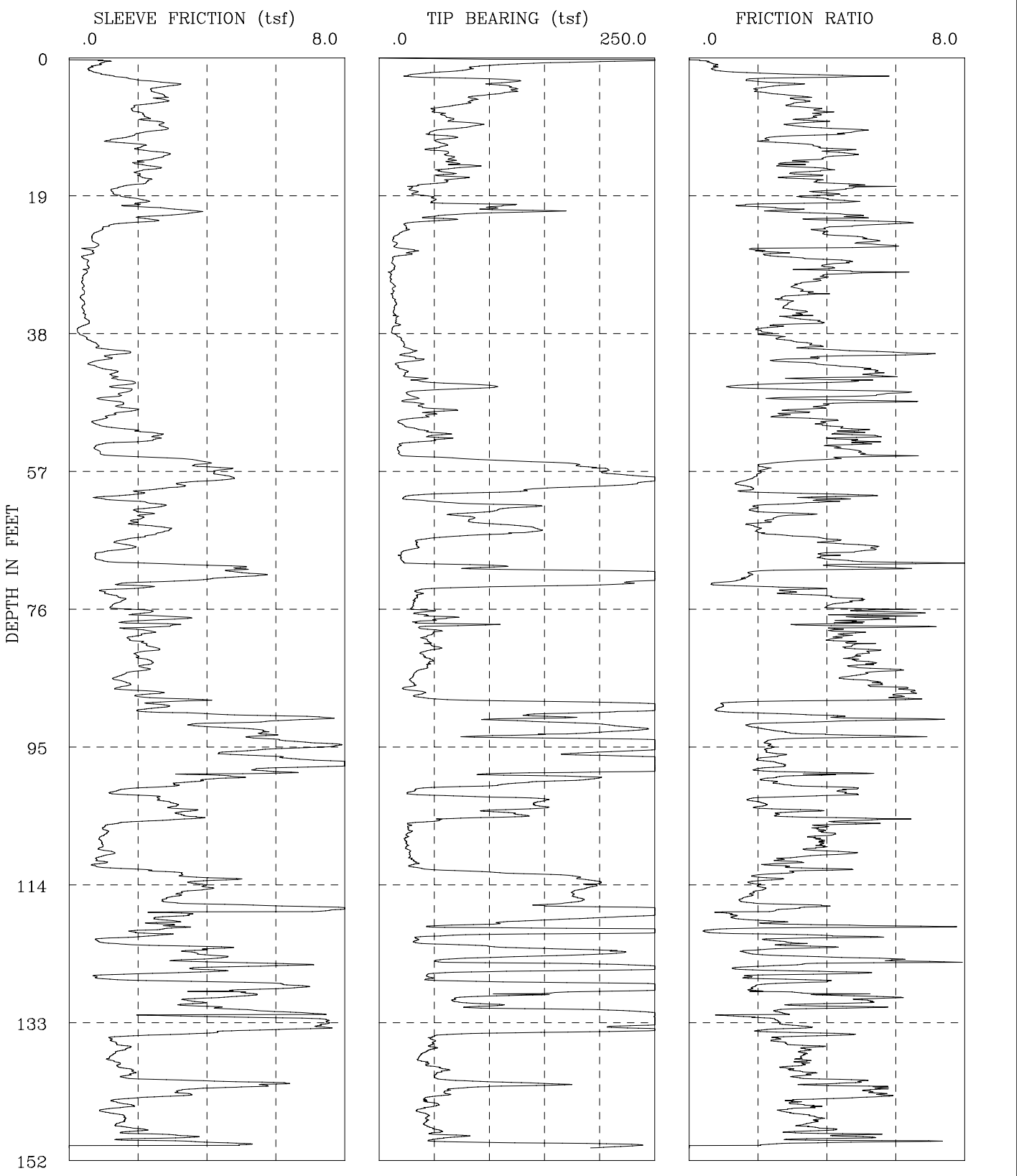
B1-A3



I-436 SR-22 Phase 2	CPT-08-006
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-21a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-006
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 03/31/2008
Cone Used : 30 ton
Water table (feet) : 23.95013

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	162.45	0.77	0.48	0.03	sand	>90	>48	31	UNDEFINED
0.60	2	76.38	0.63	0.82	0.09	sand to silty sand	>90	>48	18	UNDEFINED
0.95	3	63.52	1.49	2.35	0.15	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
1.25	4	113.90	2.86	2.51	0.22	silty sand to sandy silt	>90	46-48	36	UNDEFINED
1.55	5	115.30	2.51	2.17	0.28	silty sand to sandy silt	80-90	46-48	37	UNDEFINED
1.85	6	84.43	2.76	3.27	0.33	sandy silt to clayey silt	UNDFND	UNDFD	32	5.6
2.15	7	63.54	2.01	3.17	0.39	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
2.45	8	54.73	2.06	3.76	0.45	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
2.75	9	70.87	2.42	3.42	0.51	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
3.05	10	73.38	2.72	3.70	0.57	clayey silt to silty clay	UNDFND	UNDFD	35	4.8
3.35	11	54.98	1.90	3.46	0.63	clayey silt to silty clay	UNDFND	UNDFD	26	3.6
3.65	12	56.38	1.52	2.69	0.69	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
3.95	13	53.42	2.17	4.07	0.75	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
4.25	14	63.43	2.72	4.28	0.81	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
4.55	15	73.86	2.10	2.84	0.87	sandy silt to clayey silt	UNDFND	UNDFD	28	4.8
4.85	16	62.42	2.22	3.56	0.93	clayey silt to silty clay	UNDFND	UNDFD	30	4.1
5.15	17	65.35	2.18	3.34	0.98	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
5.45	18	42.04	1.86	4.43	1.04	silty clay to clay	UNDFND	UNDFD	27	2.7
5.75	19	31.71	1.28	4.04	1.10	silty clay to clay	UNDFND	UNDFD	20	2.0
6.05	20	48.78	1.96	4.01	1.16	clayey silt to silty clay	UNDFND	UNDFD	23	3.1
6.40	21	104.43	2.40	2.30	1.23	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
6.70	22	79.82	3.00	3.76	1.29	clayey silt to silty clay	UNDFND	UNDFD	38	5.2
7.00	23	42.95	2.00	4.65	1.35	silty clay to clay	UNDFND	UNDFD	27	2.7
7.35	24	23.52	0.94	3.99	1.41	silty clay to clay	UNDFND	UNDFD	15	1.4
7.65	25	14.30	0.67	4.67	1.46	clay	UNDFND	UNDFD	14	.8
7.95	26	14.61	0.79	5.38	1.48	clay	UNDFND	UNDFD	14	.8
8.25	27	28.39	0.61	2.15	1.51	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
8.55	28	13.67	0.46	3.40	1.54	silty clay to clay	UNDFND	UNDFD	9	.8
8.85	29	13.23	0.54	4.12	1.57	clay	UNDFND	UNDFD	13	.7
9.15	30	10.79	0.47	4.38	1.60	clay	UNDFND	UNDFD	10	.6
9.45	31	10.52	0.39	3.68	1.63	clay	UNDFND	UNDFD	10	.5
9.75	32	13.07	0.41	3.11	1.65	silty clay to clay	UNDFND	UNDFD	8	.7
10.05	33	12.31	0.40	3.24	1.68	silty clay to clay	UNDFND	UNDFD	8	.6
10.35	34	14.68	0.41	2.81	1.71	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.65	35	13.72	0.40	2.95	1.74	silty clay to clay	UNDFND	UNDFD	9	.7
10.95	36	14.96	0.45	3.03	1.77	silty clay to clay	UNDFND	UNDFD	10	.8
11.25	37	16.01	0.53	3.31	1.80	silty clay to clay	UNDFND	UNDFD	10	.9
11.55	38	11.83	0.26	2.20	1.82	clayey silt to silty clay	UNDFND	UNDFD	6	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	17.63	0.45	2.55	1.85	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.15	40	22.52	0.77	3.43	1.88	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
12.45	41	27.99	1.43	5.13	1.91	clay	UNDFND	UNDFD	27	1.7
12.80	42	29.48	0.96	3.27	1.94	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	17.73	0.83	4.67	1.97	clay	UNDFND	UNDFD	17	1.0
13.40	44	24.24	1.32	5.42	2.00	clay	UNDFND	UNDFD	23	1.4
13.75	45	55.41	1.62	2.93	2.03	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
14.05	46	64.79	1.58	2.43	2.06	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
14.35	47	29.69	1.21	4.07	2.09	silty clay to clay	UNDFND	UNDFD	19	1.7
14.65	48	32.38	1.44	4.44	2.12	silty clay to clay	UNDFND	UNDFD	21	1.9
14.95	49	52.70	1.67	3.17	2.14	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
15.25	50	32.61	1.01	3.10	2.17	clayey silt to silty clay	UNDFND	UNDFD	16	1.9
15.55	51	22.71	0.93	4.11	2.20	silty clay to clay	UNDFND	UNDFD	15	1.3
15.85	52	47.86	2.26	4.73	2.23	silty clay to clay	UNDFND	UNDFD	31	2.9
16.15	53	47.63	2.28	4.79	2.26	silty clay to clay	UNDFND	UNDFD	30	2.9
16.45	54	18.02	0.82	4.52	2.29	clay	UNDFND	UNDFD	17	.9
16.75	55	21.24	1.11	5.21	2.31	clay	UNDFND	UNDFD	20	1.1
17.05	56	120.80	3.63	3.01	2.34	sandy silt to clayey silt	UNDFND	UNDFD	46	7.8
17.35	57	195.95	4.16	2.12	2.37	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
17.65	58	227.67	4.46	1.96	2.40	sand to silty sand	70-80	40-42	>50	UNDEFINED
17.95	59	242.58	3.71	1.53	2.43	sand to silty sand	70-80	40-42	>50	UNDEFINED
18.25	60	144.72	2.54	1.75	2.46	sand to silty sand	60-70	38-40	35	UNDEFINED
18.55	61	32.52	1.34	4.12	2.48	silty clay to clay	UNDFND	UNDFD	21	1.9
18.85	62	92.90	2.38	2.56	2.51	sandy silt to clayey silt	UNDFND	UNDFD	36	5.9
19.20	63	94.62	2.15	2.27	2.54	silty sand to sandy silt	50-60	36-38	30	UNDEFINED
19.50	64	82.54	2.00	2.42	2.57	sandy silt to clayey silt	UNDFND	UNDFD	32	5.2
19.80	65	126.10	2.42	1.92	2.60	silty sand to sandy silt	50-60	36-38	40	UNDEFINED
20.15	66	104.68	2.48	2.37	2.63	silty sand to sandy silt	50-60	36-38	33	UNDEFINED
20.45	67	35.75	1.52	4.24	2.66	silty clay to clay	UNDFND	UNDFD	23	2.1
20.75	68	29.61	1.56	5.27	2.69	clay	UNDFND	UNDFD	28	1.7
21.05	69	19.51	0.76	3.91	2.72	silty clay to clay	UNDFND	UNDFD	12	1.0
21.35	70	51.59	2.44	4.73	2.75	silty clay to clay	UNDFND	UNDFD	33	3.1
21.65	71	183.98	4.92	2.67	2.78	silty sand to sandy silt	60-70	38-40	>50	UNDEFINED
21.95	72	284.59	4.66	1.64	2.81	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.25	73	178.65	2.05	1.15	2.83	sand to silty sand	60-70	38-40	43	UNDEFINED
22.55	74	37.16	1.16	3.11	2.86	clayey silt to silty clay	UNDFND	UNDFD	18	2.1
22.85	75	32.94	1.51	4.59	2.89	silty clay to clay	UNDFND	UNDFD	21	1.8
23.15	76	30.33	1.31	4.33	2.92	silty clay to clay	UNDFND	UNDFD	19	1.7
23.45	77	40.64	2.27	5.57	2.95	clay	UNDFND	UNDFD	39	2.4
23.75	78	49.14	2.50	5.08	2.98	clay	UNDFND	UNDFD	47	2.9
24.05	79	58.91	2.43	4.12	3.00	clayey silt to silty clay	UNDFND	UNDFD	28	3.6
24.35	80	46.35	2.11	4.55	3.03	silty clay to clay	UNDFND	UNDFD	30	2.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21c

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
24.65	81	43.88	2.01	4.57	3.06	silty clay to clay	UNDFND	UNDFD	28	2.6
24.95	82	49.09	2.41	4.90	3.09	silty clay to clay	UNDFND	UNDFD	31	2.9
25.25	83	41.14	2.00	4.87	3.12	silty clay to clay	UNDFND	UNDFD	26	2.4
25.60	84	45.40	2.28	5.01	3.15	clay	UNDFND	UNDFD	43	2.6
25.90	85	35.27	1.95	5.52	3.18	clay	UNDFND	UNDFD	34	2.0
26.20	86	29.36	1.41	4.82	3.21	clay	UNDFND	UNDFD	28	1.6
26.55	87	27.94	1.59	5.70	3.24	clay	UNDFND	UNDFD	27	1.5
26.85	88	36.55	2.29	6.28	3.27	clay	UNDFND	UNDFD	35	2.0
27.15	89	144.06	2.95	2.05	3.30	silty sand to sandy silt	60-70	36-38	46	UNDEFINED
27.45	90	276.73	2.43	0.88	3.32	sand	70-80	40-42	>50	UNDEFINED
27.75	91	155.74	5.46	3.51	3.35	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.0
28.05	92	162.70	4.92	3.03	3.38	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.4
28.35	93	224.38	5.18	2.31	3.41	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
28.65	94	156.75	5.65	3.60	3.44	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
28.95	95	316.45	7.30	2.31	3.47	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
29.25	96	221.44	5.16	2.33	3.49	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
29.55	97	292.69	6.53	2.23	3.52	sand to silty sand	70-80	40-42	>50	UNDEFINED
29.85	98	304.81	7.81	2.56	3.55	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
30.15	99	185.34	5.18	2.80	3.58	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.45	100	172.86	4.09	2.37	3.61	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
30.75	101	72.03	2.46	3.42	3.64	sandy silt to clayey silt	UNDFND	UNDFD	28	4.4
31.05	102	45.82	1.71	3.74	3.66	clayey silt to silty clay	UNDFND	UNDFD	22	2.6
31.35	103	145.21	2.81	1.93	3.69	silty sand to sandy silt	50-60	36-38	46	UNDEFINED
31.65	104	129.56	3.25	2.51	3.72	silty sand to sandy silt	50-60	34-36	41	UNDEFINED
32.00	105	106.14	3.35	3.16	3.75	sandy silt to clayey silt	UNDFND	UNDFD	41	6.6
32.30	106	33.99	1.49	4.39	3.78	silty clay to clay	UNDFND	UNDFD	22	1.8
32.60	107	27.13	1.05	3.88	3.81	silty clay to clay	UNDFND	UNDFD	17	1.3
32.95	108	24.39	0.93	3.79	3.84	silty clay to clay	UNDFND	UNDFD	16	1.1
33.25	109	24.87	0.93	3.75	3.87	silty clay to clay	UNDFND	UNDFD	16	1.2
33.55	110	27.90	1.14	4.09	3.90	silty clay to clay	UNDFND	UNDFD	18	1.4
33.85	111	31.44	0.89	2.82	3.93	clayey silt to silty clay	UNDFND	UNDFD	15	1.6
34.15	112	40.50	1.37	3.38	3.96	clayey silt to silty clay	UNDFND	UNDFD	19	2.2
34.45	113	149.32	3.39	2.27	3.99	silty sand to sandy silt	50-60	36-38	48	UNDEFINED
34.75	114	195.25	4.02	2.06	4.01	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.05	115	184.39	3.78	2.05	4.04	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.35	116	178.86	3.01	1.68	4.07	sand to silty sand	60-70	36-38	43	UNDEFINED
35.65	117	166.93	4.09	2.45	4.10	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
35.95	118	293.52	6.35	2.16	4.13	sand to silty sand	70-80	38-40	>50	UNDEFINED
36.25	119	203.09	2.92	1.44	4.16	sand to silty sand	60-70	36-38	49	UNDEFINED
36.55	120	89.66	2.95	3.29	4.18	sandy silt to clayey silt	UNDFND	UNDFD	34	5.5
36.85	121	284.22	2.34	0.82	4.21	sand	70-80	38-40	>50	UNDEFINED
37.15	122	36.08	1.23	3.42	4.24	clayey silt to silty clay	UNDFND	UNDFD	17	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-21d

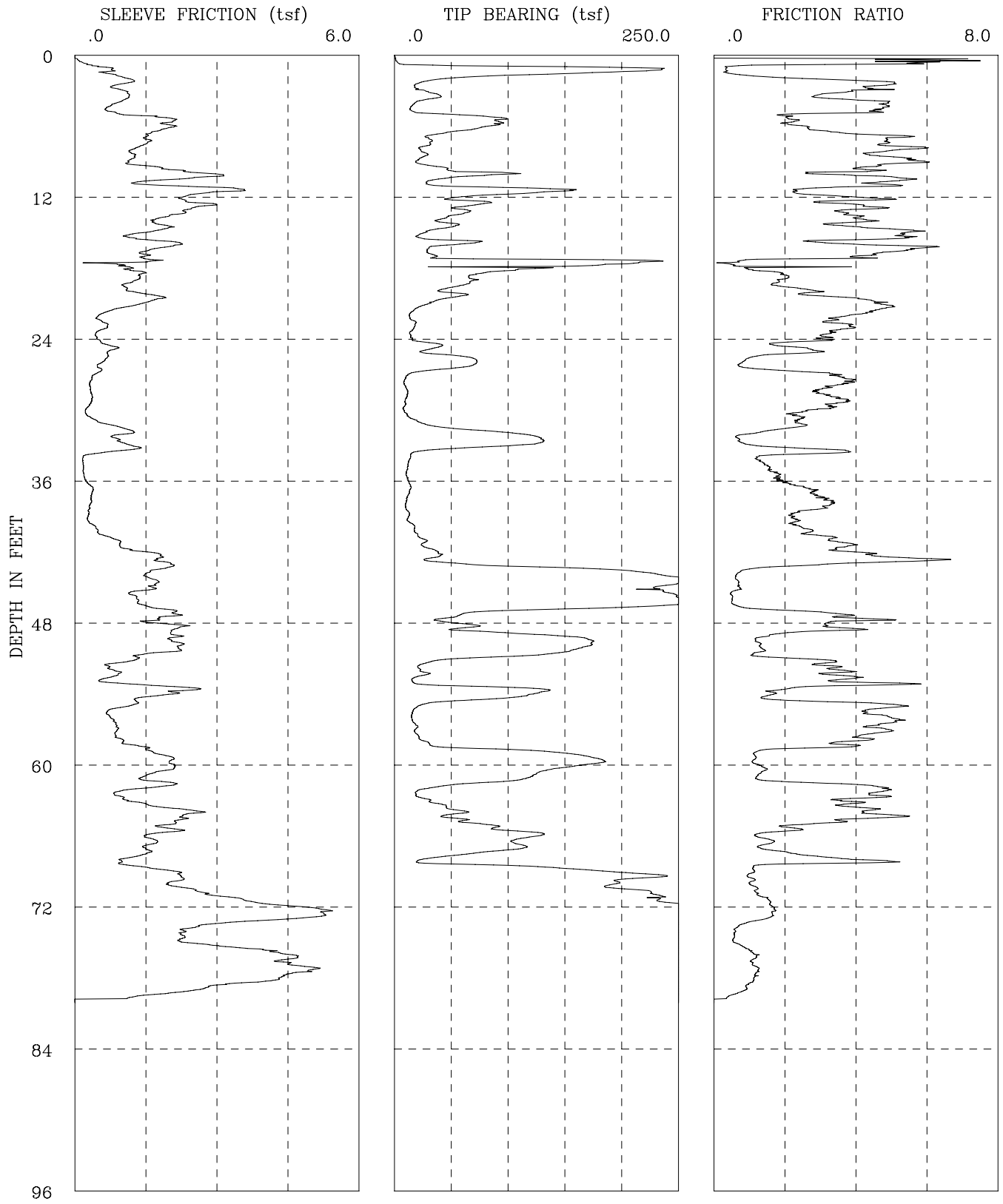
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
37.45	123	101.45	3.10	3.05	4.27	sandy silt to clayey silt	UNDFND	UNDFD	39	6.2
37.75	124	194.66	3.85	1.98	4.30	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.05	125	83.68	4.24	5.07	4.33	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
38.40	126	220.43	4.73	2.14	4.36	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
38.70	127	46.37	1.29	2.78	4.39	sandy silt to clayey silt	UNDFND	UNDFD	18	2.5
39.00	128	205.41	4.99	2.43	4.42	silty sand to sandy silt	60-70	36-38	>50	UNDEFINED
39.35	129	242.22	5.49	2.27	4.45	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
39.65	130	78.54	4.06	5.17	4.48	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
39.95	131	98.93	3.91	3.96	4.50	clayey silt to silty clay	UNDFND	UNDFD	47	6.0
40.25	132	241.09	5.40	2.24	4.53	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
40.55	133	283.46	6.92	2.44	4.56	silty sand to sandy silt	70-80	38-40	>50	UNDEFINED
40.85	134	243.92	6.92	2.84	4.59	silty sand to sandy silt	70-80	36-38	>50	UNDEFINED
41.15	135	99.59	2.95	2.96	4.62	sandy silt to clayey silt	UNDFND	UNDFD	38	6.1
41.45	136	48.78	1.29	2.65	4.65	sandy silt to clayey silt	UNDFND	UNDFD	19	2.7
41.75	137	46.78	1.61	3.44	4.67	clayey silt to silty clay	UNDFND	UNDFD	22	2.5
42.05	138	37.42	1.22	3.27	4.70	clayey silt to silty clay	UNDFND	UNDFD	18	1.9
42.35	139	41.42	1.36	3.29	4.73	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
42.65	140	56.91	1.74	3.07	4.76	sandy silt to clayey silt	UNDFND	UNDFD	22	3.2
42.95	141	53.32	1.97	3.70	4.79	clayey silt to silty clay	UNDFND	UNDFD	26	2.9
43.25	142	121.91	5.49	4.51	4.82	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.55	143	62.84	3.38	5.37	4.84	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
43.85	144	44.82	1.97	4.39	4.87	silty clay to clay	UNDFND	UNDFD	29	2.4
44.15	145	47.98	1.57	3.26	4.90	clayey silt to silty clay	UNDFND	UNDFD	23	2.6
44.45	146	39.48	1.21	3.06	4.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.0
44.80	147	42.47	1.55	3.65	4.96	clayey silt to silty clay	UNDFND	UNDFD	20	2.2
45.10	148	49.22	1.82	3.70	4.99	clayey silt to silty clay	UNDFND	UNDFD	24	2.6
45.40	149	61.08	2.67	4.37	5.02	clayey silt to silty clay	UNDFND	UNDFD	29	3.4
45.75	150	144.76	2.88	1.99	5.05	silty sand to sandy silt	50-60	34-36	46	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-21e



CPT-08-018	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-30a

GROUP DELTA CONSULTANTS

Engineer : Nava
On Site Loc: CPT-08-018
Job No. : I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/24/2008
Cone Used : 30 ton
Water table (feet) : 24.93438

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	34.20	0.21	0.60	0.03	silty sand to sandy silt	80-90	>48	11	UNDEFINED
0.60	2	143.63	0.87	0.60	0.09	sand	>90	>48	28	UNDEFINED
0.95	3	23.57	1.01	4.29	0.15	silty clay to clay	UNDFND	UNDFD	15	1.5
1.25	4	29.47	1.03	3.50	0.22	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
1.55	5	27.04	0.84	3.10	0.28	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
1.85	6	90.35	2.00	2.21	0.33	silty sand to sandy silt	70-80	44-46	29	UNDEFINED
2.15	7	43.26	1.62	3.75	0.39	clayey silt to silty clay	UNDFND	UNDFD	21	2.8
2.45	8	27.60	1.40	5.08	0.45	clay	UNDFND	UNDFD	26	1.8
2.75	9	24.03	1.20	5.01	0.51	clay	UNDFND	UNDFD	23	1.5
3.05	10	53.84	1.98	3.67	0.57	clayey silt to silty clay	UNDFND	UNDFD	26	3.5
3.35	11	41.97	2.01	4.79	0.63	silty clay to clay	UNDFND	UNDFD	27	2.7
3.65	12	107.15	2.89	2.70	0.69	sandy silt to clayey silt	UNDFND	UNDFD	41	7.0
3.95	13	64.06	2.54	3.96	0.75	clayey silt to silty clay	UNDFND	UNDFD	31	4.2
4.25	14	52.47	2.01	3.82	0.81	clayey silt to silty clay	UNDFND	UNDFD	25	3.4
4.55	15	42.78	1.78	4.17	0.87	silty clay to clay	UNDFND	UNDFD	27	2.7
4.85	16	40.48	1.54	3.81	0.93	clayey silt to silty clay	UNDFND	UNDFD	19	2.6
5.15	17	32.34	1.67	5.16	0.98	clay	UNDFND	UNDFD	31	2.0
5.45	18	131.32	1.15	0.88	1.04	sand to silty sand	70-80	40-42	31	UNDEFINED
5.75	19	82.62	1.32	1.60	1.10	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
6.05	20	56.77	1.12	1.97	1.16	silty sand to sandy silt	40-50	36-38	18	UNDEFINED
6.40	21	45.10	1.58	3.51	1.23	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
6.70	22	17.45	0.80	4.59	1.29	clay	UNDFND	UNDFD	17	1.0
7.00	23	16.61	0.59	3.56	1.35	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	15.17	0.49	3.22	1.41	silty clay to clay	UNDFND	UNDFD	10	.9
7.65	25	32.55	0.73	2.23	1.48	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
7.95	26	63.89	0.63	0.99	1.51	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
8.25	27	34.16	0.48	1.41	1.54	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
8.55	28	9.16	0.33	3.60	1.57	clay	UNDFND	UNDFD	9	.5
8.85	29	10.94	0.35	3.16	1.60	silty clay to clay	UNDFND	UNDFD	7	.6
9.15	30	8.79	0.29	3.28	1.63	clay	UNDFND	UNDFD	8	.4
9.45	31	14.47	0.34	2.35	1.66	clayey silt to silty clay	UNDFND	UNDFD	7	.8
9.75	32	63.14	1.01	1.60	1.68	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
10.05	33	123.84	0.96	0.77	1.71	sand to silty sand	60-70	38-40	30	UNDEFINED
10.35	34	29.30	0.72	2.46	1.74	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
10.65	35	12.23	0.17	1.39	1.77	clayey silt to silty clay	UNDFND	UNDFD	6	.6
10.95	36	10.97	0.19	1.78	1.80	clayey silt to silty clay	UNDFND	UNDFD	5	.5
11.25	37	13.57	0.34	2.48	1.83	clayey silt to silty clay	UNDFND	UNDFD	7	.7
11.55	38	11.15	0.34	3.06	1.85	silty clay to clay	UNDFND	UNDFD	7	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

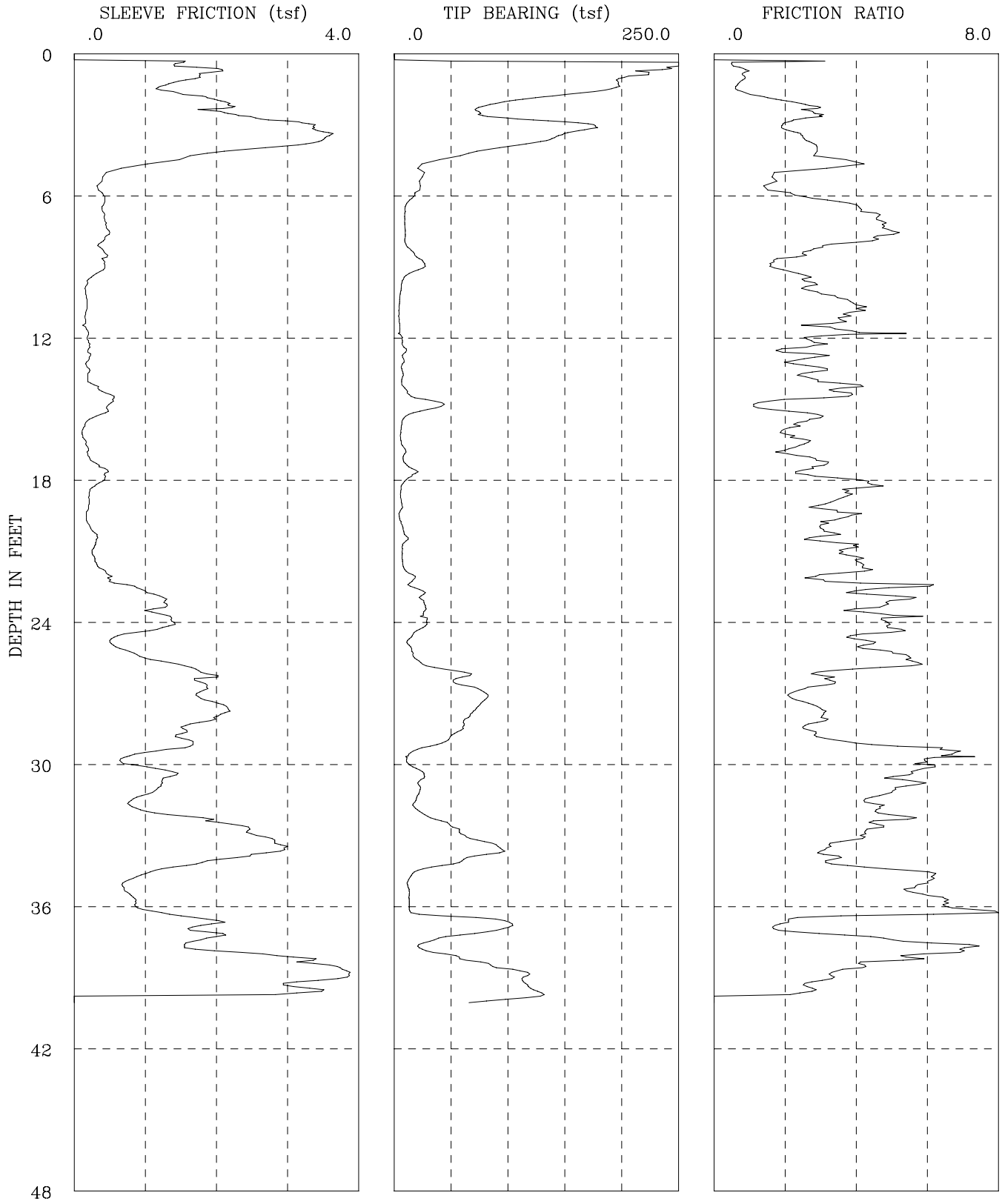
Figure A-30b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	11.41	0.30	2.59	1.88	silty clay to clay	UNDFND	UNDFD	7	.6
12.15	40	14.09	0.32	2.30	1.91	clayey silt to silty clay	UNDFND	UNDFD	7	.7
12.45	41	19.93	0.58	2.93	1.94	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
12.80	42	29.89	1.08	3.61	1.97	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
13.10	43	39.71	1.84	4.62	2.00	silty clay to clay	UNDFND	UNDFD	25	2.4
13.40	44	184.43	1.72	0.93	2.03	sand	70-80	40-42	35	UNDEFINED
13.75	45	246.32	1.67	0.68	2.06	sand	80-90	40-42	47	UNDEFINED
14.05	46	248.95	1.27	0.51	2.09	sand	80-90	40-42	48	UNDEFINED
14.35	47	179.26	1.70	0.95	2.12	sand	70-80	40-42	34	UNDEFINED
14.65	48	50.24	1.86	3.70	2.15	clayey silt to silty clay	UNDFND	UNDFD	24	3.1
14.95	49	86.89	2.16	2.48	2.18	sandy silt to clayey silt	UNDFND	UNDFD	33	5.5
15.25	50	170.53	2.13	1.25	2.20	sand to silty sand	70-80	38-40	41	UNDEFINED
15.55	51	120.37	1.66	1.38	2.23	sand to silty sand	60-70	38-40	29	UNDEFINED
15.85	52	25.18	0.84	3.33	2.26	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
16.15	53	20.83	0.75	3.59	2.29	silty clay to clay	UNDFND	UNDFD	13	1.1
16.45	54	98.30	2.05	2.09	2.32	silty sand to sandy silt	50-60	36-38	31	UNDEFINED
16.75	55	64.17	1.36	2.12	2.35	silty sand to sandy silt	40-50	32-34	20	UNDEFINED
17.05	56	16.41	0.75	4.58	2.37	clay	UNDFND	UNDFD	16	.8
17.35	57	17.88	0.86	4.79	2.40	clay	UNDFND	UNDFD	17	.9
17.65	58	20.50	0.90	4.41	2.43	clay	UNDFND	UNDFD	20	1.1
17.95	59	68.80	1.37	1.99	2.46	silty sand to sandy silt	40-50	34-36	22	UNDEFINED
18.25	60	174.08	1.98	1.14	2.49	sand to silty sand	60-70	38-40	42	UNDEFINED
18.55	61	137.10	1.86	1.36	2.52	sand to silty sand	60-70	38-40	33	UNDEFINED
18.85	62	81.50	1.74	2.13	2.54	silty sand to sandy silt	40-50	34-36	26	UNDEFINED
19.20	63	23.19	1.01	4.34	2.57	silty clay to clay	UNDFND	UNDFD	15	1.2
19.50	64	47.92	1.98	4.12	2.61	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
19.80	65	56.83	2.24	3.93	2.63	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
20.15	66	108.78	1.79	1.64	2.66	silty sand to sandy silt	50-60	36-38	35	UNDEFINED
20.45	67	108.99	1.60	1.46	2.69	sand to silty sand	50-60	36-38	26	UNDEFINED
20.75	68	51.06	1.30	2.55	2.72	sandy silt to clayey silt	UNDFND	UNDFD	20	3.1
21.05	69	123.78	1.54	1.24	2.75	sand to silty sand	50-60	36-38	30	UNDEFINED
21.35	70	211.00	2.16	1.02	2.78	sand	70-80	38-40	40	UNDEFINED
21.65	71	212.96	2.55	1.20	2.81	sand	70-80	38-40	41	UNDEFINED
21.95	72	251.25	3.99	1.59	2.84	sand to silty sand	70-80	40-42	>50	UNDEFINED
22.25	73	315.52	5.12	1.62	2.86	sand to silty sand	80-90	40-42	>50	UNDEFINED
22.55	74	367.51	2.81	0.77	2.89	sand	80-90	42-44	>50	UNDEFINED
22.85	75	401.60	2.25	0.56	2.92	gravelly sand to sand	>90	42-44	>50	UNDEFINED
23.15	76	395.11	3.65	0.92	2.95	sand	>90	42-44	>50	UNDEFINED
23.45	77	408.09	4.54	1.11	2.98	sand	>90	42-44	>50	UNDEFINED
23.75	78	393.78	4.74	1.20	3.01	sand	>90	42-44	>50	UNDEFINED
24.05	79	337.28	3.40	1.01	3.03	sand	80-90	40-42	>50	UNDEFINED
24.35	80	309.14	1.42	0.46	3.06	gravelly sand to sand	80-90	40-42	49	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-30c



CPT-08-113	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-44a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-113
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	183.30	1.43	0.78	0.03	sand	>90	>48	35	UNDEFINED
0.60	2	164.79	1.54	0.93	0.09	sand	>90	>48	32	UNDEFINED
0.95	3	112.11	2.60	2.32	0.15	silty sand to sandy silt	>90	>48	36	UNDEFINED
1.25	4	121.40	3.14	2.58	0.22	silty sand to sandy silt	>90	>48	39	UNDEFINED
1.55	5	34.19	1.03	3.01	0.28	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
1.85	6	21.04	0.38	1.79	0.33	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
2.15	7	9.87	0.42	4.21	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	9.64	0.43	4.49	0.45	clay	UNDFND	UNDFD	9	.6
2.75	9	20.86	0.42	2.01	0.51	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
3.05	10	9.04	0.22	2.47	0.57	silty clay to clay	UNDFND	UNDFD	6	.5
3.35	11	4.55	0.17	3.78	0.61	clay	UNDFND	UNDFD	4	.2
3.65	12	4.98	0.17	3.36	0.64	clay	UNDFND	UNDFD	5	.2
3.95	13	8.38	0.20	2.44	0.67	silty clay to clay	UNDFND	UNDFD	5	.5
4.25	14	6.96	0.20	2.91	0.69	clay	UNDFND	UNDFD	7	.4
4.55	15	24.18	0.46	1.92	0.72	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
4.85	16	10.00	0.24	2.39	0.75	silty clay to clay	UNDFND	UNDFD	6	.6
5.15	17	7.35	0.16	2.24	0.78	silty clay to clay	UNDFND	UNDFD	5	.4
5.45	18	12.93	0.36	2.78	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	6.51	0.26	3.94	0.84	clay	UNDFND	UNDFD	6	.3
6.05	20	5.71	0.19	3.26	0.86	clay	UNDFND	UNDFD	5	.3
6.40	21	8.61	0.28	3.25	0.89	clay	UNDFND	UNDFD	8	.4
6.70	22	9.29	0.35	3.78	0.93	clay	UNDFND	UNDFD	9	.5
7.00	23	19.80	0.87	4.39	0.95	clay	UNDFND	UNDFD	19	1.2
7.35	24	27.14	1.28	4.70	0.98	clay	UNDFND	UNDFD	26	1.7
7.65	25	15.73	0.71	4.50	1.02	clay	UNDFND	UNDFD	15	.9
7.95	26	29.18	1.29	4.42	1.04	silty clay to clay	UNDFND	UNDFD	19	1.8
8.25	27	67.36	1.82	2.70	1.07	sandy silt to clayey silt	UNDFND	UNDFD	26	4.3
8.55	28	71.83	2.03	2.82	1.10	sandy silt to clayey silt	UNDFND	UNDFD	28	4.6
8.85	29	54.36	1.59	2.92	1.13	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
9.15	30	17.22	1.01	5.86	1.16	clay	UNDFND	UNDFD	16	1.0
9.45	31	23.25	1.26	5.44	1.19	clay	UNDFND	UNDFD	22	1.4
9.75	32	19.83	0.91	4.61	1.21	clay	UNDFND	UNDFD	19	1.1
10.05	33	47.15	2.16	4.59	1.24	silty clay to clay	UNDFND	UNDFD	30	3.0
10.35	34	80.64	2.70	3.35	1.27	sandy silt to clayey silt	UNDFND	UNDFD	31	5.2
10.65	35	26.66	1.17	4.39	1.30	silty clay to clay	UNDFND	UNDFD	17	1.6
10.95	36	12.95	0.78	6.03	1.33	clay	UNDFND	UNDFD	12	.7
11.25	37	63.62	1.54	2.43	1.36	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
11.55	38	40.09	1.83	4.56	1.38	silty clay to clay	UNDFND	UNDFD	26	2.5
11.85	39	85.57	3.50	4.09	1.41	clayey silt to silty clay	UNDFND	UNDFD	41	5.5
12.15	40	118.55	2.69	2.27	1.44	silty sand to sandy silt	60-70	40-42	38	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

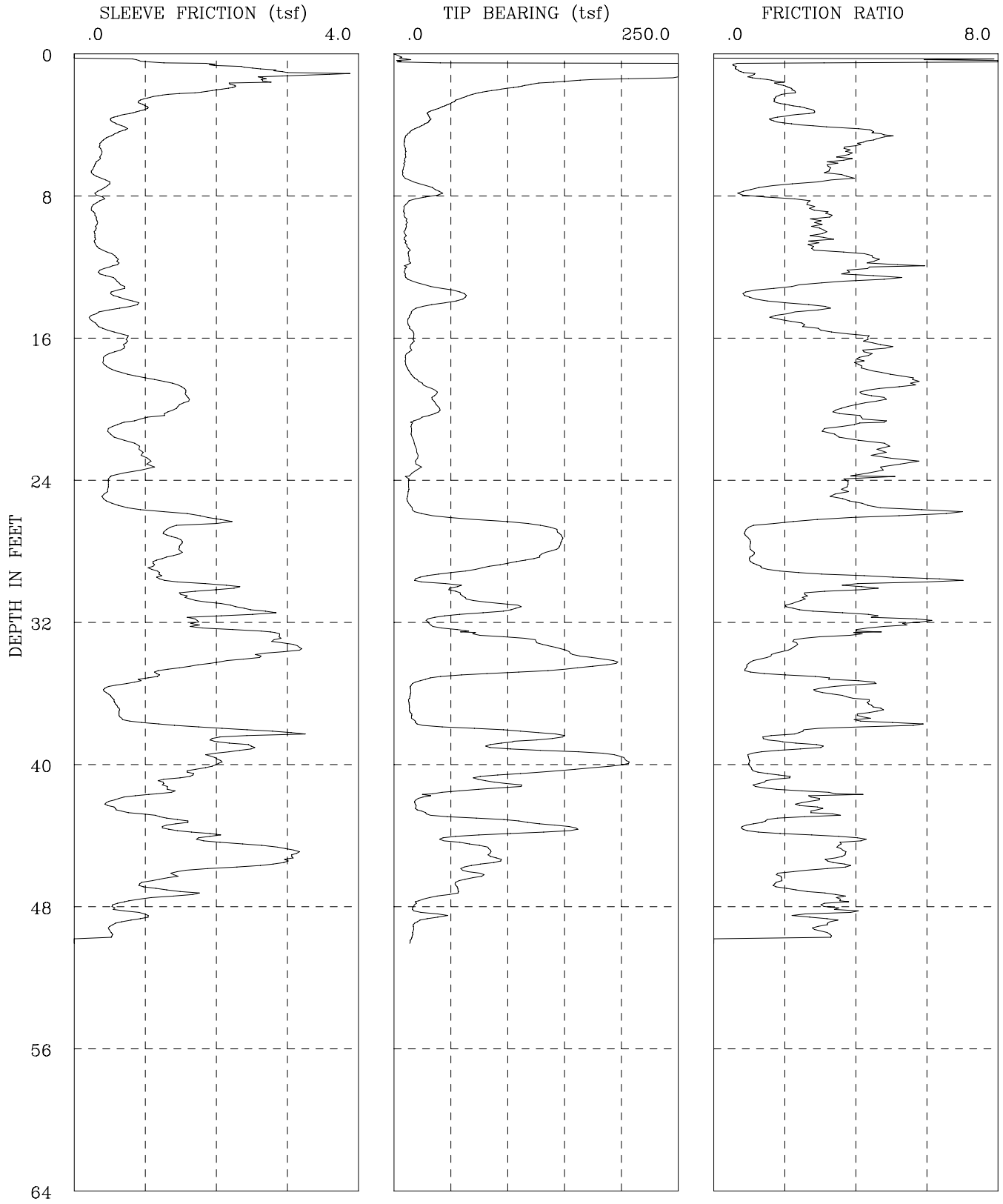
Figure A-44b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	117.56	2.39	2.04	1.41	silty sand to sandy silt	60-70	40-42	38	UNDEFINED
12.15	40	168.09	2.14	1.27	1.44	sand to silty sand	70-80	40-42	40	UNDEFINED
12.45	41	128.61	1.65	1.28	1.47	sand to silty sand	60-70	40-42	31	UNDEFINED
12.80	42	59.33	1.08	1.83	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	28.77	0.75	2.61	1.53	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
13.40	44	124.55	1.55	1.24	1.56	sand to silty sand	60-70	40-42	30	UNDEFINED
13.75	45	69.32	2.57	3.70	1.59	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
14.05	46	75.76	2.35	3.11	1.62	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
14.35	47	60.75	1.17	1.92	1.65	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
14.65	48	28.44	0.97	3.42	1.68	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.95	49	26.01	0.79	3.02	1.70	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
15.25	50	15.82	0.34	2.16	1.73	clayey silt to silty clay	UNDFND	UNDFD	8	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-46c



CPT-08-117	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-46a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-117
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

CPT Date : 04/14/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	203.64	1.58	0.78	0.03	sand	>90	>48	39	UNDEFINED
0.60	2	180.03	2.57	1.43	0.09	sand to silty sand	>90	>48	43	UNDEFINED
0.95	3	56.05	1.15	2.05	0.15	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
1.25	4	28.63	0.64	2.25	0.22	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
1.55	5	11.39	0.51	4.47	0.28	clay	UNDFND	UNDFD	11	.7
1.85	6	9.82	0.36	3.68	0.33	clay	UNDFND	UNDFD	9	.6
2.15	7	8.76	0.30	3.39	0.39	clay	UNDFND	UNDFD	8	.5
2.45	8	31.38	0.40	1.29	0.45	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
2.75	9	10.80	0.30	2.74	0.51	silty clay to clay	UNDFND	UNDFD	7	.6
3.05	10	10.30	0.31	2.99	0.57	silty clay to clay	UNDFND	UNDFD	7	.6
3.35	11	10.74	0.31	2.87	0.61	silty clay to clay	UNDFND	UNDFD	7	.6
3.65	12	12.68	0.56	4.40	0.64	clay	UNDFND	UNDFD	12	.7
3.95	13	13.56	0.49	3.65	0.67	silty clay to clay	UNDFND	UNDFD	9	.8
4.25	14	53.61	0.66	1.23	0.69	silty sand to sandy silt	50-60	38-40	17	UNDEFINED
4.55	15	18.83	0.47	2.50	0.72	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
4.85	16	14.84	0.48	3.24	0.75	silty clay to clay	UNDFND	UNDFD	9	.9
5.15	17	14.61	0.66	4.50	0.78	clay	UNDFND	UNDFD	14	.9
5.45	18	11.04	0.47	4.22	0.81	clay	UNDFND	UNDFD	11	.6
5.75	19	23.43	1.23	5.23	0.84	clay	UNDFND	UNDFD	22	1.4
6.05	20	36.35	1.55	4.28	0.86	silty clay to clay	UNDFND	UNDFD	23	2.3
6.40	21	25.88	0.99	3.83	0.89	silty clay to clay	UNDFND	UNDFD	17	1.6
6.70	22	16.34	0.63	3.85	0.93	silty clay to clay	UNDFND	UNDFD	10	1.0
7.00	23	19.89	0.98	4.93	0.95	clay	UNDFND	UNDFD	19	1.2
7.35	24	16.25	0.74	4.52	0.98	clay	UNDFND	UNDFD	16	.9
7.65	25	12.31	0.45	3.62	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	22.54	1.12	4.97	1.04	clay	UNDFND	UNDFD	22	1.4
8.25	27	126.63	1.57	1.24	1.07	sand to silty sand	70-80	40-42	30	UNDEFINED
8.55	28	143.98	1.49	1.03	1.10	sand to silty sand	70-80	42-44	34	UNDEFINED
8.85	29	102.15	1.19	1.16	1.13	sand to silty sand	60-70	40-42	24	UNDEFINED
9.15	30	37.71	1.55	4.10	1.16	silty clay to clay	UNDFND	UNDFD	24	2.3
9.45	31	69.29	1.77	2.55	1.19	sandy silt to clayey silt	UNDFND	UNDFD	27	4.4
9.75	32	62.93	2.16	3.43	1.21	clayey silt to silty clay	UNDFND	UNDFD	30	4.0
10.05	33	71.46	2.46	3.44	1.24	sandy silt to clayey silt	UNDFND	UNDFD	27	4.6
10.35	34	147.89	2.91	1.96	1.27	silty sand to sandy silt	70-80	40-42	47	UNDEFINED
10.65	35	149.13	1.58	1.06	1.30	sand to silty sand	70-80	40-42	36	UNDEFINED
10.95	36	19.56	0.68	3.50	1.33	silty clay to clay	UNDFND	UNDFD	12	1.1
11.25	37	13.51	0.57	4.23	1.36	clay	UNDFND	UNDFD	13	.7
11.55	38	22.35	0.97	4.32	1.38	silty clay to clay	UNDFND	UNDFD	14	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

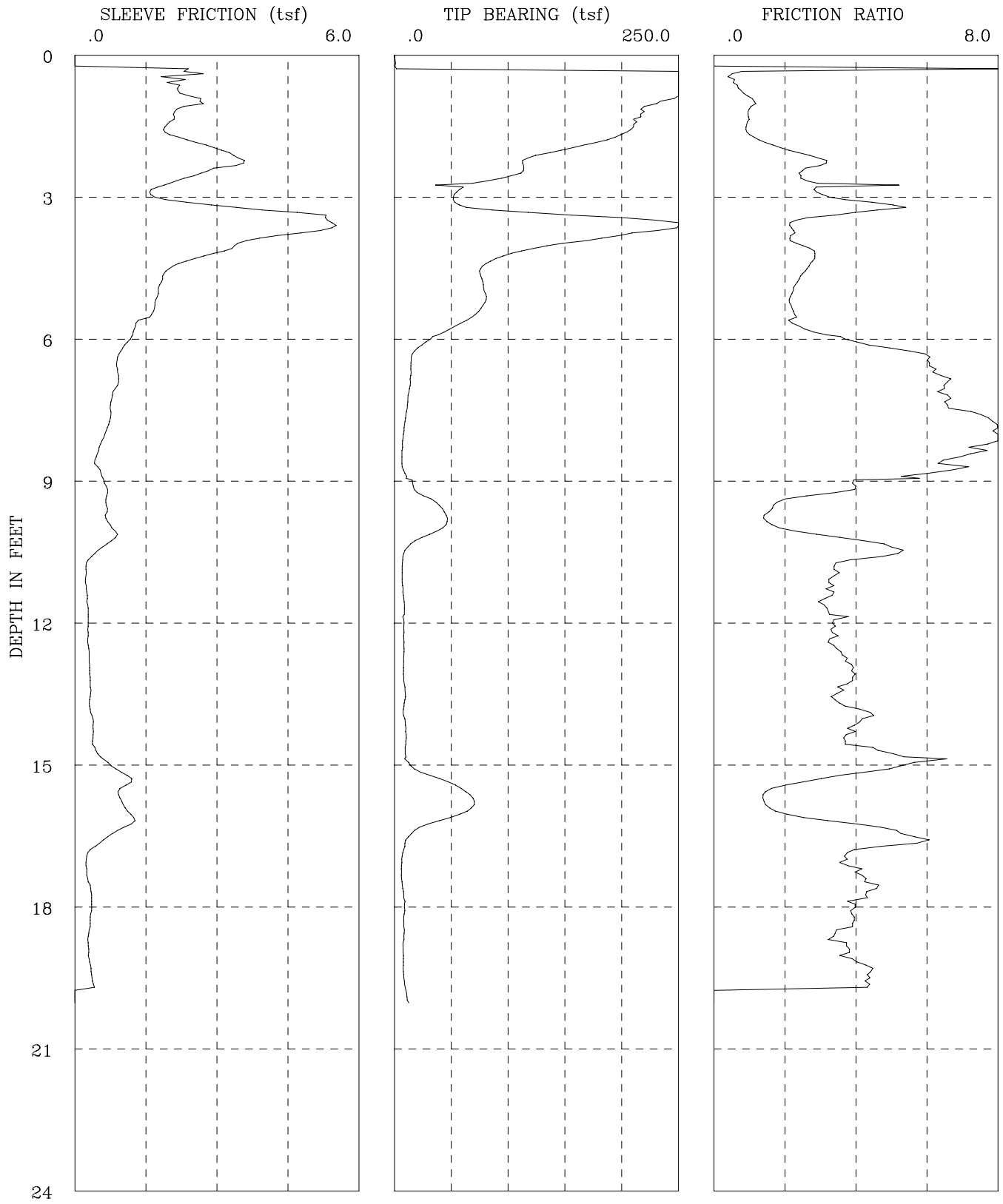
Figure A-46b

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	117.56	2.39	2.04	1.41	silty sand to sandy silt	60-70	40-42	38	UNDEFINED
12.15	40	168.09	2.14	1.27	1.44	sand to silty sand	70-80	40-42	40	UNDEFINED
12.45	41	128.61	1.65	1.28	1.47	sand to silty sand	60-70	40-42	31	UNDEFINED
12.80	42	59.33	1.08	1.83	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	28.77	0.75	2.61	1.53	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
13.40	44	124.55	1.55	1.24	1.56	sand to silty sand	60-70	40-42	30	UNDEFINED
13.75	45	69.32	2.57	3.70	1.59	clayey silt to silty clay	UNDFND	UNDFD	33	4.4
14.05	46	75.76	2.35	3.11	1.62	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
14.35	47	60.75	1.17	1.92	1.65	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
14.65	48	28.44	0.97	3.42	1.68	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.95	49	26.01	0.79	3.02	1.70	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
15.25	50	15.82	0.34	2.16	1.73	clayey silt to silty clay	UNDFND	UNDFD	8	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-46c



CPT-08-118	I-436 SR-22 Phase 2
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-47a

GROUP DELTA CONSULTANTS

Engineer :Nava
On Site Loc:CPT-08-118
Job No. :I-436
Tot. Unit Wt. (avg) : 120 pcf

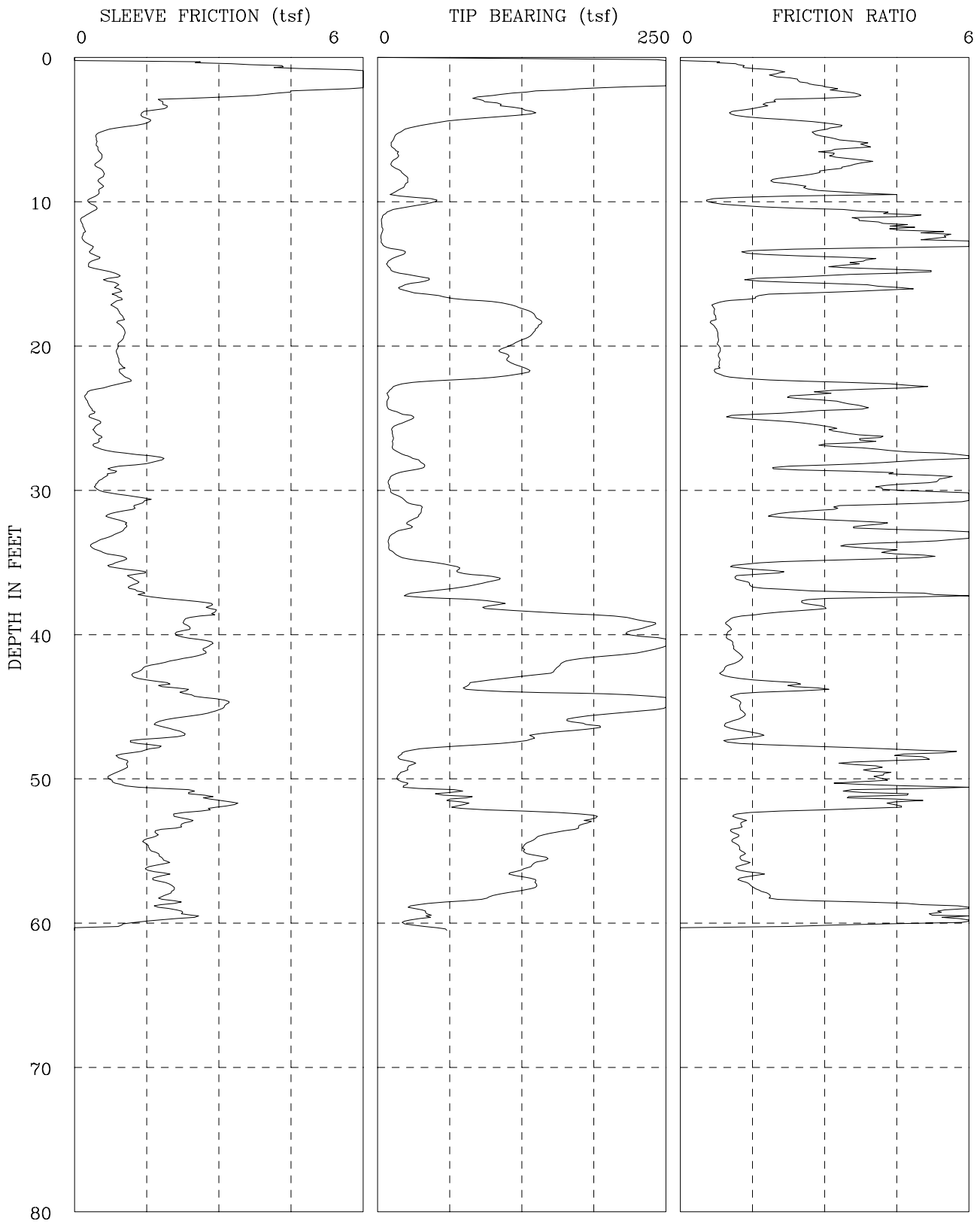
CPT Date : 04/03/2008
Cone Used : 30 ton
Water table (feet) : 9.84252

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	245.53	1.93	0.79	0.03	sand	>90	>48	47	UNDEFINED
0.60	2	197.36	2.25	1.14	0.09	sand	>90	>48	38	UNDEFINED
0.95	3	86.08	2.53	2.93	0.15	sandy silt to clayey silt	UNDFND	UNDFD	33	5.7
1.25	4	173.77	4.39	2.53	0.22	silty sand to sandy silt	>90	>48	>50	UNDEFINED
1.55	5	80.63	2.00	2.48	0.28	sandy silt to clayey silt	UNDFND	UNDFD	31	5.3
1.85	6	55.94	1.39	2.49	0.33	sandy silt to clayey silt	UNDFND	UNDFD	21	3.7
2.15	7	14.85	0.90	6.09	0.39	clay	UNDFND	UNDFD	14	.9
2.45	8	9.87	0.72	7.32	0.45	clay	UNDFND	UNDFD	9	.6
2.75	9	8.71	0.52	5.98	0.51	clay	UNDFND	UNDFD	8	.5
3.05	10	36.57	0.69	1.89	0.57	sandy silt to clayey silt	UNDFND	UNDFD	14	2.4
3.35	11	11.58	0.45	3.93	0.61	clay	UNDFND	UNDFD	11	.7
3.65	12	8.06	0.26	3.24	0.64	clay	UNDFND	UNDFD	8	.4
3.95	13	8.18	0.29	3.54	0.67	clay	UNDFND	UNDFD	8	.4
4.25	14	8.54	0.33	3.81	0.69	clay	UNDFND	UNDFD	8	.5
4.55	15	10.09	0.45	4.48	0.72	clay	UNDFND	UNDFD	10	.6
4.85	16	51.54	1.02	1.97	0.75	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
5.15	17	20.99	0.76	3.61	0.78	silty clay to clay	UNDFND	UNDFD	13	1.3
5.45	18	7.21	0.29	4.09	0.81	clay	UNDFND	UNDFD	7	.4
5.75	19	8.26	0.31	3.72	0.84	clay	UNDFND	UNDFD	8	.4
6.05	20	8.66	0.29	3.30	0.86	clay	UNDFND	UNDFD	8	.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****
→

Figure A-47b



CPT−09−122	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-58a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-122 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 6 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	300.63	3.69	1.23	0.03	sand	>90	UNDFD	>50	UNDEFINED
0.60	2	333.38	7.88	2.36	0.09	silty sand to sandy silt	>90	>48	>50	UNDEFINED
0.95	3	118.23	3.59	3.04	0.15	sandy silt to clayey silt	UNDFND	UNDFD	45	7.8
1.25	4	120.94	1.63	1.34	0.22	sand to silty sand	>90	>48	29	UNDEFINED
1.55	5	44.96	1.20	2.66	0.28	sandy silt to clayey silt	UNDFND	UNDFD	17	2.9
1.85	6	14.19	0.46	3.24	0.33	silty clay to clay	UNDFND	UNDFD	9	.9
2.15	7	16.22	0.53	3.28	0.38	silty clay to clay	UNDFND	UNDFD	10	1.0
2.45	8	15.96	0.52	3.26	0.40	silty clay to clay	UNDFND	UNDFD	10	1.0
2.75	9	24.73	0.56	2.25	0.43	sandy silt to clayey silt	UNDFND	UNDFD	9	1.6
3.05	10	28.78	0.41	1.44	0.46	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
3.35	11	17.78	0.36	2.03	0.49	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
3.65	12	3.93	0.17	4.26	0.52	clay	UNDFND	UNDFD	4	.2
3.95	13	3.50	0.21	5.85	0.55	clay	UNDFND	UNDFD	3	.1
4.25	14	16.58	0.40	2.43	0.57	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
4.55	15	11.21	0.46	4.13	0.60	clay	UNDFND	UNDFD	11	.6
4.85	16	32.39	0.83	2.56	0.63	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
5.15	17	51.45	0.91	1.76	0.66	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
5.45	18	125.99	0.89	0.70	0.69	sand	70-80	42-44	24	UNDEFINED
5.75	19	139.40	0.98	0.70	0.72	sand	80-90	42-44	27	UNDEFINED
6.05	20	127.90	1.00	0.78	0.74	sand to silty sand	70-80	42-44	31	UNDEFINED
6.40	21	110.79	0.90	0.81	0.77	sand to silty sand	70-80	42-44	27	UNDEFINED
6.70	22	123.77	0.97	0.78	0.81	sand to silty sand	70-80	42-44	30	UNDEFINED
7.00	23	43.75	0.91	2.08	0.83	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
7.35	24	8.87	0.26	2.97	0.86	silty clay to clay	UNDFND	UNDFD	6	.4
7.65	25	20.58	0.37	1.80	0.90	sandy silt to clayey silt	UNDFND	UNDFD	8	1.2
7.95	26	15.61	0.46	2.93	0.92	clayey silt to silty clay	UNDFND	UNDFD	7	.9
8.25	27	13.19	0.49	3.68	0.95	silty clay to clay	UNDFND	UNDFD	8	.7
8.55	28	26.71	1.38	5.18	0.98	clay	UNDFND	UNDFD	26	1.6
8.85	29	27.55	0.85	3.08	1.01	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
9.15	30	10.28	0.49	4.77	1.04	clay	UNDFND	UNDFD	10	.5
9.45	31	22.16	1.24	5.60	1.07	clay	UNDFND	UNDFD	21	1.3
9.75	32	36.28	0.93	2.56	1.09	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
10.05	33	23.51	1.02	4.33	1.12	silty clay to clay	UNDFND	UNDFD	15	1.4
10.35	34	10.03	0.51	5.12	1.15	clay	UNDFND	UNDFD	10	.5
10.65	35	22.08	0.81	3.65	1.18	silty clay to clay	UNDFND	UNDFD	14	1.3
10.95	36	72.46	1.07	1.48	1.21	silty sand to sandy silt	50-60	38-40	23	UNDEFINED
11.25	37	84.25	1.23	1.46	1.24	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
11.55	38	64.45	2.01	3.11	1.26	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-58b

GROUP DELTA CONSULTANTS

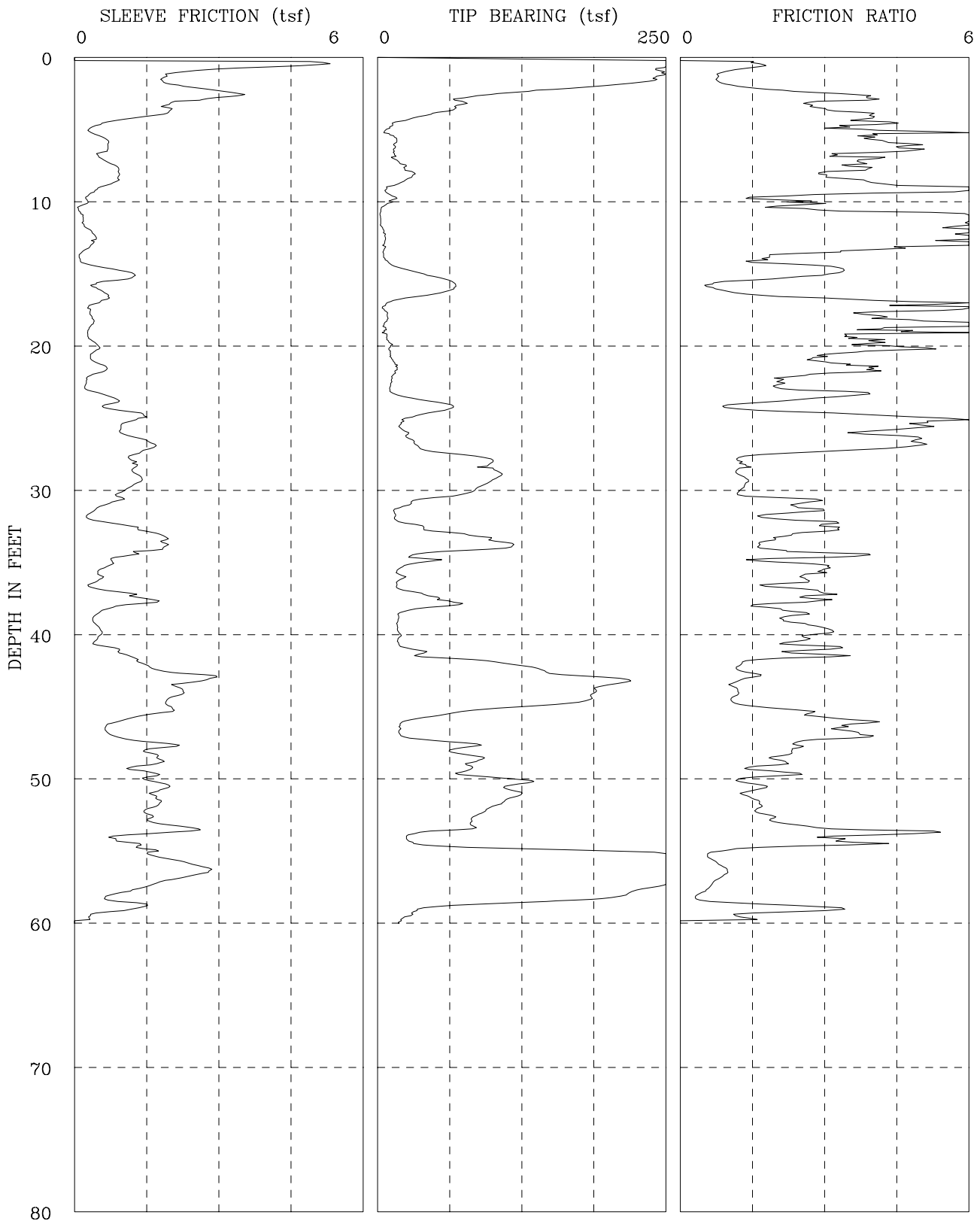
Cone Used : CPT-09-122 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 6 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	152.57	2.73	1.79	1.29	sand to silty sand	70-80	40-42	37	UNDEFINED
12.15	40	229.35	2.29	1.00	1.32	sand	80-90	42-44	44	UNDEFINED
12.45	41	248.16	2.58	1.04	1.35	sand	80-90	42-44	48	UNDEFINED
12.80	42	197.43	2.37	1.20	1.38	sand	80-90	42-44	38	UNDEFINED
13.10	43	144.25	1.34	0.93	1.41	sand to silty sand	70-80	40-42	35	UNDEFINED
13.40	44	89.26	1.96	2.19	1.44	silty sand to sandy silt	50-60	38-40	29	UNDEFINED
13.75	45	245.08	2.92	1.19	1.47	sand	80-90	42-44	47	UNDEFINED
14.05	46	188.58	2.32	1.23	1.50	sand to silty sand	70-80	40-42	45	UNDEFINED
14.35	47	163.58	2.05	1.25	1.53	sand to silty sand	70-80	40-42	39	UNDEFINED
14.65	48	81.46	1.47	1.81	1.56	silty sand to sandy silt	50-60	36-38	26	UNDEFINED
14.95	49	23.95	1.03	4.29	1.58	silty clay to clay	UNDFND	UNDFD	15	1.4
15.25	50	20.87	0.86	4.13	1.61	silty clay to clay	UNDFND	UNDFD	13	1.1
15.55	51	39.99	1.63	4.08	1.64	silty clay to clay	UNDFND	UNDFD	26	2.4
15.85	52	70.57	3.01	4.27	1.67	clayey silt to silty clay	UNDFND	UNDFD	34	4.4
16.15	53	166.93	2.34	1.40	1.70	sand to silty sand	70-80	40-42	40	UNDEFINED
16.45	54	161.55	1.90	1.18	1.73	sand to silty sand	70-80	40-42	39	UNDEFINED
16.75	55	129.81	1.52	1.17	1.75	sand to silty sand	60-70	38-40	31	UNDEFINED
17.05	56	138.07	1.81	1.31	1.78	sand to silty sand	60-70	38-40	33	UNDEFINED
17.35	57	124.87	1.68	1.34	1.81	sand to silty sand	60-70	38-40	30	UNDEFINED
17.65	58	130.24	1.98	1.52	1.84	sand to silty sand	60-70	38-40	31	UNDEFINED
17.95	59	65.56	1.88	2.87	1.87	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
18.25	60	37.36	2.10	5.63	1.90	clay	UNDFND	UNDFD	36	2.2

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-58c



CPT−09−123	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-59a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-123 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	262.01	3.26	1.24	0.03	sand	>90	>48	>50	UNDEFINED
0.60	2	230.32	1.93	0.84	0.09	sand	>90	>48	44	UNDEFINED
0.95	3	103.91	2.86	2.75	0.15	sandy silt to clayey silt	UNDFND	UNDFD	40	6.9
1.25	4	57.34	1.85	3.23	0.22	sandy silt to clayey silt	UNDFND	UNDFD	22	3.8
1.55	5	15.05	0.57	3.82	0.28	silty clay to clay	UNDFND	UNDFD	10	.9
1.85	6	13.89	0.60	4.30	0.33	clay	UNDFND	UNDFD	13	.9
2.15	7	14.40	0.59	4.10	0.39	clay	UNDFND	UNDFD	14	.9
2.45	8	24.45	0.85	3.46	0.45	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
2.75	9	20.69	0.78	3.79	0.51	silty clay to clay	UNDFND	UNDFD	13	1.3
3.05	10	11.27	0.32	2.82	0.57	silty clay to clay	UNDFND	UNDFD	7	.7
3.35	11	3.87	0.13	3.42	0.61	clay	UNDFND	UNDFD	4	.2
3.65	12	3.48	0.22	6.30	0.64	clay	UNDFND	UNDFD	3	.1
3.95	13	6.22	0.40	6.49	0.67	clay	UNDFND	UNDFD	6	.3
4.25	14	5.86	0.18	3.04	0.70	clay	UNDFND	UNDFD	6	.3
4.55	15	19.50	0.59	3.03	0.73	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
4.85	16	59.73	0.79	1.32	0.76	silty sand to sandy silt	50-60	40-42	19	UNDEFINED
5.15	17	40.18	0.62	1.54	0.78	silty sand to sandy silt	40-50	36-38	13	UNDEFINED
5.45	18	6.95	0.34	4.84	0.81	clay	UNDFND	UNDFD	7	.3
5.75	19	7.30	0.36	4.87	0.84	clay	UNDFND	UNDFD	7	.4
6.05	20	8.60	0.33	3.89	0.87	clay	UNDFND	UNDFD	8	.4
6.40	21	11.49	0.41	3.55	0.90	silty clay to clay	UNDFND	UNDFD	7	.6
6.70	22	15.86	0.55	3.48	0.93	silty clay to clay	UNDFND	UNDFD	10	.9
7.00	23	11.63	0.24	2.10	0.96	clayey silt to silty clay	UNDFND	UNDFD	6	.6
7.35	24	34.25	0.69	2.01	0.99	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
7.65	25	42.78	1.17	2.74	1.02	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
7.95	26	22.01	0.99	4.51	1.05	clay	UNDFND	UNDFD	21	1.3
8.25	27	31.10	1.49	4.80	1.08	clay	UNDFND	UNDFD	30	1.9
8.55	28	78.10	1.26	1.61	1.11	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
8.85	29	100.70	1.28	1.27	1.13	sand to silty sand	60-70	40-42	24	UNDEFINED
9.15	30	92.46	1.23	1.34	1.16	sand to silty sand	60-70	40-42	22	UNDEFINED
9.45	31	47.10	0.85	1.81	1.19	silty sand to sandy silt	40-50	36-38	15	UNDEFINED
9.75	32	15.78	0.35	2.24	1.22	clayey silt to silty clay	UNDFND	UNDFD	8	.9
10.05	33	40.21	1.17	2.91	1.25	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
10.35	34	103.76	1.88	1.81	1.28	silty sand to sandy silt	60-70	40-42	33	UNDEFINED
10.65	35	47.48	1.12	2.35	1.30	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
10.95	36	20.97	0.59	2.83	1.33	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
11.25	37	18.72	0.45	2.41	1.36	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
11.55	38	52.94	1.35	2.56	1.39	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-59b

GROUP DELTA CONSULTANTS

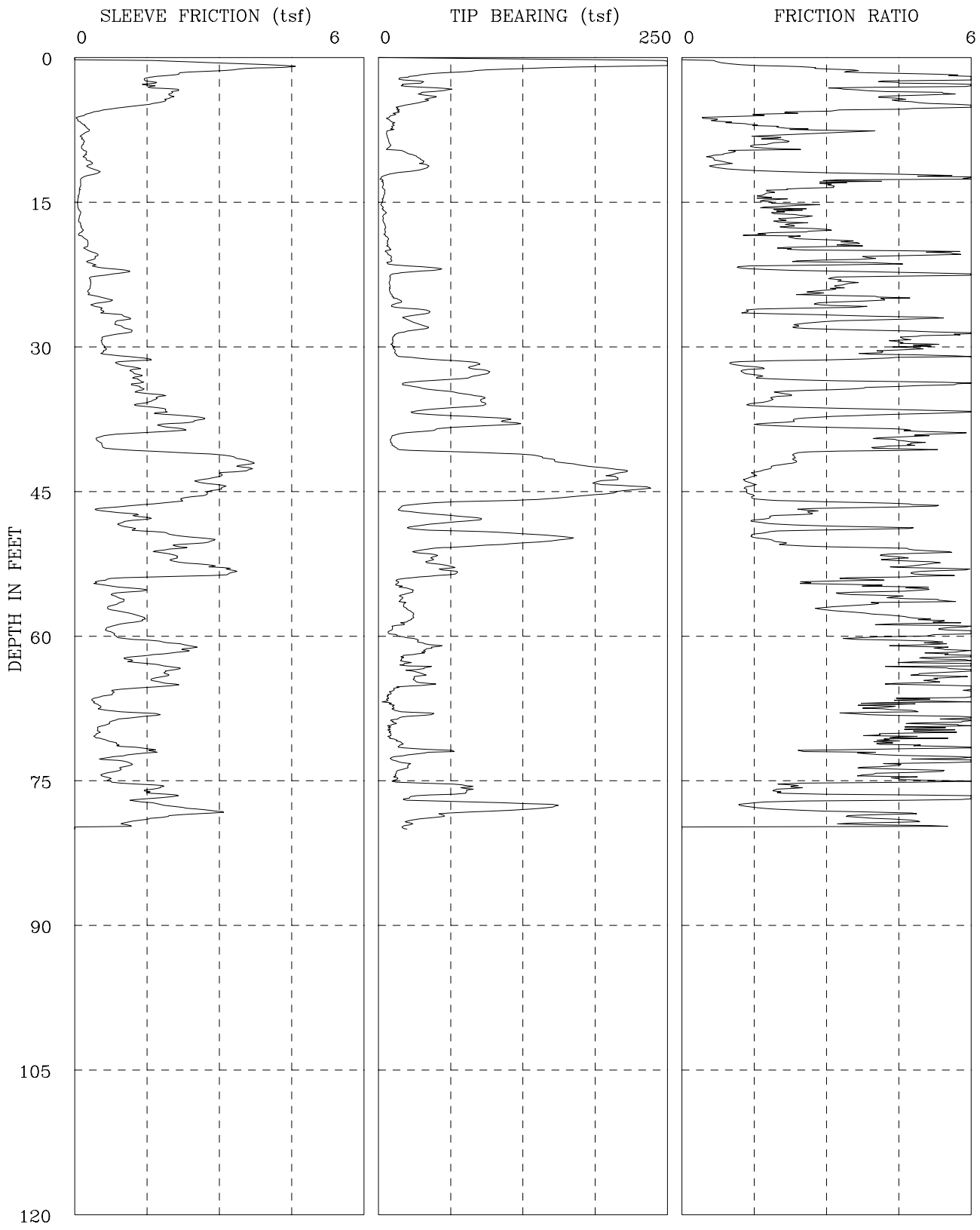
Cone Used : CPT-09-123 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	27.18	0.55	2.03	1.42	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
12.15	40	17.56	0.49	2.78	1.44	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
12.45	41	19.04	0.50	2.64	1.47	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
12.80	42	60.28	1.15	1.90	1.50	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.10	43	153.97	2.13	1.38	1.53	sand to silty sand	70-80	40-42	37	UNDEFINED
13.40	44	200.31	2.30	1.15	1.56	sand	80-90	42-44	38	UNDEFINED
13.75	45	162.06	2.01	1.24	1.59	sand to silty sand	70-80	40-42	39	UNDEFINED
14.05	46	46.94	1.37	2.92	1.62	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
14.35	47	19.82	0.71	3.58	1.65	silty clay to clay	UNDFND	UNDFD	13	1.1
14.65	48	66.02	1.62	2.45	1.68	sandy silt to clayey silt	UNDFND	UNDFD	25	4.2
14.95	49	81.73	1.70	2.08	1.71	silty sand to sandy silt	50-60	36-38	26	UNDEFINED
15.25	50	87.80	1.45	1.65	1.74	silty sand to sandy silt	50-60	36-38	28	UNDEFINED
15.55	51	120.61	1.78	1.48	1.77	sand to silty sand	60-70	38-40	29	UNDEFINED
15.85	52	108.83	1.71	1.58	1.79	silty sand to sandy silt	60-70	38-40	35	UNDEFINED
16.15	53	86.06	1.54	1.79	1.82	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
16.45	54	57.04	1.88	3.30	1.85	clayey silt to silty clay	UNDFND	UNDFD	27	3.5
16.75	55	69.56	1.24	1.78	1.88	silty sand to sandy silt	40-50	36-38	22	UNDEFINED
17.05	56	294.65	1.97	0.67	1.91	sand	80-90	42-44	>50	UNDEFINED
17.35	57	281.62	2.57	0.91	1.94	sand	80-90	42-44	>50	UNDEFINED
17.65	58	238.51	1.42	0.59	1.96	sand	80-90	40-42	46	UNDEFINED
17.95	59	138.18	1.03	0.74	1.99	sand	60-70	38-40	26	UNDEFINED
18.25	60	26.74	0.46	1.74	2.02	sandy silt to clayey silt	UNDFND	UNDFD	10	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-59c



CPT−09−124	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-60a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-124 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	256.05	2.78	1.08	0.03	sand	>90	>48	49	UNDEFINED
0.60	2	67.72	2.54	3.75	0.09	clayey silt to silty clay	UNDFND	UNDFD	32	4.5
0.95	3	28.75	1.54	5.35	0.15	clay	UNDFND	UNDFD	28	1.9
1.25	4	47.18	2.04	4.32	0.22	silty clay to clay	UNDFND	UNDFD	30	3.1
1.55	5	33.14	1.65	4.97	0.28	clay	UNDFND	UNDFD	32	2.1
1.85	6	15.10	0.45	2.99	0.33	clayey silt to silty clay	UNDFND	UNDFD	7	.9
2.15	7	11.14	0.11	0.99	0.39	sandy silt to clayey silt	UNDFND	UNDFD	4	.7
2.45	8	9.24	0.24	2.57	0.45	silty clay to clay	UNDFND	UNDFD	6	.5
2.75	9	8.94	0.17	1.89	0.51	clayey silt to silty clay	UNDFND	UNDFD	4	.5
3.05	10	16.29	0.19	1.17	0.57	sandy silt to clayey silt	UNDFND	UNDFD	6	1.0
3.35	11	35.79	0.27	0.75	0.61	silty sand to sandy silt	40-50	38-40	11	UNDEFINED
3.65	12	34.13	0.38	1.13	0.64	silty sand to sandy silt	40-50	36-38	11	UNDEFINED
3.95	13	4.00	0.18	4.62	0.67	clay	UNDFND	UNDFD	4	.2
4.25	14	4.55	0.11	2.44	0.70	clay	UNDFND	UNDFD	4	.2
4.55	15	4.44	0.08	1.72	0.73	sensitive fine grained	UNDFND	UNDFD	2	.2
4.85	16	3.67	0.07	1.99	0.76	clay	UNDFND	UNDFD	4	.1
5.15	17	4.72	0.10	2.18	0.78	undefined	UNDFND	UNDFD	UDF	UNDEFINED
5.45	18	5.53	0.13	2.40	0.81	silty clay to clay	UNDFND	UNDFD	4	.2
5.75	19	6.75	0.15	2.29	0.84	silty clay to clay	UNDFND	UNDFD	4	.3
6.05	20	8.35	0.26	3.06	0.87	silty clay to clay	UNDFND	UNDFD	5	.4
6.40	21	9.46	0.40	4.22	0.90	clay	UNDFND	UNDFD	9	.5
6.70	22	27.75	0.49	1.77	0.93	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
7.00	23	16.71	0.67	4.04	0.96	silty clay to clay	UNDFND	UNDFD	11	1.0
7.35	24	9.85	0.32	3.25	0.99	silty clay to clay	UNDFND	UNDFD	6	.5
7.65	25	12.54	0.45	3.60	1.02	silty clay to clay	UNDFND	UNDFD	8	.7
7.95	26	18.87	0.52	2.73	1.05	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
8.25	27	33.87	0.86	2.54	1.08	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
8.55	28	34.93	0.92	2.64	1.11	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
8.85	29	19.65	0.93	4.71	1.13	clay	UNDFND	UNDFD	19	1.1
9.15	30	12.61	0.58	4.60	1.16	clay	UNDFND	UNDFD	12	.7
9.45	31	15.02	0.72	4.78	1.19	clay	UNDFND	UNDFD	14	.8
9.75	32	68.54	1.16	1.69	1.22	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
10.05	33	88.84	1.26	1.42	1.25	silty sand to sandy silt	60-70	38-40	28	UNDEFINED
10.35	34	45.90	1.30	2.82	1.28	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
10.65	35	53.76	1.43	2.67	1.30	sandy silt to clayey silt	UNDFND	UNDFD	21	3.4
10.95	36	89.96	1.60	1.78	1.33	silty sand to sandy silt	50-60	38-40	29	UNDEFINED
11.25	37	51.28	1.71	3.33	1.36	clayey silt to silty clay	UNDFND	UNDFD	25	3.2
11.55	38	97.30	2.43	2.50	1.39	silty sand to sandy silt	60-70	38-40	31	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-60b

GROUP DELTA CONSULTANTS

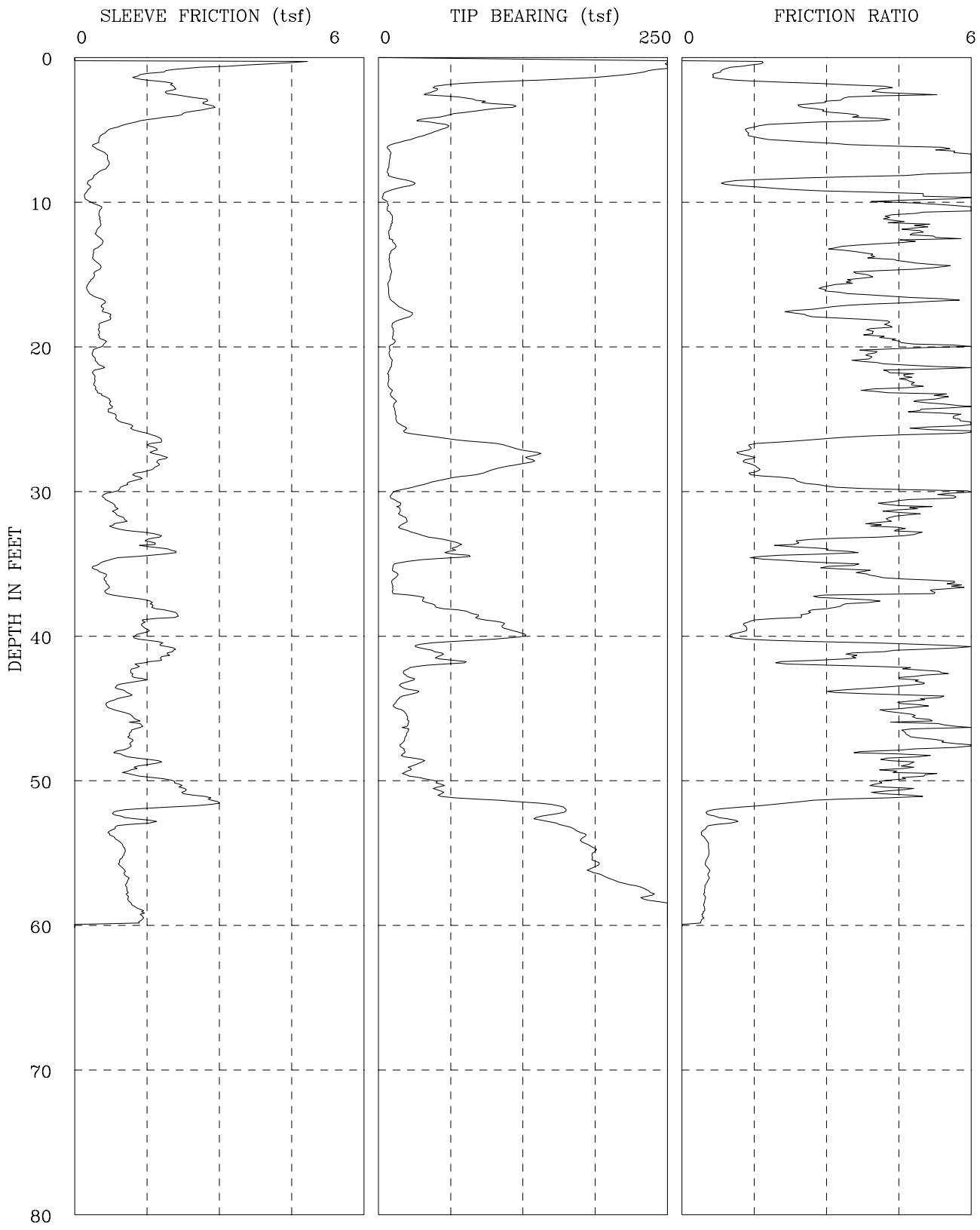
Cone Used : CPT-09-124 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	62.99	1.91	3.03	1.42	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
12.15	40	12.08	0.57	4.75	1.44	clay	UNDFND	UNDFD	12	.6
12.45	41	21.59	0.84	3.88	1.47	silty clay to clay	UNDFND	UNDFD	14	1.2
12.80	42	138.59	3.24	2.34	1.50	silty sand to sandy silt	70-80	40-42	44	UNDEFINED
13.10	43	194.74	3.50	1.80	1.53	sand to silty sand	70-80	42-44	47	UNDEFINED
13.40	44	201.43	2.83	1.40	1.56	sand to silty sand	80-90	42-44	48	UNDEFINED
13.75	45	210.44	2.91	1.38	1.59	sand to silty sand	80-90	42-44	>50	UNDEFINED
14.05	46	141.79	2.37	1.67	1.62	sand to silty sand	60-70	40-42	34	UNDEFINED
14.35	47	23.93	0.92	3.83	1.65	silty clay to clay	UNDFND	UNDFD	15	1.4
14.65	48	69.22	1.29	1.86	1.68	silty sand to sandy silt	40-50	36-38	22	UNDEFINED
14.95	49	42.18	1.09	2.58	1.71	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
15.25	50	142.70	2.31	1.62	1.74	sand to silty sand	60-70	40-42	34	UNDEFINED
15.55	51	89.45	2.31	2.59	1.77	sandy silt to clayey silt	UNDFND	UNDFD	34	5.7
15.85	52	42.82	1.96	4.57	1.79	silty clay to clay	UNDFND	UNDFD	27	2.6
16.15	53	52.79	2.61	4.94	1.82	silty clay to clay	UNDFND	UNDFD	34	3.3
16.45	54	53.29	2.64	4.96	1.85	silty clay to clay	UNDFND	UNDFD	34	3.3
16.75	55	17.63	0.65	3.70	1.88	silty clay to clay	UNDFND	UNDFD	11	.9
17.05	56	24.98	1.05	4.22	1.91	silty clay to clay	UNDFND	UNDFD	16	1.4
17.35	57	20.77	0.90	4.34	1.94	clay	UNDFND	UNDFD	20	1.1
17.65	58	27.95	1.01	3.60	1.96	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
17.95	59	24.18	1.22	5.04	1.99	clay	UNDFND	UNDFD	23	1.3
18.25	60	11.53	0.73	6.37	2.02	clay	UNDFND	UNDFD	11	.5
18.55	61	32.94	1.52	4.62	2.05	silty clay to clay	UNDFND	UNDFD	21	1.9
18.85	62	41.87	2.23	5.33	2.08	clay	UNDFND	UNDFD	40	2.5
19.20	63	21.07	1.33	6.29	2.11	clay	UNDFND	UNDFD	20	1.1
19.50	64	36.79	1.98	5.37	2.14	clay	UNDFND	UNDFD	35	2.1
19.80	65	35.43	1.78	5.04	2.17	clay	UNDFND	UNDFD	34	2.1
20.15	66	15.33	1.12	7.32	2.20	clay	UNDFND	UNDFD	15	.7
20.45	67	8.76	0.43	4.91	2.23	clay	UNDFND	UNDFD	8	.3
20.75	68	22.36	0.89	3.98	2.26	silty clay to clay	UNDFND	UNDFD	14	1.2
21.05	69	18.74	1.03	5.50	2.29	clay	UNDFND	UNDFD	18	.9
21.35	70	10.03	0.51	5.11	2.31	clay	UNDFND	UNDFD	10	.3
21.65	71	13.09	0.57	4.37	2.34	clay	UNDFND	UNDFD	13	.5
21.95	72	34.54	1.30	3.78	2.37	clayey silt to silty clay	UNDFND	UNDFD	17	2.0
22.25	73	18.72	0.93	4.95	2.40	clay	UNDFND	UNDFD	18	.9
22.55	74	22.80	1.03	4.52	2.43	clay	UNDFND	UNDFD	22	1.2
22.85	75	15.00	0.66	4.40	2.46	clay	UNDFND	UNDFD	14	.7
23.15	76	62.41	1.44	2.30	2.48	sandy silt to clayey silt	UNDFND	UNDFD	24	3.8
23.45	77	46.73	1.70	3.64	2.51	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
23.75	78	122.64	1.88	1.53	2.54	sand to silty sand	50-60	36-38	29	UNDEFINED
24.05	79	64.41	2.32	3.60	2.57	clayey silt to silty clay	UNDFND	UNDFD	31	3.9
24.35	80	25.00	0.94	3.78	2.60	silty clay to clay	UNDFND	UNDFD	16	1.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-60c



CPT−09−125	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-61a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-125 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	248.41	2.52	1.01	0.03	sand	>90	>48	48	UNDEFINED
0.60	2	135.57	1.63	1.20	0.09	sand to silty sand	>90	>48	32	UNDEFINED
0.95	3	63.20	2.30	3.64	0.15	clayey silt to silty clay	UNDFND	UNDFD	30	4.2
1.25	4	86.00	2.48	2.88	0.22	sandy silt to clayey silt	UNDFND	UNDFD	33	5.7
1.55	5	49.88	1.06	2.12	0.28	sandy silt to clayey silt	UNDFND	UNDFD	19	3.3
1.85	6	27.51	0.50	1.82	0.33	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
2.15	7	9.74	0.59	6.11	0.39	clay	UNDFND	UNDFD	9	.6
2.45	8	8.73	0.62	7.09	0.45	clay	UNDFND	UNDFD	8	.5
2.75	9	21.69	0.32	1.49	0.51	sandy silt to clayey silt	UNDFND	UNDFD	8	1.4
3.05	10	6.00	0.25	4.19	0.57	clay	UNDFND	UNDFD	6	.3
3.35	11	9.40	0.51	5.45	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	10.89	0.51	4.67	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	11.34	0.52	4.58	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	11.07	0.41	3.66	0.70	clay	UNDFND	UNDFD	11	.6
4.55	15	10.39	0.48	4.59	0.73	clay	UNDFND	UNDFD	10	.6
4.85	16	9.30	0.32	3.46	0.76	clay	UNDFND	UNDFD	9	.5
5.15	17	9.95	0.43	4.30	0.78	clay	UNDFND	UNDFD	10	.5
5.45	18	23.15	0.63	2.72	0.81	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
5.75	19	14.45	0.57	3.97	0.84	clay	UNDFND	UNDFD	14	.8
6.05	20	12.90	0.56	4.33	0.87	clay	UNDFND	UNDFD	12	.7
6.40	21	10.16	0.42	4.12	0.90	clay	UNDFND	UNDFD	10	.5
6.70	22	9.91	0.47	4.70	0.93	clay	UNDFND	UNDFD	9	.5
7.00	23	9.28	0.42	4.54	0.96	clay	UNDFND	UNDFD	9	.5
7.35	24	12.77	0.66	5.21	0.99	clay	UNDFND	UNDFD	12	.7
7.65	25	14.82	0.80	5.43	1.02	clay	UNDFND	UNDFD	14	.8
7.95	26	23.81	1.28	5.38	1.05	clay	UNDFND	UNDFD	23	1.4
8.25	27	90.75	1.69	1.86	1.08	silty sand to sandy silt	60-70	40-42	29	UNDEFINED
8.55	28	132.31	1.74	1.32	1.11	sand to silty sand	70-80	40-42	32	UNDEFINED
8.85	29	92.11	1.47	1.60	1.13	silty sand to sandy silt	60-70	40-42	29	UNDEFINED
9.15	30	33.88	1.03	3.05	1.16	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.45	31	14.50	0.70	4.80	1.19	clay	UNDFND	UNDFD	14	.8
9.75	32	20.55	0.92	4.48	1.22	clay	UNDFND	UNDFD	20	1.2
10.05	33	24.59	1.11	4.53	1.25	clay	UNDFND	UNDFD	24	1.5
10.35	34	61.12	1.65	2.70	1.28	sandy silt to clayey silt	UNDFND	UNDFD	23	3.9
10.65	35	51.13	1.25	2.45	1.30	sandy silt to clayey silt	UNDFND	UNDFD	20	3.2
10.95	36	14.17	0.52	3.67	1.33	silty clay to clay	UNDFND	UNDFD	9	.8
11.25	37	12.20	0.66	5.42	1.36	clay	UNDFND	UNDFD	12	.6
11.55	38	36.99	1.29	3.48	1.39	clayey silt to silty clay	UNDFND	UNDFD	18	2.3

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-61b

GROUP DELTA CONSULTANTS

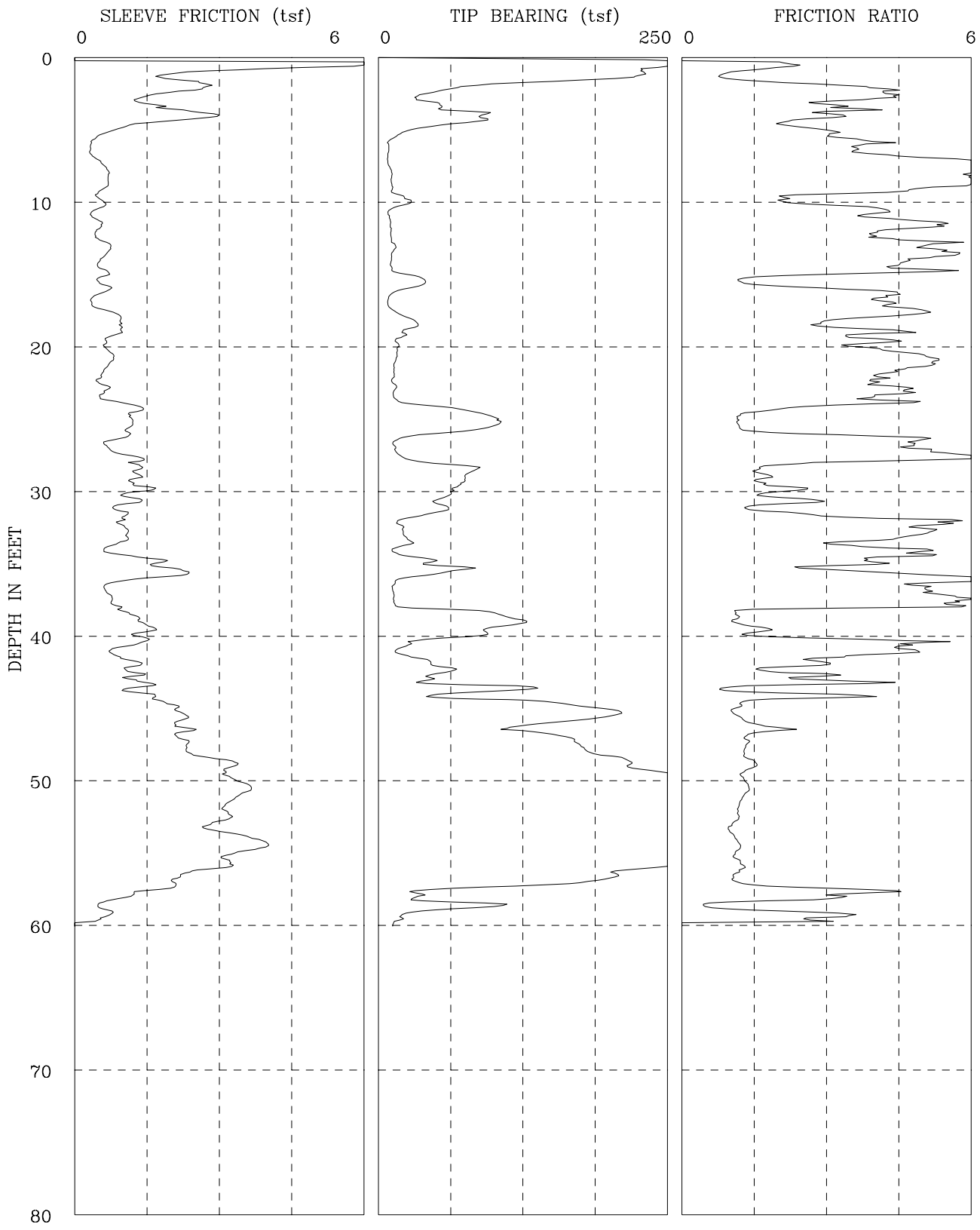
Cone Used : CPT-09-125 Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	78.23	1.87	2.39	1.42	sandy silt to clayey silt	UNDFND	UNDFD	30	5.0
12.15	40	113.43	1.43	1.26	1.44	sand to silty sand	60-70	38-40	27	UNDEFINED
12.45	41	66.81	1.66	2.48	1.47	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
12.80	42	55.73	1.75	3.14	1.50	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
13.10	43	25.75	1.25	4.85	1.53	clay	UNDFND	UNDFD	25	1.5
13.40	44	25.65	1.02	3.99	1.56	silty clay to clay	UNDFND	UNDFD	16	1.5
13.75	45	16.99	0.81	4.79	1.59	clay	UNDFND	UNDFD	16	.9
14.05	46	24.86	1.21	4.86	1.62	clay	UNDFND	UNDFD	24	1.4
14.35	47	24.37	1.20	4.93	1.65	clay	UNDFND	UNDFD	23	1.4
14.65	48	21.22	1.07	5.03	1.68	clay	UNDFND	UNDFD	20	1.2
14.95	49	30.13	1.39	4.63	1.71	clay	UNDFND	UNDFD	29	1.8
15.25	50	32.55	1.47	4.50	1.74	silty clay to clay	UNDFND	UNDFD	21	1.9
15.55	51	52.78	2.29	4.33	1.77	silty clay to clay	UNDFND	UNDFD	34	3.3
15.85	52	129.77	2.37	1.83	1.79	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
16.15	53	148.04	1.15	0.78	1.82	sand	60-70	40-42	28	UNDEFINED
16.45	54	172.80	0.79	0.46	1.85	sand	70-80	40-42	33	UNDEFINED
16.75	55	182.60	1.00	0.55	1.88	sand	70-80	40-42	35	UNDEFINED
17.05	56	186.94	0.96	0.51	1.91	sand	70-80	40-42	36	UNDEFINED
17.35	57	192.91	1.06	0.55	1.94	sand	70-80	40-42	37	UNDEFINED
17.65	58	228.12	1.08	0.47	1.96	sand	80-90	40-42	44	UNDEFINED
17.95	59	255.71	1.20	0.47	1.99	sand	80-90	42-44	49	UNDEFINED
18.25	60	333.36	1.26	0.38	2.02	gravelly sand to sand	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-61c



CPT−09−126	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-62a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-126 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	253.11	3.99	1.58	0.03	sand to silty sand	>90	>48	>50	UNDEFINED
0.60	2	164.41	2.27	1.38	0.09	sand to silty sand	>90	>48	39	UNDEFINED
0.95	3	45.08	1.76	3.89	0.15	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
1.25	4	72.02	2.32	3.23	0.22	sandy silt to clayey silt	UNDFND	UNDFD	28	4.7
1.55	5	57.22	1.36	2.37	0.28	sandy silt to clayey silt	UNDFND	UNDFD	22	3.7
1.85	6	12.42	0.43	3.43	0.33	silty clay to clay	UNDFND	UNDFD	8	.8
2.15	7	8.54	0.37	4.29	0.39	clay	UNDFND	UNDFD	8	.5
2.45	8	10.03	0.64	6.40	0.45	clay	UNDFND	UNDFD	10	.6
2.75	9	11.56	0.68	5.89	0.51	clay	UNDFND	UNDFD	11	.7
3.05	10	20.21	0.52	2.56	0.57	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
3.35	11	12.40	0.45	3.63	0.61	silty clay to clay	UNDFND	UNDFD	8	.7
3.65	12	10.57	0.51	4.86	0.64	clay	UNDFND	UNDFD	10	.6
3.95	13	11.76	0.54	4.62	0.67	clay	UNDFND	UNDFD	11	.7
4.25	14	12.51	0.66	5.24	0.70	clay	UNDFND	UNDFD	12	.7
4.55	15	12.80	0.57	4.44	0.73	clay	UNDFND	UNDFD	12	.7
4.85	16	36.09	0.58	1.62	0.76	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
5.15	17	11.22	0.47	4.16	0.78	clay	UNDFND	UNDFD	11	.6
5.45	18	13.85	0.64	4.65	0.81	clay	UNDFND	UNDFD	13	.8
5.75	19	29.62	0.96	3.24	0.84	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
6.05	20	18.79	0.73	3.87	0.87	silty clay to clay	UNDFND	UNDFD	12	1.1
6.40	21	15.94	0.75	4.67	0.90	clay	UNDFND	UNDFD	15	.9
6.70	22	13.58	0.63	4.60	0.93	clay	UNDFND	UNDFD	13	.8
7.00	23	13.60	0.58	4.27	0.96	clay	UNDFND	UNDFD	13	.8
7.35	24	21.87	0.80	3.66	0.99	silty clay to clay	UNDFND	UNDFD	14	1.3
7.65	25	90.43	1.23	1.37	1.02	sand to silty sand	60-70	40-42	22	UNDEFINED
7.95	26	79.68	1.14	1.43	1.05	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
8.25	27	15.48	0.75	4.86	1.08	clay	UNDFND	UNDFD	15	.9
8.55	28	26.06	1.16	4.46	1.11	silty clay to clay	UNDFND	UNDFD	17	1.6
8.85	29	79.25	1.33	1.68	1.13	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
9.15	30	68.81	1.33	1.93	1.16	silty sand to sandy silt	50-60	38-40	22	UNDEFINED
9.45	31	55.00	1.12	2.03	1.19	sandy silt to clayey silt	UNDFND	UNDFD	21	3.5
9.75	32	40.57	0.98	2.41	1.22	sandy silt to clayey silt	UNDFND	UNDFD	16	2.5
10.05	33	20.21	1.03	5.11	1.25	clay	UNDFND	UNDFD	19	1.2
10.35	34	22.99	0.89	3.87	1.28	silty clay to clay	UNDFND	UNDFD	15	1.3
10.65	35	30.64	1.29	4.22	1.30	silty clay to clay	UNDFND	UNDFD	20	1.9
10.95	36	54.21	2.02	3.72	1.33	clayey silt to silty clay	UNDFND	UNDFD	26	3.4
11.25	37	13.59	0.76	5.58	1.36	clay	UNDFND	UNDFD	13	.7
11.55	38	13.68	0.77	5.66	1.39	clay	UNDFND	UNDFD	13	.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-62b

GROUP DELTA CONSULTANTS

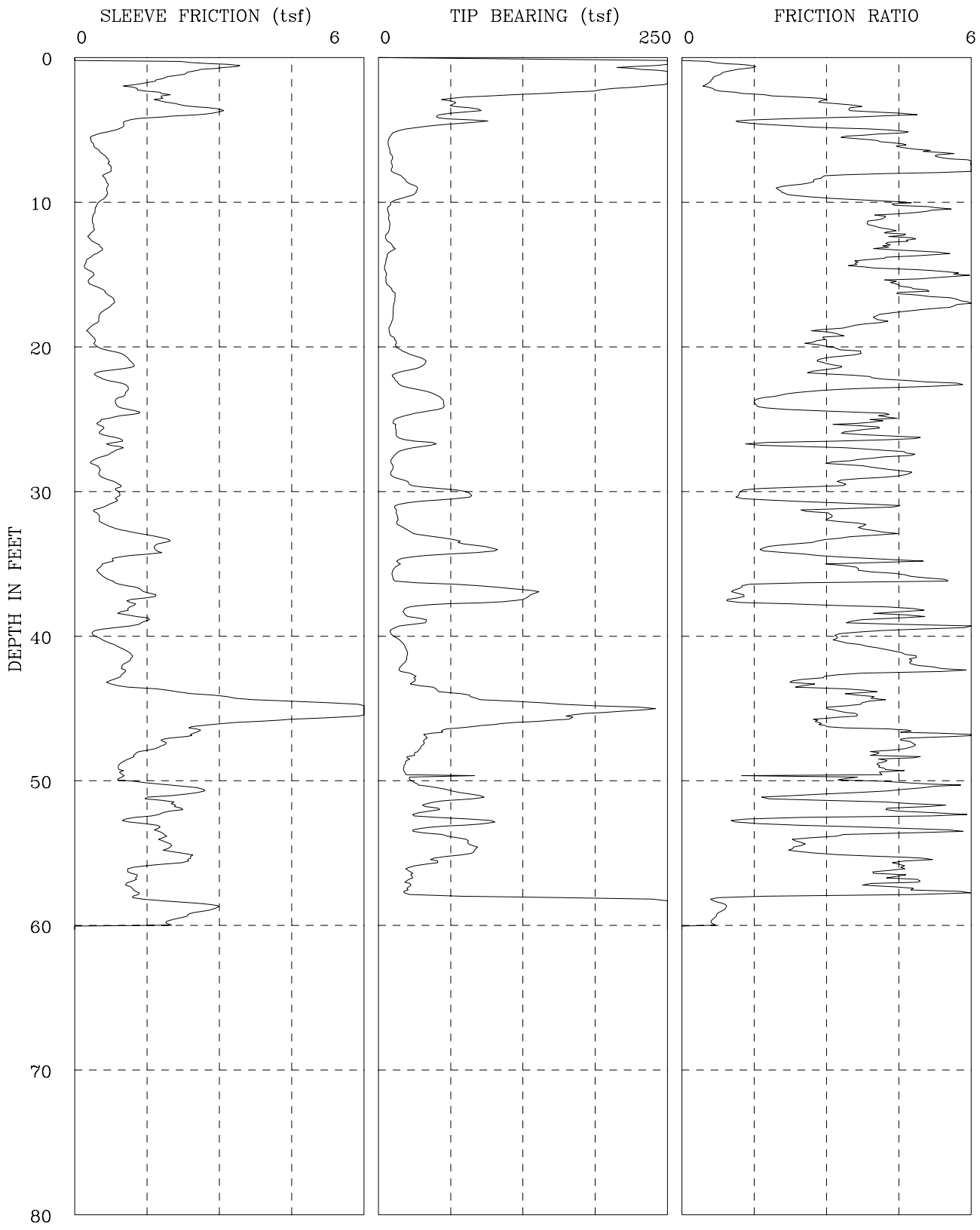
Cone Used : CPT-09-126 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	94.13	1.15	1.22	1.42	sand to silty sand	50-60	38-40	23	UNDEFINED
12.15	40	103.85	1.48	1.42	1.44	sand to silty sand	60-70	38-40	25	UNDEFINED
12.45	41	36.81	1.25	3.41	1.47	clayey silt to silty clay	UNDFND	UNDFD	18	2.2
12.80	42	32.14	1.03	3.20	1.50	clayey silt to silty clay	UNDFND	UNDFD	15	1.9
13.10	43	53.41	1.17	2.20	1.53	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
13.40	44	85.15	1.35	1.59	1.56	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
13.75	45	137.20	1.90	1.38	1.59	sand to silty sand	60-70	40-42	33	UNDEFINED
14.05	46	179.22	2.22	1.24	1.62	sand to silty sand	70-80	40-42	43	UNDEFINED
14.35	47	138.82	2.22	1.60	1.65	sand to silty sand	60-70	40-42	33	UNDEFINED
14.65	48	176.30	2.34	1.33	1.68	sand to silty sand	70-80	40-42	42	UNDEFINED
14.95	49	211.96	3.06	1.44	1.71	sand to silty sand	80-90	40-42	>50	UNDEFINED
15.25	50	250.18	3.20	1.28	1.74	sand	80-90	42-44	48	UNDEFINED
15.55	51	263.67	3.56	1.35	1.77	sand	80-90	42-44	>50	UNDEFINED
15.85	52	265.49	3.18	1.20	1.79	sand	80-90	42-44	>50	UNDEFINED
16.15	53	273.49	3.10	1.13	1.82	sand	80-90	42-44	>50	UNDEFINED
16.45	54	305.69	3.15	1.03	1.85	sand	80-90	42-44	>50	UNDEFINED
16.75	55	324.36	3.79	1.17	1.88	sand	>90	42-44	>50	UNDEFINED
17.05	56	270.38	3.18	1.18	1.91	sand	80-90	42-44	>50	UNDEFINED
17.35	57	203.37	2.28	1.12	1.94	sand	70-80	40-42	39	UNDEFINED
17.65	58	78.09	1.68	2.15	1.96	silty sand to sandy silt	40-50	36-38	25	UNDEFINED
17.95	59	64.96	0.66	1.02	1.99	silty sand to sandy silt	40-50	34-36	21	UNDEFINED
18.25	60	19.91	0.52	2.63	2.02	clayey silt to silty clay	UNDFND	UNDFD	10	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-62c



CPT−09−127	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-63a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-127 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	262.47	2.30	0.88	0.03	sand	>90	>48	>50	UNDEFINED
0.60	2	270.24	1.68	0.62	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	119.75	1.69	1.41	0.15	sand to silty sand	>90	>48	29	UNDEFINED
1.25	4	67.10	2.56	3.81	0.22	clayey silt to silty clay	UNDFND	UNDFD	32	4.4
1.55	5	50.93	1.00	1.96	0.28	sandy silt to clayey silt	UNDFND	UNDFD	20	3.3
1.85	6	9.63	0.39	4.06	0.33	clay	UNDFND	UNDFD	9	.6
2.15	7	10.81	0.57	5.28	0.39	clay	UNDFND	UNDFD	10	.6
2.45	8	12.23	0.72	5.90	0.45	clay	UNDFND	UNDFD	12	.7
2.75	9	26.31	0.65	2.48	0.51	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
3.05	10	23.91	0.62	2.60	0.57	clayey silt to silty clay	UNDFND	UNDFD	11	1.5
3.35	11	8.90	0.42	4.72	0.61	clay	UNDFND	UNDFD	9	.5
3.65	12	9.47	0.38	4.07	0.64	clay	UNDFND	UNDFD	9	.5
3.95	13	8.26	0.37	4.43	0.67	clay	UNDFND	UNDFD	8	.5
4.25	14	9.61	0.44	4.58	0.70	clay	UNDFND	UNDFD	9	.5
4.55	15	6.10	0.27	4.41	0.73	clay	UNDFND	UNDFD	6	.3
4.85	16	7.61	0.36	4.79	0.76	clay	UNDFND	UNDFD	7	.4
5.15	17	13.82	0.72	5.23	0.78	clay	UNDFND	UNDFD	13	.8
5.45	18	12.91	0.63	4.89	0.81	clay	UNDFND	UNDFD	12	.7
5.75	19	10.65	0.39	3.69	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	13.07	0.38	2.94	0.87	silty clay to clay	UNDFND	UNDFD	8	.7
6.40	21	28.16	0.90	3.18	0.90	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
6.70	22	27.08	0.84	3.09	0.93	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
7.00	23	20.80	0.90	4.34	0.96	clay	UNDFND	UNDFD	20	1.2
7.35	24	52.94	0.93	1.76	0.99	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
7.65	25	29.97	0.97	3.25	1.02	clayey silt to silty clay	UNDFND	UNDFD	14	1.9
7.95	26	14.70	0.54	3.70	1.05	silty clay to clay	UNDFND	UNDFD	9	.8
8.25	27	31.44	0.88	2.80	1.08	sandy silt to clayey silt	UNDFND	UNDFD	12	1.9
8.55	28	13.39	0.55	4.10	1.11	clay	UNDFND	UNDFD	13	.7
8.85	29	12.17	0.52	4.24	1.13	clay	UNDFND	UNDFD	12	.6
9.15	30	42.01	0.87	2.06	1.16	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
9.45	31	49.27	0.83	1.68	1.19	silty sand to sandy silt	40-50	36-38	16	UNDEFINED
9.75	32	15.90	0.48	3.05	1.22	clayey silt to silty clay	UNDFND	UNDFD	8	.9
10.05	33	23.89	0.94	3.93	1.25	silty clay to clay	UNDFND	UNDFD	15	1.4
10.35	34	75.01	1.77	2.36	1.28	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
10.65	35	43.21	1.11	2.56	1.30	sandy silt to clayey silt	UNDFND	UNDFD	17	2.7
10.95	36	13.38	0.53	3.99	1.33	clay	UNDFND	UNDFD	13	.7
11.25	37	76.90	1.08	1.40	1.36	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
11.55	38	102.44	1.36	1.32	1.39	sand to silty sand	60-70	38-40	25	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-63b

GROUP DELTA CONSULTANTS

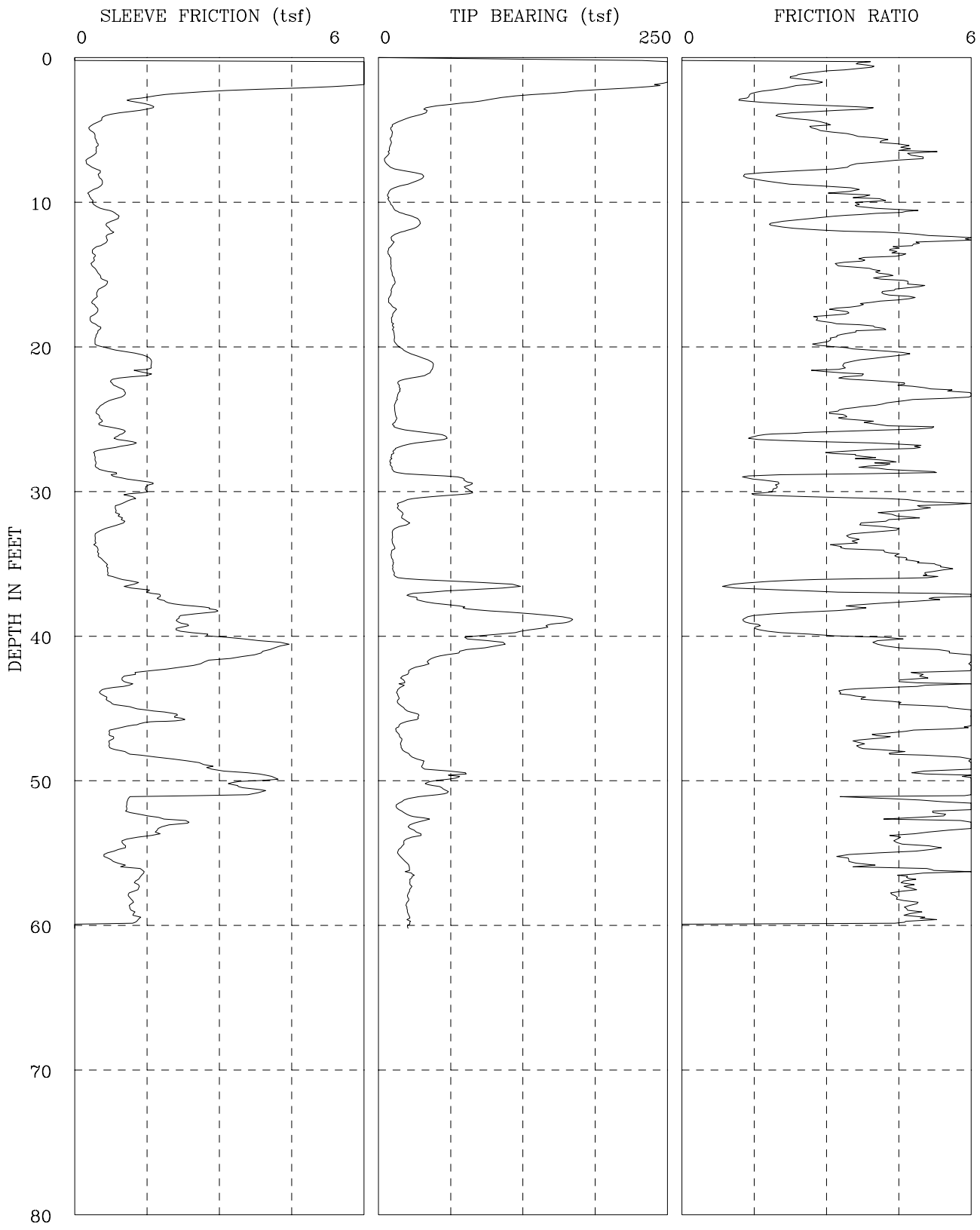
Cone Used : CPT-09-127 Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	27.49	1.20	4.38	1.42	silty clay to clay	UNDFND	UNDFD	18	1.6
12.15	40	19.55	0.82	4.21	1.44	silty clay to clay	UNDFND	UNDFD	12	1.1
12.45	41	19.84	0.71	3.58	1.47	silty clay to clay	UNDFND	UNDFD	13	1.1
12.80	42	23.71	1.11	4.70	1.50	clay	UNDFND	UNDFD	23	1.4
13.10	43	25.32	0.96	3.80	1.53	silty clay to clay	UNDFND	UNDFD	16	1.5
13.40	44	45.28	1.43	3.15	1.56	clayey silt to silty clay	UNDFND	UNDFD	22	2.8
13.75	45	149.61	5.17	3.46	1.59	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.7
14.05	46	152.85	4.83	3.16	1.62	sandy silt to clayey silt	UNDFND	UNDFD	>50	10.0
14.35	47	53.15	2.37	4.45	1.65	silty clay to clay	UNDFND	UNDFD	34	3.3
14.65	48	36.38	1.66	4.57	1.68	silty clay to clay	UNDFND	UNDFD	23	2.2
14.95	49	25.01	1.05	4.20	1.71	silty clay to clay	UNDFND	UNDFD	16	1.4
15.25	50	29.39	1.00	3.40	1.74	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
15.55	51	58.86	2.28	3.87	1.77	clayey silt to silty clay	UNDFND	UNDFD	28	3.7
15.85	52	55.46	1.96	3.53	1.79	clayey silt to silty clay	UNDFND	UNDFD	27	3.4
16.15	53	63.42	1.44	2.27	1.82	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
16.45	54	49.04	1.79	3.65	1.85	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
16.75	55	80.99	1.95	2.40	1.88	sandy silt to clayey silt	UNDFND	UNDFD	31	5.1
17.05	56	48.24	2.10	4.35	1.91	silty clay to clay	UNDFND	UNDFD	31	2.9
17.35	57	26.94	1.20	4.45	1.94	silty clay to clay	UNDFND	UNDFD	17	1.5
17.65	58	28.62	1.20	4.20	1.96	silty clay to clay	UNDFND	UNDFD	18	1.6
17.95	59	280.30	2.30	0.82	1.99	sand	80-90	42-44	>50	UNDEFINED
18.25	60	320.47	2.19	0.68	2.02	sand	80-90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-63c



CPT−09−128	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-64a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-128 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	258.90	8.12	3.14	0.03	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
0.60	2	319.31	7.94	2.49	0.09	silty sand to sandy silt	>90	>48	>50	UNDEFINED
0.95	3	133.86	2.19	1.63	0.15	sand to silty sand	>90	>48	32	UNDEFINED
1.25	4	41.42	1.17	2.83	0.22	sandy silt to clayey silt	UNDFND	UNDFD	16	2.7
1.55	5	14.76	0.41	2.75	0.28	clayey silt to silty clay	UNDFND	UNDFD	7	.9
1.85	6	11.05	0.44	4.01	0.33	clay	UNDFND	UNDFD	11	.7
2.15	7	8.09	0.38	4.75	0.39	clay	UNDFND	UNDFD	8	.5
2.45	8	16.38	0.39	2.36	0.45	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
2.75	9	28.47	0.53	1.87	0.51	sandy silt to clayey silt	UNDFND	UNDFD	11	1.8
3.05	10	9.09	0.33	3.66	0.57	clay	UNDFND	UNDFD	9	.5
3.35	11	17.86	0.68	3.80	0.61	silty clay to clay	UNDFND	UNDFD	11	1.1
3.65	12	32.57	0.74	2.27	0.64	sandy silt to clayey silt	UNDFND	UNDFD	12	2.1
3.95	13	12.90	0.66	5.15	0.67	clay	UNDFND	UNDFD	12	.8
4.25	14	9.45	0.40	4.25	0.70	clay	UNDFND	UNDFD	9	.5
4.55	15	11.13	0.41	3.72	0.73	clay	UNDFND	UNDFD	11	.6
4.85	16	13.15	0.60	4.55	0.76	clay	UNDFND	UNDFD	13	.8
5.15	17	9.99	0.43	4.35	0.78	clay	UNDFND	UNDFD	10	.6
5.45	18	12.90	0.43	3.32	0.81	silty clay to clay	UNDFND	UNDFD	8	.7
5.75	19	12.30	0.42	3.46	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	14.16	0.44	3.10	0.87	silty clay to clay	UNDFND	UNDFD	9	.8
6.40	21	30.51	1.21	3.97	0.90	silty clay to clay	UNDFND	UNDFD	19	1.9
6.70	22	45.15	1.50	3.33	0.93	clayey silt to silty clay	UNDFND	UNDFD	22	2.9
7.00	23	19.91	0.86	4.34	0.96	clay	UNDFND	UNDFD	19	1.2
7.35	24	15.81	0.81	5.12	0.99	clay	UNDFND	UNDFD	15	.9
7.65	25	14.84	0.50	3.37	1.02	silty clay to clay	UNDFND	UNDFD	9	.8
7.95	26	26.89	0.81	3.00	1.05	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
8.25	27	35.64	0.95	2.66	1.08	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
8.55	28	11.44	0.42	3.70	1.11	clay	UNDFND	UNDFD	11	.6
8.85	29	28.05	0.68	2.41	1.13	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
9.15	30	77.50	1.46	1.89	1.16	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
9.45	31	34.15	1.07	3.14	1.19	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
9.75	32	20.14	0.91	4.54	1.22	clay	UNDFND	UNDFD	19	1.2
10.05	33	17.39	0.68	3.92	1.25	silty clay to clay	UNDFND	UNDFD	11	1.0
10.35	34	12.73	0.44	3.45	1.28	silty clay to clay	UNDFND	UNDFD	8	.7
10.65	35	11.82	0.54	4.59	1.30	clay	UNDFND	UNDFD	11	.6
10.95	36	13.46	0.71	5.25	1.33	clay	UNDFND	UNDFD	13	.7
11.25	37	82.44	1.24	1.51	1.36	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
11.55	38	40.89	1.91	4.66	1.39	silty clay to clay	UNDFND	UNDFD	26	2.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-64b

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-128 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

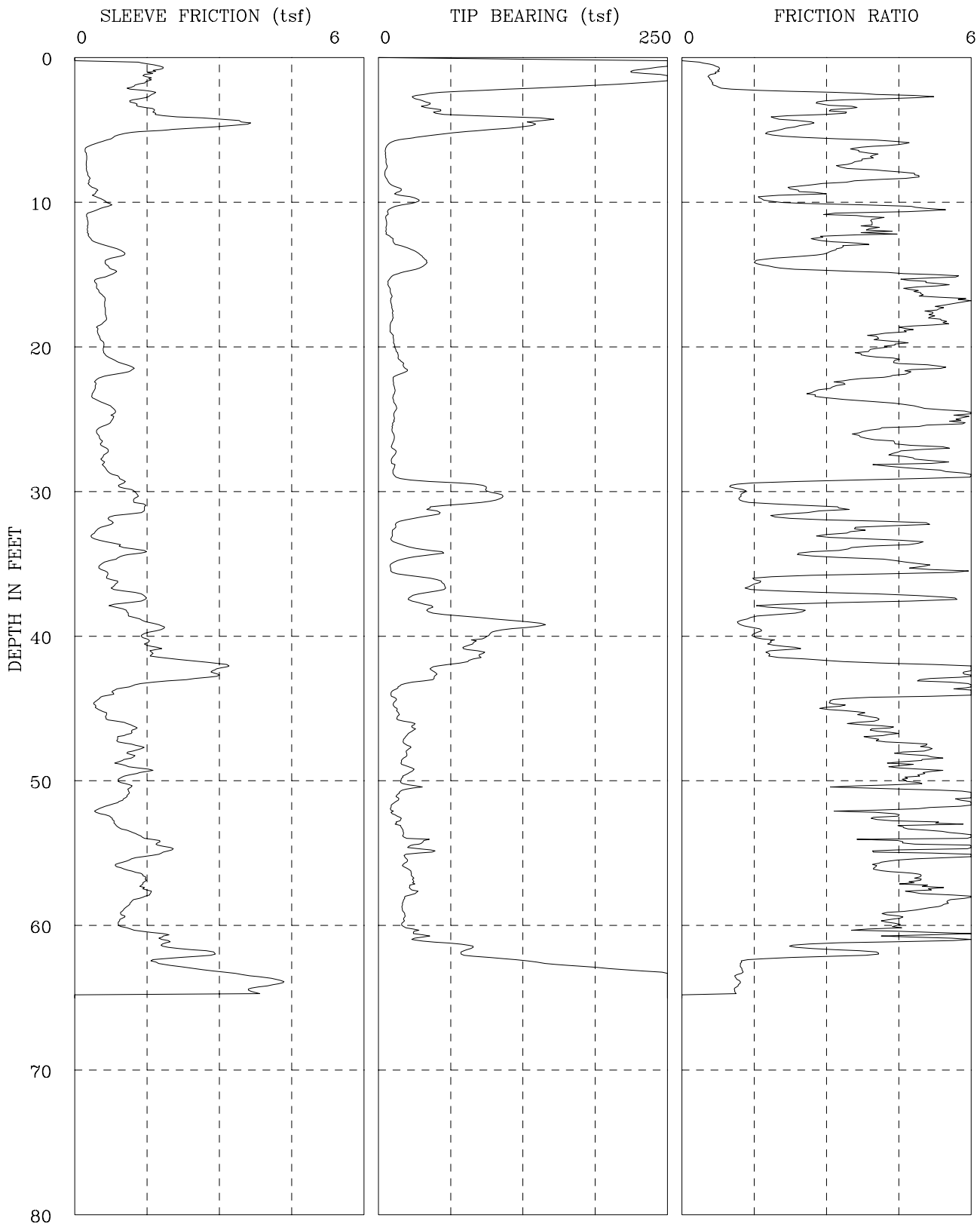
DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	127.37	2.50	1.96	1.42	silty sand to sandy silt	60-70	40-42	41	UNDEFINED
12.15	40	135.82	2.32	1.71	1.44	sand to silty sand	70-80	40-42	33	UNDEFINED
12.45	41	92.04	3.87	4.21	1.47	clayey silt to silty clay	UNDFND	UNDFD	44	5.9
12.80	42	52.82	3.23	6.12	1.50	clay	UNDFND	UNDFD	>50	3.3
13.10	43	25.22	1.41	5.60	1.53	clay	UNDFND	UNDFD	24	1.5
13.40	44	18.65	0.82	4.40	1.56	clay	UNDFND	UNDFD	18	1.0
13.75	45	19.03	0.91	4.76	1.59	clay	UNDFND	UNDFD	18	1.0
14.05	46	28.88	1.90	6.59	1.62	clay	UNDFND	UNDFD	28	1.7
14.35	47	17.34	0.81	4.67	1.65	clay	UNDFND	UNDFD	17	.9
14.65	48	20.84	0.82	3.92	1.68	silty clay to clay	UNDFND	UNDFD	13	1.1
14.95	49	34.87	2.23	6.38	1.71	clay	UNDFND	UNDFD	33	2.1
15.25	50	60.18	3.63	6.04	1.74	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
15.55	51	51.41	3.45	6.71	1.77	clay	UNDFND	UNDFD	49	3.2
15.85	52	19.81	1.09	5.50	1.79	clay	UNDFND	UNDFD	19	1.1
16.15	53	31.41	1.77	5.63	1.82	clay	UNDFND	UNDFD	30	1.8
16.45	54	30.57	1.62	5.30	1.85	clay	UNDFND	UNDFD	29	1.8
16.75	55	19.84	0.94	4.74	1.88	clay	UNDFND	UNDFD	19	1.1
17.05	56	22.52	0.80	3.54	1.91	clayey silt to silty clay	UNDFND	UNDFD	11	1.2
17.35	57	27.33	1.37	5.00	1.94	clay	UNDFND	UNDFD	26	1.5
17.65	58	27.00	1.24	4.59	1.96	clay	UNDFND	UNDFD	26	1.5
17.95	59	25.03	1.17	4.66	1.99	clay	UNDFND	UNDFD	24	1.4
18.25	60	26.47	1.17	4.44	2.02	silty clay to clay	UNDFND	UNDFD	17	1.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-64c



CPT−09−129	I−436 WCC 405/22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-65a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-129 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	249.31	1.36	0.54	0.03	sand	>90	>48	48	UNDEFINED
0.60	2	236.37	1.44	0.61	0.09	sand	>90	>48	45	UNDEFINED
0.95	3	57.92	1.38	2.39	0.15	sandy silt to clayey silt	UNDFND	UNDFD	22	3.8
1.25	4	59.18	1.63	2.76	0.22	sandy silt to clayey silt	UNDFND	UNDFD	23	3.9
1.55	5	122.58	2.83	2.31	0.28	silty sand to sandy silt	>90	46-48	39	UNDEFINED
1.85	6	27.05	0.68	2.53	0.33	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
2.15	7	6.30	0.24	3.79	0.39	clay	UNDFND	UNDFD	6	.3
2.45	8	6.57	0.25	3.79	0.45	clay	UNDFND	UNDFD	6	.4
2.75	9	10.16	0.32	3.11	0.51	silty clay to clay	UNDFND	UNDFD	6	.6
3.05	10	25.09	0.50	2.00	0.57	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
3.35	11	11.20	0.46	4.10	0.61	clay	UNDFND	UNDFD	11	.7
3.65	12	6.78	0.27	3.94	0.64	clay	UNDFND	UNDFD	6	.4
3.95	13	11.58	0.38	3.31	0.67	silty clay to clay	UNDFND	UNDFD	7	.7
4.25	14	33.40	0.89	2.66	0.70	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
4.55	15	33.15	0.73	2.21	0.73	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
4.85	16	9.58	0.50	5.17	0.76	clay	UNDFND	UNDFD	9	.5
5.15	17	10.88	0.57	5.28	0.78	clay	UNDFND	UNDFD	10	.6
5.45	18	12.07	0.64	5.26	0.81	clay	UNDFND	UNDFD	12	.7
5.75	19	10.89	0.55	5.07	0.84	clay	UNDFND	UNDFD	10	.6
6.05	20	12.84	0.54	4.21	0.87	clay	UNDFND	UNDFD	12	.7
6.40	21	16.57	0.68	4.08	0.90	clay	UNDFND	UNDFD	16	1.0
6.70	22	21.32	1.03	4.83	0.93	clay	UNDFND	UNDFD	20	1.3
7.00	23	13.40	0.44	3.30	0.96	silty clay to clay	UNDFND	UNDFD	9	.8
7.35	24	13.74	0.49	3.60	0.99	silty clay to clay	UNDFND	UNDFD	9	.8
7.65	25	14.10	0.80	5.70	1.02	clay	UNDFND	UNDFD	14	.8
7.95	26	12.48	0.55	4.38	1.05	clay	UNDFND	UNDFD	12	.7
8.25	27	12.73	0.57	4.50	1.08	clay	UNDFND	UNDFD	12	.7
8.55	28	12.90	0.61	4.74	1.11	clay	UNDFND	UNDFD	12	.7
8.85	29	13.78	0.73	5.31	1.13	clay	UNDFND	UNDFD	13	.8
9.15	30	76.06	1.05	1.38	1.16	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
9.45	31	90.58	1.32	1.45	1.19	silty sand to sandy silt	60-70	38-40	29	UNDEFINED
9.75	32	41.03	1.07	2.60	1.22	sandy silt to clayey silt	UNDFND	UNDFD	16	2.6
10.05	33	13.78	0.55	3.98	1.25	clay	UNDFND	UNDFD	13	.7
10.35	34	18.87	0.74	3.93	1.28	silty clay to clay	UNDFND	UNDFD	12	1.1
10.65	35	32.43	0.99	3.06	1.30	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
10.95	36	17.54	0.61	3.45	1.33	silty clay to clay	UNDFND	UNDFD	11	1.0
11.25	37	54.25	0.86	1.58	1.36	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
11.55	38	33.72	1.23	3.65	1.39	clayey silt to silty clay	UNDFND	UNDFD	16	2.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-65b

GROUP DELTA CONSULTANTS

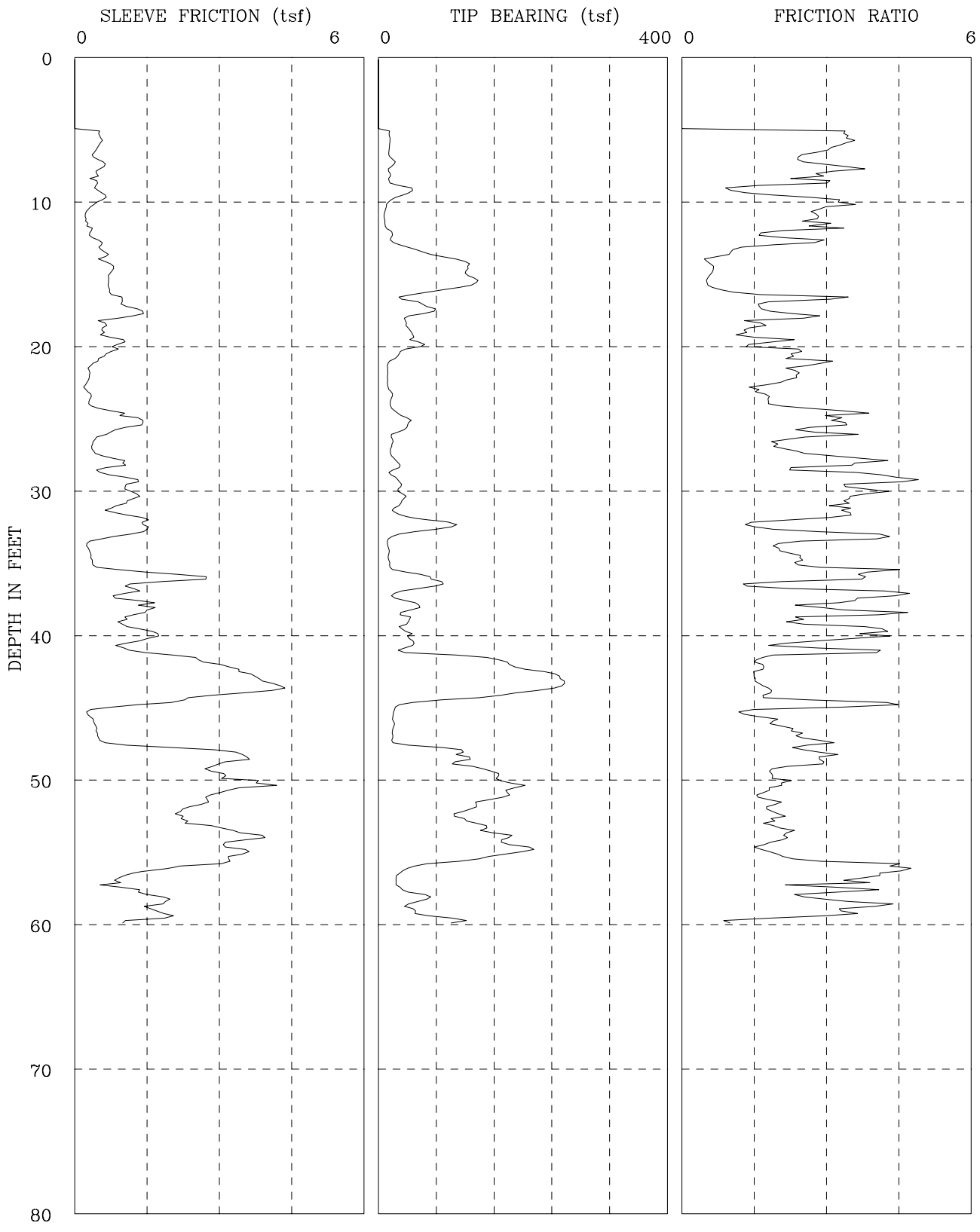
Cone Used : CPT-09-129 Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	65.95	1.14	1.73	1.42	silty sand to sandy silt	40-50	36-38	21	UNDEFINED
12.15	40	118.97	1.65	1.39	1.44	sand to silty sand	60-70	40-42	28	UNDEFINED
12.45	41	82.98	1.55	1.86	1.47	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
12.80	42	79.65	2.14	2.69	1.50	sandy silt to clayey silt	UNDFND	UNDFD	31	5.1
13.10	43	47.71	2.84	5.96	1.53	clay	UNDFND	UNDFD	46	3.0
13.40	44	18.78	1.13	6.00	1.56	clay	UNDFND	UNDFD	18	1.0
13.75	45	14.04	0.49	3.47	1.59	silty clay to clay	UNDFND	UNDFD	9	.7
14.05	46	20.91	0.79	3.78	1.62	silty clay to clay	UNDFND	UNDFD	13	1.2
14.35	47	26.94	1.11	4.13	1.65	silty clay to clay	UNDFND	UNDFD	17	1.6
14.65	48	24.38	1.17	4.79	1.68	clay	UNDFND	UNDFD	23	1.4
14.95	49	22.53	1.08	4.77	1.71	clay	UNDFND	UNDFD	22	1.3
15.25	50	23.96	1.18	4.90	1.74	clay	UNDFND	UNDFD	23	1.3
15.55	51	22.67	1.12	4.92	1.77	clay	UNDFND	UNDFD	22	1.3
15.85	52	13.53	0.78	5.76	1.79	clay	UNDFND	UNDFD	13	.6
16.15	53	15.56	0.70	4.52	1.82	clay	UNDFND	UNDFD	15	.8
16.45	54	21.43	1.18	5.49	1.85	clay	UNDFND	UNDFD	21	1.2
16.75	55	36.77	1.84	5.00	1.88	clay	UNDFND	UNDFD	35	2.2
17.05	56	23.14	1.15	4.97	1.91	clay	UNDFND	UNDFD	22	1.3
17.35	57	28.71	1.34	4.65	1.94	clay	UNDFND	UNDFD	27	1.6
17.65	58	29.13	1.48	5.07	1.96	clay	UNDFND	UNDFD	28	1.7
17.95	59	21.25	1.17	5.49	1.99	clay	UNDFND	UNDFD	20	1.1
18.25	60	21.95	0.96	4.37	2.02	clay	UNDFND	UNDFD	21	1.2
18.55	61	31.17	1.46	4.68	2.05	clay	UNDFND	UNDFD	30	1.8
18.85	62	66.05	2.15	3.26	2.08	sandy silt to clayey silt	UNDFND	UNDFD	25	4.1
19.20	63	134.13	2.15	1.60	2.11	sand to silty sand	60-70	38-40	32	UNDEFINED
19.50	64	319.72	3.76	1.18	2.14	sand	80-90	42-44	>50	UNDEFINED
19.80	65	338.55	2.52	0.74	2.17	sand	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-65c



CPT−09−130	I−436 SR−22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-66a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-130 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.00	0.00	0.00	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.00	0.00	0.00	0.09	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.00	0.00	0.00	0.15	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	0.00	0.00	0.00	0.22	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.55	5	2.56	0.09	3.38	0.28	clay	UNDFND	UNDFD	2	.1
1.85	6	15.51	0.53	3.41	0.33	silty clay to clay	UNDFND	UNDFD	10	1.0
2.15	7	15.90	0.43	2.68	0.39	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
2.45	8	17.90	0.54	3.03	0.45	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
2.75	9	22.57	0.43	1.92	0.51	sandy silt to clayey silt	UNDFND	UNDFD	9	1.4
3.05	10	30.23	0.56	1.86	0.57	sandy silt to clayey silt	UNDFND	UNDFD	12	1.9
3.35	11	9.47	0.28	2.98	0.61	silty clay to clay	UNDFND	UNDFD	6	.5
3.65	12	10.59	0.28	2.69	0.64	silty clay to clay	UNDFND	UNDFD	7	.6
3.95	13	20.43	0.44	2.13	0.67	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
4.25	14	69.98	0.58	0.84	0.70	sand to silty sand	60-70	40-42	17	UNDEFINED
4.55	15	122.42	0.75	0.61	0.73	sand	70-80	42-44	23	UNDEFINED
4.85	16	128.49	0.70	0.55	0.76	sand	70-80	42-44	25	UNDEFINED
5.15	17	53.19	0.86	1.62	0.78	silty sand to sandy silt	50-60	38-40	17	UNDEFINED
5.45	18	64.74	1.23	1.90	0.81	silty sand to sandy silt	50-60	40-42	21	UNDEFINED
5.75	19	39.22	0.64	1.63	0.84	silty sand to sandy silt	40-50	36-38	13	UNDEFINED
6.05	20	50.92	0.81	1.58	0.87	silty sand to sandy silt	40-50	38-40	16	UNDEFINED
6.40	21	31.41	0.67	2.13	0.90	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
6.70	22	12.93	0.32	2.47	0.93	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.00	23	13.17	0.25	1.88	0.96	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.35	24	17.65	0.31	1.78	0.99	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
7.65	25	30.78	0.99	3.22	1.02	clayey silt to silty clay	UNDFND	UNDFD	15	1.9
7.95	26	33.77	1.02	3.01	1.05	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
8.25	27	18.65	0.39	2.10	1.08	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
8.55	28	20.86	0.70	3.37	1.11	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
8.85	29	22.49	0.74	3.31	1.13	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
9.15	30	28.86	1.16	4.02	1.16	silty clay to clay	UNDFND	UNDFD	18	1.8
9.45	31	33.16	1.15	3.46	1.19	clayey silt to silty clay	UNDFND	UNDFD	16	2.0
9.75	32	35.06	1.05	2.98	1.22	clayey silt to silty clay	UNDFND	UNDFD	17	2.2
10.05	33	77.49	1.41	1.81	1.25	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
10.35	34	14.23	0.41	2.89	1.28	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.65	35	14.65	0.34	2.33	1.30	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.95	36	36.65	1.34	3.67	1.33	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
11.25	37	69.18	1.55	2.24	1.36	sandy silt to clayey silt	UNDFND	UNDFD	27	4.4
11.55	38	34.61	1.16	3.36	1.39	clayey silt to silty clay	UNDFND	UNDFD	17	2.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-66b

GROUP DELTA CONSULTANTS

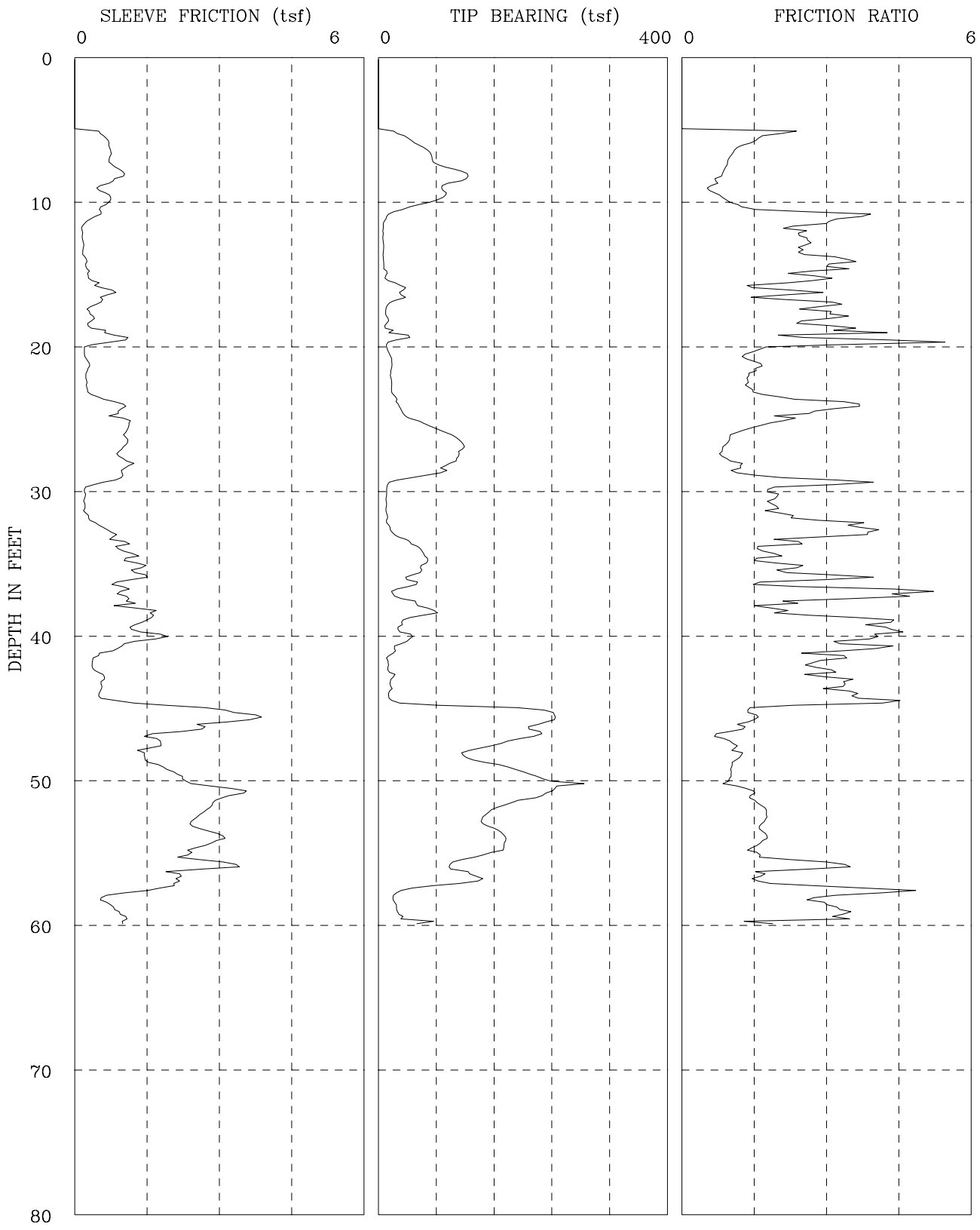
Cone Used : CPT-09-130 Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	41.77	1.33	3.18	1.42	clayey silt to silty clay	UNDFND	UNDFD	20	2.6
12.15	40	37.71	1.28	3.38	1.44	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
12.45	41	43.96	1.26	2.86	1.47	sandy silt to clayey silt	UNDFND	UNDFD	17	2.7
12.80	42	121.04	2.20	1.82	1.50	silty sand to sandy silt	60-70	40-42	39	UNDEFINED
13.10	43	227.99	3.54	1.55	1.53	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.40	44	237.05	4.04	1.70	1.56	sand to silty sand	80-90	42-44	>50	UNDEFINED
13.75	45	74.08	1.70	2.30	1.59	sandy silt to clayey silt	UNDFND	UNDFD	28	4.7
14.05	46	20.78	0.34	1.62	1.62	sandy silt to clayey silt	UNDFND	UNDFD	8	1.2
14.35	47	19.99	0.47	2.33	1.65	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
14.65	48	66.70	1.75	2.62	1.68	sandy silt to clayey silt	UNDFND	UNDFD	26	4.2
14.95	49	116.62	3.28	2.81	1.71	sandy silt to clayey silt	UNDFND	UNDFD	45	7.5
15.25	50	160.71	3.10	1.93	1.74	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
15.55	51	184.94	3.40	1.84	1.77	sand to silty sand	70-80	40-42	44	UNDEFINED
15.85	52	143.26	2.58	1.80	1.79	silty sand to sandy silt	60-70	40-42	46	UNDEFINED
16.15	53	117.31	2.23	1.90	1.82	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
16.45	54	160.72	3.41	2.12	1.85	silty sand to sandy silt	70-80	40-42	>50	UNDEFINED
16.75	55	190.84	3.34	1.75	1.88	sand to silty sand	70-80	40-42	46	UNDEFINED
17.05	56	115.85	3.05	2.63	1.91	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
17.35	57	29.67	1.24	4.18	1.94	silty clay to clay	UNDFND	UNDFD	19	1.7
17.65	58	36.24	1.10	3.04	1.96	clayey silt to silty clay	UNDFND	UNDFD	17	2.1
17.95	59	53.37	1.76	3.29	1.99	clayey silt to silty clay	UNDFND	UNDFD	26	3.3
18.25	60	82.62	1.59	1.92	2.02	silty sand to sandy silt	50-60	36-38	26	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-66c



CPT−09−131	I−436 SR−22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-67a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-131 Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.00	0.00	0.00	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.00	0.00	0.00	0.09	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.00	0.00	0.00	0.15	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	0.00	0.00	0.00	0.22	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.55	5	3.51	0.08	2.37	0.28	clay	UNDFND	UNDFD	3	.2
1.85	6	42.63	0.65	1.53	0.33	silty sand to sandy silt	50-60	42-44	14	UNDEFINED
2.15	7	70.69	0.74	1.04	0.39	sand to silty sand	70-80	42-44	17	UNDEFINED
2.45	8	98.50	0.88	0.89	0.45	sand to silty sand	70-80	44-46	24	UNDEFINED
2.75	9	105.42	0.72	0.69	0.51	sand to silty sand	70-80	44-46	25	UNDEFINED
3.05	10	86.37	0.68	0.79	0.57	sand to silty sand	70-80	42-44	21	UNDEFINED
3.35	11	29.87	0.54	1.79	0.61	sandy silt to clayey silt	UNDFND	UNDFD	11	1.9
3.65	12	7.53	0.21	2.76	0.64	silty clay to clay	UNDFND	UNDFD	5	.4
3.95	13	6.66	0.17	2.55	0.67	silty clay to clay	UNDFND	UNDFD	4	.3
4.25	14	6.96	0.19	2.74	0.70	silty clay to clay	UNDFND	UNDFD	4	.4
4.55	15	8.90	0.26	2.91	0.73	silty clay to clay	UNDFND	UNDFD	6	.5
4.85	16	20.72	0.40	1.93	0.76	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
5.15	17	29.65	0.66	2.23	0.78	sandy silt to clayey silt	UNDFND	UNDFD	11	1.9
5.45	18	11.15	0.34	3.05	0.81	silty clay to clay	UNDFND	UNDFD	7	.6
5.75	19	12.95	0.38	2.95	0.84	silty clay to clay	UNDFND	UNDFD	8	.7
6.05	20	24.78	0.78	3.16	0.87	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
6.40	21	15.35	0.22	1.44	0.90	sandy silt to clayey silt	UNDFND	UNDFD	6	.9
6.70	22	17.78	0.27	1.53	0.93	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
7.00	23	18.15	0.25	1.38	0.96	sandy silt to clayey silt	UNDFND	UNDFD	7	1.1
7.35	24	24.20	0.66	2.71	0.99	clayey silt to silty clay	UNDFND	UNDFD	12	1.5
7.65	25	38.74	0.94	2.43	1.02	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
7.95	26	81.03	1.09	1.34	1.05	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
8.25	27	114.40	1.05	0.92	1.08	sand to silty sand	60-70	40-42	27	UNDEFINED
8.55	28	108.01	1.00	0.93	1.11	sand to silty sand	60-70	40-42	26	UNDEFINED
8.85	29	78.78	1.01	1.29	1.13	silty sand to sandy silt	50-60	38-40	25	UNDEFINED
9.15	30	14.73	0.41	2.79	1.16	clayey silt to silty clay	UNDFND	UNDFD	7	.8
9.45	31	11.08	0.21	1.91	1.19	clayey silt to silty clay	UNDFND	UNDFD	5	.6
9.75	32	11.52	0.25	2.21	1.22	clayey silt to silty clay	UNDFND	UNDFD	6	.6
10.05	33	16.80	0.64	3.79	1.25	silty clay to clay	UNDFND	UNDFD	11	.9
10.35	34	44.45	0.91	2.05	1.28	sandy silt to clayey silt	UNDFND	UNDFD	17	2.8
10.65	35	65.04	1.15	1.77	1.30	silty sand to sandy silt	50-60	36-38	21	UNDEFINED
10.95	36	53.39	1.38	2.58	1.33	sandy silt to clayey silt	UNDFND	UNDFD	20	3.4
11.25	37	38.46	0.98	2.56	1.36	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
11.55	38	38.88	1.04	2.67	1.39	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-67b

GROUP DELTA CONSULTANTS

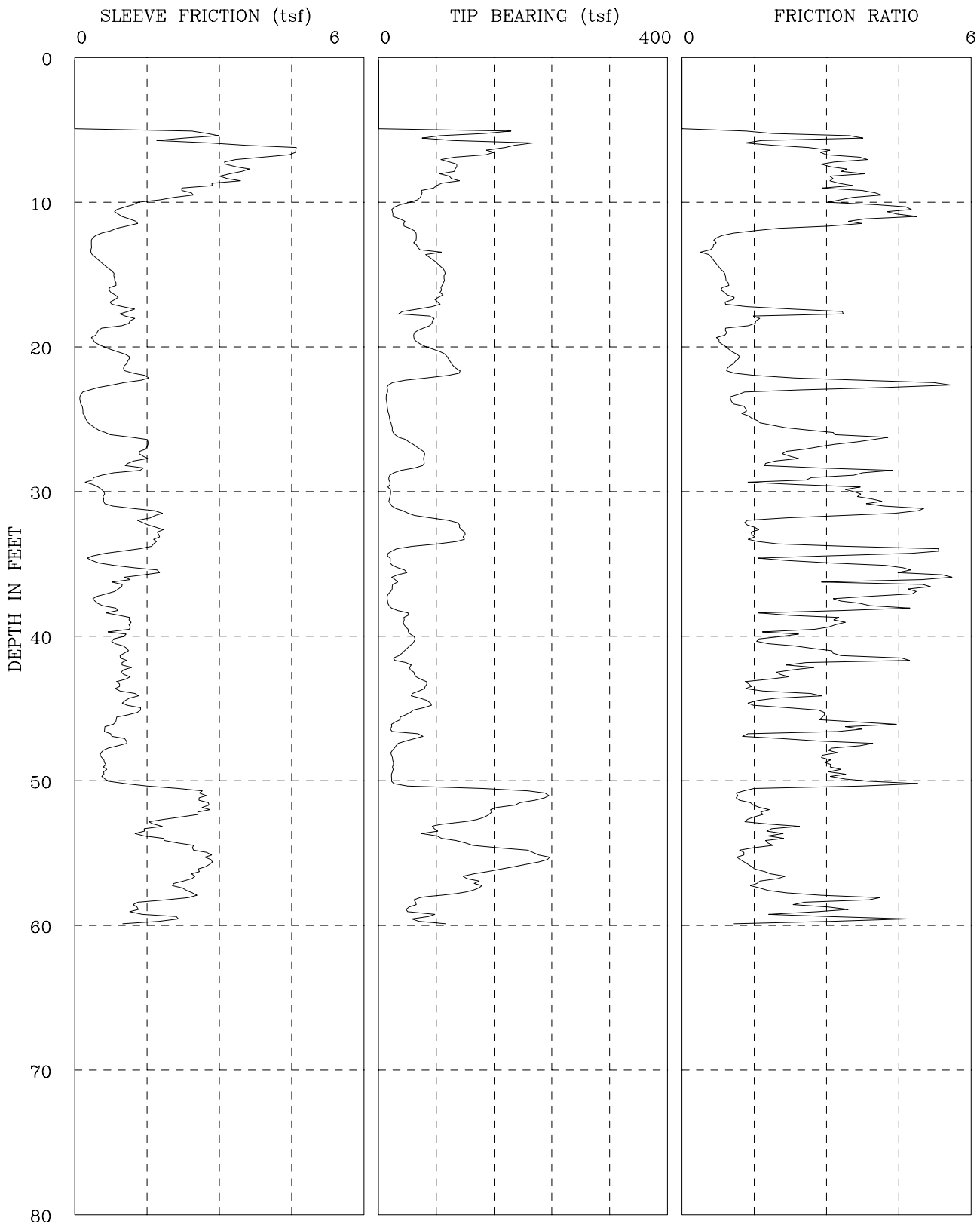
Cone Used : CPT-09-131 Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	61.16	1.54	2.52	1.42	sandy silt to clayey silt	UNDFND	UNDFD	23	3.9
12.15	40	32.25	1.35	4.19	1.44	silty clay to clay	UNDFND	UNDFD	21	1.9
12.45	41	34.35	1.29	3.76	1.47	clayey silt to silty clay	UNDFND	UNDFD	16	2.1
12.80	42	15.85	0.47	2.96	1.50	clayey silt to silty clay	UNDFND	UNDFD	8	.8
13.10	43	17.11	0.51	2.99	1.53	clayey silt to silty clay	UNDFND	UNDFD	8	.9
13.40	44	16.27	0.54	3.33	1.56	silty clay to clay	UNDFND	UNDFD	10	.9
13.75	45	82.76	1.55	1.87	1.59	silty sand to sandy silt	50-60	36-38	26	UNDEFINED
14.05	46	237.85	3.38	1.42	1.62	sand to silty sand	80-90	42-44	>50	UNDEFINED
14.35	47	212.91	2.05	0.96	1.65	sand	80-90	42-44	41	UNDEFINED
14.65	48	147.90	1.61	1.09	1.68	sand to silty sand	70-80	40-42	35	UNDEFINED
14.95	49	143.80	1.58	1.10	1.71	sand to silty sand	60-70	40-42	34	UNDEFINED
15.25	50	214.52	2.15	1.00	1.74	sand	80-90	40-42	41	UNDEFINED
15.55	51	245.81	3.13	1.27	1.77	sand	80-90	42-44	47	UNDEFINED
15.85	52	181.71	2.87	1.58	1.79	sand to silty sand	70-80	40-42	44	UNDEFINED
16.15	53	145.98	2.52	1.72	1.82	sand to silty sand	60-70	40-42	35	UNDEFINED
16.45	54	167.43	2.83	1.69	1.85	sand to silty sand	70-80	40-42	40	UNDEFINED
16.75	55	171.09	2.63	1.54	1.88	sand to silty sand	70-80	40-42	41	UNDEFINED
17.05	56	115.50	2.82	2.44	1.91	silty sand to sandy silt	60-70	38-40	37	UNDEFINED
17.35	57	127.92	2.21	1.72	1.94	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
17.65	58	52.15	1.52	2.91	1.96	sandy silt to clayey silt	UNDFND	UNDFD	20	3.2
17.95	59	23.07	0.69	2.98	1.99	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
18.25	60	41.55	1.00	2.41	2.02	sandy silt to clayey silt	UNDFND	UNDFD	16	2.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-67c



CPT−09−132	I−436 SR−22
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-68a

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-132 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.00	0.00	0.00	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.00	0.00	0.00	0.09	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.00	0.00	0.00	0.15	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	0.00	0.00	0.00	0.22	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.55	5	30.55	0.41	1.33	0.28	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
1.85	6	132.99	2.68	2.01	0.33	silty sand to sandy silt	>90	46-48	42	UNDEFINED
2.15	7	137.70	4.24	3.08	0.39	sandy silt to clayey silt	UNDFND	UNDFD	>50	9.1
2.45	8	101.94	3.32	3.25	0.45	sandy silt to clayey silt	UNDFND	UNDFD	39	6.7
2.75	9	92.67	2.92	3.15	0.51	sandy silt to clayey silt	UNDFND	UNDFD	36	6.1
3.05	10	55.87	2.04	3.66	0.57	clayey silt to silty clay	UNDFND	UNDFD	27	3.6
3.35	11	21.88	0.98	4.46	0.61	clay	UNDFND	UNDFD	21	1.4
3.65	12	38.40	1.07	2.78	0.64	sandy silt to clayey silt	UNDFND	UNDFD	15	2.5
3.95	13	51.80	0.40	0.77	0.67	silty sand to sandy silt	50-60	38-40	17	UNDEFINED
4.25	14	68.08	0.38	0.56	0.70	sand to silty sand	60-70	40-42	16	UNDEFINED
4.55	15	86.76	0.68	0.78	0.73	sand to silty sand	60-70	40-42	21	UNDEFINED
4.85	16	89.54	0.82	0.91	0.76	sand to silty sand	60-70	40-42	21	UNDEFINED
5.15	17	84.29	0.79	0.94	0.78	sand to silty sand	60-70	40-42	20	UNDEFINED
5.45	18	57.65	1.02	1.76	0.81	silty sand to sandy silt	50-60	38-40	18	UNDEFINED
5.75	19	68.97	0.92	1.34	0.84	silty sand to sandy silt	50-60	40-42	22	UNDEFINED
6.05	20	51.96	0.43	0.82	0.87	silty sand to sandy silt	40-50	38-40	17	UNDEFINED
6.40	21	87.45	0.95	1.09	0.90	sand to silty sand	60-70	40-42	21	UNDEFINED
6.70	22	105.85	1.14	1.08	0.93	sand to silty sand	60-70	40-42	25	UNDEFINED
7.00	23	26.84	0.92	3.43	0.96	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
7.35	24	11.60	0.13	1.13	0.99	clayey silt to silty clay	UNDFND	UNDFD	6	.6
7.65	25	14.41	0.20	1.39	1.02	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
7.95	26	19.62	0.49	2.48	1.05	clayey silt to silty clay	UNDFND	UNDFD	9	1.2
8.25	27	44.40	1.45	3.27	1.08	clayey silt to silty clay	UNDFND	UNDFD	21	2.8
8.55	28	63.26	1.33	2.09	1.11	silty sand to sandy silt	50-60	38-40	20	UNDEFINED
8.85	29	32.33	0.93	2.88	1.13	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
9.15	30	15.54	0.44	2.82	1.16	clayey silt to silty clay	UNDFND	UNDFD	7	.9
9.45	31	16.31	0.64	3.91	1.19	silty clay to clay	UNDFND	UNDFD	10	.9
9.75	32	52.99	1.54	2.90	1.22	sandy silt to clayey silt	UNDFND	UNDFD	20	3.4
10.05	33	114.84	1.65	1.44	1.25	sand to silty sand	60-70	40-42	28	UNDEFINED
10.35	34	83.15	1.61	1.94	1.28	silty sand to sandy silt	50-60	38-40	27	UNDEFINED
10.65	35	15.60	0.52	3.32	1.30	silty clay to clay	UNDFND	UNDFD	10	.9
10.95	36	27.84	1.33	4.79	1.33	clay	UNDFND	UNDFD	27	1.7
11.25	37	20.85	0.94	4.50	1.36	clay	UNDFND	UNDFD	20	1.2
11.55	38	13.04	0.50	3.80	1.39	silty clay to clay	UNDFND	UNDFD	8	.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-68b

GROUP DELTA CONSULTANTS

Cone Used : CPT-09-132 | Job No. : I-436 WCC I405/SR22
Depth to water table (ft) : 10 | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	33.00	0.93	2.83	1.42	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0
12.15	40	39.13	1.06	2.70	1.44	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
12.45	41	46.66	0.92	1.98	1.47	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
12.80	42	32.07	1.01	3.15	1.50	clayey silt to silty clay	UNDFND	UNDFD	15	1.9
13.10	43	49.53	1.06	2.15	1.53	sandy silt to clayey silt	UNDFND	UNDFD	19	3.1
13.40	44	60.86	0.96	1.58	1.56	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
13.75	45	61.05	1.19	1.95	1.59	silty sand to sandy silt	40-50	36-38	19	UNDEFINED
14.05	46	30.55	0.97	3.16	1.62	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
14.35	47	36.91	0.74	2.00	1.65	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
14.65	48	24.80	0.82	3.29	1.68	clayey silt to silty clay	UNDFND	UNDFD	12	1.4
14.95	49	19.72	0.59	3.01	1.71	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
15.25	50	18.79	0.63	3.34	1.74	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
15.55	51	146.61	2.11	1.44	1.77	sand to silty sand	60-70	40-42	35	UNDEFINED
15.85	52	191.70	2.69	1.41	1.79	sand to silty sand	70-80	40-42	46	UNDEFINED
16.15	53	133.98	2.06	1.54	1.82	sand to silty sand	60-70	38-40	32	UNDEFINED
16.45	54	77.08	1.54	2.00	1.85	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
16.75	55	157.21	2.35	1.50	1.88	sand to silty sand	70-80	40-42	38	UNDEFINED
17.05	56	217.65	2.79	1.28	1.91	sand	70-80	40-42	42	UNDEFINED
17.35	57	138.56	2.46	1.77	1.94	silty sand to sandy silt	60-70	38-40	44	UNDEFINED
17.65	58	124.13	2.27	1.83	1.96	silty sand to sandy silt	60-70	38-40	40	UNDEFINED
17.95	59	48.60	1.57	3.22	1.99	clayey silt to silty clay	UNDFND	UNDFD	23	3.0
18.25	60	63.86	1.59	2.49	2.02	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-68c

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Relatively undisturbed Modified California drive samples and Standard Penetration Test (SPT) samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples were then transported to laboratory for examination and testing. Tests were performed on selected samples as an aid in classifying the soils and to evaluate their physical properties and engineering characteristics. This investigation included determination of moisture content and dry unit weight, Atterberg Limits, Grain Size Distribution and Percent Passing No. 200 Sieve, Direct Shear, and Soil Corrosivity. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

The subsurface materials were classified visually in the field using the Unified Soil Classification System (USCS), in accordance with ASTM Test Methods D2487 and D2488. Soil classifications were modified as necessary based on further inspection and testing in the laboratory. The USCS soil classifications are presented on key for soil classification and on the boring logs Figures A-1a through A-17d and Figures A-50 through A-57 of Appendix A.

B.3 Moisture Content and Dry Unit Weight

The field moisture and dry unit weight of each relatively undisturbed sample were determined in general accordance with ASTM D2216. The samples were trimmed to obtain volume and wet weight then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The moisture content of selected SPT samples was also determined. Results of these tests are presented on the boring logs in Figures A-2a through A-17d of Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of the encountered soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D4318. Results of these tests are presented on the boring logs in Figures A-2a and A-17d and Figures A-50 through A-57 of Appendix A and in Figures B-1a through B-1f of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (i.e., soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D1140. For selected samples, the material was run through a standard set of sieves in accordance with ASTM D422. The results of grain size distribution tests performed are provided in Figure B-2. The relative proportion (or percentage) by dry weight percent fines (finer than No. 200 sieve) determined from grain size analyses is provided on the boring logs in Figures A-2a through A-17d and Figures A-50 through A-57 of Appendix A.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples in accordance with ASTM D3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was submerged, allowed to consolidate, and then was sheared to failure. Shear stress and sample deformations were monitored throughout the test. The process was repeated under two additional normal loads. The test results are presented in Figures B-3a through B-3e.

B.7 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included soil pH (Caltrans method 643), water-soluble chlorides (Caltrans Test Method 422), water-soluble sulfates (Caltrans Test Method 417) and electrical resistivity (Caltrans Test Method 643). The test results are summarized in Table B-1.

B.8 List of Attached Table and Figures

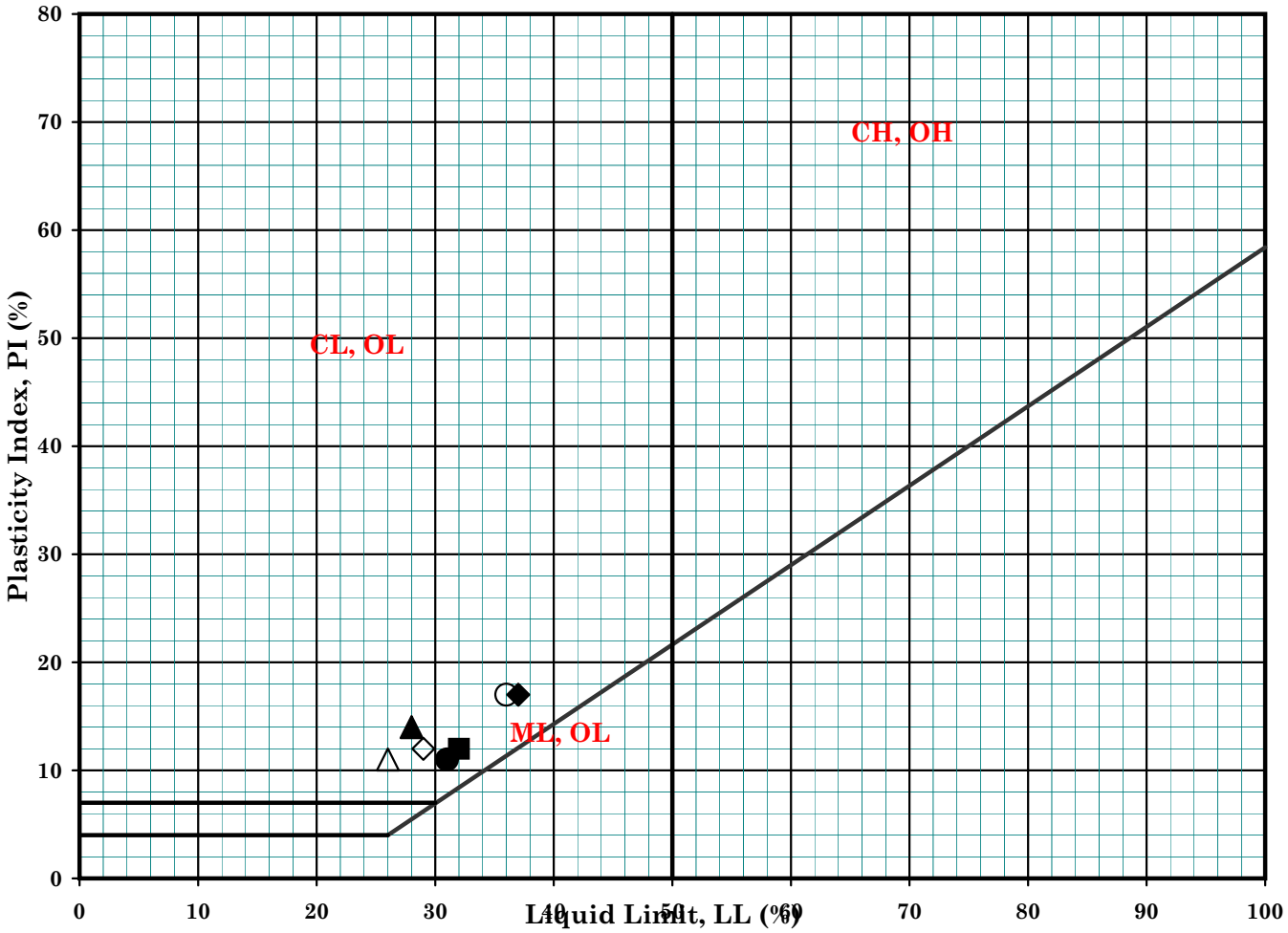
The following Table and figures are attached and complete this appendix:

Table 1	Summary of Corrosion Test Results
Figures B-1a through B-1f	Atterberg Limits Test Results
Figure B-2	Grain Size Distribution Test Results
Figures B-3a through B-3e	Direct Shear Test Results

TABLE B-1:
SUMMARY OF CORROSION TEST RESULTS

Boring No.	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride Content CTM 422 (ppm)
A-08-101	B-1	1-5	SC	2000	8.5	100	30
A-08-105	R-2	10-11.5	CL	NA	9.3	74	218
A-08-112	B-1	1.5-5	SC	<500	8.2	3900	626
A-08-116	S-3	10-11.5	CL	NA	8.3	4720	388
A-08-119	R-5	20-21.5	CL	NA	7.9	1140	96
A-08-122	B-1	1.2-5	SC	2750	8.3	132	163
R-08-004	B-1	1.5-3.5	CL	1350	9.1	465	604
R-08-011	S-3	15-16.5	CL	NA	8.2	189	1330
R-08-017	R-4	20-21.5	CL	NA	7.7	62	1311
R-08-017	S-7	35-36.5	ML	NA	8.8	576	255
R-08-019	S-7	35-36.5	SM	NA	8.5	538	336
R-08-023	S-4	20-21.5	CL	NA	7.8	2432	2897
R-08-023	S-6	30-31.5	CL	NA	8.0	490	25

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-101	B-1	1.0	2.5	0.3	0.8	12	31	20	11	-0.73	Brown Clayey Sand (SC)
▲	A-08-105	B-1	1.2	5.0	0.4	1.5	11	28	14	14	-0.21	Brown Clayey Sand (SC)
◆	A-08-116	R-2	6.0	6.5	1.8	2.0	23	37	20	17	0.18	Olive Brown Lean Clay (CL)
■	A-08-119	B-1	1.0	5.0	0.3	1.5	15	32	20	12	-0.42	Olive Brown Clayey Sand (SC)
○	A-08-120	R-4	16.0	16.5	4.9	5.0	29	36	19	17	0.59	Dark Brown Lean Clay with Sand (CL)
△	A-08-122	B-1	1.0	5.0	0.3	1.5	7	26	15	11	-0.73	Light Brown Clayey Sand (SC)
◇	R-08-004	B-1	1.3	3.5	0.4	1.1	16	29	17	12	-0.08	Dark Brown Sandy Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

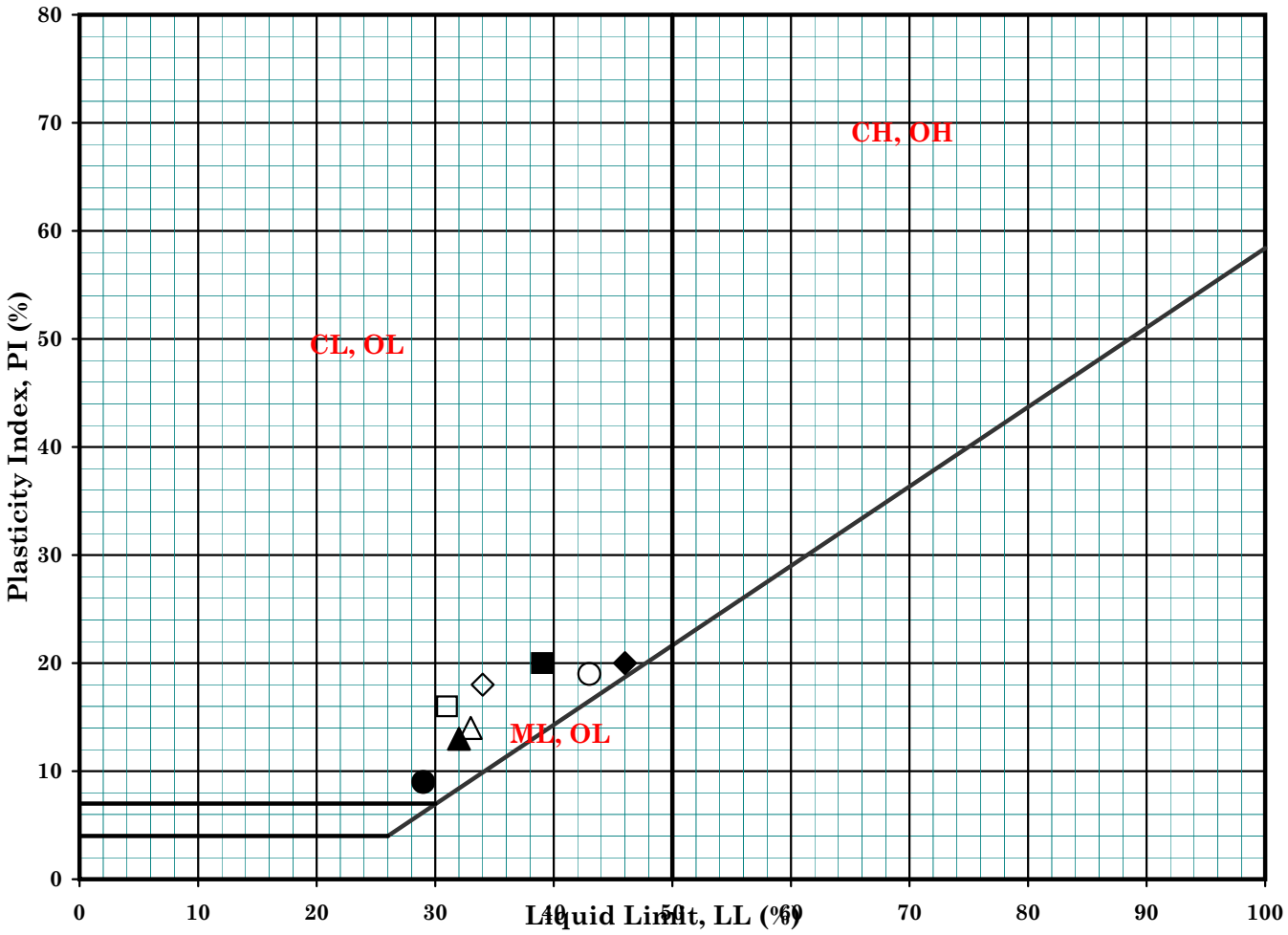
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1a

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-005	B-1	2.0	5.0	0.6	1.5	16	29	20	9	-0.44	Gray Sandy Lean Clay (CL)
▲	R-08-005	R-1	6.0	6.5	1.8	2.0	19	32	19	13	0.00	Dark Gray Sandy Lean Clay (CL)
◆	R-08-005	S-6	30.0	32.0	9.2	9.8	41	46	26	20	0.75	Gray Brown Lean Clay (CL)
■	R-08-005	S-7	40.0	41.5	12.2	12.7	31	39	19	20	0.60	Gray Brown Lean Clay (CL)
○	R-08-005	R-9	71.0	71.5	21.7	21.8	45	43	24	19	1.11	Lean Clay with Sand (CL)
△	R-08-011	S-1	5.0	6.5	1.5	2.0	19	33	19	14	0.00	Olive Brown Clayey Sand (SC)
◇	R-08-011	R-4	21.0	21.5	6.4	6.6	24	34	16	18	0.44	Olive Brown Sandy Lean Clay (CL)
□	R-08-011	R-12	71.0	71.5	21.7	21.8	17	31	15	16	0.13	Light Brown Gray Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

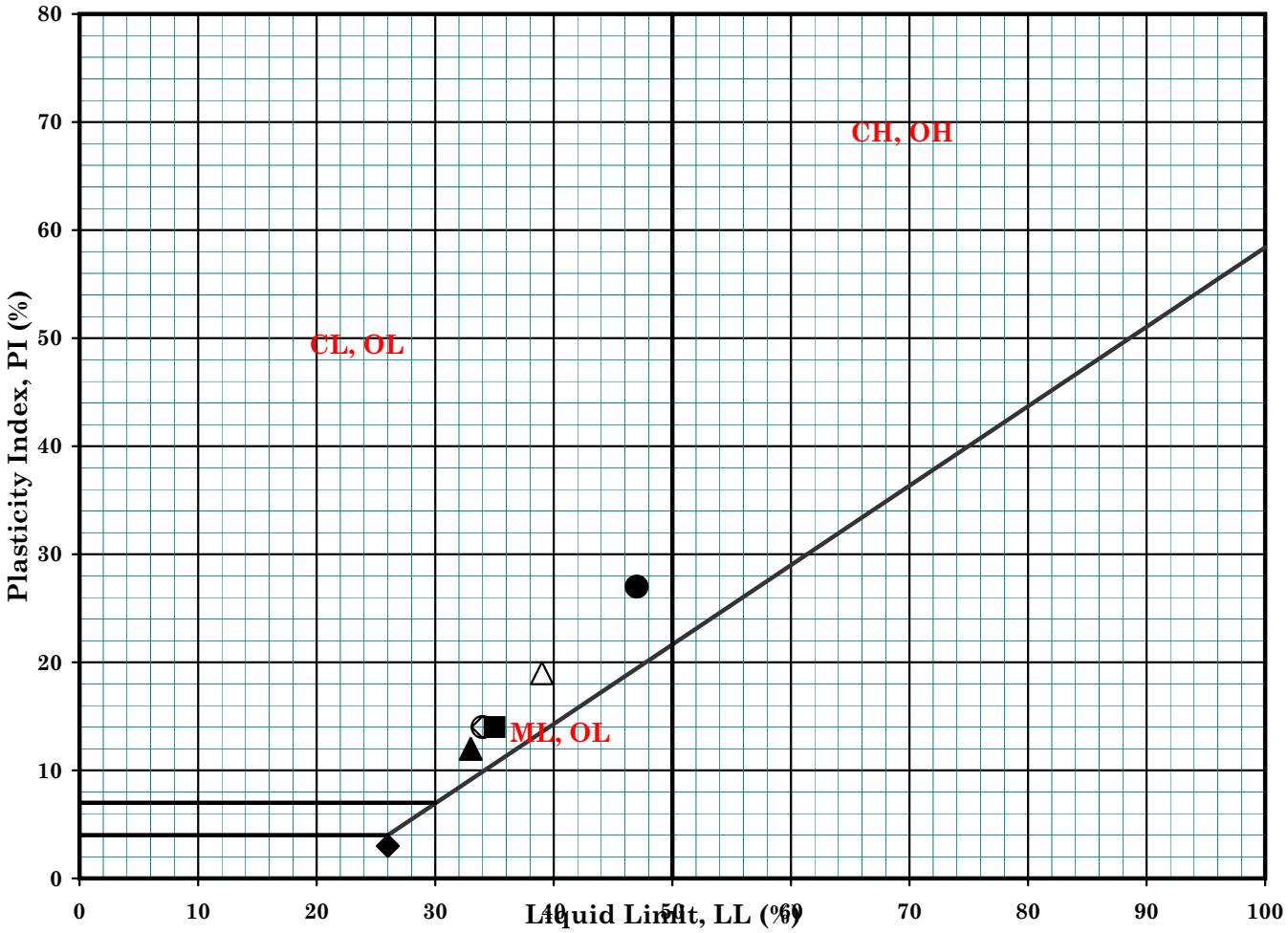
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1b

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-012	R-1	6.0	6.5	1.8	2.0	28	47	20	27	0.30	Dark Brown Lean Clay with Sand (CL)
▲	R-08-012	R-5	26.0	26.5	7.9	8.1	29	33	21	12	0.67	Dark Brown Lean Clay with Sand (CL)
◆	R-08-012	R-9	46.0	46.5	14.0	14.2	26	26	23	3	1.00	Dark Brown Sandy Silt (ML)
■	R-08-017	R-2	11.0	11.5	3.4	3.5	32	35	21	14	0.79	Dark Brown Lean Clay with Sand (CL)
○	R-08-017	S-3	15.0	16.5	4.6	5.0	27	34	20	14	0.50	Light Brown Sandy Lean Clay (CL)
△	R-08-017	R-8	41.0	41.5	12.5	12.7	28	39	20	19	0.42	Gray Brown Lean Clay (CL)
◇	R-08-019	S-1	5.0	6.5	1.5	2.0	20	34	20	14	0.00	Red Brown Sandy Lean Clay (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

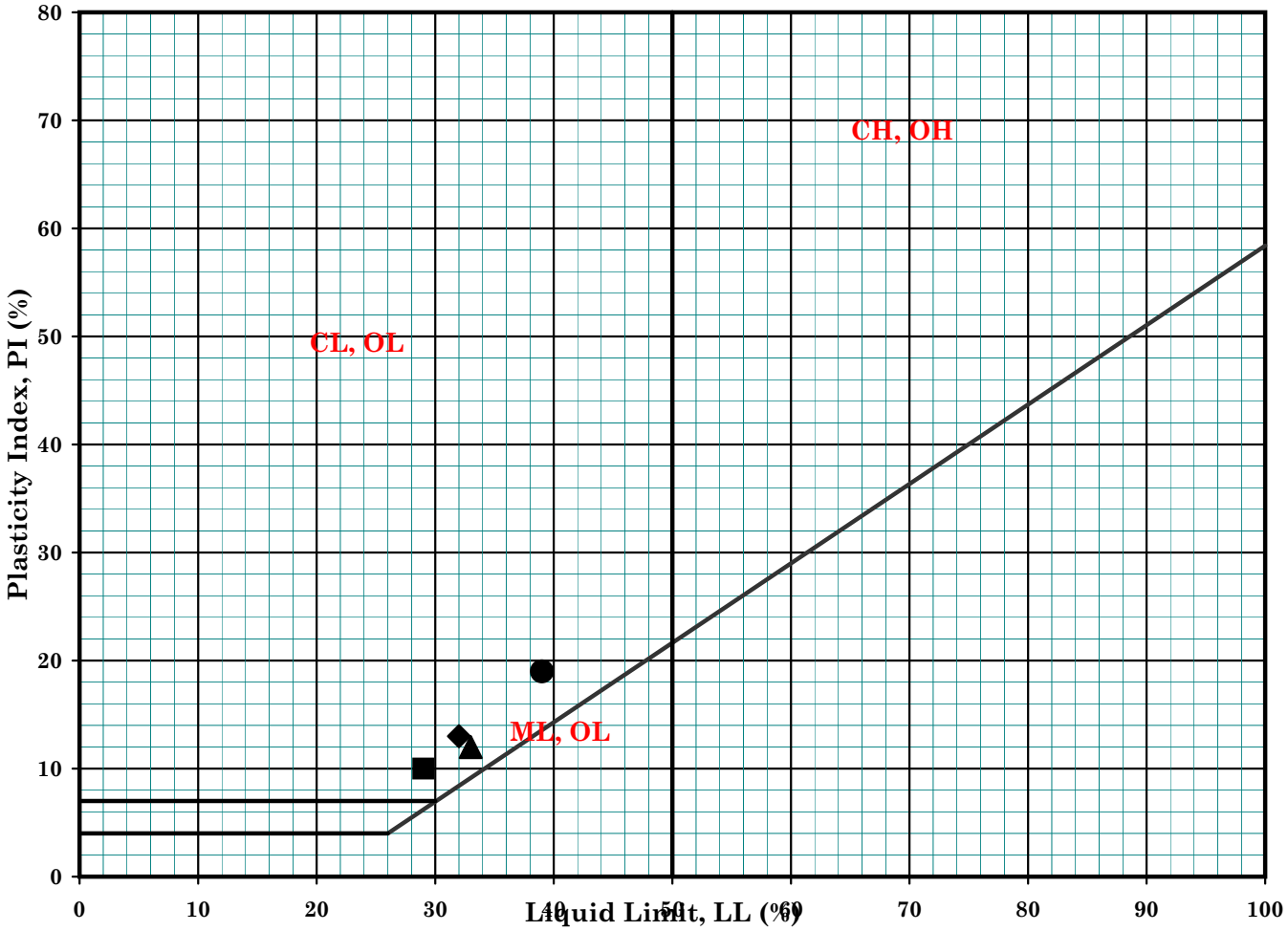
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1c

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	R-08-019	R-2	11.0	11.5	3.4	3.5	17	39	20	19	-0.16	Brown Yellow Clayey Sand (SC)
▲	R-08-019	R-6	31.0	31.5	9.5	9.6	19	33	21	12	-0.17	Gray Brown Lean Clay (CL)
◆	R-08-023	R-1	6.0	6.5	1.8	2.0	10	32	19	13	-0.69	Red Brown Sandy Lean Clay (CL)
■	R-08-023	S-8	40.0	41.5	12.2	12.7	24	29	19	10	0.50	Light Brown Gray Clayey Sand/Sandy Lean Clay (SC/CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

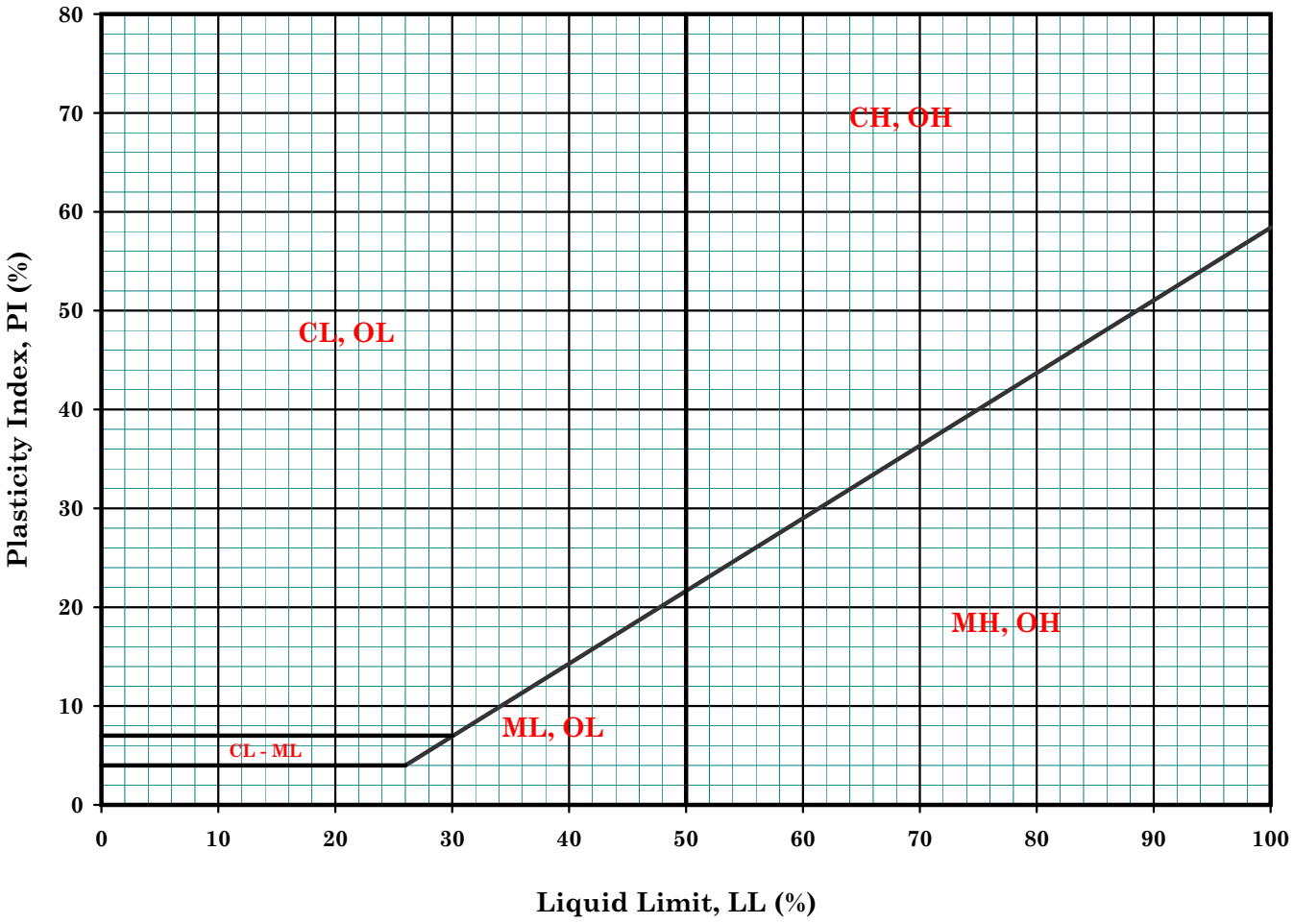
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

Figure No. : B-1d

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	A-08-105	R-5	41.0	41.5	12.5	12.7	22	Non-Plastic			-	Olive Brown Silty Sand (SM)
▲	A-08-112	S-4	15.0	16.5	4.6	5.0	32	Non-Plastic			-	Olive Gray Silt with Sand (ML)
◆	A-08-120	R-8	36.0	36.5	11.0	11.1	25	Non-Plastic			-	Dark Brown Sandy Silt (ML)

Remarks :

GROUP DELTA CONSULTANTS

SR-22 West County Connector Segment

Project No. : I-436

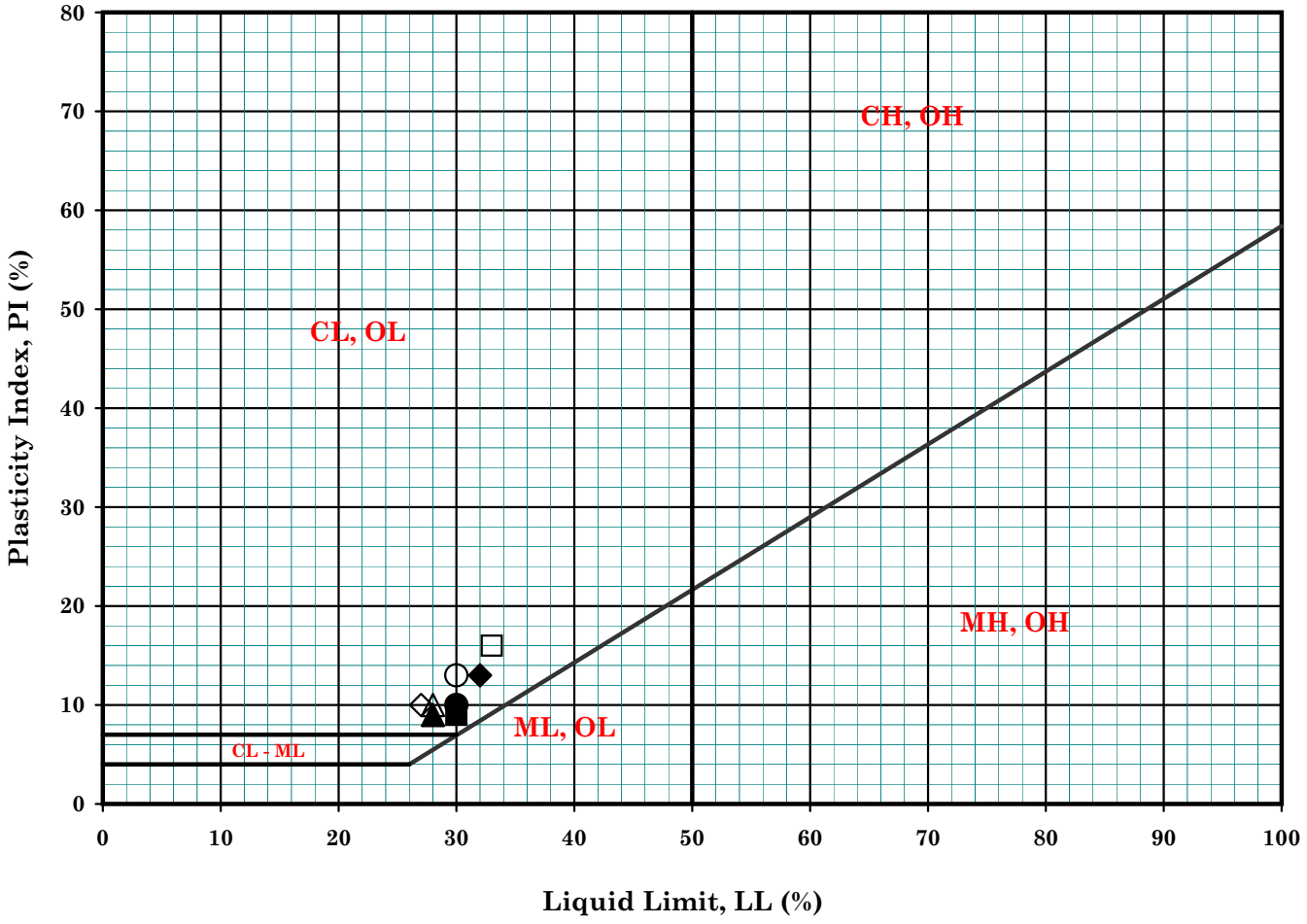
Date : 05/30/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1e

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	LI	Description
●	HA-08-01	B-1	0.0	5.0	0.0	1.5	N/A	30	20	10	N/A	Light Brown Sandy CLAY (CL)
▲	HA-08-02	B-1	0.0	5.0	0.0	1.5	N/A	28	19	9	N/A	Grayish Brown Sandy CLAY (CL)
◆	HA-08-03	B-1	0.0	5.0	0.0	1.5	N/A	32	19	13	N/A	Grayish Brown Sandy CLAY (CL)
■	HA-08-04	B-1	0.0	5.0	0.0	1.5	N/A	30	21	9	N/A	Brown Sandy CLAY (CL)
○	HA-08-05	B-1	0.0	5.0	0.0	1.5	N/A	30	17	13	N/A	Grayish Brown Sandy CLAY (CL)
△	HA-08-06	B-1	0.0	5.0	0.0	1.5	N/A	28	18	10	N/A	Dark Brown Sandy CLAY (CL)
◇	HA-08-07	B-1	0.0	5.0	0.0	1.5	N/A	27	17	10	N/A	Light Brown Clayey SAND (SC)
□	HA-08-08	B-1	0.0	5.0	0.0	1.5	N/A	33	17	16	N/A	Dark Brown Sandy CLAY (CL)

Remarks :

GROUP DELTA CONSULTANTS

SR-22

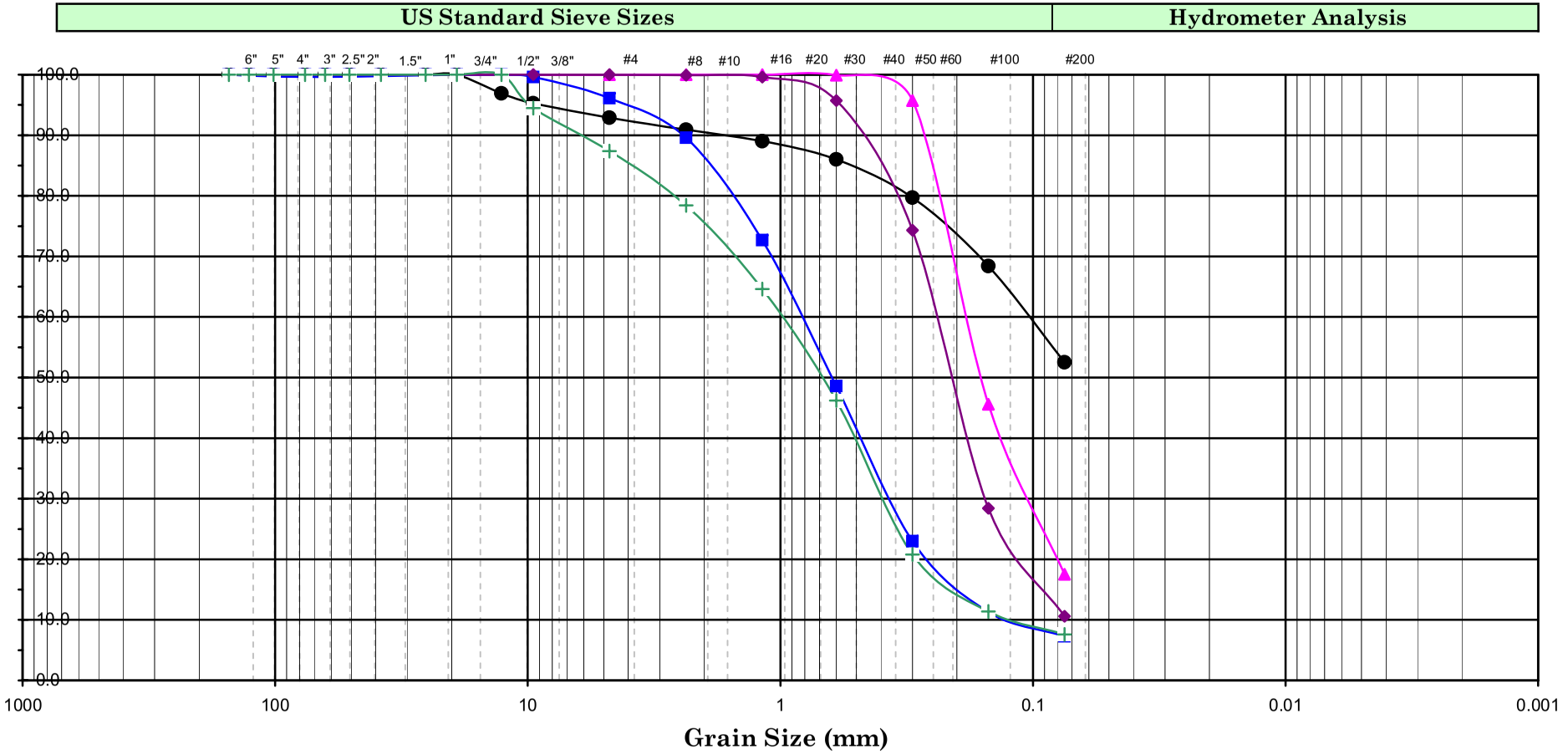
Project No. : I-436

Date : 10/14/08

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1f



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	R-08-005	R-1	5.0	6.5	1.53	1.98	Gray	Sandy Lean Clay (CL)	CL
▲	R-08-005	S-2	10.0	11.5	3.05	3.51	Gray Brown	Silty Sand (SM)	SM
■	R-08-011	S-11	60.0	61.3	18.30	18.70	Gray Brown	Well Graded Sand with Silt (SW-SM)	SW-SM
◆	R-08-023	S-13	45.0	46.5	13.73	14.18	Brown	Poorly Graded Sand with Silt (SP-SM)	SP-SM
+	A-08-116	B-1	1.0	5.0	0.31	1.53	Yellow Brown	Well Graded Sand with Silt (SW-SM)	SW-SM

Remark :

GROUP DELTA CONSULTANTS

SR-22

GRAIN SIZE ANALYSIS

(ASTM D-422-63)

Project No. : I-436

Date : 05/28/08

Figure No. : B-2

DIRECT SHEARS

GLA JOB NO. : **2002-017**
CLIENT: **Group Delta # I-436**
JOB NAME:

DATE: 6/12/2008

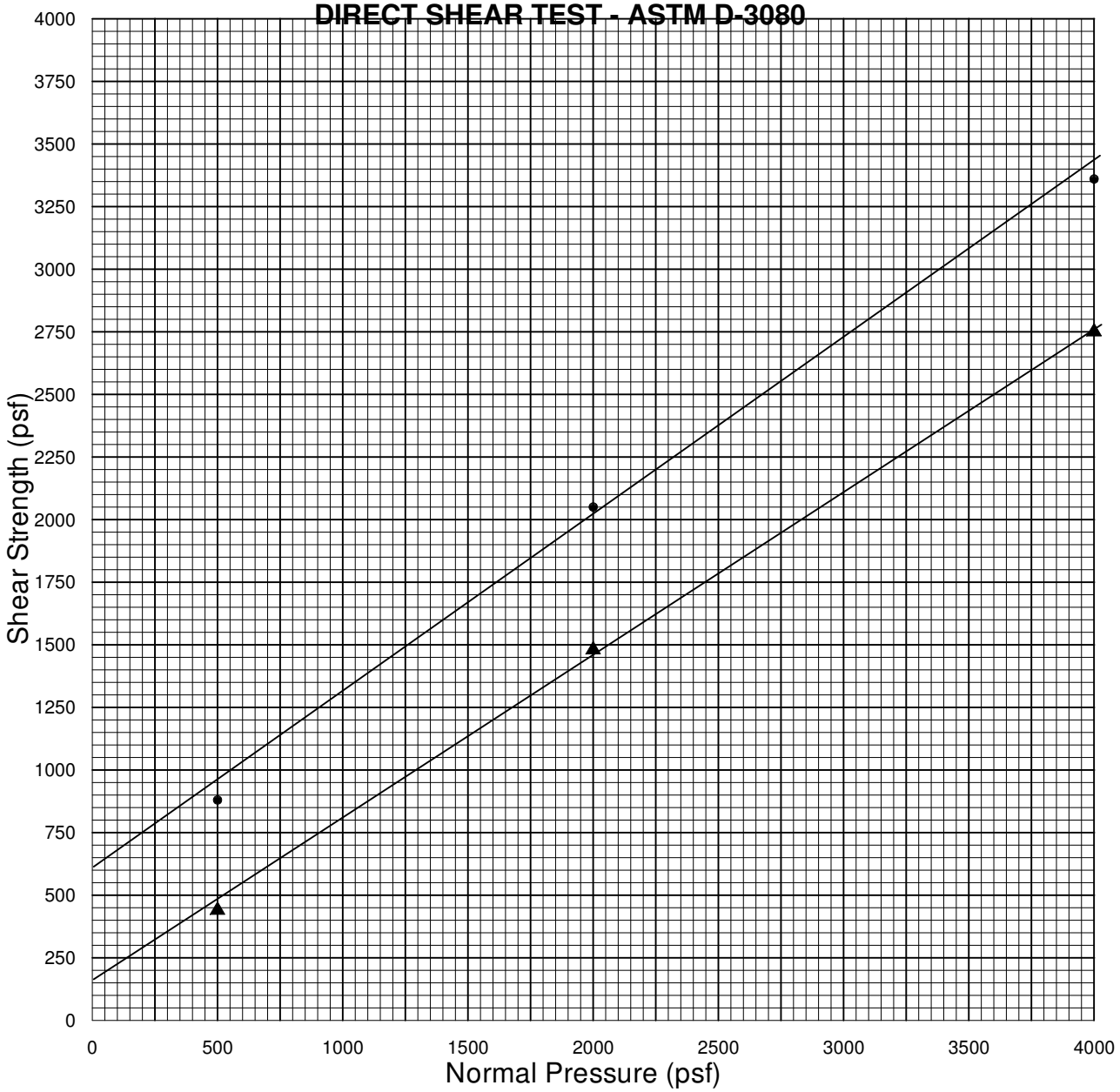
BY: LD

SAMPLE	DESCRIPTION	DRY DENSITY (PCF)	WATER CONTENT (%)	SHEAR RATE (IN/MIN.)	NORMAL STRESS (PSF)	PEAK SHEAR STRESS (PSF)	SHEAR STRESS (PSF) @ 0.25 IN.
R-08-004 / R-6	Clayey Silt w. Siltstone	96.4	26.7	0.0042	1500	1200 @ 0.095	1100
R-08-005 / R-3	Silty Clay	99.3	25.3	0.0042	800	780 @ 0.11	700
R-08-005 / R-3	Silty Clay	99.0	25.3	0.0042	5000	3350 @ 0.185	3320
R-08-012 / R-3	Silty Clay	103.7	24.1	0.0042	4000	2540 @ 0.245	2530
R-08-019 / R-8	Silty Clay	104.3	23.3	0.0042	3000	2140 @ 0.15	1970
R-08-019 / R-8	Silty Clay	104.7	23.3	0.0042	7000	4880 @ 0.2	4730
R-08-023 / R-7	Silty Clay	85.5	37.9	0.0042	2000	1340 @ 0.09	1180

FIGURE B-3a

• peak shear strength ▲ strength at 1/4" displacement

DIRECT SHEAR TEST - ASTM D-3080



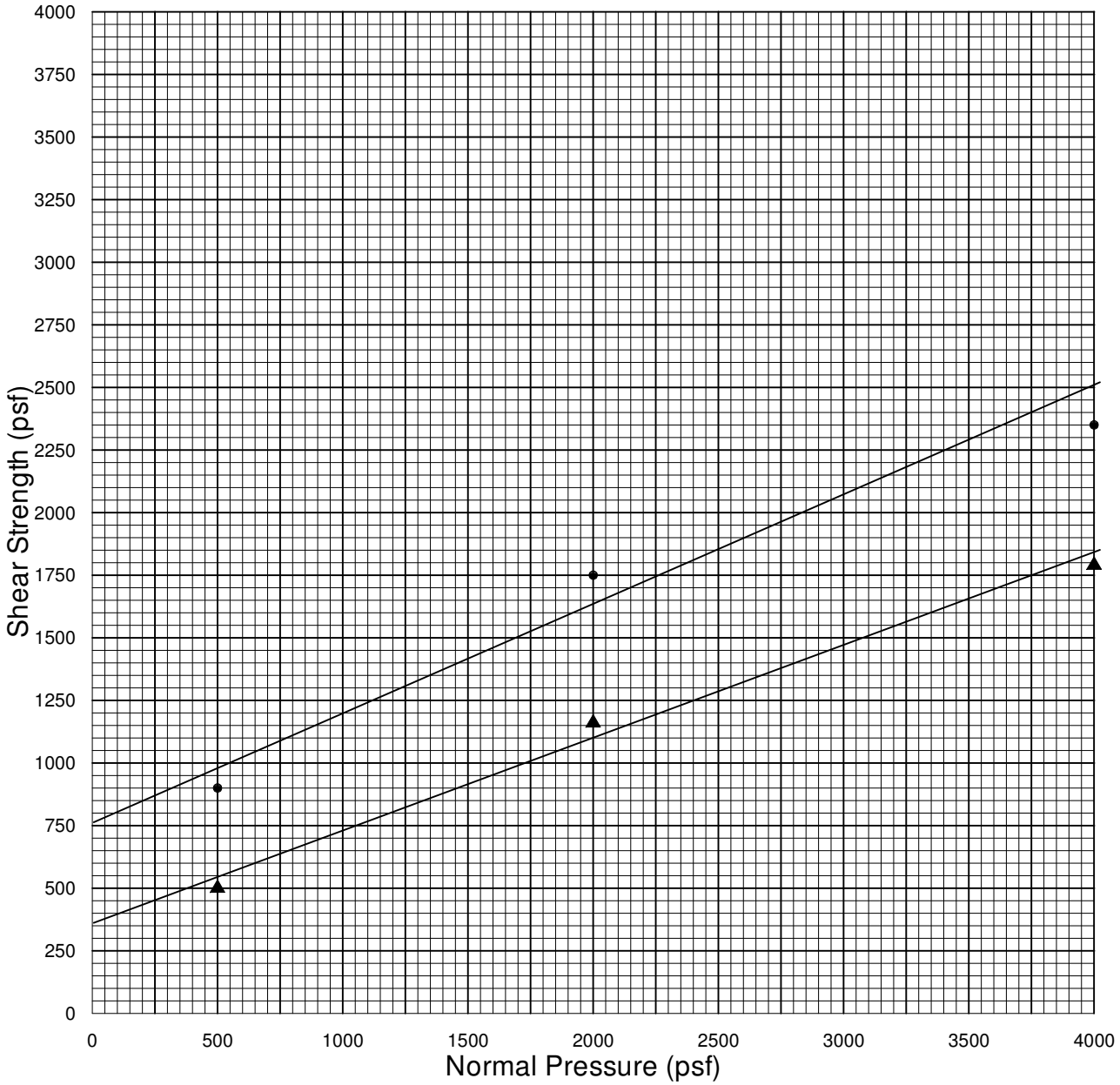
Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-004 @ 3'-5'	Undisturbed & Saturated	Sandy Lean Clay	120.4	10.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	880 @ 0.0750"	440
2000	2050 @ 0.1000"	1480
4000	3360 @ 0.1050"	2750
	C = 600 psf	C = 150 psf
	ϕ = 35 deg.	ϕ = 33 deg.

Figure 3b

DIRECT SHEAR TEST - ASTM D-3080

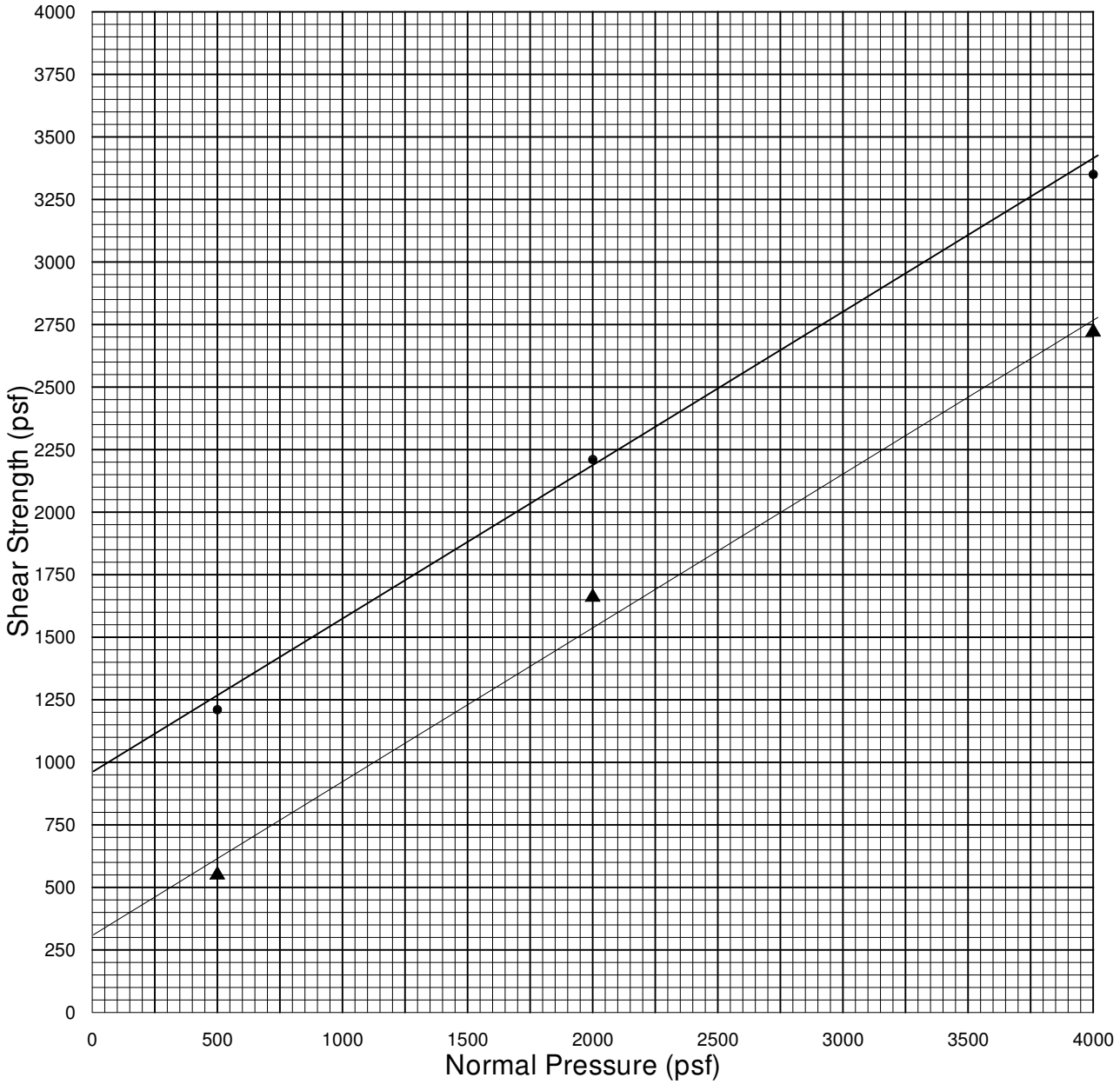


Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-017 @ 10'-11.5'	Undisturbed & Saturated	Lean Clay w/Sand	92.4	25.8

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	900 @ 0.0500"	500
2000	1750 @ 0.0550"	1160
4000	2350 @ 0.0650"	1790
	C = 750 psf	C = 350 psf
	ϕ = 24 deg.	ϕ = 20 deg.

Figure 3c



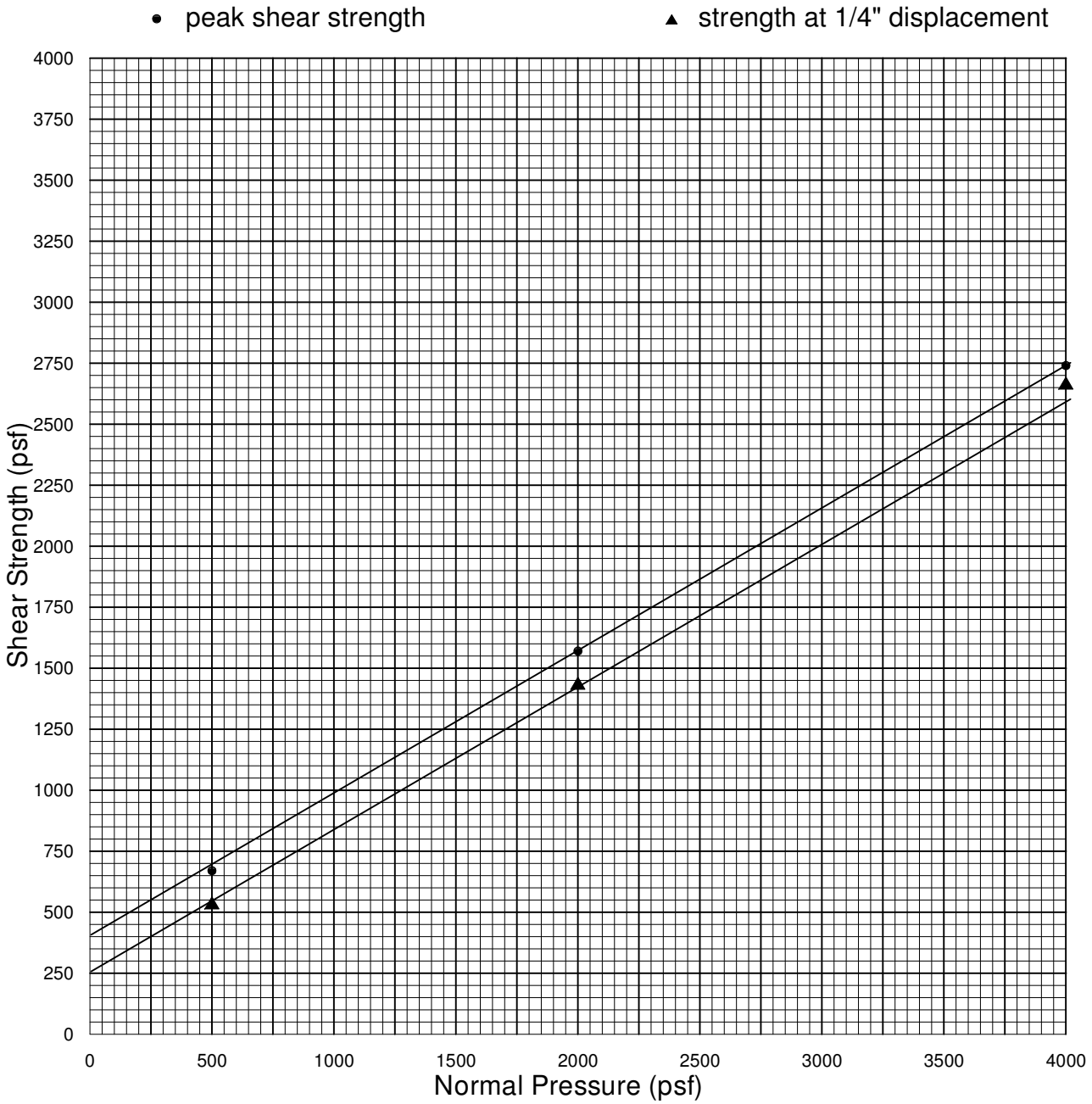
Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-019 @ 10'-11.5'	Undisturbed & Saturated	Sandy Lean Clay	115.5	15.9

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	1210 @ 0.0600"	550
2000	2210 @ 0.0900"	1660
4000	3350 @ 0.0800"	2720
	C = 900 psf	C = 300 psf
	ϕ = 32 deg.	ϕ = 32 deg.

Figure 3d

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
R-08-023 @ 26'-26.5'	Undisturbed & Saturated	Sandy Lean Clay/ Lean Clay w/Sand	94.6	28.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	670 @ 0.1000"	530
2000	1570 @ 0.1200"	1430
4000	2740 @ 0.2000"	2660
	C = 400 psf	C = 250 psf
	ϕ = 30 deg.	ϕ = 30 deg.

Figure 3e

APPENDIX C
STANDARD PLAN SIGN FOUNDATIONS

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Jeffrey B. Woody
REGISTERED CIVIL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Jeffrey B. Woody — No. C41260 — Exp. 3-31-07 — CIVIL — STATE OF CALIFORNIA

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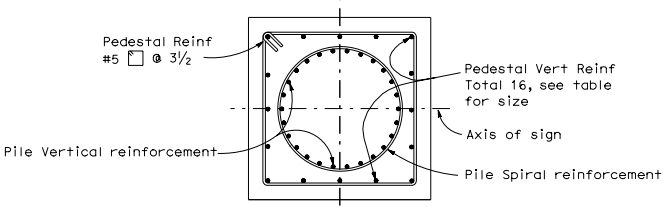
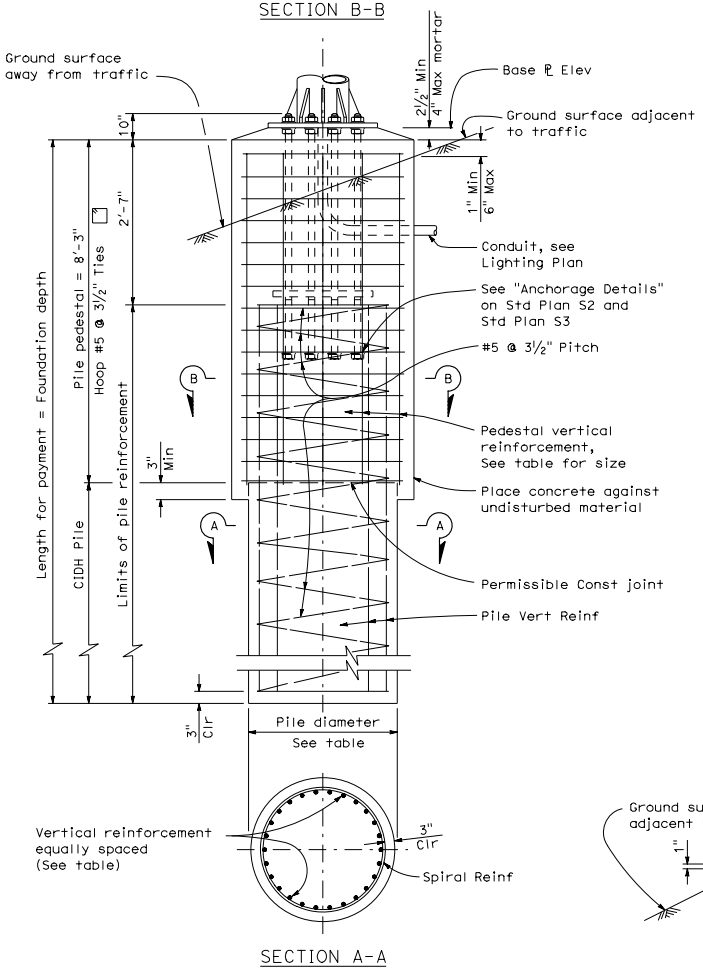


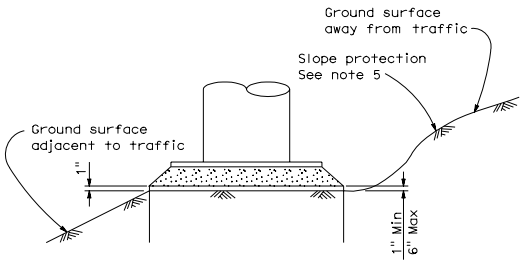
SECTION B-B



SECTION A-A

Post Type No.	Anchor Bolts			Square Pile Pedestal						CIDH Pile					Foundation Depth * *
	Bolt Circle	Bolt Total and Dia	Total Length	Pedestal Square one side	Vertical Reinforcing Total	Vertical Reinforcing Bar Size	Vertical Reinforcing # of bars each face	Hoop Bar Size	Hoop Spacing	Pile Dia	Vertical Reinforcing Total	Vertical Reinforcing Bar Size	Spiral Bar Size	Spiral Pitch	
II	2'-0"	12-2"	4'-2"	5'-3"	16	#10	5	#5	3½"	4'-6"	26	#10	#5	3½"	14'-9"
III	2'-0"	12-2"													16'-0"
IV	2'-0"	12-2"													18'-0"
V	2'-10"	14-2"													19'-0"
VI		16-2½"	5'-0"	5'-9"		#11				5'-0"	28	#11			22'-0"
VII															23'-0"
VIII															25'-0"
IX															25'-0"

* * Use Foundation Depth shown in table unless otherwise shown on the Project Plans.



DETAIL C

NOTES:

1. **For anchor bolt layout, see Standard Plan S3.**
2. For "Base ℄ elevation" see Project Plans.
3. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
4. Pedestal shall be formed 6" minimum below ground surface Remainder to be placed against undisturbed material.
5. Slope protection required when indicated on the Project Plans.
6. Foundation design is based on 2001 AASHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction used is 30 degree and unit weight of soil used is 120 lb/ft^3.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS SINGLE POST TYPE SQUARE PEDESTAL PILE FOUNDATION

NO SCALE

S7

1-4-06

Return to Table of Contents

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Jeffrey B. Woody
REGISTERED CIVIL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Jeffrey B. Woody
No. C41260
Exp. 3-31-07
CIVIL
STATE OF CALIFORNIA

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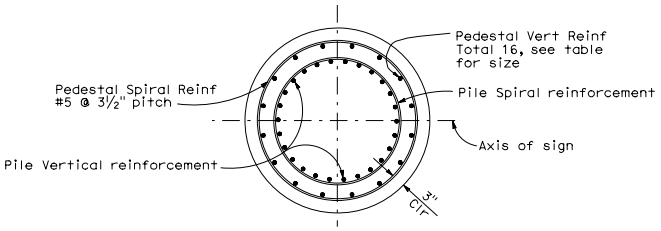
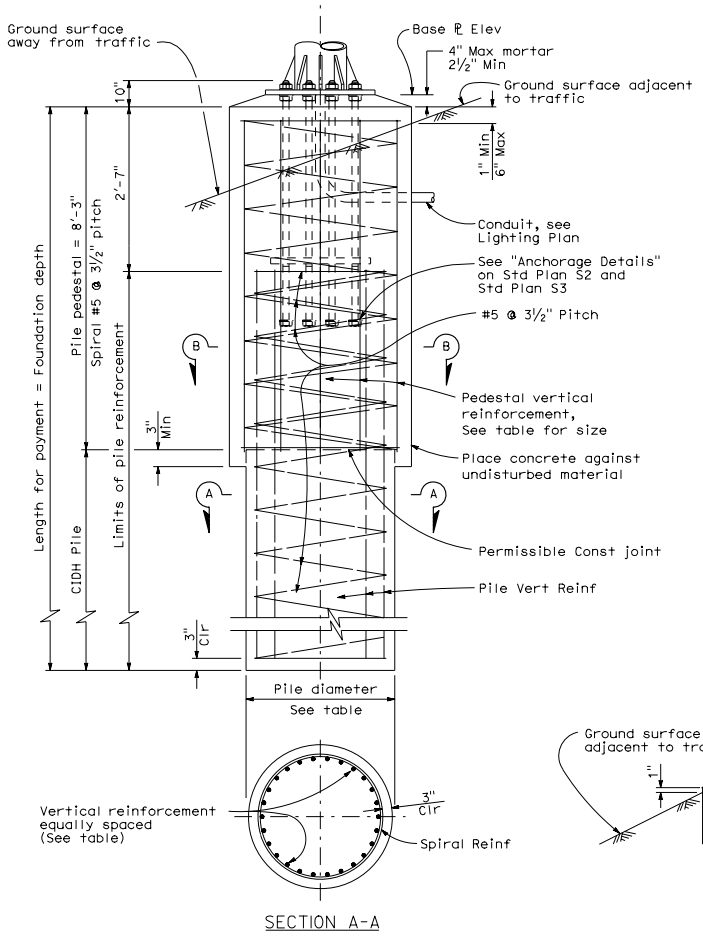
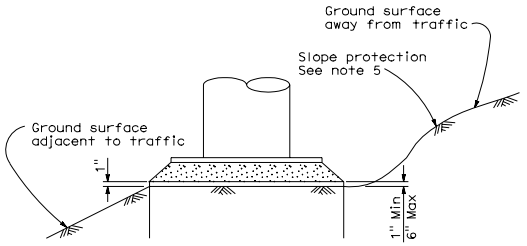


SECTION B-B



SECTION A-A



DETAIL C

Post Type No.	Anchor Bolts			Round Pile Pedestal					CIDH Pile					Foundation Depth **
	Bolt Circle	Bolt Total and Dia	Total Length	Dia	Vertical Reinforcing Total	Vertical Reinforcing Bar Size	Spiral Bar Size	Spiral Pitch	Pile Dia	Vertical Reinforcing Total	Vertical Reinforcing Bar Size	Spiral Bar Size	Spiral Pitch	
II	2'-0"	12-2"	4'-2"	5'-3"	16	#10	#5	3½"	4'-6"	26	#10	#5	3½"	14'-9"
III	2'-0"	12-2"	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	16'-0"
IV	2'-0"	12-2"	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	18'-0"
V	2'-10"	14-2"	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	19'-0"
VI	↓	16-2½"	5'-0"	5'-9"	↓	#11	↓	↓	5'-0"	28	#11	↓	↓	22'-0"
VII	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	23'-0"
VIII	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	25'-0"
IX	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	25'-0"

** Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

NOTES:

1. For anchor bolt layout, see Standard Plan S3.
2. For "Base ℄ elevation" see Project Plans.
3. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
4. Pedestal shall be formed 6" minimum below ground surface Remainder to be placed against undisturbed material.
5. Slope protection required when indicated on the Project Plans.
6. Foundation design is based on 2001 AASHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction used is 30 degree and unit weight of soil used is 120 lb/ft^3.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS SINGLE POST TYPE ROUND PEDESTAL PILE FOUNDATION

NO SCALE

S8

1-4-06

Return to Table of Contents

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Jeffrey B. Woody
REGISTERED CIVIL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Jeffrey B. Woody
No. C41260
Exp. 3-31-07
CIVIL
STATE OF CALIFORNIA

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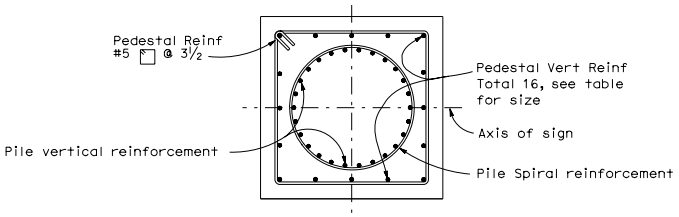
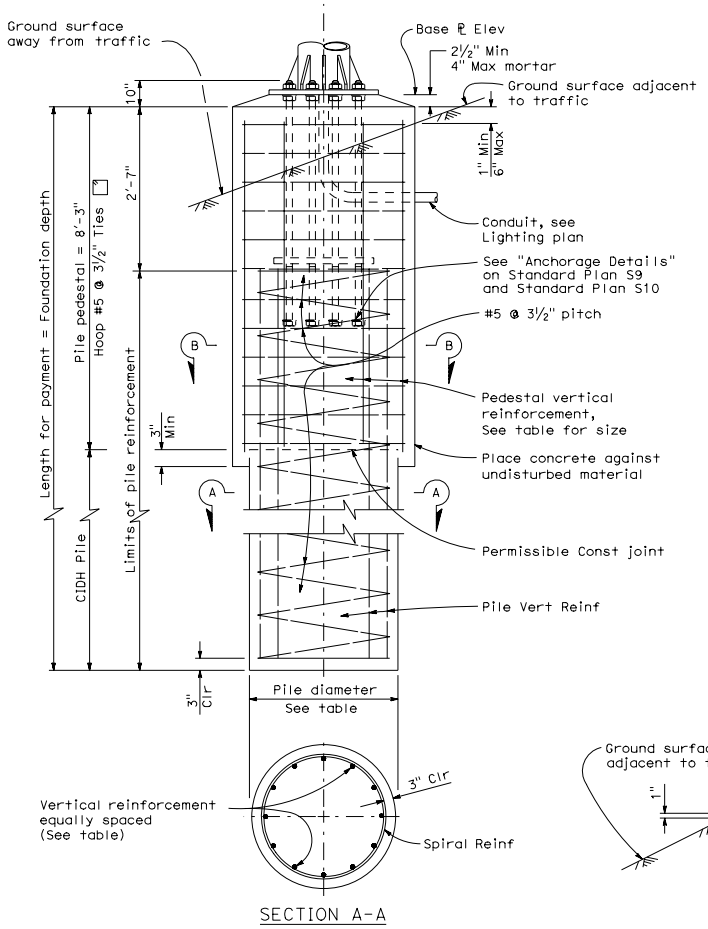


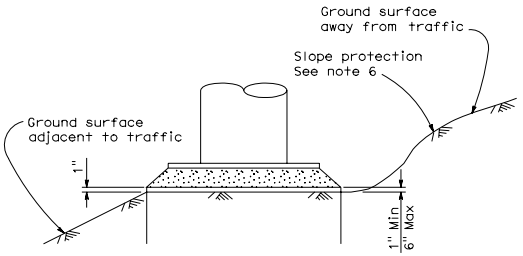
SECTION B-B



SECTION A-A

Post Type	Anchor Bolts				Square Pile Pedestal						CIDH Pile					Foundation Depth **
	Total	Dia	Bolt Circle	Total Length	Pedestal Square one side	Vertical Reinforcing			Hoop		Pile Dia	Vertical Reinforcing		Spiral		
						Total	Bar Size	# of bars each face	Bar Size	Spacing		Total	Bar Size	Bar Size	Pitch	
I-S	12	2"	2'-4"	4'-2"	5'-3"	16	#10	5	#5	3½"	4'-6"	26	#10	#5	3½"	18'-0"
II-S	12		2'-4"													19'-8"
III-S	12		2'-7"													23'-0"
IV-S	14		2'-10"													23'-0"
V-S	16	2½"	3'-2"	5'-0"	5'-10"		#11				5'-0"	28	#11			26'-3"
VI-S	16	2½"	3'-5"	5'-0"	5'-10"		#11				5'-0"	28	#11			27'-10"
VII-S	16	2½"	3'-5"	5'-0"	5'-10"		#11				5'-0"	28	#11			27'-10"

** Use Foundation Depth shown in table unless otherwise shown on the Project Plans.



DETAIL C

NOTES:

1. For anchor bolt layout, see Standard Plan S10.
2. For "Base ℄ elevation" see Project Plans.
3. Longer side of post shall be normal to axis of sign.
4. Prior to erection of the post, backfill which is equivalent to the surrounding material, shall be in place.
5. Pedestal shall be formed 6" Min below ground surface. Remainder to be placed against undisturbed material.
6. Slope protection required when indicated on the Project Plans.
7. Foundation design is based on 2001 AASHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction used is 30° and unit weight of soil used is 120 lb/ft^3.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS TWO POST TYPE SQUARE PEDESTAL PILE FOUNDATION

NO SCALE

S14

1-4-06

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

Jeffrey B. Woody
REGISTERED CIVIL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Jeffrey B. Woody — No. C41260 — Exp. 3-31-07 — CIVIL — STATE OF CALIFORNIA

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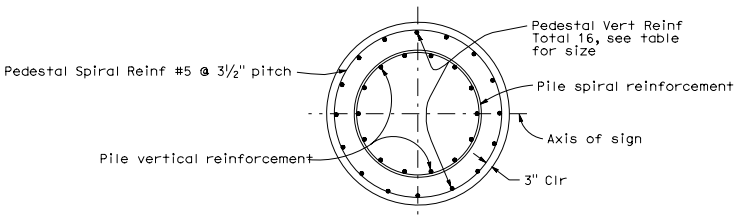
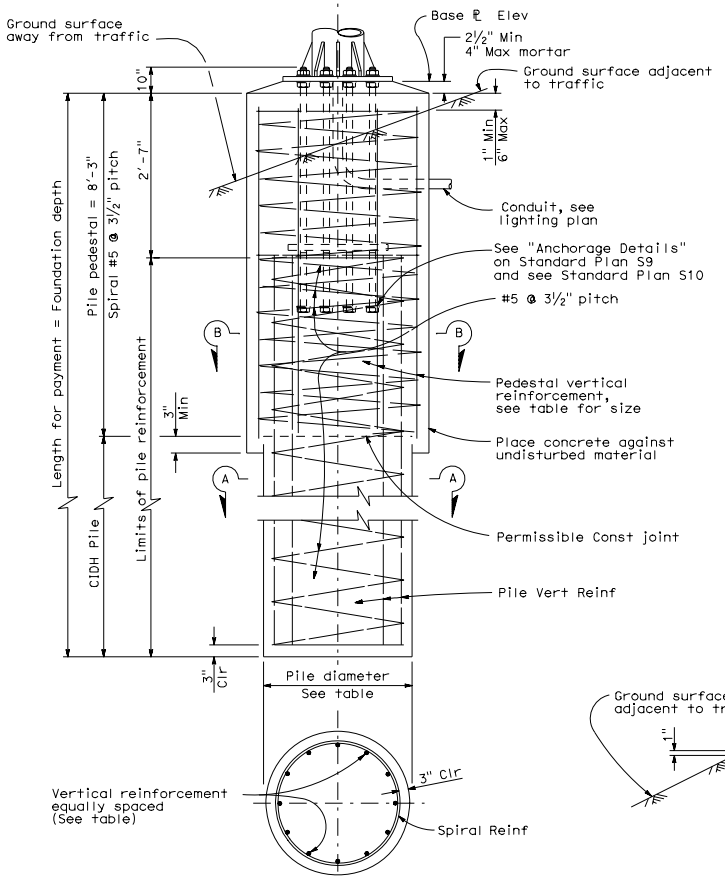
To get to the Caltrans web site, go to: http://www.dot.ca.gov



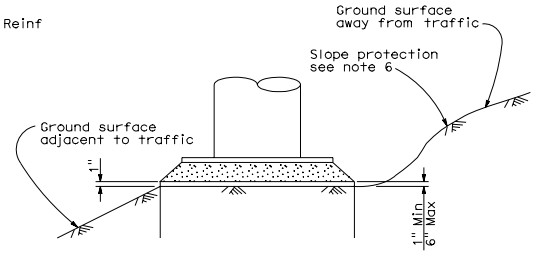
SECTION B-B



SECTION A-A

Post Type	Anchor Bolts				Round Pile Pedestal					CIDH Pile					Foundation Depth * *
	Total	Dia	Bolt Circle	Total Length	Dia	Vertical Reinforcing Total	Spiral Bar Size	Spiral Bar Size	Spiral Pitch	Pile Dia	Vertical Reinforcing Total	Spiral Bar Size	Spiral Bar Size	Spiral Pitch	
I-S	12	2"	2'-4"	4'-2"	5'-3"	16	#10	#5	3½"	4'-6"	26	#10	#5	3½"	18'-0"
II-S	12		2'-4"												19'-8"
III-S	12		2'-7"												23'-0"
IV-S	14		2'-10"												23'-0"
V-S	16	2½"	3'-2"	5'-0"	5'-9"		#11			5'-0"	28	#11			26'-3"
VI-S	16	2½"	3'-5"	5'-0"	5'-9"		#11			5'-0"	28	#11			27'-10"
VII-S	16	2½"	3'-5"	5'-0"	5'-9"		#11			5'-0"	28	#11			27'-10"

* * Use Foundation Depth shown in table unless otherwise shown on the Project Plans.



DETAIL C

NOTES:

1. For anchor bolt layout, see Standard Plan S10.
2. For "Base ℄ elevation" see Project Plans.
3. Longer side of post shall be normal to axis of sign.
4. Prior to erection of the post, backfill which is equivalent to the surrounding material, shall be in place.
5. Pedestal shall be formed 6" Min below ground surface. Remainder to be placed against undisturbed material.
6. Slope protection required when indicated on the Project Plans.
7. Foundation design is based on 2001 AASHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction used is 30° and unit weight of soil used is 120 lb/ft^3.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS TWO POST TYPE ROUND PEDESTAL PILE FOUNDATION

NO SCALE

S15

1-4-06

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APPENDIX D
CALCULATIONS

Appendix D.1	EQFAULT / Deterministic Seismic Calculations
Appendix D.2	Liquefaction Calculations

Appendix D.1
EQFAULT / Deterministic Seismic Calculations

TABLE 2
SUMMARY OF NEARBY FAULTS AND SEISMICITY

Fault Name	Fault Type	Mw	LOCATION																			
			Springdale OC			Bolsa Chica Road OC			405/22 HOV Conn. Separation			Middle RW3319 & 3320			W. End RW1325 & 1326			Closest to Los Alamitos Fault			W. End Project		
			Lat. 33.7741 Lon. 118.0192			Lat. 33.7743 Lon. 118.0380			Lat. 33.7749 Lon. 118.0427			Lat. 33.7741 Lon. 118.0441			Lat. 33.7745 Lon. 118.0475			Lat. 33.7743 Lon. 118.0587			Lat. 33.7743 Lon. 118.0681		
			Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA	Dist (km)	PBA	PGA
Newport-Inglewood	Strike Slip	7.00	6.80	0.46	0.38	5.50	0.50	0.41	5.20	0.51	0.42	5.00	0.52	0.42	4.80	0.53	0.43	4.10	0.56	0.45	3.40	0.59	0.47
Los Alamitos	Reverse	6.00	4.00	0.46	0.40	2.00	0.57	0.48	1.70	0.59	0.50	1.60	0.60	0.50	1.20	0.63	0.52	0.90	0.65	0.54	1.90	0.58	0.49
San Joaquin Hills	Blind Thrust	7.00	12.00	0.40	0.37	13.30	0.37	0.35	13.60	0.36	0.35	13.70	0.36	0.34	13.90	0.36	0.34	14.70	0.34	0.33	15.40	0.33	0.32
Puente Hills	Blind Thrust	7.25	18.10	0.32	0.32	18.20	0.32	0.32	18.10	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.20	0.32	0.32	18.30	0.32	0.31

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: West End of Project St "A" 395+50

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7743
   SITE LONGITUDE:  118.0681

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
```

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.1(3.4)	7.0	0.585	X
SAN JOAQUIN HILLS	9.6(15.4)	7.0	0.328	IX
PALOS VERDES	10.7(17.2)	7.0	0.249	IX
PUENTE HILLS BLIND THRUST	11.4(18.3)	7.3	0.317	IX
WHITTIER	14.6(23.5)	6.8	0.166	VIII
NEWPORT-INGLEWOOD (Offshore)	15.4(24.8)	7.0	0.175	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.6)	7.0	0.154	VIII
SAN JOSE	21.3(34.3)	6.4	0.095	VII
CHINO-CENTRAL AVE. (Elsinore)	23.1(37.2)	6.7	0.106	VII
RAYMOND	24.0(38.7)	7.5	0.171	VIII
VERDUGO	25.2(40.5)	6.9	0.109	VII
ELSINORE (GLEN IVY)	25.4(40.8)	6.8	0.084	VII
HOLLYWOOD	25.6(41.2)	7.5	0.159	VIII
SIERRA MADRE	27.0(43.4)	7.2	0.123	VII
CLAMSHELL-SAWPIT	28.1(45.3)	6.5	0.069	VI
SANTA MONICA	28.3(45.5)	6.6	0.074	VII
CUCAMONGA	31.1(50.1)	6.9	0.081	VII
MALIBU COAST	32.0(51.5)	6.7	0.067	VI
CORONADO BANK	35.9(57.7)	7.6	0.092	VII
SIERRA MADRE (San Fernando)	37.2(59.8)	6.7	0.053	VI
NORTHRIDGE (E. Oak Ridge)	37.4(60.2)	7.0	0.067	VI
ANACAPA-DUME	38.8(62.5)	7.5	0.093	VII
SAN GABRIEL	39.5(63.5)	7.2	0.060	VI
ELSINORE (TEMECULA)	42.3(68.1)	6.8	0.039	V
SANTA SUSANA	45.2(72.8)	6.7	0.039	V
SAN JACINTO-SAN BERNARDINO	45.7(73.6)	7.5	0.061	VI
SAN ANDREAS - Cho-Moj M-1b-1	47.0(75.6)	7.8	0.074	VII
SAN ANDREAS - Mojave M-1c-3	47.0(75.6)	7.4	0.054	VI
SAN ANDREAS - 1857 Rupture M-2a	47.0(75.6)	7.8	0.074	VII
SAN ANDREAS - Whole M-1a	47.0(75.6)	8.0	0.085	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.3(77.8)	7.7	0.066	VI
SAN ANDREAS - San Bernardino M-1	48.3(77.8)	7.5	0.056	VI
SAN ANDREAS - SB-Coach. M-2b	48.3(77.8)	7.7	0.066	VI
CLEGHORN	50.8(81.7)	6.5	0.022	IV
HOLSER	50.8(81.7)	6.5	0.027	V
SAN JACINTO-SAN JACINTO VALLEY	50.8(81.7)	7.5	0.052	VI
SIMI-SANTA ROSA	51.1(82.3)	7.0	0.041	V
OAK RIDGE (Onshore)	55.3(89.0)	7.0	0.036	V
ROSE CANYON	58.3(93.8)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	59.3(95.4)	7.2	0.038	

****

-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.1 MILES (3.4 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5850 g

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: West End of Project St "A" 395+50

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7743
SITE LONGITUDE: 118.0681

SEARCH RADIUS: 60 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.1(3.4)	7.0	0.465	X
SAN JOAQUIN HILLS	9.6(15.4)	7.0	0.319	IX
PALOS VERDES	10.7(17.2)	7.0	0.230	IX
PUENTE HILLS BLIND THRUST	11.4(18.3)	7.3	0.313	IX
WHITTIER	14.6(23.5)	6.8	0.162	VIII
NEWPORT-INGLEWOOD (Offshore)	15.4(24.8)	7.0	0.172	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.6)	7.0	0.171	VIII
SAN JOSE	21.3(34.3)	6.4	0.109	VII
CHINO-CENTRAL AVE. (Elsinore)	23.1(37.2)	6.7	0.124	VII
RAYMOND	24.0(38.7)	7.5	0.192	VIII
VERDUGO	25.2(40.5)	6.9	0.128	VIII
ELSINORE (GLEN IVY)	25.4(40.8)	6.8	0.093	VII
HOLLYWOOD	25.6(41.2)	7.5	0.181	VIII
SIERRA MADRE	27.0(43.4)	7.2	0.144	VIII
CLAMSHELL-SAWPIT	28.1(45.3)	6.5	0.086	VII
SANTA MONICA	28.3(45.5)	6.6	0.091	VII
CUCAMONGA	31.1(50.1)	6.9	0.101	VII
MALIBU COAST	32.0(51.5)	6.7	0.085	VII
CORONADO BANK	35.9(57.7)	7.6	0.106	VII
SIERRA MADRE (San Fernando)	37.2(59.8)	6.7	0.070	VI
NORTHRIDGE (E. Oak Ridge)	37.4(60.2)	7.0	0.087	VII
ANACAPA-DUME	38.8(62.5)	7.5	0.117	VII
SAN GABRIEL	39.5(63.5)	7.2	0.073	VII
ELSINORE (TEMECULA)	42.3(68.1)	6.8	0.050	VI
SANTA SUSANA	45.2(72.8)	6.7	0.054	VI
SAN JACINTO-SAN BERNARDINO	45.7(73.6)	7.5	0.076	VII
SAN ANDREAS - Cho-Moj M-1b-1	47.0(75.6)	7.8	0.090	VII
SAN ANDREAS - Mojave M-1c-3	47.0(75.6)	7.4	0.068	VI
SAN ANDREAS - 1857 Rupture M-2a	47.0(75.6)	7.8	0.090	VII
SAN ANDREAS - Whole M-1a	47.0(75.6)	8.0	0.102	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.3(77.8)	7.7	0.081	VII
SAN ANDREAS - San Bernardino M-1	48.3(77.8)	7.5	0.071	VI
SAN ANDREAS - SB-Coach. M-2b	48.3(77.8)	7.7	0.081	VII
CLEGHORN	50.8(81.7)	6.5	0.031	V
HOLSER	50.8(81.7)	6.5	0.039	V
SAN JACINTO-SAN JACINTO VALLEY	50.8(81.7)	7.5	0.067	VI
SIMI-SANTA ROSA	51.1(82.3)	7.0	0.058	VI
OAK RIDGE (Onshore)	55.3(89.0)	7.0	0.052	VI
ROSE CANYON	58.3(93.8)	7.0	0.038	V
NORTH FRONTAL FAULT ZONE (West)	59.3(95.4)	7.2	0.056	VI

-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.1 MILES (3.4 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4650 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: West End of Proj

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.580**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos

Location: West End of Proj

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.488**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: Closest to Los Alamitos Fault St "A" 366+00

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE: 33.7743
   SITE LONGITUDE: 118.0587

SEARCH RADIUS: 60 mi

ATTENUATION RELATION: 21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M   Number of Sigmas: 0.0
   DISTANCE MEASURE: clodis
   SCOND: 0
   Basement Depth: 5.00 km   Campbell SSR: Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.5(4.1)	7.0	0.555	X
SAN JOAQUIN HILLS	9.1(14.7)	7.0	0.341	IX
PALOS VERDES	11.1(17.9)	7.0	0.241	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.319	IX
WHITTIER	14.4(23.2)	6.8	0.168	VIII
NEWPORT-INGLEWOOD (Offshore)	15.1(24.3)	7.0	0.179	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.7)	7.0	0.153	VIII
SAN JOSE	21.0(33.8)	6.4	0.097	VII
CHINO-CENTRAL AVE. (Elsinore)	22.7(36.5)	6.7	0.109	VII
RAYMOND	24.1(38.8)	7.5	0.171	VIII
ELSINORE (GLEN IVY)	24.9(40.0)	6.8	0.086	VII
VERDUGO	25.3(40.7)	6.9	0.108	VII
HOLLYWOOD	25.8(41.5)	7.5	0.158	VIII
SIERRA MADRE	26.8(43.2)	7.2	0.123	VII
CLAMSHELL-SAWPIT	28.1(45.2)	6.5	0.069	VI
SANTA MONICA	28.6(46.1)	6.6	0.073	VII
CUCAMONGA	30.8(49.5)	6.9	0.083	VII
MALIBU COAST	32.5(52.3)	6.7	0.065	VI
CORONADO BANK	35.7(57.5)	7.6	0.093	VII
SIERRA MADRE (San Fernando)	37.3(60.1)	6.7	0.053	VI
NORTHRIDGE (E. Oak Ridge)	37.8(60.8)	7.0	0.066	VI
ANACAPA-DUME	39.3(63.3)	7.5	0.091	VII
SAN GABRIEL	39.6(63.8)	7.2	0.060	VI
ELSINORE (TEMECULA)	41.8(67.3)	6.8	0.040	V
SAN JACINTO-SAN BERNARDINO	45.4(73.0)	7.5	0.062	VI
SANTA SUSANA	45.5(73.3)	6.7	0.038	V
SAN ANDREAS - Cho-Moj M-1b-1	46.7(75.2)	7.8	0.074	VII
SAN ANDREAS - Mojave M-1c-3	46.7(75.2)	7.4	0.055	VI
SAN ANDREAS - 1857 Rupture M-2a	46.7(75.2)	7.8	0.074	VII
SAN ANDREAS - Whole M-1a	46.7(75.2)	8.0	0.086	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.0(77.2)	7.7	0.066	VI
SAN ANDREAS - San Bernardino M-1	48.0(77.2)	7.5	0.057	VI
SAN ANDREAS - SB-Coach. M-2b	48.0(77.2)	7.7	0.066	VI
SAN JACINTO-SAN JACINTO VALLEY	50.3(80.9)	7.5	0.053	VI
CLEGHORN	50.4(81.1)	6.5	0.023	IV
HOLSER	51.1(82.2)	6.5	0.027	V
SIMI-SANTA ROSA	51.5(82.9)	7.0	0.041	V
OAK RIDGE (Onshore)	55.7(89.6)	7.0	0.036	V
ROSE CANYON	58.0(93.3)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	58.8(94.7)	7.2	0.039	V

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.5 MILES (4.1 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5549 g

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*    Version 3.00    *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: Closest to Los Alamitos Fault St "A" 366+00

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7743
SITE LONGITUDE: 118.0587

SEARCH RADIUS: 60 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	2.5(4.1)	7.0	0.445	X
SAN JOAQUIN HILLS	9.1(14.7)	7.0	0.329	IX
PALOS VERDES	11.1(17.9)	7.0	0.223	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.315	IX
WHITTIER	14.4(23.2)	6.8	0.164	VIII
NEWPORT-INGLEWOOD (Offshore)	15.1(24.3)	7.0	0.175	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.3(32.7)	7.0	0.171	VIII
SAN JOSE	21.0(33.8)	6.4	0.111	VII
CHINO-CENTRAL AVE. (Elsinore)	22.7(36.5)	6.7	0.126	VIII
RAYMOND	24.1(38.8)	7.5	0.192	VIII
ELSINORE (GLEN IVY)	24.9(40.0)	6.8	0.095	VII
VERDUGO	25.3(40.7)	6.9	0.128	VIII
HOLLYWOOD	25.8(41.5)	7.5	0.180	VIII
SIERRA MADRE	26.8(43.2)	7.2	0.145	VIII
CLAMSHELL-SAWPIT	28.1(45.2)	6.5	0.086	VII
SANTA MONICA	28.6(46.1)	6.6	0.090	VII
CUCAMONGA	30.8(49.5)	6.9	0.102	VII
MALIBU COAST	32.5(52.3)	6.7	0.083	VII
CORONADO BANK	35.7(57.5)	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.3(60.1)	6.7	0.070	VI
NORTHRIDGE (E. Oak Ridge)	37.8(60.8)	7.0	0.086	VII
ANACAPA-DUME	39.3(63.3)	7.5	0.116	VII
SAN GABRIEL	39.6(63.8)	7.2	0.073	VII
ELSINORE (TEMECULA)	41.8(67.3)	6.8	0.051	VI
SAN JACINTO-SAN BERNARDINO	45.4(73.0)	7.5	0.076	VII
SANTA SUSANA	45.5(73.3)	6.7	0.054	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.7(75.2)	7.8	0.090	VII
SAN ANDREAS - Mojave M-1c-3	46.7(75.2)	7.4	0.069	VI
SAN ANDREAS - 1857 Rupture M-2a	46.7(75.2)	7.8	0.090	VII
SAN ANDREAS - Whole M-1a	46.7(75.2)	8.0	0.103	VII
SAN ANDREAS - SB-Coach. M-1b-2	48.0(77.2)	7.7	0.082	VII
SAN ANDREAS - San Bernardino M-1	48.0(77.2)	7.5	0.071	VI
SAN ANDREAS - SB-Coach. M-2b	48.0(77.2)	7.7	0.082	VII
SAN JACINTO-SAN JACINTO VALLEY	50.3(80.9)	7.5	0.067	VI
CLEGHORN	50.4(81.1)	6.5	0.031	V
HOLSER	51.1(82.2)	6.5	0.039	V
SIMI-SANTA ROSA	51.5(82.9)	7.0	0.058	VI
OAK RIDGE (Onshore)	55.7(89.6)	7.0	0.052	VI
ROSE CANYON	58.0(93.3)	7.0	0.038	V
NORTH FRONTAL FAULT ZONE (West)	58.8(94.7)	7.2	0.056	VI

-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.5 MILES (4.1 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4451 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: Closest to the Fault

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	0.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.653**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos

Location: Closest to the Fault

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	0.9
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.542**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: W. End RW 1325 & 1326  St "H" 1331+57

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7745
   SITE LONGITUDE:  118.0475

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.0(4.8)	7.0	0.527	X
SAN JOAQUIN HILLS	8.6(13.9)	7.0	0.356	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.319	IX
PALOS VERDES	11.7(18.8)	7.0	0.230	IX
WHITTIER	14.2(22.8)	6.8	0.171	VIII
NEWPORT-INGLEWOOD (Offshore)	14.8(23.8)	7.0	0.183	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.4(32.9)	7.0	0.152	VIII
SAN JOSE	20.7(33.3)	6.4	0.099	VII
CHINO-CENTRAL AVE. (Elsinore)	22.2(35.8)	6.7	0.112	VII
RAYMOND	24.2(39.0)	7.5	0.170	VIII
ELSINORE (GLEN IVY)	24.2(39.0)	6.8	0.089	VII
VERDUGO	25.4(40.9)	6.9	0.108	VII
HOLLYWOOD	26.0(41.9)	7.5	0.156	VIII
SIERRA MADRE	26.7(42.9)	7.2	0.124	VII
CLAMSHELL-SAWPIT	28.0(45.1)	6.5	0.070	VI
SANTA MONICA	29.1(46.9)	6.6	0.071	VI
CUCAMONGA	30.4(48.9)	6.9	0.084	VII
MALIBU COAST	33.0(53.1)	6.7	0.064	VI
CORONADO BANK	35.7(57.4)	7.6	0.093	VII
SIERRA MADRE (San Fernando)	37.6(60.5)	6.7	0.052	VI
NORTHRIDGE (E. Oak Ridge)	38.2(61.5)	7.0	0.065	VI
SAN GABRIEL	39.8(64.1)	7.2	0.059	VI
ANACAPA-DUME	39.9(64.2)	7.5	0.089	VII
ELSINORE (TEMECULA)	41.2(66.3)	6.8	0.041	V
SAN JACINTO-SAN BERNARDINO	44.9(72.2)	7.5	0.063	VI
SANTA SUSANA	45.9(73.8)	6.7	0.038	V
SAN ANDREAS - Cho-Moj M-1b-1	46.4(74.7)	7.8	0.075	VII
SAN ANDREAS - Mojave M-1c-3	46.4(74.7)	7.4	0.055	VI
SAN ANDREAS - 1857 Rupture M-2a	46.4(74.7)	7.8	0.075	VII
SAN ANDREAS - Whole M-1a	46.4(74.7)	8.0	0.087	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.5(76.5)	7.7	0.067	VI
SAN ANDREAS - San Bernardino M-1	47.5(76.5)	7.5	0.058	VI
SAN ANDREAS - SB-Coach. M-2b	47.5(76.5)	7.7	0.067	VI
SAN JACINTO-SAN JACINTO VALLEY	49.6(79.9)	7.5	0.054	VI
CLEGHORN	50.0(80.4)	6.5	0.023	IV
HOLSER	51.4(82.8)	6.5	0.026	V
SIMI-SANTA ROSA	51.9(83.6)	7.0	0.040	V
OAK RIDGE (Onshore)	56.1(90.3)	7.0	0.035	V
ROSE CANYON	57.5(92.6)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	58.3(93.9)	7.2	0.039	V

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.0 MILES (4.8 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5271 g

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 10-28-2008

JOB NAME: SR22/I-405 Connector Segment

CALCULATION NAME: W. End RW 1325 & 1326  St "H" 1331+57

FAULT-DATA-FILE NAME: C:\Program Files\EQfault\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7745
   SITE LONGITUDE:  118.0475

SEARCH RADIUS:   60  mi

ATTENUATION RELATION:  20) Sadigh et al. (1997) Horiz. - Soil
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQfault\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi	(km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.0	4.8	7.0	0.427	X
SAN JOAQUIN HILLS	8.6	13.9	7.0	0.341	IX
PUENTE HILLS BLIND THRUST	11.3	18.2	7.3	0.315	IX
PALOS VERDES	11.7	18.8	7.0	0.215	VIII
WHITTIER	14.2	22.8	6.8	0.167	VIII
NEWPORT-INGLEWOOD (Offshore)	14.8	23.8	7.0	0.178	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.4	32.9	7.0	0.170	VIII
SAN JOSE	20.7	33.3	6.4	0.113	VII
CHINO-CENTRAL AVE. (Elsinore)	22.2	35.8	6.7	0.129	VIII
RAYMOND	24.2	39.0	7.5	0.191	VIII
ELSINORE (GLEN IVY)	24.2	39.0	6.8	0.098	VII
VERDUGO	25.4	40.9	6.9	0.127	VIII
HOLLYWOOD	26.0	41.9	7.5	0.178	VIII
SIERRA MADRE	26.7	42.9	7.2	0.146	VIII
CLAMSHELL-SAWPIT	28.0	45.1	6.5	0.086	VII
SANTA MONICA	29.1	46.9	6.6	0.088	VII
CUCAMONGA	30.4	48.9	6.9	0.104	VII
MALIBU COAST	33.0	53.1	6.7	0.081	VII
CORONADO BANK	35.7	57.4	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.6	60.5	6.7	0.069	VI
NORTHRIDGE (E. Oak Ridge)	38.2	61.5	7.0	0.084	VII
SAN GABRIEL	39.8	64.1	7.2	0.072	VI
ANACAPA-DUME	39.9	64.2	7.5	0.114	VII
ELSINORE (TEMECULA)	41.2	66.3	6.8	0.052	VI
SAN JACINTO-SAN BERNARDINO	44.9	72.2	7.5	0.077	VII
SANTA SUSANA	45.9	73.8	6.7	0.053	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.4	74.7	7.8	0.091	VII
SAN ANDREAS - Mojave M-1c-3	46.4	74.7	7.4	0.069	VI
SAN ANDREAS - 1857 Rupture M-2a	46.4	74.7	7.8	0.091	VII
SAN ANDREAS - Whole M-1a	46.4	74.7	8.0	0.104	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.5	76.5	7.7	0.083	VII
SAN ANDREAS - San Bernardino M-1	47.5	76.5	7.5	0.072	VI
SAN ANDREAS - SB-Coach. M-2b	47.5	76.5	7.7	0.083	VII
SAN JACINTO-SAN JACINTO VALLEY	49.6	79.9	7.5	0.068	VI
CLEGHORN	50.0	80.4	6.5	0.031	V
HOLSER	51.4	82.8	6.5	0.039	V
SIMI-SANTA ROSA	51.9	83.6	7.0	0.057	VI
OAK RIDGE (Onshore)	56.1	90.3	7.0	0.051	VI
ROSE CANYON	57.5	92.6	7.0	0.039	V
NORTH FRONTAL FAULT ZONE (West)	58.3	93.9	7.2	0.057	VI

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-END OF SEARCH- 40 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.0 MILES (4.8 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4266 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: West End RW1325+6

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.630**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos

Location: West End RW1325+6

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.524**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 08-22-2008

JOB NAME: HOV Conn

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7749
SITE LONGITUDE: 118.0427

SEARCH RADIUS: 62 mi

ATTENUATION RELATION: 21) Sadigh et al. (1997) Horiz. - Rock
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.2(5.2)	7.0	0.512	X
SAN JOAQUIN HILLS	8.5(13.6)	7.0	0.362	IX
PUENTE HILLS BLIND THRUST	11.2(18.1)	7.3	0.320	IX
PALOS VERDES	11.9(19.2)	7.0	0.226	IX
WHITTIER	14.0(22.5)	6.8	0.173	VIII
NEWPORT-INGLEWOOD (Offshore)	14.7(23.6)	7.0	0.184	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.5(33.0)	7.0	0.152	VIII
SAN JOSE	20.6(33.1)	6.4	0.100	VII
CHINO-CENTRAL AVE. (Elsinore)	22.0(35.4)	6.7	0.114	VII
ELSINORE (GLEN IVY)	23.9(38.5)	6.8	0.091	VII
RAYMOND	24.2(39.0)	7.5	0.170	VIII
VERDUGO	25.4(40.9)	6.9	0.108	VII
HOLLYWOOD	26.1(42.0)	7.5	0.155	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.125	VII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.070	VI
SANTA MONICA	29.3(47.2)	6.6	0.070	VI
CUCAMONGA	30.2(48.6)	6.9	0.085	VII
MALIBU COAST	33.2(53.5)	6.7	0.063	VI
CORONADO BANK	35.6(57.3)	7.6	0.093	VII
SIERRA MADRE (San Fernando)	37.7(60.6)	6.7	0.052	VI
NORTHRIDGE (E. Oak Ridge)	38.3(61.7)	7.0	0.064	VI
SAN GABRIEL	39.9(64.2)	7.2	0.059	VI
ANACAPA-DUME	40.1(64.6)	7.5	0.088	VII
ELSINORE (TEMECULA)	40.9(65.9)	6.8	0.041	V
SAN JACINTO-SAN BERNARDINO	44.7(71.9)	7.5	0.063	VI
SANTA SUSANA	46.0(74.0)	6.7	0.038	V
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.4)	7.8	0.075	VII
SAN ANDREAS - Mojave M-1c-3	46.2(74.4)	7.4	0.056	VI
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.4)	7.8	0.075	VII
SAN ANDREAS - Whole M-1a	46.2(74.4)	8.0	0.087	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.3(76.2)	7.7	0.068	VI
SAN ANDREAS - San Bernardino M-1	47.3(76.2)	7.5	0.058	VI
SAN ANDREAS - SB-Coach. M-2b	47.3(76.2)	7.7	0.068	VI
SAN JACINTO-SAN JACINTO VALLEY	49.4(79.5)	7.5	0.054	VI
CLEGHORN	49.8(80.1)	6.5	0.023	IV
HOLSER	51.6(83.1)	6.5	0.026	V
SIMI-SANTA ROSA	52.1(83.9)	7.0	0.040	V
OAK RIDGE (Onshore)	56.3(90.6)	7.0	0.035	V
ROSE CANYON	57.4(92.4)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	58.1(93.5)	7.2	0.040	V
SAN CAYETANO	61.6(99.1)	7.0	0.030	V

-END OF SEARCH- 41 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.2 MILES (5.2 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5122 g

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*    Version 3.00    *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 08-22-2008

JOB NAME: HOV Conn

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7749
SITE LONGITUDE: 118.0427

SEARCH RADIUS: 62 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.2(5.2)	7.0	0.416	X
SAN JOAQUIN HILLS	8.5(13.6)	7.0	0.346	IX
PUENTE HILLS BLIND THRUST	11.2(18.1)	7.3	0.316	IX
PALOS VERDES	11.9(19.2)	7.0	0.212	VIII
WHITTIER	14.0(22.5)	6.8	0.169	VIII
NEWPORT-INGLEWOOD (Offshore)	14.7(23.6)	7.0	0.179	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.5(33.0)	7.0	0.169	VIII
SAN JOSE	20.6(33.1)	6.4	0.114	VII
CHINO-CENTRAL AVE. (Elsinore)	22.0(35.4)	6.7	0.131	VIII
ELSINORE (GLEN IVY)	23.9(38.5)	6.8	0.099	VII
RAYMOND	24.2(39.0)	7.5	0.191	VIII
VERDUGO	25.4(40.9)	6.9	0.127	VIII
HOLLYWOOD	26.1(42.0)	7.5	0.178	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.146	VIII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.086	VII
SANTA MONICA	29.3(47.2)	6.6	0.087	VII
CUCAMONGA	30.2(48.6)	6.9	0.104	VII
MALIBU COAST	33.2(53.5)	6.7	0.081	VII
CORONADO BANK	35.6(57.3)	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.7(60.6)	6.7	0.069	VI
NORTHRIDGE (E. Oak Ridge)	38.3(61.7)	7.0	0.084	VII
SAN GABRIEL	39.9(64.2)	7.2	0.072	VI
ANACAPA-DUME	40.1(64.6)	7.5	0.113	VII
ELSINORE (TEMECULA)	40.9(65.9)	6.8	0.052	VI
SAN JACINTO-SAN BERNARDINO	44.7(71.9)	7.5	0.078	VII
SANTA SUSANA	46.0(74.0)	6.7	0.053	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.4)	7.8	0.092	VII
SAN ANDREAS - Mojave M-1c-3	46.2(74.4)	7.4	0.069	VI
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.4)	7.8	0.092	VII
SAN ANDREAS - Whole M-1a	46.2(74.4)	8.0	0.104	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.3(76.2)	7.7	0.083	VII
SAN ANDREAS - San Bernardino M-1	47.3(76.2)	7.5	0.072	VII
SAN ANDREAS - SB-Coach. M-2b	47.3(76.2)	7.7	0.083	VII
SAN JACINTO-SAN JACINTO VALLEY	49.4(79.5)	7.5	0.069	VI
CLEGHORN	49.8(80.1)	6.5	0.032	V
HOLSER	51.6(83.1)	6.5	0.038	V
SIMI-SANTA ROSA	52.1(83.9)	7.0	0.057	VI
OAK RIDGE (Onshore)	56.3(90.6)	7.0	0.051	VI
ROSE CANYON	57.4(92.4)	7.0	0.039	V
NORTH FRONTAL FAULT ZONE (West)	58.1(93.5)	7.2	0.057	VI
SAN CAYETANO	61.6(99.1)	7.0	0.045	VI

-END OF SEARCH- 41 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.2 MILES (5.2 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4165 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: HOV Connector

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.7
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.594**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: HOV Connector

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	1.7
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.498**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: I-436
                                                DATE: 07-23-2008

JOB NAME: SR-22 Bolsa Chica Rd OC

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE:  33.7743
   SITE LONGITUDE:  118.0380

SEARCH RADIUS:   100  mi

ATTENUATION RELATION:  21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  clodis
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km):  0.0
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EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.4(5.5)	7.0	0.501	X
SAN JOAQUIN HILLS	8.3(13.3)	7.0	0.368	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.319	IX
PALOS VERDES	12.1(19.5)	7.0	0.222	IX
WHITTIER	13.9(22.4)	6.8	0.174	VIII
NEWPORT-INGLEWOOD (Offshore)	14.5(23.4)	7.0	0.186	VIII
SAN JOSE	20.4(32.9)	6.4	0.100	VII
UPPER ELYSIAN PARK BLIND THRUST	20.6(33.2)	7.0	0.150	VIII
CHINO-CENTRAL AVE. (Elsinore)	21.8(35.1)	6.7	0.115	VII
ELSINORE (GLEN IVY)	23.7(38.1)	6.8	0.092	VII
RAYMOND	24.4(39.2)	7.5	0.169	VIII
VERDUGO	25.5(41.1)	6.9	0.107	VII
HOLLYWOOD	26.3(42.3)	7.5	0.154	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.125	VII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.070	VI
SANTA MONICA	29.5(47.5)	6.6	0.070	VI
CUCAMONGA	30.1(48.4)	6.9	0.085	VII
MALIBU COAST	33.5(53.9)	6.7	0.062	VI
CORONADO BANK	35.5(57.2)	7.6	0.094	VII
SIERRA MADRE (San Fernando)	37.8(60.8)	6.7	0.052	VI
NORTHRIDGE (E. Oak Ridge)	38.6(62.1)	7.0	0.064	VI
SAN GABRIEL	40.1(64.5)	7.2	0.059	VI
ANACAPA-DUME	40.4(65.0)	7.5	0.088	VII
ELSINORE (TEMECULA)	40.6(65.4)	6.8	0.042	VI
SAN JACINTO-SAN BERNARDINO	44.5(71.6)	7.5	0.064	VI
SAN ANDREAS - Mojave M-1c-3	46.2(74.3)	7.4	0.056	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.3)	7.8	0.075	VII
SANTA SUSANA	46.2(74.3)	6.7	0.038	V
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.3)	7.8	0.075	VII
SAN ANDREAS - Whole M-1a	46.2(74.3)	8.0	0.087	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.2(76.0)	7.7	0.068	VI
SAN ANDREAS - San Bernardino M-1	47.2(76.0)	7.5	0.058	VI
SAN ANDREAS - SB-Coach. M-2b	47.2(76.0)	7.7	0.068	VI
SAN JACINTO-SAN JACINTO VALLEY	49.2(79.1)	7.5	0.055	VI
CLEGHORN	49.6(79.9)	6.5	0.023	IV
HOLSER	51.8(83.4)	6.5	0.026	V
SIMI-SANTA ROSA	52.3(84.2)	7.0	0.040	V
OAK RIDGE (Onshore)	56.5(90.9)	7.0	0.035	V
ROSE CANYON	57.2(92.1)	7.0	0.028	V
NORTH FRONTAL FAULT ZONE (West)	57.9(93.2)	7.2	0.040	V
SAN CAYETANO	61.8(99.5)	7.0	0.030	V
SAN JACINTO-ANZA	64.4(103.7)	7.2	0.028	V

-END OF SEARCH- 67 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.4 MILES (5.5 km) AWAY.
LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5013 g

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*    Version 3.00    *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 07-23-2008

JOB NAME: SR-22 Bolsa Chica Rd OC

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7743
SITE LONGITUDE: 118.0380

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.4(5.5)	7.0	0.409	X
SAN JOAQUIN HILLS	8.3(13.3)	7.0	0.350	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.315	IX
PALOS VERDES	12.1(19.5)	7.0	0.209	VIII
WHITTIER	13.9(22.4)	6.8	0.169	VIII
NEWPORT-INGLEWOOD (Offshore)	14.5(23.4)	7.0	0.181	VIII
SAN JOSE	20.4(32.9)	6.4	0.115	VII
UPPER ELYSIAN PARK BLIND THRUST	20.6(33.2)	7.0	0.168	VIII
CHINO-CENTRAL AVE. (Elsinore)	21.8(35.1)	6.7	0.132	VIII
ELSINORE (GLEN IVY)	23.7(38.1)	6.8	0.100	VII
RAYMOND	24.4(39.2)	7.5	0.190	VIII
VERDUGO	25.5(41.1)	6.9	0.126	VIII
HOLLYWOOD	26.3(42.3)	7.5	0.177	VIII
SIERRA MADRE	26.6(42.8)	7.2	0.146	VIII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.086	VII
SANTA MONICA	29.5(47.5)	6.6	0.087	VII
CUCAMONGA	30.1(48.4)	6.9	0.105	VII
MALIBU COAST	33.5(53.9)	6.7	0.080	VII
CORONADO BANK	35.5(57.2)	7.6	0.107	VII
SIERRA MADRE (San Fernando)	37.8(60.8)	6.7	0.069	VI
NORTHRIDGE (E. Oak Ridge)	38.6(62.1)	7.0	0.083	VII
SAN GABRIEL	40.1(64.5)	7.2	0.072	VI
ANACAPA-DUME	40.4(65.0)	7.5	0.112	VII
ELSINORE (TEMECULA)	40.6(65.4)	6.8	0.052	VI
SAN JACINTO-SAN BERNARDINO	44.5(71.6)	7.5	0.078	VII
SAN ANDREAS - Mojave M-1c-3	46.2(74.3)	7.4	0.070	VI
SAN ANDREAS - Cho-Moj M-1b-1	46.2(74.3)	7.8	0.092	VII
SANTA SUSANA	46.2(74.3)	6.7	0.053	VI
SAN ANDREAS - 1857 Rupture M-2a	46.2(74.3)	7.8	0.092	VII
SAN ANDREAS - Whole M-1a	46.2(74.3)	8.0	0.104	VII
SAN ANDREAS - SB-Coach. M-1b-2	47.2(76.0)	7.7	0.083	VII
SAN ANDREAS - San Bernardino M-1	47.2(76.0)	7.5	0.073	VII
SAN ANDREAS - SB-Coach. M-2b	47.2(76.0)	7.7	0.083	VII
SAN JACINTO-SAN JACINTO VALLEY	49.2(79.1)	7.5	0.069	VI
CLEGHORN	49.6(79.9)	6.5	0.032	V
HOLSER	51.8(83.4)	6.5	0.038	V
SIMI-SANTA ROSA	52.3(84.2)	7.0	0.056	VI
OAK RIDGE (Onshore)	56.5(90.9)	7.0	0.051	VI
ROSE CANYON	57.2(92.1)	7.0	0.039	V
NORTH FRONTAL FAULT ZONE (West)	57.9(93.2)	7.2	0.058	VI
SAN CAYETANO	61.8(99.5)	7.0	0.045	VI
SAN JACINTO-ANZA	64.4(103.7)	7.2	0.039	V

-END OF SEARCH- 67 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.4 MILES (5.5 km) AWAY.
LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4092 g

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: Bolsa Chica Road OC

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	0
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PBA= 0.573**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

Implementation of the Sadigh and Others (1997) Attenuation Relations

Fault: Los Alamitos
Location: Bolsa Chica Road OC

Input Parameters	Input Value
M, Moment Magnitude	6.0
R_{rup}, Closest Distance to Rupture Plane	2
F, Fault Type (0=Strike Slip; 1=Reverse/Thrust)	1
S, Site Class (0=Rock; 1=Deep Soil)	1
Nσ, Number of Logarithmic Standard Deviations	0

Model: **5% Damping** **PGA= 0.483**

$$\ln S_a(g) = C_1 + C_2M + C_3(8.5M)^{2.5} + C_4 \ln[R_{rup} + \exp(C_5 + C_6M)] + C_7\ln(R_{rup} + 2) + \text{Error}$$

$$\ln S_a(g) = c_1 + c_2M - c_3 \ln[R_{rup} + c_4\exp(c_5M)] + c_6 + c_7(8.5 - M)^{2.5} + \text{Error}$$

where: $\text{Error} = N\sigma(\sigma_{Error})$

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 9842-0000

DATE: 02-11-2009

JOB NAME: Test Run

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
SITE LATITUDE: 33.7740
SITE LONGITUDE: 118.0282

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: clodis
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	3.8(6.1)	7.0	0.395	X
SAN JOAQUIN HILLS	7.8(12.6)	7.0	0.362	IX
PUENTE HILLS BLIND THRUST	11.3(18.2)	7.3	0.315	IX
PALOS VERDES	12.6(20.3)	7.0	0.203	VIII
WHITTIER	13.7(22.1)	7.5	0.237	IX
NEWPORT-INGLEWOOD (Offshore)	14.2(22.9)	7.0	0.184	VIII
SAN JOSE	20.3(32.6)	6.8	0.147	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.8(33.4)	7.0	0.167	VIII
CHINO-CENTRAL AVE. (Elsinore)	21.4(34.5)	6.5	0.118	VII
ELSINORE (GLEN IVY)	23.1(37.2)	7.5	0.156	VIII
RAYMOND	24.5(39.4)	7.5	0.189	VIII
VERDUGO	25.7(41.4)	6.9	0.125	VII
SIERRA MADRE	26.5(42.6)	7.2	0.147	VIII
HOLLYWOOD	26.5(42.7)	7.5	0.175	VIII
CLAMSHELL-SAWPIT	28.0(45.0)	6.5	0.086	VII
CUCAMONGA	29.8(47.9)	6.9	0.106	VII
SANTA MONICA	30.0(48.2)	6.6	0.085	VII
MALIBU COAST	34.0(54.7)	7.5	0.136	VIII
CORONADO BANK	35.4(57.0)	7.8	0.118	VII
SIERRA MADRE (San Fernando)	38.0(61.2)	7.5	0.120	VII
NORTHRIDGE (E. Oak Ridge)	39.0(62.7)	7.0	0.082	VII
ELSINORE (TEMECULA)	40.1(64.5)	7.5	0.088	VII
SAN GABRIEL	40.3(64.8)	7.2	0.071	VI
ANACAPA-DUME	40.9(65.9)	7.5	0.110	VII
SAN JACINTO-SAN BERNARDINO	44.1(71.0)	7.5	0.079	VII
SAN ANDREAS - Mojave M-1c-3	45.9(73.8)	7.4	0.070	VI
SAN ANDREAS - Cho-Moj M-1b-1	45.9(73.8)	7.8	0.092	VII
SAN ANDREAS - Whole M-1a	45.9(73.8)	8.0	0.105	VII
SAN ANDREAS - 1857 Rupture M-2a	45.9(73.8)	7.8	0.092	VII
SANTA SUSANA	46.5(74.9)	6.7	0.052	VI
SAN ANDREAS - SB-Coach. M-1b-2	46.9(75.4)	7.7	0.084	VII
SAN ANDREAS - San Bernardino M-1	46.9(75.4)	7.5	0.073	VII

SAN ANDREAS - SB-Coach. M-2b	46.9(75.4)	7.7	0.084	VII
SAN JACINTO-SAN JACINTO VALLEY	48.7(78.3)	7.5	0.070	VI
CLEGHORN	49.3(79.3)	6.5	0.032	V
HOLSER	52.1(83.9)	6.5	0.038	V
SIMI-SANTA ROSA	52.8(84.9)	7.0	0.056	VI
ROSE CANYON	56.9(91.5)	7.0	0.039	V
OAK RIDGE (Onshore)	56.9(91.6)	7.0	0.050	VI
NORTH FRONTAL FAULT ZONE (West)	57.5(92.5)	7.2	0.058	VI

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
SAN CAYETANO	62.2(100.1)	7.0	0.045	VI
SAN JACINTO-ANZA	63.9(102.8)	7.2	0.039	V
ELSINORE (JULIAN)	64.4(103.7)	7.5	0.049	VI
SAN ANDREAS - Carrizo M-1c-2	69.6(112.0)	7.4	0.041	V
OAK RIDGE(Blind Thrust Offshore)	71.3(114.8)	7.1	0.040	V
CHANNEL IS. THRUST (Eastern)	72.5(116.7)	7.5	0.054	VI
SANTA YNEZ (East)	74.6(120.1)	7.1	0.029	V
VENTURA - PITAS POINT	75.1(120.9)	6.9	0.032	V
HELENDALE - S. LOCKHARDT	76.5(123.1)	7.3	0.033	V
NORTH FRONTAL FAULT ZONE (East)	76.9(123.7)	6.7	0.026	V
PINTO MOUNTAIN	77.6(124.9)	7.2	0.030	V
OAK RIDGE MID-CHANNEL STRUCTURE	78.9(127.0)	6.6	0.023	IV
M.RIDGE-ARROYO PARIDA-SANTA ANA	81.2(130.6)	7.2	0.036	V
RED MOUNTAIN	83.9(135.1)	7.0	0.029	V
SANTA CRUZ ISLAND	86.7(139.5)	7.0	0.028	V
GARLOCK (West)	87.2(140.3)	7.3	0.028	V
PLEITO THRUST	88.2(142.0)	7.0	0.027	V
LENWOOD-LOCKHART-OLD WOMAN SPRGS	89.4(143.9)	7.5	0.032	V
SAN JACINTO-COYOTE CREEK	90.0(144.9)	6.6	0.014	IV
SAN ANDREAS - Coachella M-1c-5	90.1(145.0)	7.2	0.024	V
BIG PINE	91.5(147.3)	6.9	0.018	IV
EARTHQUAKE VALLEY	92.6(149.1)	6.5	0.013	III
JOHNSON VALLEY (Northern)	93.2(150.0)	6.7	0.015	IV
BURNT MTN.	94.7(152.4)	6.5	0.012	III
LANDERS	95.9(154.3)	7.3	0.024	V
EUREKA PEAK	96.9(155.9)	6.4	0.011	III
GRAVEL HILLS - HARPER LAKE	98.4(158.4)	7.1	0.020	IV

-END OF SEARCH- 67 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.8 MILES (6.1 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.3952 g

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*    E Q F A U L T   *
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*    Version 3.00    *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 02-09-2009

JOB NAME: springdale

CALCULATION NAME: Sign 143

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE: 33.7741
   SITE LONGITUDE: 118.0192

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 21) Sadigh et al. (1997) Horiz. - Rock
   UNCERTAINTY (M=Median, S=Sigma): M   Number of Sigmas: 0.0
   DISTANCE MEASURE: clodis
   SCOND: 0
   Basement Depth: 5.00 km   Campbell SSR: Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	4.2(6.8)	7.0	0.458	X
SAN JOAQUIN HILLS	7.5(12.0)	7.0	0.397	X
PUENTE HILLS BLIND THRUST	11.2(18.1)	7.3	0.320	IX
PALOS VERDES	13.0(21.0)	7.0	0.207	VIII
WHITTIER	13.5(21.8)	7.5	0.255	IX
NEWPORT-INGLEWOOD (Offshore)	14.0(22.5)	7.0	0.193	VIII
SAN JOSE	20.0(32.2)	6.8	0.133	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.9(33.6)	7.0	0.148	VIII
CHINO-CENTRAL AVE. (Elsinore)	21.0(33.8)	6.5	0.105	VII
ELSINORE (GLEN IVY)	22.6(36.4)	7.5	0.153	VIII
RAYMOND	24.6(39.6)	7.5	0.167	VIII
VERDUGO	25.8(41.6)	6.9	0.105	VII
SIERRA MADRE	26.3(42.4)	7.2	0.126	VIII
HOLLYWOOD	26.7(43.0)	7.5	0.151	VIII
CLAMSHELL-SAWPIT	27.9(44.9)	6.5	0.070	VI
CUCAMONGA	29.5(47.4)	6.9	0.088	VII
SANTA MONICA	30.3(48.8)	6.6	0.067	VI
MALIBU COAST	34.4(55.4)	7.5	0.109	VII
CORONADO BANK	35.4(56.9)	7.8	0.104	VII
SIERRA MADRE (San Fernando)	38.2(61.5)	7.5	0.095	VII
NORTHRIDGE (E. Oak Ridge)	39.3(63.3)	7.0	0.062	VI
ELSINORE (TEMECULA)	39.6(63.7)	7.5	0.075	VII
SAN GABRIEL	40.5(65.1)	7.2	0.058	VI
ANACAPA-DUME	41.4(66.7)	7.5	0.084	VII
SAN JACINTO-SAN BERNARDINO	43.7(70.4)	7.5	0.065	VI
SAN ANDREAS - Mojave M-1c-3	45.6(73.4)	7.4	0.057	VI
SAN ANDREAS - Cho-Moj M-1b-1	45.6(73.4)	7.8	0.077	VII
SAN ANDREAS - Whole M-1a	45.6(73.4)	8.0	0.089	VII
SAN ANDREAS - 1857 Rupture M-2a	45.6(73.4)	7.8	0.077	VII
SAN ANDREAS - SB-Coach. M-2b	46.5(74.9)	7.7	0.069	VI
SAN ANDREAS - San Bernardino M-1	46.5(74.9)	7.5	0.059	VI
SAN ANDREAS - SB-Coach. M-1b-2	46.5(74.9)	7.7	0.069	VI

SANTA SUSANA	46.9(75.4)	6.7	0.037	V
SAN JACINTO-SAN JACINTO VALLEY	48.2(77.5)	7.5	0.057	VI
CLEGHORN	48.9(78.7)	6.5	0.024	IV
HOLSER	52.4(84.4)	6.5	0.025	V
SIMI-SANTA ROSA	53.1(85.5)	7.0	0.039	V
ROSE CANYON	56.5(91.0)	7.0	0.029	V
NORTH FRONTAL FAULT ZONE (West)	57.1(91.9)	7.2	0.041	V
OAK RIDGE (Onshore)	57.3(92.2)	7.0	0.034	V

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
SAN CAYETANO	62.6(100.7)	7.0	0.029	V
SAN JACINTO-ANZA	63.3(101.9)	7.2	0.029	V
ELSINORE (JULIAN)	64.0(103.0)	7.5	0.036	V
SAN ANDREAS - Carrizo M-1c-2	69.8(112.3)	7.4	0.029	V
OAK RIDGE(Blind Thrust Offshore)	71.8(115.6)	7.1	0.025	V
CHANNEL IS. THRUST (Eastern)	73.0(117.5)	7.5	0.035	V
SANTA YNEZ (East)	74.9(120.6)	7.1	0.020	IV
VENTURA - PITAS POINT	75.6(121.6)	6.9	0.019	IV
HELENDALE - S. LOCKHARDT	76.1(122.5)	7.3	0.023	IV
NORTH FRONTAL FAULT ZONE (East)	76.4(122.9)	6.7	0.016	IV
PINTO MOUNTAIN	77.0(124.0)	7.2	0.020	IV
OAK RIDGE MID-CHANNEL STRUCTURE	79.4(127.8)	6.6	0.013	III
M.RIDGE-ARROYO PARIDA-SANTA ANA	81.5(131.2)	7.2	0.022	IV
RED MOUNTAIN	84.4(135.8)	7.0	0.017	IV
SANTA CRUZ ISLAND	87.2(140.4)	7.0	0.016	IV
GARLOCK (West)	87.4(140.7)	7.3	0.018	IV
PLEITO THRUST	88.5(142.4)	7.0	0.016	IV
LENWOOD-LOCKHART-OLD WOMAN SPRGS	89.0(143.2)	7.5	0.021	IV
SAN JACINTO-COYOTE CREEK	89.5(144.1)	6.6	0.009	III
SAN ANDREAS - Coachella M-1c-5	89.6(144.2)	7.2	0.016	IV
BIG PINE	91.8(147.8)	6.9	0.011	III
EARTHQUAKE VALLEY	92.1(148.3)	6.5	0.008	II
JOHNSON VALLEY (Northern)	92.8(149.3)	6.7	0.009	III
BURNT MTN.	94.2(151.6)	6.5	0.007	II
LANDERS	95.4(153.5)	7.3	0.015	IV
EUREKA PEAK	96.4(155.1)	6.4	0.006	II
GRAVEL HILLS - HARPER LAKE	98.1(157.9)	7.1	0.012	III
EMERSON So. - COPPER MTN.	99.7 (160.5)	7.0	0.011	III

-END OF SEARCH- 68 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 4.2 MILES (6.8 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4581 g

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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: I-436

DATE: 02-09-2009

JOB NAME: springdale

CALCULATION NAME: Sign 143

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

SITE COORDINATES:
   SITE LATITUDE: 33.7741
   SITE LONGITUDE: 118.0192

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 20) Sadigh et al. (1997) Horiz. - Soil
   UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
   DISTANCE MEASURE: clodis
   SCOND: 0
   Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE1.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
NEWPORT-INGLEWOOD (L.A.Basin)	4.2(6.8)	7.0	0.380	X
SAN JOAQUIN HILLS	7.5(12.0)	7.0	0.373	IX
PUENTE HILLS BLIND THRUST	11.2(18.1)	7.3	0.316	IX
PALOS VERDES	13.0(21.0)	7.0	0.198	VIII
WHITTIER	13.5(21.8)	7.5	0.239	IX
NEWPORT-INGLEWOOD (Offshore)	14.0(22.5)	7.0	0.187	VIII
SAN JOSE	20.0(32.2)	6.8	0.149	VIII
UPPER ELYSIAN PARK BLIND THRUST	20.9(33.6)	7.0	0.166	VIII
CHINO-CENTRAL AVE. (Elsinore)	21.0(33.8)	6.5	0.121	VII
ELSINORE (GLEN IVY)	22.6(36.4)	7.5	0.159	VIII
RAYMOND	24.6(39.6)	7.5	0.188	VIII
VERDUGO	25.8(41.6)	6.9	0.125	VII
SIERRA MADRE	26.3(42.4)	7.2	0.148	VIII
HOLLYWOOD	26.7(43.0)	7.5	0.174	VIII
CLAMSHELL-SAWPIT	27.9(44.9)	6.5	0.087	VII
CUCAMONGA	29.5(47.4)	6.9	0.107	VII
SANTA MONICA	30.3(48.8)	6.6	0.084	VII
MALIBU COAST	34.4(55.4)	7.5	0.134	VIII
CORONADO BANK	35.4(56.9)	7.8	0.118	VII
SIERRA MADRE (San Fernando)	38.2(61.5)	7.5	0.119	VII
NORTHRIDGE (E. Oak Ridge)	39.3(63.3)	7.0	0.081	VII
ELSINORE (TEMECULA)	39.6(63.7)	7.5	0.089	VII

SAN GABRIEL	40.5(65.1)	7.2	0.071	VI
ANACAPA-DUME	41.4(66.7)	7.5	0.109	VII
SAN JACINTO-SAN BERNARDINO	43.7(70.4)	7.5	0.080	VII
SAN ANDREAS - Mojave M-1c-3	45.6(73.4)	7.4	0.071	VI
SAN ANDREAS - Cho-Moj M-1b-1	45.6(73.4)	7.8	0.093	VII
SAN ANDREAS - Whole M-1a	45.6(73.4)	8.0	0.106	VII
SAN ANDREAS - 1857 Rupture M-2a	45.6(73.4)	7.8	0.093	VII
SAN ANDREAS - SB-Coach. M-2b	46.5(74.9)	7.7	0.085	VII
SAN ANDREAS - San Bernardino M-1	46.5(74.9)	7.5	0.074	VII
SAN ANDREAS - SB-Coach. M-1b-2	46.5(74.9)	7.7	0.085	VII
SANTA SUSANA	46.9(75.4)	6.7	0.052	VI
SAN JACINTO-SAN JACINTO VALLEY	48.2(77.5)	7.5	0.071	VI
CLEGHORN	48.9(78.7)	6.5	0.032	V
HOLSER	52.4(84.4)	6.5	0.038	V
SIMI-SANTA ROSA	53.1(85.5)	7.0	0.055	VI
ROSE CANYON	56.5(91.0)	7.0	0.040	V
NORTH FRONTAL FAULT ZONE (West)	57.1(91.9)	7.2	0.059	VI
OAK RIDGE (Onshore)	57.3(92.2)	7.0	0.050	VI

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
SAN CAYETANO	62.6(100.7)	7.0	0.044	VI
SAN JACINTO-ANZA	63.3(101.9)	7.2	0.040	V
ELSINORE (JULIAN)	64.0(103.0)	7.5	0.050	VI
SAN ANDREAS - Carrizo M-1c-2	69.8(112.3)	7.4	0.041	V
OAK RIDGE(Blind Thrust Offshore)	71.8(115.6)	7.1	0.040	V
CHANNEL IS. THRUST (Eastern)	73.0(117.5)	7.5	0.054	VI
SANTA YNEZ (East)	74.9(120.6)	7.1	0.029	V
VENTURA - PITAS POINT	75.6(121.6)	6.9	0.031	V
HELENDALE - S. LOCKHARDT	76.1(122.5)	7.3	0.034	V
NORTH FRONTAL FAULT ZONE (East)	76.4(122.9)	6.7	0.026	V
PINTO MOUNTAIN	77.0(124.0)	7.2	0.030	V
OAK RIDGE MID-CHANNEL STRUCTURE	79.4(127.8)	6.6	0.022	IV
M.RIDGE-ARROYO PARIDA-SANTA ANA	81.5(131.2)	7.2	0.036	V
RED MOUNTAIN	84.4(135.8)	7.0	0.029	V
SANTA CRUZ ISLAND	87.2(140.4)	7.0	0.028	V
GARLOCK (West)	87.4(140.7)	7.3	0.028	V
PLEITO THRUST	88.5(142.4)	7.0	0.027	V
LENWOOD-LOCKHART-OLD WOMAN SPRGS	89.0(143.2)	7.5	0.032	V
SAN JACINTO-COYOTE CREEK	89.5(144.1)	6.6	0.015	IV
SAN ANDREAS - Coachella M-1c-5	89.6(144.2)	7.2	0.025	V
BIG PINE	91.8(147.8)	6.9	0.018	IV
EARTHQUAKE VALLEY	92.1(148.3)	6.5	0.013	III
JOHNSON VALLEY (Northern)	92.8(149.3)	6.7	0.015	IV
BURNT MTN.	94.2(151.6)	6.5	0.012	III

LANDERS	95.4(153.5)	7.3	0.024	V
EUREKA PEAK	96.4(155.1)	6.4	0.011	III
GRAVEL HILLS - HARPER LAKE	98.1(157.9)	7.1	0.020	IV
EMERSON So. - COPPER MTN.	99.7 (160.5)	7.0	0.018	IV

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-END OF SEARCH- 68 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 4.2 MILES (6.8 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.3798 g

Appendix D.2
Liquefaction Calculations

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-006

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	42.13 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.43 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\, A_{max}\, (\sigma_v/\sigma_v')\, r_d$

+++ $FS = (CRR_{7.5}/CSR)\, MSF\, K_\sigma\, K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	26.13 ft below ground surface
GWT Depth For Design, Zwd =	26.13 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	2.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.00 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.00 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{1dNcs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_i (in.)	Cumulative Settlement Profile (in.)
0.50	182.71	0.79	0.43	sand	41.1	1.66	61	60	60	60	0.68	1.00	1,746.64	0.999	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	102.9	0.011	0.000	0.00	0.00
1.50	81.74	0.63	0.77	sand to silty sand	40.1	1.00	20	180	180	180	1.52	1.00	272.47	0.997	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	38.9	0.026	0.021	0.00	0.00
2.50	47.90	1.30	2.72	sandy silt to clayey silt	39.1	1.00	19	300	300	300	2.15	1.56	193.07	0.994	N/A	0.278	N/A	N/A	NO	N/A	N/A	N/A	44.1	N/A	N/A	N/A	0.00
3.50	114.81	2.76	2.41	silty sand to sandy silt	38.1	1.00	38	420	420	420	1.93	1.22	304.56	0.992	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	83.1	0.031	0.000	0.00	0.00
4.50	118.63	2.48	2.09	silty sand to sandy silt	37.1	1.00	40	540	540	540	1.90	1.19	271.56	0.990	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	85.7	0.034	0.000	0.00	0.00
5.50	86.59	2.76	3.18	sandy silt to clayey silt	36.1	1.00	35	660	660	660	2.15	1.56	235.51	0.987	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	75.7	N/A	N/A	N/A	0.00
6.50	68.09	2.13	3.13	sandy silt to clayey silt	35.1	1.00	27	780	780	780	2.24	1.76	192.10	0.985	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	57.3	N/A	N/A	N/A	0.00
7.50	53.13	2.01	3.78	clayey silt to silty clay	34.1	1.00	27	900	900	900	2.39	2.27	180.05	0.983	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
8.50	68.01	2.38	3.50	clayey silt to silty clay	33.1	1.00	34	1,020	1,020	1,020	2.31	1.99	189.29	0.980	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
9.50	77.40	2.74	3.54	clayey silt to silty clay	32.1	1.00	39	1,140	1,140	1,140	2.30	1.93	198.32	0.978	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
10.50	53.16	2.00	3.77	clayey silt to silty clay	31.1	1.00	27	1,260	1,260	1,260	2.44	2.48	165.85	0.976	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
11.50	57.02	1.46	2.57	sandy silt to clayey silt	30.1	1.00	23	1,380	1,380	1,380	2.31	1.98	136.22	0.973	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	37.9	N/A	N/A	N/A	0.00
12.50	53.48	2.14	4.00	clayey silt to silty clay	29.1	1.00	27	1,500	1,500	1,500	2.48	2.68	165.47	0.971	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
13.50	63.51	2.72	4.29	clayey silt to silty clay	28.1	1.00	32	1,620	1,620	1,620	2.47	2.60	183.54	0.969	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
14.50	72.89	2.12	2.91	sandy silt to clayey silt	27.1	1.00	29	1,740	1,740	1,740	2.31	1.98	154.98	0.966	N/A	0.270	N/A	N/A	NO	N/A	N/A	N/A	42.5	N/A	N/A	N/A	0.00
15.50	63.25	2.23	3.52	clayey silt to silty clay	26.1	1.00	32	1,860	1,860	1,860	2.42	2.41	158.33	0.964	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
16.50	65.40	2.19	3.35	sandy silt to clayey silt	25.1	1.00	26	1,980	1,980	1,980	2.41	2.34	154.03	0.962	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	36.6	N/A	N/A	N/A	0.00
17.50	41.63	1.84	4.42	silty clay to clay	24.1	1.00	28	2,100	2,100	2,100	2.65	N/A	N/A	0.959	N/A	0.268	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
18.50	31.92	1.29	4.04	silty clay to clay	23.1	1.00	21	2,220	2,220	2,220	2.72	N/A	N/A	0.957	N/A	0.267	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
19.50	48.72	1.98	4.05	clayey silt to silty clay	22.1	1.00	24	2,340	2,340	2,340	2.60	3.30	143.12	0.955	N/A	0.267	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
20.50	102.08	2.30	2.26	silty sand to sandy silt	21.1	1.00	34	2,460	2,460	2,460	2.18	1.62	149.38	0.952	N/A	0.266	N/A	N/A	NO	N/A	N/A	N/A	41.8	0.086	0.000	0.00	0.00
21.50	90.59	3.11	3.44	sandy silt to clayey silt	20.1	1.66	60	2,580	2,580	2,580	2.05	1.37	180.65	0.950	N/A	0.265	N/A	N/A	NO	N/A	N/A	N/A	68.4	N/A	N/A	N/A	0.00
22.50	43.42	2.04	4.70	silty clay to clay	19.1	1.00	29	2,700	2,700	2,700	2.71	N/A	N/A	0.948	N/A	0.265	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
23.50	24.17	0.98	4.07	silty clay to clay	18.1	1.00	16	2,820	2,820	2,820	2.88	N/A	N/A	0.945	N/A	0.264	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
24.50	15.51	0.68	4.40	clay	17.1	1.00	16	2,940	2,940	2,940	3.07	N/A	N/A	0.943	N/A	0.264	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
25.50	14.15	0.76	5.40	clay	16.1	1.00	14	3,060	3,060	3,060	3.17	N/A	N/A	0.941	N/A	0.263	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
26.50	26.21	0.65	2.48	sandy silt to clayey silt	15.1	1.00	10	3,180	3,157	3,157	2.74	N/A	N/A	0.938	N/A	0.264	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
27.50	16.00	0.47	2.97	clayey silt to silty clay	14.1	1.00	8	3,300	3,215	3,215	2.98	N/A	N/A	0.936	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
28.50	12.95	0.54	4.20	clay	13.1	1.00	13	3,420	3,272	3,272	3.16	N/A	N/A	0.934	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
29.50	11.29	0.49	4.37	clay	12.1	1.00	11	3,540	3,330	3,330	3.23	N/A	N/A	0.931	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
30.50	10.44	0.39	3.73	clay	11.1	1.00	10	3,660	3,387	3,387	3.22	N/A	N/A	0.926	N/A	0.280	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
31.50	13.01	0.41	3.12	silty clay to clay	10.1	1.00	9	3,780	3,445	3,445	3.10	N/A	N/A	0.918	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
32.50	12.30	0.41	3.36	silty clay to clay	9.1	1.00	8	3,900	3,503	3,503	3.14	N/A	N/A	0.909	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
33.50	14.43	0.41	2.81	clayey silt to silty clay	8.1	1.00	7	4,020	3,560	3,560	3.04	N/A	N/A	0.901	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
34.50	13.69	0.40	2.95	clayey silt to silty clay	7.1	1.00	7	4,140	3,618	3,618	3.08	N/A	N/A	0.893	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
35.50	14.76	0.46	3.10	clayey silt to silty clay	6.1	1.00	7	4,260	3,675	3,675	3.07	N/A	N/A	0.885	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
36.50	15.95	0.52	3.29	silty clay to clay	5.1	1.00	11	4,380	3,733	3,733	3.06	N/A	N/A	0.877	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
37.50	11.78	0.26	2.18	clayey silt to silty clay	4.1	1.00	6	4,500	3,791	3,791	3.09	N/A	N/A	0.869	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
38.50	17.84	0.46	2.58	clayey silt to silty clay	3.1	1.00	9	4,620	3,848	3,848	2.96	N/A	N/A	0.861	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
39.50	22.82	0.78	3.45	clayey silt to silty clay	2.1	1.00	11	4,740	3,906	3,906	2.95	N/A	N/A	0.852	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
40.50	27.33	1.45	5.33	clay	1.1	1.00	27	4,860	3,963	3,963	3.01	N/A	N/A	0.844	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
41.50	30.81	0.98	3.18	clayey silt to silty clay	0.1	1.00	15	4,980	4,021	4,021	2.82	N/A	N/A	0.836	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
42.50	17.04	0.77	4.53	clay	-0.9	1.00	17	5,100	4,078	4,078	3.14	N/A	N/A	0.828	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
43.50	23.90	1.31	5.47	clay	-1.9	1.00	24	5,220	4,136	4,136	3.07	N/A	N/A	0.820	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
44.50	43.14	1.63	3.77	clayey silt to silty clay	-2.9	1.00	22	5,340	4,194	4,194	2.76	N/A	N/A	0.812	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
45.50	79.67	1.56	1.96	silty sand to sandy silt	-3.9	1.66	44	5,460	4,251	4,251	2.00	1.29	117.13	0.804	0.740	0.288	0.229	0.702	YES	2.8	33.0	1,500	41.2	N/A	0.000	0.00	0.00
46.50	28.88	1.35	4.68	clay	-4.9	1.00	29	5,580	4,309	4,309	2.97	N/A	N/A	0.795	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
47.50	30.93	1.35	4.38	silty clay to clay	-5.9	1.00	21	5,700	4,366	4,366	2.93	N/A	N/A	0.787	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	51.59	1.67	3.24	clayey silt to silty clay	-6.9	1.00	26	5,820	4,424	4,424	2.67	N/A	N/A	0.779	N/A	0.287	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	36.22	1.08	3.00	clayey silt to silty clay	-7.9	1.00	18	5,940	4,482	4,482	2.78	N/A	N/A	0.771	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
50.50	21.03	0.85	4.05	silty clay to clay	-8.9	1.00	14	6,060	4,539	4,539	3.07	N/A	N/A	0.763	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
51.50	46.11	2.13	4.63	silty clay to clay	-9.9	1.00	31	6,180	4,597	4,597	2.82	N/A	N/A	0.755	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	49.99	2.44	4.89	silty clay to clay	-10.9	1.66	55	6,300	4,654	4,654	2.43	2.45	133.14	0.747	0.713	0.282	0.299	0.902	YES	5.0	41.2	1,500	N/A	N/A	0.000	0.00	0.00
53.50	19.11	0.87	4.55	clay	-11.9	1.00	19	6,420	4,712	4,712	3.15	N/A	N/A	0.739	N/A	0.281	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
54.50	19.86	1.04	5.29	clay	-12.9	1.00	20	6,540	4,770	4,770	3.18	N/A	N/A	0.730	N/A	0.280	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	116.02	3.57	3.08	sandy silt to clayey silt	-13.9	1.00	46	6,660	4,827	4,827	2.35	2.11	157.60	0.722	0.703	0.278	0.444	1.337	NO	N/A	N/A	N/A	40.8	N/A	0.000	0.00	0.00
56.50	194.87	4.18	2.14	silty sand to sandy silt	-14.9	1.00	65	6,780	4,885	4,885	2.08	1.42	176.56	0.714	0.700	0.277	N/A	N/A	NO	N/A	N/A	N/A	54.9	N/A	0.000	0.00	0.00
57.50	229.04	4.48	1.96	sand to silty sand	-15.9	1.00	57	6,900	4,942	4,942	2.00	1.30	190.00	0.706	0.696	0.275	N/A	N/A	NO	N/A	N/A	N/A	40.7	N/A	0.000	0.00	0.00
58.50	239.13	3.63	1.52	sand to silty sand	-16.9	1.00	60	7,020	5,000	5,000	1.91	1.20	181.22	0.698	0.693	0.274	N/A	N/A	NO	N/A	N/A	N/A	42.1	N/A	0.000	0.00	0.00
59.50	137.97	2.47	1.79	silty sand to sandy silt	-17.9	1.66	76	7,140	5,058	5,058	1.82	1.12	161.09	0.690	0.690	0.272	N/A	N/A	NO	N/A	N/A	N/A	62.5	N/A	0.000	0.00	0.00
60.50	32.88	1.36	4.16	silty clay to clay	-18.9	1.00	22	7,260	5,115	5,115	2.94	N/A	N/A	0.682	N/A	0.270	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
																					max=	1,500					
																					min=	1,500					
																					avg=	1,500					

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-018

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	43.59 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.42 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\, A_{max}\, (\sigma_v/\sigma_v')\, r_d$

+++ $FS = (CRR_{7.5}/CSR)\, MSF\, K_\sigma\, K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	27.59 ft below ground surface
GWT Depth For Design, Zwd =	27.59 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	10.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.15 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.07 inches	<--- Dry or Unsaturated Sands
Total:	0.22 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{1dNcs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r(psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_t (in.)	Cumulative Settlement Profile (in.)
0.50	20.27	0.17	0.84	sandy silt to clayey silt	42.6	1.00	8	60	60	60	1.81	1.11	130.33	0.999	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	21.5	N/A	N/A	N/A	0.22
1.50	159.00	0.81	0.51	sand	41.6	1.66	53	180	180	180	0.88	1.00	877.52	0.997	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	89.5	0.019	0.000	0.00	0.22
2.50	23.38	1.00	4.29	silty clay to clay	40.6	1.00	16	300	300	300	2.51	2.82	170.01	0.994	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
3.50	31.66	1.08	3.42	clayey silt to silty clay	39.6	1.00	16	420	420	420	2.40	2.30	158.93	0.992	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
4.50	18.74	0.76	4.06	silty clay to clay	38.6	1.00	12	540	540	540	2.55	3.03	151.81	0.990	N/A	0.270	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
5.50	87.92	1.89	2.15	silty sand to sandy silt	37.6	1.00	29	660	660	660	2.02	1.32	202.52	0.987	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	64.8	0.040	0.000	0.00	0.22
6.50	51.90	1.72	3.31	clayey silt to silty clay	36.6	1.00	26	780	780	780	2.33	2.06	170.92	0.985	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
7.50	28.26	1.43	5.07	clay	35.6	1.00	28	900	900	900	2.61	N/A	N/A	0.983	N/A	0.268	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
8.50	24.56	1.20	4.92	clay	34.6	1.00	25	1,020	1,020	1,020	2.67	N/A	N/A	0.980	N/A	0.268	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
9.50	47.39	1.85	3.91	clayey silt to silty clay	33.6	1.00	24	1,140	1,140	1,140	2.47	2.61	164.04	0.978	N/A	0.267	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
10.50	50.12	2.21	4.42	silty clay to clay	32.6	1.00	33	1,260	1,260	1,260	2.51	2.80	177.06	0.976	N/A	0.266	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
11.50	102.52	2.85	2.78	sandy silt to clayey silt	31.6	1.00	41	1,380	1,380	1,380	2.16	1.58	195.06	0.973	N/A	0.266	N/A	N/A	NO	N/A	N/A	N/A	64.2	N/A	N/A	N/A	0.22
12.50	63.49	2.52	3.99	clayey silt to silty clay	30.6	1.00	32	1,500	1,500	1,500	2.43	2.44	178.74	0.971	N/A	0.265	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
13.50	53.18	2.04	3.85	clayey silt to silty clay	29.6	1.00	27	1,620	1,620	1,620	2.48	2.68	158.41	0.969	N/A	0.264	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
14.50	42.49	1.78	4.22	silty clay to clay	28.6	1.00	28	1,740	1,740	1,740	2.59	3.27	148.97	0.966	N/A	0.264	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
15.50	40.34	1.53	3.82	clayey silt to silty clay	27.6	1.00	20	1,860	1,860	1,860	2.59	3.25	135.93	0.964	N/A	0.263	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
16.50	33.03	1.67	5.08	clay	26.6	1.00	33	1,980	1,980	1,980	2.75	N/A	N/A	0.962	N/A	0.262	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.22
17.50	148.71	1.24	0.84	sand	25.6	1.00	30	2,100	2,100	2,100	1.74	1.06	154.38	0.959	N/A	0.262	N/A	N/A	NO	N/A	N/A	N/A	29.0	0.088	0.101	0.01	0.21
18.50	80.18	1.33	1.66	silty sand to sandy silt	24.6	1.00	27	2,220	2,220	2,220	2.15	1.55	117.86	0.957	N/A	0.261	N/A	N/A	NO	N/A	N/A	N/A	35.4	0.084	0.076	0.01	0.20
19.50	54.51	1.11	2.04	silty sand to sandy silt	23.6	1.00	18	2,340	2,340	2,340	2.34	2.10	105.59	0.955	N/A	0.261	N/A	N/A	NO	N/A	N/A	N/A	25.2	0.096	0.131	0.02	0.19
20.50	46.65	1.62	3.48	clayey silt to silty clay	22.6	1.66	39	2,460	2,460	2,460	2.25	1.79	124.33	0.952	N/A	0.260	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
21.50	18.50	0.86	4.68	clay	21.6	1.00	19	2,580	2,580	2,580	2.98	N/A	N/A	0.950	N/A	0.259	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
22.50	16.39	0.58	3.58	silty clay to clay	20.6	1.00	11	2,700	2,700	2,700	2.97	N/A	N/A	0.948	N/A	0.259	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
23.50	14.89	0.49	3.35	silty clay to clay	19.6	1.00	10	2,820	2,820	2,820	3.00	N/A	N/A	0.945	N/A	0.258	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
24.50	30.99	0.70	2.26	sandy silt to clayey silt	18.6	1.00	12	2,940	2,940	2,940	2.64	N/A	N/A	0.943	N/A	0.257	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
25.50	55.67	0.66	1.19	silty sand to sandy silt	17.6	1.00	19	3,060	3,060	3,060	2.24	1.77	79.46	0.941	N/A	0.257	N/A	N/A	NO	N/A	N/A	N/A	23.0	0.110	0.168	0.02	0.17
26.50	43.42	0.50	1.16	silty sand to sandy silt	16.6	1.66	24	3,180	3,180	3,180	2.02	1.33	75.86	0.938	N/A	0.256	N/A	N/A	NO	N/A	N/A	N/A	27.8	0.105	0.127	0.02	0.15
27.50	9.28	0.34	3.71	clay	15.6	1.00	9	3,300	3,300	3,300	3.25	N/A	N/A	0.936	N/A	0.255	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
28.50	11.01	0.34	3.20	silty clay to clay	14.6	1.00	7	3,420	3,363	3,363	3.15	N/A	N/A	0.934	N/A	0.259	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
29.50	8.99	0.31	3.53	clay	13.6	1.00	9	3,540	3,421	3,421	3.27	N/A	N/A	0.931	N/A	0.263	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
30.50	13.16	0.31	2.48	clayey silt to silty clay	12.6	1.00	7	3,660	3,478	3,478	3.03	N/A	N/A	0.926	N/A	0.266	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15
31.50	56.70	0.97	1.72	silty sand to sandy silt	11.6	1.00	19	3,780	3,536	3,536	2.35	2.13	90.87	0.918	0.851	0.268	0.150	0.568	YES	2.8	17.0	875	22.1	N/A	0.185	0.02	0.13
32.50	124.39	0.94	0.76	sand	10.6	1.66	41	3,900	3,594	3,594	1.56	1.00	153.65	0.909	0.791	0.269	0.417	1.461	NO	N/A	N/A	N/A	30.7	N/A	0.058	0.01	0.12
33.50	32.85	0.77	2.36	sandy silt to clayey silt	9.6	1.66	22	4,020	3,651	3,651	2.32	2.03	81.77	0.901	0.834	0.271	0.131	0.481	YES	2.8	18.9	1,070	24.3	N/A	0.099	0.01	0.11
34.50	12.35	0.17	1.43	clayey silt to silty clay	8.6	1.00	6	4,140	3,709	3,709	2.95	N/A	N/A	0.893	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
35.50	10.95	0.19	1.87	clayey silt to silty clay	7.6	1.00	5	4,260	3,766	3,766	3.06	N/A	N/A	0.885	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
36.50	13.59	0.34	2.64	clayey silt to silty clay	6.6	1.00	7	4,380	3,824	3,824	3.06	N/A	N/A	0.877	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
37.50	11.03	0.34	3.34	silty clay to clay	5.6	1.00	7	4,500	3,882	3,882	3.20	N/A	N/A	0.869	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
38.50	11.42	0.30	2.76	silty clay to clay	4.6	1.00	8	4,620	3,939	3,939	3.15	N/A	N/A	0.861	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
39.50	14.41	0.34	2.46	clayey silt to silty clay	3.6	1.00	7	4,740	3,997	3,997	3.03	N/A	N/A	0.852	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
40.50	20.51	0.61	3.11	clayey silt to silty clay	2.6	1.00	10	4,860	4,054	4,054	2.96	N/A	N/A	0.844	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
41.50	29.18	1.05	3.73	clayey silt to silty clay	1.6	1.00	15	4,980	4,112	4,112	2.88	N/A	N/A	0.836	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
42.50	38.18	1.81	4.81	clay	0.6	1.00	38	5,100	4,170	4,170	2.87	N/A	N/A	0.828	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.11
43.50	165.31	1.79	1.08	sand	-0.4	1.00	33	5,220	4,227	4,227	1.90	1.18	134.67	0.820	0.765	0.276	0.307	1.014	YES	0.0	22.7	1,461	22.7	N/A	0.179	0.02	0.09
44.50	249.88	1.66	0.66	sand	-1.4	1.00	50	5,340	4,285	4,285	1.62	1.00	170.72	0.812	0.737	0.276	N/A	N/A	NO	N/A	N/A	N/A	34.1	N/A	0.038	0.00	0.08
45.50	243.48	1.33	0.55	sand	-2.4	1.00	49	5,460	4,342	4,342	1.58	1.00	165.24	0.804	0.733	0.276	N/A	N/A	NO	N/A	N/A	N/A	33.0	N/A	0.045	0.01	0.08
46.50	219.11	1.54	0.70	sand	-3.4	1.66	73	5,580	4,400	4,400	1.38	1.00	244.60	0.795	0.730	0.275	N/A	N/A	NO	N/A	N/A	N/A	48.9	N/A	0.000	0.00	0.08
47.50	51.31	1.87	3.66	clayey silt to silty clay	-4.4	1.00	26	5,700	4,458	4,458	2.71	N/A	N/A	0.787	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.08
48.50	77.38	2.08	2.70	sandy silt to clayey silt	-5.4	1.00	31	5,820	4,515	4,515	2.42	2.40	123.84	0.779	0.758	0.274	0.257	0.846	YES	2.8	23.4	1,500	29.7	N/A	0.065	0.01	0.07
49.50	167.70	2.15	1.28	sand to silty sand	-6.4	1.00	42	5,940	4,573	4,573	1.95	1.24	137.83	0.771	0.721	0.273	0.324	1.018	YES	1.3	29.1	1,500	31.6	N/A	0.054	0.01	0.06
50.50	133.01	1.76	1.32	sand to silty sand	-7.4	1.66	55	6,060	4,630	4,630	1.73	1.06	153.00	0.763	0.715	0.273	0.413	1.292	NO	N/A	N/A	N/A	40.4	N/A	0.000	0.00	0.06
51.50	27.72	0.90	3.27	clayey silt to silty clay	-8.4	1.00	14	6,180	4,688	4,688	2.91	N/A	N/A	0.755	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
52.50	21.29	0.76	3.66	silty clay to clay	-9.4	1.00	14	6,300	4,746	4,746	3.04	N/A	N/A	0.747	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.06
53.50	92.42	1.97	2.14	silty sand to sandy silt	-10.4	1.00	31	6,420	4,803	4,803	2.31	1.97	117.46	0.739	0.746	0.269	0.231	0.762	YES	2.8	22.7	1,455	28.9	N/A	0.070	0.01	0.06
54.50	65.70	1.38	2.09	silty sand to sandy silt	-11.4	1.66	36	6,540	4,861	4,861	2.10	1.46	102.02	0.730	0.725	0.268	0.179	0.576	YES	2.8	26.1	1,500	32.9	N/A	0.044	0.01	0.05
55.50	16.62	0.77	4.72	clay	-12.4	1.00	17	6,660	4,918	4,918	3.22	N/A	N/A	0.722	N/A	0.267	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
56.50	17.82	0.86	4.98	clay	-13.4	1.00	18	6,780	4,976	4,976	3.21	N/A	N/A	0.714	N/A	0.266	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
57.50	20.74	0.91	4.60	clay	-14.4	1.00	21	6,900	5,034	5,034	3.13	N/A	N/A	0.706	N/A	0.264	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05
58.50	70.06	1.38	1.98	silty sand to sandy silt	-15.4	1.00	23	7,020	5,091	5,091	2.39	2.26	99.29	0.698	0.765	0.263	0.171	0.594	YES	2.8	17.4	918	22.6	N/A	0.145	0.02	0.03
59.50	173.95	1.99	1.14	sand	-16.4	1.00	35	7,140	5,149	5,149	1.93	1.22	131.81	0.690	0.719	0.261	0.293	0.962	YES	0.0	21.7	1,359	21.7	N/A	0.181	0.02	0.01
60.50	135.47	1.82	1.34	sand to silty sand	-17.4	1.00	34	7,260	5,206	5,206	2.06	1.38	116.22	0.682	0.720	0.259	0.226	0.748	YES	1.3	22.3	1,422	24.5	N/A	0.093	0.01	0.00

max=	1,500
min=	875
avg=	1,306

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	SR-22 Phase 2
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-08-117

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	22.00 ft
GWT Elev. During Test	15.00 ft
GWT Elev. For Design	15.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.44 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\, A_{max}\, (\sigma_v/\sigma_v')\, r_d$

+++ $FS = (CRR_{7.5}/CSR)\, MSF\, K_\sigma\, K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	7.00 ft below ground surface
GWT Depth For Design, Zwd =	7.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	14.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.26 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.26 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{cINcs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_t (in.)	Cumulative Settlement Profile (in.)
0.50	203.34	1.53	0.75	sand	21.0	1.00	41	60	60	60	1.17	1.00	1,174.00	0.999	N/A	0.286	N/A	N/A	NO	N/A	N/A	N/A	69.1	0.013	0.000	0.00	0.26
1.50	196.82	2.64	1.34	sand to silty sand	20.0	1.66	81	180	180	180	1.21	1.00	1,086.27	0.997	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	147.7	0.017	0.000	0.00	0.26
2.50	62.15	1.24	2.00	silty sand to sandy silt	19.0	1.00	21	300	300	300	1.98	1.27	204.08	0.994	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	47.3	0.033	0.000	0.00	0.26
3.50	31.71	0.72	2.27	sandy silt to clayey silt	18.0	1.66	21	420	420	420	1.96	1.25	143.08	0.992	N/A	0.284	N/A	N/A	NO	N/A	N/A	N/A	47.8	N/A	N/A	N/A	0.26
4.50	13.79	0.57	4.13	clay	17.0	1.00	14	540	540	540	2.65	N/A	N/A	0.990	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
5.50	9.65	0.37	3.82	clay	16.0	1.00	10	660	660	660	2.80	N/A	N/A	0.987	N/A	0.282	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
6.50	8.44	0.29	3.40	clay	15.0	1.00	8	780	780	780	2.85	N/A	N/A	0.985	N/A	0.282	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
7.50	30.22	0.41	1.34	silty sand to sandy silt	14.0	1.66	17	900	869	869	1.95	1.24	94.32	0.983	1.000	0.291	0.158	0.648	YES	2.8	28.1	1,500	35.4	N/A	0.032	0.00	0.26
8.50	12.64	0.31	2.43	clayey silt to silty clay	13.0	1.00	6	1,020	926	926	2.67	N/A	N/A	0.980	N/A	0.309	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
9.50	10.37	0.31	3.00	silty clay to clay	12.0	1.00	7	1,140	984	984	2.81	N/A	N/A	0.978	N/A	0.324	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
10.50	10.30	0.30	2.92	silty clay to clay	11.0	1.00	7	1,260	1,042	1,042	2.82	N/A	N/A	0.976	N/A	0.337	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
11.50	12.62	0.55	4.38	clay	10.0	1.00	13	1,380	1,099	1,099	2.88	N/A	N/A	0.973	N/A	0.349	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
12.50	13.46	0.49	3.69	silty clay to clay	9.0	1.00	9	1,500	1,157	1,157	2.82	N/A	N/A	0.971	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
13.50	54.16	0.64	1.19	silty sand to sandy silt	8.0	1.66	30	1,620	1,214	1,214	1.77	1.09	125.23	0.969	1.000	0.370	0.263	0.848	YES	2.8	41.2	1,500	51.0	N/A	0.000	0.00	0.26
14.50	20.17	0.48	2.39	clayey silt to silty clay	7.0	1.00	10	1,740	1,272	1,272	2.58	3.24	91.65	0.966	1.000	0.378	0.152	0.478	YES	2.8	15.4	721	N/A	N/A	0.000	0.00	0.26
15.50	14.85	0.48	3.32	silty clay to clay	6.0	1.00	10	1,860	1,330	1,330	2.79	N/A	N/A	0.964	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
16.50	14.43	0.65	4.58	clay	5.0	1.00	14	1,980	1,387	1,387	2.90	N/A	N/A	0.962	N/A	0.393	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
17.50	11.22	0.48	4.44	clay	4.0	1.00	11	2,100	1,445	1,445	2.99	N/A	N/A	0.959	N/A	0.399	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
18.50	24.04	1.25	5.30	clay	3.0	1.00	24	2,220	1,502	1,502	2.79	N/A	N/A	0.957	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
19.50	36.53	1.55	4.27	silty clay to clay	2.0	1.00	24	2,340	1,560	1,560	2.61	N/A	N/A	0.955	N/A	0.409	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
20.50	24.76	0.96	3.95	silty clay to clay	1.0	1.00	17	2,460	1,618	1,618	2.72	N/A	N/A	0.952	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
21.50	16.10	0.60	3.88	silty clay to clay	0.0	1.00	11	2,580	1,675	1,675	2.86	N/A	N/A	0.950	N/A	0.418	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
22.50	19.83	0.98	5.10	clay	-1.0	1.00	20	2,700	1,733	1,733	2.88	N/A	N/A	0.948	N/A	0.422	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
23.50	16.53	0.76	4.72	clay	-2.0	1.00	17	2,820	1,790	1,790	2.93	N/A	N/A	0.945	N/A	0.426	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
24.50	12.56	0.46	3.90	clay	-3.0	1.00	13	2,940	1,848	1,848	2.98	N/A	N/A	0.943	N/A	0.429	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
25.50	17.58	0.92	5.51	clay	-4.0	1.00	18	3,060	1,906	1,906	2.97	N/A	N/A	0.941	N/A	0.432	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26
26.50	114.99	1.64	1.43	sand to silty sand	-5.0	1.00	29	3,180	1,963	1,963	1.97	1.26	146.52	0.938	1.000	0.435	0.373	1.022	YES	1.3	30.3	1,500	32.9	N/A	0.086	0.01	0.25
27.50	145.76	1.46	1.00	sand	-6.0	1.00	29	3,300	2,021	2,021	1.79	1.10	159.78	0.936	0.996	0.437	0.459	1.248	NO	N/A	N/A	N/A	29.0	N/A	0.496	0.06	0.19
28.50	111.01	1.24	1.12	sand to silty sand	-7.0	1.66	46	3,420	2,078	2,078	1.61	1.00	180.30	0.934	0.985	0.439	N/A	N/A	NO	N/A	N/A	N/A	49.7	N/A	0.000	0.00	0.19
29.50	41.51	1.44	3.49	clayey silt to silty clay	-8.0	1.00	21	3,540	2,136	2,136	2.58	3.23	127.46	0.931	0.978	0.441	0.273	0.721	YES	2.8	22.9	1,474	N/A	N/A	0.000	0.00	0.19
30.50	63.40	1.76	2.78	sandy silt to clayey silt	-9.0	1.00	25	3,660	2,194	2,194	2.38	2.23	134.75	0.926	0.966	0.442	0.308	0.803	YES	2.8	27.0	1,500	34.1	N/A	0.074	0.01	0.18
31.50	69.33	2.19	3.16	sandy silt to clayey silt	-10.0	1.00	28	3,780	2,251	2,251	2.39	2.29	149.62	0.918	0.956	0.441	0.391	1.013	YES	2.8	28.9	1,500	36.4	N/A	0.045	0.01	0.18
32.50	66.97	2.44	3.65	clayey silt to silty clay	-11.0	1.00	33	3,900	2,309	2,309	2.45	2.55	158.78	0.909	0.944	0.439	0.452	1.159	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.18
33.50	146.67	2.91	1.98	silty sand to sandy silt	-12.0	1.00	49	4,020	2,366	2,366	2.03	1.34	180.63	0.901	0.935	0.438	N/A	N/A	NO	N/A	N/A	N/A	58.9	N/A	0.000	0.00	0.18
34.50	152.48	1.61	1.06	sand	-13.0	1.66	50	4,140	2,424	2,424	1.51	1.00	229.33	0.893	0.926	0.436	N/A	N/A	NO	N/A	N/A	N/A	45.9	N/A	0.000	0.00	0.18
35.50	20.09	0.68	3.44	clayey silt to silty clay	-14.0	1.00	10	4,260	2,482	2,482	2.87	N/A	N/A	0.885	N/A	0.435	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
36.50	13.53	0.57	4.47	clay	-15.0	1.00	14	4,380	2,539	2,539	3.09	N/A	N/A	0.877	N/A	0.433	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
37.50	24.12	1.00	4.31	silty clay to clay	-16.0	1.00	16	4,500	2,597	2,597	2.87	N/A	N/A	0.869	N/A	0.431	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
38.50	116.09	2.38	2.05	silty sand to sandy silt	-17.0	1.00	39	4,620	2,654	2,654	2.13	1.51	151.80	0.861	0.893	0.428	0.405	1.008	YES	2.8	36.4	1,500	45.3	N/A	0.000	0.00	0.18
39.50	172.98	2.12	1.23	sand to silty sand	-18.0	1.00	43	4,740	2,712	2,712	1.85	1.14	169.81	0.852	0.885	0.426	N/A	N/A	NO	N/A	N/A	N/A	41.4	N/A	0.000	0.00	0.18
40.50	122.22	1.60	1.31	sand to silty sand	-19.0	1.66	51	4,860	2,770	2,770	1.67	1.02	174.90	0.844	0.878	0.424	N/A	N/A	NO	N/A	N/A	N/A	47.6	N/A	0.000	0.00	0.18
41.50	57.39	1.09	1.91	silty sand to sandy silt	-20.0	1.66	32	4,980	2,827	2,827	2.03	1.34	107.32	0.836	0.875	0.421	0.195	0.483	YES	2.8	29.4	1,500	37.0	N/A	0.035	0.00	0.17
42.50	24.33	0.69	2.93	clayey silt to silty clay	-21.0	1.00	12	5,100	2,885	2,885	2.80	N/A	N/A	0.828	N/A	0.419	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.17
43.50	123.37	1.51	1.22	sand to silty sand	-22.0	1.00	31	5,220	2,942	2,942	1.97	1.26	128.11	0.820	0.864	0.416	0.276	0.683	YES	1.3	26.8	1,500	29.1	N/A	0.310	0.04	0.13
44.50	66.73	2.46	3.70	clayey silt to silty clay	-23.0	1.00	33	5,340	3,000	3,000	2.50	2.78	151.36	0.812	0.853	0.413	0.403	0.991	YES	2.8	30.0	1,500	N/A	N/A	0.000	0.00	0.13
45.50	78.03	2.66	3.42	sandy silt to clayey silt	-24.0	1.00	31	5,460	3,058	3,058	2.43	2.45	154.55	0.804	0.852	0.410	0.423	1.048	YES	2.8	28.0	1,500	35.3	N/A	0.053	0.01	0.13
46.50	63.34	1.18	1.87	silty sand to sandy silt	-25.0	1.00	21	5,580	3,115	3,115	2.32	2.02	102.76	0.795	0.872	0.408	0.181	0.462	YES	2.8	19.7	1,156	25.3	N/A	1.064	0.13	0.00
47.50	33.99	1.07	3.15	clayey silt to silty clay	-26.0	1.00	17	5,700	3,173	3,173	2.73	N/A	N/A	0.787	N/A	0.405	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	26.19	0.80	3.09	clayey silt to silty clay	-27.0	1.00	13	5,820	3,230	3,230	2.82	N/A	N/A	0.779	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	16.08	0.38	2.41	clayey silt to silty clay	-28.0	1.00	8	5,940	3,288	3,288	2.95	N/A	N/A	0.771	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
50.50	101.59	2.42	2.38	silty sand to sandy silt	-29.0	1.66	56	6,060	3,346	3,346	1.94	1.23	159.64	0.763	0.814	0.395	0.458	1.126	NO	N/A	N/A	N/A	57.0	N/A	0.000	0.00	0.00
51.50	41.97	1.95	4.62	silty clay to clay	-30.0	1.00	28	6,180	3,403	3,403	2.79	N/A	N/A	0.755	N/A	0.392	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	52.14	2.52	4.82	silty clay to clay	-31.0	1.00	35	6,300	3,461	3,461	2.73	N/A	N/A	0.747	N/A	0.389	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
53.50	55.03	2.80	5.08	silty clay to clay	-32.0	1.66	61	6,420	3,518	3,518	2.37	2.21	151.79	0.739	0.798	0.385	0.405	1.001	YES	5.0	50.8	1,500	N/A	N/A	0.000	0.00	0.00
54.50	17.65	0.65	3.65	silty clay to clay	-33.0	1.00	12	6,540	3,576	3,576	3.06	N/A	N/A	0.730	N/A	0.382	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	24.56	1.06	4.23	silty clay to clay	-34.0	1.00	16	6,660	3,634	3,634	2.98	N/A	N/A	0.722	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
56.50	20.00	0.91	4.35	clay	-35.0	1.00	20	6,780	3,691	3,691	3.07	N/A	N/A	0.714	N/A	0.375	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	26.53	1.01	3.61	clayey silt to silty clay	-36.0	1.00	13	6,900	3,749	3,749	2.92	N/A	N/A	0.706	N/A	0.372	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	23.17	1.20	5.06	clay	-37.0	1.66	38	7,020	3,806	3,806	2.73	N/A	N/A	0.698	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	11.32	0.75	6.26	clay	-38.0	1.00	11	7,140	3,864	3,864	3.43	N/A	N/A	0.690	N/A	0.364	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

	max=	1,500
	min=	721
	avg=	1,418

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	West County Connector - 405/22 HOV Segment
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-09-122

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	39.00 ft
GWT Elev. During Test	29.00 ft
GWT Elev. For Design	29.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.38 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\ A_{max}\ (\sigma_v/\sigma_v')\ r_d$

+++ $FS = (CRR_{7.5}/CSR)\ MSF\ K_\sigma\ K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	10.00 ft below ground surface
GWT Depth For Design, Zwd =	10.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	20.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.65 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.65 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{cINcs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60s}$	Residual Shear Strength S_r(psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_i (in.)	Cumulative Settlement Profile (in.)
0.50	282.21	3.42	1.21	sand	38.0	1.00	56	60	60	60	1.33	1.00	1,629.36	0.999	N/A	0.247	N/A	N/A	NO	N/A	N/A	N/A	96.0	0.009	0.000	0.00	0.65
1.50	338.21	7.88	2.33	sand to silty sand	37.0	1.66	140	180	180	180	1.38	1.00	1,866.61	0.997	N/A	0.246	N/A	N/A	NO	N/A	N/A	N/A	251.9	0.011	0.000	0.00	0.65
2.50	129.73	4.11	3.17	sandy silt to clayey silt	36.0	1.00	52	300	300	300	1.96	1.26	420.41	0.994	N/A	0.246	N/A	N/A	NO	N/A	N/A	N/A	110.9	N/A	N/A	N/A	0.65
3.50	118.45	1.71	1.45	sand to silty sand	35.0	1.00	30	420	420	420	1.74	1.06	275.13	0.992	N/A	0.245	N/A	N/A	NO	N/A	N/A	N/A	55.3	0.028	0.000	0.00	0.65
4.50	60.38	1.31	2.17	sandy silt to clayey silt	34.0	1.66	40	540	540	540	1.79	1.10	211.36	0.990	N/A	0.244	N/A	N/A	NO	N/A	N/A	N/A	86.6	N/A	N/A	N/A	0.65
5.50	15.78	0.49	3.07	clayey silt to silty clay	33.0	1.00	8	660	660	660	2.57	3.14	113.83	0.987	N/A	0.244	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.65
6.50	15.48	0.51	3.32	silty clay to clay	32.0	1.00	10	780	780	780	2.64	N/A	N/A	0.985	N/A	0.243	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.65
7.50	15.31	0.52	3.37	silty clay to clay	31.0	1.00	10	900	900	900	2.68	N/A	N/A	0.983	N/A	0.243	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.65
8.50	24.85	0.56	2.26	sandy silt to clayey silt	30.0	1.00	10	1,020	1,020	1,020	2.49	2.74	95.41	0.980	N/A	0.242	N/A	N/A	NO	N/A	N/A	N/A	21.7	N/A	N/A	N/A	0.65
9.50	27.24	0.44	1.61	sandy silt to clayey silt	29.0	1.00	11	1,140	1,140	1,140	2.39	2.28	82.10	0.978	N/A	0.242	N/A	N/A	NO	N/A	N/A	N/A	22.3	N/A	N/A	N/A	0.65
10.50	21.21	0.38	1.77	sandy silt to clayey silt	28.0	1.66	14	1,260	1,229	1,229	2.21	1.69	75.84	0.976	1.000	0.247	0.121	0.582	YES	2.8	20.7	1,261	26.5	N/A	0.076	0.01	0.64
11.50	3.90	0.17	4.28	clay	27.0	1.00	4	1,380	1,286	1,286	3.35	N/A	N/A	0.973	N/A	0.258	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
12.50	3.39	0.20	5.73	clay	26.0	1.00	3	1,500	1,344	1,344	3.50	N/A	N/A	0.971	N/A	0.268	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
13.50	15.95	0.40	2.47	clayey silt to silty clay	25.0	1.00	8	1,620	1,402	1,402	2.70	N/A	N/A	0.969	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
14.50	11.02	0.46	4.11	clay	24.0	1.00	11	1,740	1,459	1,459	2.98	N/A	N/A	0.966	N/A	0.285	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.64
15.50	32.34	0.83	2.56	sandy silt to clayey silt	23.0	1.00	13	1,860	1,517	1,517	2.51	2.82	104.71	0.964	1.000	0.292	0.187	0.763	YES	2.8	17.7	940	22.8	N/A	0.299	0.04	0.60
16.50	53.56	0.91	1.69	silty sand to sandy silt	22.0	1.00	18	1,980	1,574	1,574	2.23	1.74	105.25	0.962	1.000	0.299	0.188	0.753	YES	2.8	22.9	1,478	29.1	N/A	0.077	0.01	0.60
17.50	127.70	0.90	0.70	sand	21.0	1.00	26	2,100	1,632	1,632	1.70	1.04	146.63	0.959	1.000	0.305	0.373	1.460	NO	N/A	N/A	N/A	28.3	N/A	0.085	0.01	0.58
18.50	139.56	0.98	0.70	sand	20.0	1.00	28	2,220	1,690	1,690	1.67	1.02	154.96	0.957	1.000	0.311	0.426	1.636	NO	N/A	N/A	N/A	30.4	N/A	0.071	0.01	0.58
19.50	126.66	0.99	0.78	sand	19.0	1.00	25	2,340	1,747	1,747	1.74	1.07	144.55	0.955	1.000	0.316	0.361	1.363	NO	N/A	N/A	N/A	27.1	N/A	0.097	0.01	0.56
20.50	110.31	0.90	0.81	sand to silty sand	18.0	1.00	28	2,460	1,805	1,805	1.81	1.11	128.99	0.952	1.000	0.321	0.280	1.040	YES	1.3	30.4	1,500	32.9	N/A	0.054	0.01	0.56
21.50	123.60	0.96	0.78	sand	17.0	1.66	41	2,580	1,862	1,862	1.45	1.00	212.08	0.950	1.000	0.325	N/A	N/A	NO	N/A	N/A	N/A	42.4	N/A	0.000	0.00	0.56
22.50	46.83	0.92	1.96	sandy silt to clayey silt	16.0	1.66	31	2,700	1,920	1,920	2.04	1.36	107.36	0.948	1.000	0.329	0.195	0.707	YES	2.8	34.5	1,500	43.0	N/A	0.000	0.00	0.56
23.50	8.76	0.26	2.82	silty clay to clay	15.0	1.00	6	2,820	1,978	1,978	3.08	N/A	N/A	0.945	N/A	0.333	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
24.50	16.87	0.34	2.00	clayey silt to silty clay	14.0	1.00	8	2,940	2,035	2,035	2.74	N/A	N/A	0.943	N/A	0.336	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
25.50	17.76	0.46	2.55	clayey silt to silty clay	13.0	1.00	9	3,060	2,093	2,093	2.79	N/A	N/A	0.941	N/A	0.340	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
26.50	12.94	0.48	3.63	silty clay to clay	12.0	1.00	9	3,180	2,150	2,150	3.01	N/A	N/A	0.938	N/A	0.343	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
27.50	23.18	1.24	5.29	clay	11.0	1.00	23	3,300	2,208	2,208	2.91	N/A	N/A	0.936	N/A	0.345	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
28.50	30.78	0.96	3.12	clayey silt to silty clay	10.0	1.66	25	3,420	2,266	2,266	2.34	2.09	100.25	0.934	0.955	0.348	0.174	0.569	YES	2.8	26.7	1,500	N/A	N/A	0.000	0.00	0.56
29.50	10.06	0.50	4.89	clay	9.0	1.00	10	3,540	2,323	2,323	3.22	N/A	N/A	0.931	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
30.50	19.36	1.15	5.85	clay	8.0	1.00	19	3,660	2,381	2,381	3.03	N/A	N/A	0.926	N/A	0.352	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
31.50	36.56	0.95	2.59	sandy silt to clayey silt	7.0	1.00	15	3,780	2,438	2,438	2.58	3.18	100.33	0.918	0.947	0.351	0.174	0.559	YES	2.8	16.0	779	20.9	N/A	1.324	0.16	0.40
32.50	24.17	1.02	4.21	silty clay to clay	6.0	1.66	27	3,900	2,496	2,496	2.53	2.91	104.33	0.909	0.922	0.351	0.186	0.582	YES	5.0	28.9	1,500	N/A	N/A	0.000	0.00	0.40
33.50	9.97	0.54	5.26	clay	5.0	1.00	10	4,020	2,554	2,554	3.27	N/A	N/A	0.901	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.40
34.50	19.97	0.79	3.85	silty clay to clay	4.0	1.00	13	4,140	2,611	2,611	2.93	N/A	N/A	0.893	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.40
35.50	72.33	1.07	1.47	silty sand to sandy silt	3.0	1.00	24	4,260	2,669	2,669	2.18	1.63	101.77	0.885	0.906	0.349	0.178	0.551	YES	2.8	23.7	1,500	30.0	N/A	0.086	0.01	0.39
36.50	82.67	1.24	1.50	silty sand to sandy silt	2.0	1.00	28	4,380	2,726	2,726	2.15	1.54	109.24	0.877	0.893	0.348	0.201	0.616	YES	2.8	26.4	1,500	33.3	N/A	0.058	0.01	0.38
37.50	64.47	2.02	3.12	sandy silt to clayey silt	1.0	1.00	26	4,500	2,784	2,784	2.45	2.52	137.80	0.869	0.890	0.347	0.323	0.990	YES	2.8	24.7	1,500	31.2	N/A	0.075	0.01	0.37
38.50	156.18	2.71	1.74	sand to silty sand	0.0	1.00	39	4,620	2,842	2,842	2.00	1.29	169.49	0.861	0.869	0.346	N/A	N/A	NO	N/A	N/A	N/A	36.8	N/A	0.027	0.00	0.37
39.50	229.21	2.28	1.00	sand	-1.0	1.00	46	4,740	2,899	2,899	1.71	1.04	198.39	0.852	0.862	0.344	N/A	N/A	NO	N/A	N/A	N/A	38.1	N/A	0.016	0.00	0.37
40.50	248.57	2.61	1.05	sand	-2.0	1.00	50	4,860	2,957	2,957	1.70	1.04	212.31	0.844	0.855	0.343	N/A	N/A	NO	N/A	N/A	N/A	40.9	N/A	0.000	0.00	0.37
41.50	196.74	2.41	1.22	sand	-3.0	1.00	39	4,980	3,014	3,014	1.82	1.12	180.18	0.836	0.849	0.341	N/A	N/A	NO	N/A	N/A	N/A	32.1	N/A	0.067	0.01	0.36
42.50	147.88	1.38	0.93	sand	-4.0	1.00	30	5,100	3,072	3,072	1.84	1.13	135.43	0.828	0.854	0.340	0.311	0.934	YES	0.0	23.9	1,500	23.9	N/A	0.902	0.11	0.25
43.50	89.46	1.91	2.14	silty sand to sandy silt	-5.0	1.00	30	5,220	3,130	3,130	2.25	1.79	128.18	0.820	0.849	0.338	0.276	0.827	YES	2.8	26.6	1,500	33.6	N/A	0.053	0.01	0.25
44.50	243.12	2.87	1.18	sand	-6.0	1.00	49	5,340	3,187	3,187	1.76	1.08	207.25	0.812	0.830	0.336	N/A	N/A	NO	N/A	N/A	N/A	38.5	N/A	0.012	0.00	0.24
45.50	204.00	2.58	1.27	sand to silty sand	-7.0	1.00	51	5,460	3,245	3,245	1.83	1.13	181.44	0.804	0.824	0.334	N/A	N/A	NO	N/A	N/A	N/A	44.5	N/A	0.000	0.00	0.24
46.50	168.80	1.98	1.18	sand to silty sand	-8.0	1.00	42	5,580	3,302	3,302	1.87	1.16	153.02	0.795	0.818	0.332	0.413	1.215	NO	N/A	N/A	N/A	36.9	N/A	0.025	0.00	0.24
47.50	100.21	1.57	1.56	silty sand to sandy silt	-9.0	1.66	55	5,700	3,360	3,360	1.82	1.12	143.30	0.787	0.813	0.330	0.354	1.039	YES	2.8	45.5	1,500	56.2	N/A	0.000	0.00	0.24
48.50	23.26	1.09	4.62	clay	-10.0	1.00	23	5,820	3,418	3,418	3.00	N/A	N/A	0.779	N/A	0.328	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
49.50	22.27	0.92	4.04	silty clay to clay	-11.0	1.00	15	5,940	3,475	3,475	2.98	N/A	N/A	0.771	N/A	0.326	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
50.50	34.96	1.41	3.97	silty clay to clay	-12.0	1.00	23	6,060	3,533	3,533	2.82	N/A	N/A	0.763	N/A	0.323	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
51.50	67.94	2.96	4.34	clayey silt to silty clay	-13.0	1.00	34	6,180	3,590	3,590	2.62	N/A	N/A	0.755	N/A	0.321	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.24
52.50	158.12	2.38	1.50	sand to silty sand	-14.0	1.00	40	6,300	3,648	3,648	1.99	1.28	150.01	0.747	0.786	0.318	0.394	1.160	NO	N/A	N/A	N/A	33.2	N/A	0.052	0.01	0.23
53.50	163.91	1.94	1.18	sand to silty sand	-15.0	1.00	41	6,420	3,706	3,706	1.90	1.19	143.60	0.739	0.781	0.316	0.355	1.048	YES	1.3	31.4	1,500	34.1	N/A	0.045	0.01	0.23
54.50	130.16	1.52	1.17	sand to silty sand	-16.0	1.00	33	6,540	3,763	3,763	1.98	1.27	120.82	0.730	0.794	0.314	0.244	0.737	YES	1.3	25.1	1,500	27.4	N/A	0.095	0.01	0.22
55.50	137.87	1.81	1.31	sand to silty sand	-17.0	1.00	34	6,660	3,821	3,821	2.00	1.29	129.10	0.722	0.785	0.311	0.280	0.843	YES	1.3	26.3	1,500	28.6	N/A	0.084	0.01	0.21
56.50	125.09	1.67	1.33	sand to silty sand	-18.0	1.00	31	6,780	3,878	3,878	2.03	1.35	121.13	0.714	0.790	0.308	0.245	0.750	YES	1.3	23.8	1,500	26.0	N/A	0.116	0.01	0.19
57.50	128.96	1.98	1.54	sand to silty sand	-19.0	1.66	53	6,900	3,936	3,936	1.76	1.08	163.77	0.706	0.763	0.306	N/A	N/A	NO	N/A	N/A	N/A	42.4	N/A	0.000	0.00	0.19
58.50	61.90	1.89	3.04	sandy silt to clayey silt	-20.0	1.00	25	7,020	3,994	3,994	2.57	3.16	116.44	0.698	0.805	0.303	0.227	0.719	YES	2.8	20.3	1,220	26.0	N/A	0.103	0.01	0.18
59.50	36.85	2.09	5.61	clay	-21.0	1.00	37	7,140	4,051	4,051	2.94	N/A	N/A	0.690	N/A	0.300	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
60.50	45.69	0.41	0.90	silty sand to sandy silt	-22.0	1.00	15	7,260	4,109	4,109	2.31	1.98	63.22	0.682	0.839	0.297	0.103	0.348	YES	2.8	13.4	544	17.7	N/A	1.510	0.18	0.00

max=	1,500
min=	544
avg=	1,361

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	West County Connector - 405/22 HOV Segment
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-09-123

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	27.00 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.42 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\ A_{max}\ (\sigma_v/\sigma_v')\ r_d$

+++ $FS = (CRR_{7.5}/CSR)\ MSF\ K_\sigma\ K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	11.00 ft below ground surface
GWT Depth For Design, Zwd =	11.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	22.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.90 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.90 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_t (in.)	Cumulative Settlement Profile (in.)
0.50	253.23	3.37	1.33	sand	26.0	1.00	51	60	60	60	1.38	1.00	1,462.03	0.999	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	86.1	0.011	0.000	0.00	0.90
1.50	231.05	1.94	0.84	sand	25.0	1.66	77	180	180	180	0.99	1.00	1,275.20	0.997	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	130.1	0.017	0.000	0.00	0.90
2.50	112.22	3.00	2.67	sandy silt to clayey silt	24.0	1.00	45	300	300	300	1.93	1.22	353.42	0.994	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	96.6	N/A	N/A	N/A	0.90
3.50	65.01	1.96	3.01	sandy silt to clayey silt	23.0	1.66	43	420	420	420	1.84	1.14	267.83	0.992	N/A	0.271	N/A	N/A	NO	N/A	N/A	N/A	92.8	N/A	N/A	N/A	0.90
4.50	20.36	0.79	3.86	silty clay to clay	22.0	1.00	14	540	540	540	2.51	2.81	152.94	0.990	N/A	0.270	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
5.50	12.75	0.54	4.23	clay	21.0	1.00	13	660	660	660	2.73	N/A	N/A	0.987	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
6.50	14.39	0.61	4.26	clay	20.0	1.00	14	780	780	780	2.74	N/A	N/A	0.985	N/A	0.269	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
7.50	21.42	0.79	3.67	silty clay to clay	19.0	1.00	14	900	900	900	2.60	3.31	129.18	0.983	N/A	0.268	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
8.50	24.11	0.84	3.49	clayey silt to silty clay	18.0	1.66	20	1,020	1,020	1,020	2.32	2.00	112.00	0.980	N/A	0.268	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
9.50	10.62	0.34	3.17	silty clay to clay	17.0	1.66	12	1,140	1,140	1,140	2.59	3.28	76.46	0.978	N/A	0.267	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
10.50	4.87	0.15	2.99	clay	16.0	1.00	5	1,260	1,260	1,260	3.16	N/A	N/A	0.976	N/A	0.266	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
11.50	3.28	0.21	6.35	clay	15.0	1.00	3	1,380	1,349	1,349	3.54	N/A	N/A	0.973	N/A	0.272	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
12.50	6.28	0.40	6.37	clay	14.0	1.00	6	1,500	1,406	1,406	3.30	N/A	N/A	0.971	N/A	0.283	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
13.50	5.57	0.19	3.34	clay	13.0	1.00	6	1,620	1,464	1,464	3.19	N/A	N/A	0.969	N/A	0.293	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
14.50	18.15	0.55	3.01	clayey silt to silty clay	12.0	1.00	9	1,740	1,522	1,522	2.73	N/A	N/A	0.966	N/A	0.302	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.90
15.50	58.90	0.80	1.36	silty sand to sandy silt	11.0	1.00	20	1,860	1,579	1,579	2.14	1.53	101.15	0.964	1.000	0.310	0.176	0.678	YES	2.8	24.9	1,500	31.5	N/A	0.063	0.01	0.89
16.50	39.81	0.62	1.56	silty sand to sandy silt	10.0	1.66	22	1,980	1,637	1,637	2.01	1.31	95.34	0.962	1.000	0.318	0.161	0.603	YES	2.8	27.1	1,500	34.1	N/A	0.045	0.01	0.89
17.50	7.04	0.34	4.85	clay	9.0	1.00	7	2,100	1,694	1,694	3.24	N/A	N/A	0.959	N/A	0.325	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
18.50	6.91	0.35	5.00	clay	8.0	1.00	7	2,220	1,752	1,752	3.27	N/A	N/A	0.957	N/A	0.331	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
19.50	8.79	0.35	3.95	clay	7.0	1.00	9	2,340	1,810	1,810	3.12	N/A	N/A	0.955	N/A	0.337	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
20.50	11.10	0.40	3.59	clay	6.0	1.00	11	2,460	1,867	1,867	3.02	N/A	N/A	0.952	N/A	0.342	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
21.50	15.43	0.55	3.53	silty clay to clay	5.0	1.00	10	2,580	1,925	1,925	2.90	N/A	N/A	0.950	N/A	0.348	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
22.50	11.69	0.25	2.13	clayey silt to silty clay	4.0	1.00	6	2,700	1,982	1,982	2.89	N/A	N/A	0.948	N/A	0.352	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
23.50	28.18	0.68	2.40	sandy silt to clayey silt	3.0	1.00	11	2,820	2,040	2,040	2.60	3.31	91.87	0.945	0.995	0.357	0.152	0.506	YES	2.8	14.0	589	18.4	N/A	1.575	0.19	0.70
24.50	51.42	1.04	2.02	sandy silt to clayey silt	2.0	1.66	34	2,940	2,098	2,098	2.03	1.34	111.70	0.943	0.981	0.361	0.210	0.680	YES	2.8	36.1	1,500	44.9	N/A	0.000	0.00	0.70
25.50	21.79	1.05	4.84	clay	1.0	1.00	22	3,060	2,155	2,155	2.90	N/A	N/A	0.941	N/A	0.365	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70
26.50	29.42	1.41	4.80	clay	0.0	1.00	29	3,180	2,213	2,213	2.80	N/A	N/A	0.938	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70
27.50	67.24	1.32	1.96	silty sand to sandy silt	-1.0	1.00	22	3,300	2,270	2,270	2.26	1.83	115.40	0.936	0.957	0.371	0.223	0.685	YES	2.8	23.8	1,500	30.2	N/A	0.092	0.01	0.69
28.50	100.26	1.26	1.26	sand to silty sand	-2.0	1.00	25	3,420	2,328	2,328	2.00	1.31	121.29	0.934	0.947	0.374	0.246	0.742	YES	1.3	24.6	1,500	26.8	N/A	0.418	0.05	0.64
29.50	94.01	1.26	1.34	sand to silty sand	-3.0	1.00	24	3,540	2,386	2,386	2.05	1.37	117.74	0.931	0.941	0.377	0.232	0.689	YES	1.3	22.9	1,471	25.1	N/A	1.021	0.12	0.51
30.50	49.89	0.87	1.75	silty sand to sandy silt	-4.0	1.66	28	3,660	2,443	2,443	2.03	1.34	100.23	0.926	0.928	0.379	0.174	0.508	YES	2.8	27.7	1,500	34.9	N/A	0.049	0.01	0.51
31.50	15.95	0.36	2.27	clayey silt to silty clay	-5.0	1.00	8	3,780	2,501	2,501	2.85	N/A	N/A	0.918	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.51
32.50	36.19	1.09	3.01	clayey silt to silty clay	-6.0	1.00	18	3,900	2,558	2,558	2.63	N/A	N/A	0.909	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.51
33.50	101.29	1.87	1.85	silty sand to sandy silt	-7.0	1.00	34	4,020	2,616	2,616	2.13	1.52	134.59	0.901	0.898	0.378	0.307	0.869	YES	2.8	32.3	1,500	40.4	N/A	0.000	0.00	0.51
34.50	52.14	1.17	2.25	sandy silt to clayey silt	-8.0	1.66	35	4,140	2,674	2,674	2.10	1.45	108.61	0.893	0.890	0.378	0.199	0.560	YES	2.8	32.7	1,500	40.8	N/A	0.000	0.00	0.51
35.50	21.34	0.60	2.82	clayey silt to silty clay	-9.0	1.00	11	4,260	2,731	2,731	2.82	N/A	N/A	0.885	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.51
36.50	18.29	0.44	2.39	clayey silt to silty clay	-10.0	1.00	9	4,380	2,789	2,789	2.85	N/A	N/A	0.877	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.51
37.50	53.01	1.35	2.54	sandy silt to clayey silt	-11.0	1.00	21	4,500	2,846	2,846	2.45	2.55	113.23	0.869	0.894	0.375	0.215	0.612	YES	2.8	20.6	1,246	26.3	N/A	0.597	0.07	0.44
38.50	27.03	0.55	2.03	sandy silt to clayey silt	-12.0	1.00	11	4,620	2,904	2,904	2.67	N/A	N/A	0.861	N/A	0.374	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.44
39.50	17.75	0.50	2.80	clayey silt to silty clay	-13.0	1.00	9	4,740	2,962	2,962	2.92	N/A	N/A	0.852	N/A	0.372	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.44
40.50	19.11	0.51	2.66	clayey silt to silty clay	-14.0	1.00	10	4,860	3,019	3,019	2.88	N/A	N/A	0.844	N/A	0.371	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.44
41.50	58.53	1.14	1.94	silty sand to sandy silt	-15.0	1.00	20	4,980	3,077	3,077	2.36	2.15	101.44	0.836	0.880	0.369	0.177	0.503	YES	2.8	18.5	1,031	23.9	N/A	1.103	0.13	0.30
42.50	148.26	2.05	1.38	sand to silty sand	-16.0	1.00	37	5,100	3,134	3,134	1.95	1.25	147.45	0.828	0.836	0.368	0.378	1.025	YES	1.3	30.9	1,500	33.5	N/A	0.060	0.01	0.30
43.50	201.30	2.34	1.16	sand	-17.0	1.00	40	5,220	3,192	3,192	1.81	1.11	177.46	0.820	0.829	0.366	N/A	N/A	NO	N/A	N/A	N/A	31.9	N/A	0.075	0.01	0.29
44.50	176.14	2.02	1.15	sand	-18.0	1.66	58	5,340	3,250	3,250	1.54	1.00	228.80	0.812	0.824	0.364	N/A	N/A	NO	N/A	N/A	N/A	45.8	N/A	0.000	0.00	0.29
45.50	64.92	1.60	2.47	sandy silt to clayey silt	-19.0	1.66	43	5,460	3,307	3,307	2.09	1.44	120.12	0.804	0.818	0.362	0.241	0.650	YES	2.8	36.2	1,500	45.1	N/A	0.000	0.00	0.29
46.50	19.43	0.70	3.57	silty clay to clay	-20.0	1.00	13	5,580	3,365	3,365	2.99	N/A	N/A	0.795	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.29
47.50	58.12	1.50	2.57	sandy silt to clayey silt	-21.0	1.00	23	5,700	3,422	3,422	2.46	2.58	114.65	0.787	0.844	0.358	0.220	0.619	YES	2.8	20.6	1,246	26.3	N/A	0.185	0.02	0.27
48.50	79.97	1.70	2.12	silty sand to sandy silt	-22.0	1.00	27	5,820	3,480	3,480	2.30	1.95	118.13	0.779	0.830	0.356	0.233	0.649	YES	2.8	23.0	1,486	29.2	N/A	0.096	0.01	0.25
49.50	81.57	1.45	1.78	silty sand to sandy silt	-23.0	1.00	27	5,940	3,538	3,538	2.24	1.78	109.40	0.771	0.824	0.353	0.202	0.561	YES	2.8	23.2	1,500	29.5	N/A	0.093	0.01	0.24
50.50	120.77	1.77	1.47	sand to silty sand	-24.0	1.00	30	6,060	3,595	3,595	2.06	1.39	125.12	0.763	0.812	0.351	0.262	0.723	YES	1.3	23.9	1,500	26.1	N/A	0.189	0.02	0.22
51.50	111.80	1.71	1.53	sand to silty sand	-25.0	1.00	28	6,180	3,653	3,653	2.10	1.46	120.54	0.755	0.814	0.349	0.243	0.677	YES	1.3	22.0	1,392	24.2	N/A	0.982	0.12	0.10
52.50	87.35	1.53	1.76	silty sand to sandy silt	-26.0	1.00	29	6,300	3,710	3,710	2.23	1.73	111.15	0.747	0.807	0.346	0.208	0.578	YES	2.8	24.2	1,500	30.7	N/A	0.080	0.01	0.09
53.50	60.71	1.93	3.17	sandy silt to clayey silt	-27.0	1.00	24	6,420	3,768	3,768	2.57	3.17	119.83	0.739	0.819	0.344	0.240	0.682	YES	2.8	20.5	1,237	26.2	N/A	0.179	0.02	0.07
54.50	68.42	1.22	1.78	silty sand to sandy silt	-28.0	1.00	23	6,540	3,826	3,826	2.32	2.01	99.47	0.730	0.821	0.341	0.172	0.493	YES	2.8	19.3	1,111	24.8	N/A	0.481	0.06	0.01
55.50	295.23	1.92	0.65	sand	-29.0	1.00	59	6,660	3,883	3,883	1.55	1.00	211.87	0.722	0.767	0.338	N/A	N/A	NO	N/A	N/A	N/A	42.4	N/A	0.000	0.00	0.01
56.50	282.94	2.58	0.91	sand	-30.0	1.00	57	6,780	3,941	3,941	1.66	1.01	203.97	0.714	0.762	0.335	N/A	N/A	NO	N/A	N/A	N/A	40.3	N/A	0.000	0.00	0.01
57.50	238.58	1.42	0.59	sand	-31.0	1.00	48	6,900	3,998	3,998	1.59	1.00	168.74	0.706	0.758	0.333	N/A	N/A	NO	N/A	N/A	N/A	33.7	N/A	0.050	0.01	0.01
58.50	136.48	1.03	0.76	sand	-32.0	1.66	45	7,020	4,056	4,056	1.55	1.00	158.69	0.698	0.754	0.330	0.452	1.231	NO	N/A	N/A	N/A	31.7	N/A	0.066	0.01	0.00
59.50	25.66	0.45	1.70	sandy silt to clayey silt	-33.0	1.00	10	7,140	4,114	4,114	2.76	N/A	N/A	0.690	N/A	0.327	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

	max=	1,500
	min=	589
	avg=	1,378

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	West County Connector - 405/22 HOV Segment
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-09-124

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	26.00 ft
GWT Elev. During Test	16.00 ft
GWT Elev. For Design	16.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.43 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ CSR = 0.65 A_{max} (σ_v/σ_v') r_d

+++ FS = ($CRR_{7.5}$/CSR) MSF K_σ $K_{\alpha \rightarrow 1}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	10.00 ft below ground surface
GWT Depth For Design, Zwd =	10.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	16.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	1.11 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	1.11 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r(psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_t (in.)	Cumulative Settlement Profile (in.)
0.50	257.56	2.76	1.07	sand	25.0	1.66	85	60	60	60	1.03	1.00	2,462.11	0.999	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	145.0	0.010	0.000	0.00	1.11
1.50	73.28	2.66	3.63	clayey silt to silty clay	24.0	1.66	61	180	180	180	1.78	1.10	443.03	0.997	N/A	0.279	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
2.50	26.29	1.54	5.84	clay	23.0	1.00	26	300	300	300	2.58	3.19	216.58	0.994	N/A	0.278	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
3.50	45.71	1.92	4.20	silty clay to clay	22.0	1.00	30	420	420	420	2.36	2.16	215.20	0.992	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
4.50	38.97	1.81	4.65	silty clay to clay	21.0	1.66	43	540	540	540	2.16	1.58	196.63	0.990	N/A	0.277	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
5.50	16.24	0.62	3.78	silty clay to clay	20.0	1.00	11	660	660	660	2.62	N/A	N/A	0.987	N/A	0.276	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
6.50	10.69	0.11	0.99	clayey silt to silty clay	19.0	1.00	5	780	780	780	2.55	3.05	52.10	0.985	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
7.50	10.15	0.25	2.46	silty clay to clay	18.0	1.00	7	900	900	900	2.74	N/A	N/A	0.983	N/A	0.275	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
8.50	8.54	0.17	1.93	clayey silt to silty clay	17.0	1.00	4	1,020	1,020	1,020	2.78	N/A	N/A	0.980	N/A	0.274	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.11
9.50	15.60	0.19	1.21	sandy silt to clayey silt	16.0	1.00	6	1,140	1,140	1,140	2.53	2.90	59.94	0.978	N/A	0.273	N/A	N/A	NO	N/A	N/A	N/A	14.9	N/A	N/A	N/A	1.11
10.50	35.47	0.26	0.74	silty sand to sandy silt	15.0	1.00	12	1,260	1,229	1,229	2.12	1.49	67.58	0.976	1.000	0.280	0.109	0.464	YES	2.8	17.9	964	23.1	N/A	0.172	0.02	1.09
11.50	35.24	0.38	1.08	silty sand to sandy silt	14.0	1.66	19	1,380	1,286	1,286	1.91	1.20	87.42	0.973	1.000	0.292	0.142	0.581	YES	2.8	27.0	1,500	34.1	N/A	0.041	0.00	1.08
12.50	4.14	0.19	4.60	clay	13.0	1.00	4	1,500	1,344	1,344	3.36	N/A	N/A	0.971	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
13.50	4.45	0.11	2.46	clay	12.0	1.00	4	1,620	1,402	1,402	3.20	N/A	N/A	0.969	N/A	0.313	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
14.50	4.21	0.08	1.74	sensitive fine grained	11.0	1.00	2	1,740	1,459	1,459	3.16	N/A	N/A	0.966	N/A	0.322	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
15.50	3.29	0.07	2.08	clay	10.0	1.00	3	1,860	1,517	1,517	3.33	N/A	N/A	0.964	N/A	0.330	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
16.50	4.55	0.10	2.17	silty clay to clay	9.0	1.00	3	1,980	1,574	1,574	3.21	N/A	N/A	0.962	N/A	0.338	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
17.50	5.38	0.14	2.45	clay	8.0	1.00	5	2,100	1,632	1,632	3.18	N/A	N/A	0.959	N/A	0.345	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
18.50	6.72	0.16	2.27	silty clay to clay	7.0	1.00	4	2,220	1,690	1,690	3.08	N/A	N/A	0.957	N/A	0.351	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
19.50	8.45	0.25	2.90	silty clay to clay	6.0	1.00	6	2,340	1,747	1,747	3.06	N/A	N/A	0.955	N/A	0.357	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
20.50	8.78	0.42	4.65	clay	5.0	1.00	9	2,460	1,805	1,805	3.17	N/A	N/A	0.952	N/A	0.363	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.08
21.50	25.86	0.46	1.76	sandy silt to clayey silt	4.0	1.00	10	2,580	1,862	1,862	2.53	2.91	77.93	0.950	1.000	0.368	0.124	0.402	YES	2.8	13.5	552	17.9	N/A	1.639	0.20	0.89
22.50	18.63	0.73	3.90	silty clay to clay	3.0	1.00	12	2,700	1,920	1,920	2.86	N/A	N/A	0.948	N/A	0.372	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
23.50	9.50	0.33	3.31	silty clay to clay	2.0	1.00	6	2,820	1,978	1,978	3.09	N/A	N/A	0.945	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
24.50	10.99	0.38	3.37	silty clay to clay	1.0	1.00	7	2,940	2,035	2,035	3.04	N/A	N/A	0.943	N/A	0.381	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
25.50	16.18	0.54	3.29	clayey silt to silty clay	0.0	1.00	8	3,060	2,093	2,093	2.89	N/A	N/A	0.941	N/A	0.384	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.89
26.50	36.11	0.77	2.13	sandy silt to clayey silt	-1.0	1.00	14	3,180	2,150	2,150	2.48	2.69	93.77	0.938	0.980	0.388	0.157	0.472	YES	2.8	16.7	846	21.7	N/A	1.332	0.16	0.73
27.50	32.15	0.94	2.91	clayey silt to silty clay	-2.0	1.00	16	3,300	2,208	2,208	2.63	N/A	N/A	0.936	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.73
28.50	23.04	0.96	4.15	silty clay to clay	-3.0	1.00	15	3,420	2,266	2,266	2.85	N/A	N/A	0.934	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.73
29.50	11.90	0.57	4.69	clay	-4.0	1.00	12	3,540	2,323	2,323	3.14	N/A	N/A	0.931	N/A	0.397	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.73
30.50	14.12	0.65	4.49	clay	-5.0	1.00	14	3,660	2,381	2,381	3.07	N/A	N/A	0.926	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.73
31.50	62.03	1.15	1.86	silty sand to sandy silt	-6.0	1.00	21	3,780	2,438	2,438	2.28	1.90	106.70	0.918	0.938	0.398	0.193	0.543	YES	2.8	21.5	1,343	27.5	N/A	0.524	0.06	0.66
32.50	88.69	1.25	1.41	sand to silty sand	-7.0	1.00	22	3,900	2,496	2,496	2.09	1.44	114.02	0.909	0.929	0.397	0.218	0.608	YES	1.3	21.2	1,308	23.3	N/A	1.212	0.15	0.52
33.50	49.61	1.30	2.63	sandy silt to clayey silt	-8.0	1.00	20	4,020	2,554	2,554	2.47	2.61	114.39	0.901	0.926	0.397	0.219	0.611	YES	2.8	20.4	1,224	26.1	N/A	0.928	0.11	0.41
34.50	51.58	1.41	2.73	sandy silt to clayey silt	-9.0	1.00	21	4,140	2,611	2,611	2.47	2.62	118.15	0.893	0.919	0.396	0.233	0.646	YES	2.8	20.9	1,275	26.7	N/A	0.746	0.09	0.32
35.50	90.14	1.58	1.75	silty sand to sandy silt	-10.0	1.00	30	4,260	2,669	2,669	2.16	1.57	122.55	0.885	0.896	0.395	0.251	0.679	YES	2.8	28.8	1,500	36.2	N/A	0.039	0.00	0.31
36.50	50.04	1.73	3.46	clayey silt to silty clay	-11.0	1.00	25	4,380	2,726	2,726	2.58	3.21	127.48	0.877	0.898	0.394	0.273	0.742	YES	2.8	24.2	1,500	N/A	N/A	0.000	0.00	0.31
37.50	99.30	2.43	2.45	silty sand to sandy silt	-12.0	1.00	33	4,500	2,784	2,784	2.24	1.76	148.44	0.869	0.877	0.392	0.384	1.024	YES	2.8	30.9	1,500	38.7	N/A	0.014	0.00	0.31
38.50	58.92	1.87	3.18	sandy silt to clayey silt	-13.0	1.66	39	4,620	2,842	2,842	2.17	1.60	130.88	0.861	0.869	0.391	0.288	0.765	YES	2.8	35.5	1,500	44.3	N/A	0.000	0.00	0.31
39.50	11.74	0.55	4.67	clay	-14.0	1.00	12	4,740	2,899	2,899	3.21	N/A	N/A	0.852	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
40.50	27.61	0.97	3.48	clayey silt to silty clay	-15.0	1.00	14	4,860	2,957	2,957	2.81	N/A	N/A	0.844	N/A	0.388	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
41.50	140.12	3.27	2.34	silty sand to sandy silt	-16.0	1.00	47	4,980	3,014	3,014	2.13	1.51	172.87	0.836	0.849	0.386	N/A	N/A	NO	N/A	N/A	N/A	50.7	N/A	0.000	0.00	0.31
42.50	191.56	3.55	1.85	sand to silty sand	-17.0	1.00	48	5,100	3,072	3,072	1.97	1.26	194.67	0.828	0.842	0.384	N/A	N/A	NO	N/A	N/A	N/A	43.0	N/A	0.000	0.00	0.31
43.50	203.18	2.87	1.41	sand to silty sand	-18.0	1.00	51	5,220	3,130	3,130	1.87	1.16	188.02	0.820	0.836	0.382	N/A	N/A	NO	N/A	N/A	N/A	45.1	N/A	0.000	0.00	0.31
44.50	209.84	2.90	1.38	sand to silty sand	-19.0	1.00	52	5,340	3,187	3,187	1.85	1.15	190.55	0.812	0.830	0.380	N/A	N/A	NO	N/A	N/A	N/A	46.1	N/A	0.000	0.00	0.31
45.50	160.13	2.45	1.53	sand to silty sand	-20.0	1.66	66	5,460	3,245	3,245	1.66	1.01	209.83	0.804	0.824	0.378	N/A	N/A	NO	N/A	N/A	N/A	57.0	N/A	0.000	0.00	0.31
46.50	29.96	1.17	3.86	silty clay to clay	-21.0	1.00	20	5,580	3,302	3,302	2.84	N/A	N/A	0.795	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.31
47.50	61.63	1.21	1.95	silty sand to sandy silt	-22.0	1.00	21	5,700	3,360	3,360	2.36	2.16	102.57	0.787	0.857	0.373	0.180	0.494	YES	2.8	18.6	1,044	24.0	N/A	1.101	0.13	0.18
48.50	44.25	1.04	2.35	sandy silt to clayey silt	-23.0	1.00	18	5,820	3,418	3,418	2.57	3.17	93.83	0.779	0.863	0.371	0.157	0.435	YES	2.8	16.3	807	21.2	N/A	1.341	0.16	0.02
49.50	128.37	2.09	1.63	sand to silty sand	-24.0	1.00	32	5,940	3,475	3,475	2.07	1.40	136.29	0.771	0.815	0.368	0.315	0.832	YES	1.3	25.7	1,500	28.0	N/A	0.155	0.02	0.00
50.50	101.59	2.42	2.38	silty sand to sandy silt	-25.0	1.66	56	6,060	3,533	3,533	1.95	1.24	156.48	0.763	0.796	0.366	0.436	1.133	NO	N/A	N/A	N/A	55.6	N/A	0.000	0.00	0.00
51.50	41.97	1.95	4.62	silty clay to clay	-26.0	1.00	28	6,180	3,590	3,590	2.80	N/A	N/A	0.755	N/A	0.363	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	52.14	2.52	4.82	silty clay to clay	-27.0	1.00	35	6,300	3,648	3,648	2.74	N/A	N/A	0.747	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
53.50	55.03	2.80	5.08	silty clay to clay	-28.0	1.66	61	6,420	3,706	3,706	2.38	2.24	149.92	0.739	0.781	0.358	0.393	1.025	YES	5.0	49.6	1,500	N/A	N/A	0.000	0.00	0.00
54.50	17.65	0.65	3.65	silty clay to clay	-29.0	1.00	12	6,540	3,763	3,763	3.07	N/A	N/A	0.730	N/A	0.355	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	24.56	1.06	4.23	silty clay to clay	-30.0	1.00	16	6,660	3,821	3,821	2.99	N/A	N/A	0.722	N/A	0.352	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
56.50	20.00	0.91	4.35	clay	-31.0	1.00	20	6,780	3,878	3,878	3.09	N/A	N/A	0.714	N/A	0.349	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	26.53	1.01	3.61	clayey silt to silty clay	-32.0	1.00	13	6,900	3,936	3,936	2.93	N/A	N/A	0.706	N/A	0.346	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	23.17	1.20	5.06	clay	-33.0	1.66	38	7,020	3,994	3,994	2.75	N/A	N/A	0.698	N/A	0.343	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	11.32	0.75	6.26	clay	-34.0	1.00	11	7,140	4,051	4,051	3.44	N/A	N/A	0.690	N/A	0.340	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

max=	1,500
min=	552
avg=	1,241

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	West County Connector - 405/22 HOV Segment
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-09-125

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	22.00 ft
GWT Elev. During Test	15.00 ft
GWT Elev. For Design	15.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.45 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\, A_{max}\, (\sigma_v/\sigma_v')\, r_d$

+++ $FS = (CRR_{7.5}/CSR)\, MSF\, K_\sigma\, K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	7.00 ft below ground surface
GWT Depth For Design, Zwd =	7.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	15.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.58 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.58 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_t (in.)	Cumulative Settlement Profile (in.)
0.50	237.00	2.63	1.11	sand	21.0	1.00	47	60	60	60	1.31	1.00	1,368.32	0.999	N/A	0.292	N/A	N/A	NO	N/A	N/A	N/A	80.6	0.013	0.000	0.00	0.58
1.50	145.78	1.64	1.13	sand to silty sand	20.0	1.66	60	180	180	180	1.19	1.00	804.55	0.997	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	110.0	0.020	0.000	0.00	0.58
2.50	57.41	2.22	3.87	clayey silt to silty clay	19.0	1.00	29	300	300	300	2.23	1.74	257.33	0.994	N/A	0.291	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
3.50	92.47	2.61	2.82	sandy silt to clayey silt	18.0	1.00	37	420	420	420	2.04	1.35	272.88	0.992	N/A	0.290	N/A	N/A	NO	N/A	N/A	N/A	80.5	N/A	N/A	N/A	0.58
4.50	50.70	1.29	2.53	sandy silt to clayey silt	17.0	1.00	20	540	540	540	2.20	1.67	162.53	0.990	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	46.4	N/A	N/A	N/A	0.58
5.50	34.12	0.55	1.61	sandy silt to clayey silt	16.0	1.66	23	660	660	660	1.91	1.20	117.91	0.987	N/A	0.289	N/A	N/A	NO	N/A	N/A	N/A	51.1	N/A	N/A	N/A	0.58
6.50	9.67	0.54	5.60	clay	15.0	1.00	10	780	780	780	2.95	N/A	N/A	0.985	N/A	0.288	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
7.50	8.88	0.65	7.28	clay	14.0	1.00	9	900	869	869	3.08	N/A	N/A	0.983	N/A	0.298	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
8.50	20.91	0.34	1.62	sandy silt to clayey silt	13.0	1.66	14	1,020	926	926	2.14	1.54	78.15	0.980	1.000	0.316	0.124	0.470	YES	2.8	23.1	1,498	29.4	N/A	0.080	0.01	0.57
9.50	6.84	0.25	3.60	clay	12.0	1.00	7	1,140	984	984	3.01	N/A	N/A	0.978	N/A	0.331	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
10.50	9.07	0.50	5.49	clay	11.0	1.00	9	1,260	1,042	1,042	3.04	N/A	N/A	0.976	N/A	0.345	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
11.50	11.05	0.51	4.62	clay	10.0	1.00	11	1,380	1,099	1,099	2.94	N/A	N/A	0.973	N/A	0.357	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
12.50	11.07	0.52	4.68	clay	9.0	1.00	11	1,500	1,157	1,157	2.96	N/A	N/A	0.971	N/A	0.368	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
13.50	11.22	0.41	3.61	clay	8.0	1.00	11	1,620	1,214	1,214	2.89	N/A	N/A	0.969	N/A	0.378	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
14.50	10.33	0.47	4.56	clay	7.0	1.00	10	1,740	1,272	1,272	3.00	N/A	N/A	0.966	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
15.50	9.16	0.32	3.43	clay	6.0	1.00	9	1,860	1,330	1,330	2.98	N/A	N/A	0.964	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
16.50	9.96	0.44	4.32	clay	5.0	1.00	10	1,980	1,387	1,387	3.03	N/A	N/A	0.962	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
17.50	23.33	0.63	2.70	clayey silt to silty clay	4.0	1.00	12	2,100	1,445	1,445	2.60	N/A	N/A	0.959	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
18.50	14.34	0.57	3.98	clay	3.0	1.00	14	2,220	1,502	1,502	2.89	N/A	N/A	0.957	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
19.50	12.51	0.56	4.48	clay	2.0	1.00	13	2,340	1,560	1,560	2.99	N/A	N/A	0.955	N/A	0.419	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
20.50	10.01	0.40	3.98	clay	1.0	1.00	10	2,460	1,618	1,618	3.05	N/A	N/A	0.952	N/A	0.424	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
21.50	10.00	0.47	4.60	clay	0.0	1.00	10	2,580	1,675	1,675	3.10	N/A	N/A	0.950	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
22.50	9.10	0.42	4.55	clay	-1.0	1.00	9	2,700	1,733	1,733	3.15	N/A	N/A	0.948	N/A	0.432	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
23.50	12.48	0.64	5.03	clay	-2.0	1.00	12	2,820	1,790	1,790	3.06	N/A	N/A	0.945	N/A	0.435	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
24.50	14.14	0.78	5.45	clay	-3.0	1.00	14	2,940	1,848	1,848	3.05	N/A	N/A	0.943	N/A	0.439	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
25.50	20.23	1.16	5.68	clay	-4.0	1.00	20	3,060	1,906	1,906	2.94	N/A	N/A	0.941	N/A	0.442	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.57
26.50	77.80	1.68	2.15	silty sand to sandy silt	-5.0	1.00	26	3,180	1,963	1,963	2.22	1.71	134.52	0.938	1.000	0.445	0.306	0.822	YES	2.8	29.0	1,500	36.4	N/A	0.045	0.01	0.57
27.50	131.26	1.74	1.32	sand to silty sand	-6.0	1.00	33	3,300	2,021	2,021	1.91	1.20	156.46	0.936	0.996	0.447	0.436	1.159	NO	N/A	N/A	N/A	36.7	N/A	0.041	0.00	0.56
28.50	100.54	1.52	1.52	sand to silty sand	-7.0	1.66	42	3,420	2,078	2,078	1.73	1.06	172.57	0.934	0.985	0.449	N/A	N/A	NO	N/A	N/A	N/A	45.3	N/A	0.000	0.00	0.56
29.50	40.38	1.11	2.75	sandy silt to clayey silt	-8.0	1.66	27	3,540	2,136	2,136	2.20	1.68	108.49	0.931	0.975	0.451	0.199	0.512	YES	2.8	28.7	1,500	36.1	N/A	0.050	0.01	0.56
30.50	14.19	0.69	4.89	clay	-9.0	1.00	14	3,660	2,194	2,194	3.06	N/A	N/A	0.926	N/A	0.452	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
31.50	19.79	0.90	4.54	clay	-10.0	1.00	20	3,780	2,251	2,251	2.93	N/A	N/A	0.918	N/A	0.451	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
32.50	24.14	1.08	4.47	clay	-11.0	1.00	24	3,900	2,309	2,309	2.86	N/A	N/A	0.909	N/A	0.449	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.56
33.50	60.16	1.64	2.73	sandy silt to clayey silt	-12.0	1.00	24	4,020	2,366	2,366	2.40	2.32	128.51	0.901	0.942	0.448	0.277	0.696	YES	2.8	24.9	1,500	31.5	N/A	0.136	0.02	0.54
34.50	53.70	1.31	2.44	sandy silt to clayey silt	-13.0	1.66	36	4,140	2,424	2,424	2.10	1.45	117.15	0.893	0.926	0.446	0.230	0.568	YES	2.8	35.1	1,500	43.8	N/A	0.000	0.00	0.54
35.50	14.17	0.52	3.67	silty clay to clay	-14.0	1.00	9	4,260	2,482	2,482	3.02	N/A	N/A	0.885	N/A	0.444	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.54
36.50	12.21	0.66	5.40	clay	-15.0	1.00	12	4,380	2,539	2,539	3.20	N/A	N/A	0.877	N/A	0.442	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.54
37.50	37.66	1.30	3.45	clayey silt to silty clay	-16.0	1.00	19	4,500	2,597	2,597	2.67	N/A	N/A	0.869	N/A	0.440	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.54
38.50	78.81	1.85	2.35	silty sand to sandy silt	-17.0	1.00	26	4,620	2,654	2,654	2.29	1.92	131.11	0.861	0.904	0.438	0.290	0.712	YES	2.8	25.6	1,500	32.4	N/A	0.094	0.01	0.53
39.50	114.53	1.42	1.24	sand to silty sand	-18.0	1.00	29	4,740	2,712	2,712	1.98	1.28	125.72	0.852	0.893	0.436	0.265	0.647	YES	1.3	25.9	1,500	28.3	N/A	0.645	0.08	0.45
40.50	62.39	1.71	2.74	sandy silt to clayey silt	-19.0	1.00	25	4,860	2,770	2,770	2.42	2.39	126.87	0.844	0.894	0.433	0.270	0.664	YES	2.8	24.0	1,500	30.4	N/A	0.182	0.02	0.43
41.50	58.26	1.75	3.01	sandy silt to clayey silt	-20.0	1.66	39	4,980	2,827	2,827	2.16	1.57	127.44	0.836	0.871	0.431	0.272	0.657	YES	2.8	35.3	1,500	43.9	N/A	0.000	0.00	0.43
42.50	27.07	1.24	4.57	clay	-21.0	1.00	27	5,100	2,885	2,885	2.89	N/A	N/A	0.828	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
43.50	26.03	1.06	4.05	silty clay to clay	-22.0	1.00	17	5,220	2,942	2,942	2.87	N/A	N/A	0.820	N/A	0.425	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
44.50	16.71	0.83	4.94	clay	-23.0	1.00	17	5,340	3,000	3,000	3.10	N/A	N/A	0.812	N/A	0.423	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
45.50	23.39	1.10	4.68	clay	-24.0	1.00	23	5,460	3,058	3,058	2.97	N/A	N/A	0.804	N/A	0.420	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
46.50	24.54	1.24	5.05	clay	-25.0	1.00	25	5,580	3,115	3,115	2.98	N/A	N/A	0.795	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
47.50	21.32	1.11	5.21	clay	-26.0	1.00	21	5,700	3,173	3,173	3.04	N/A	N/A	0.787	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
48.50	29.81	1.34	4.50	silty clay to clay	-27.0	1.00	20	5,820	3,230	3,230	2.88	N/A	N/A	0.779	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
49.50	29.44	1.36	4.61	clay	-28.0	1.00	29	5,940	3,288	3,288	2.90	N/A	N/A	0.771	N/A	0.407	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
50.50	52.56	2.23	4.25	clayey silt to silty clay	-29.0	1.00	26	6,060	3,346	3,346	2.68	N/A	N/A	0.763	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.43
51.50	123.32	2.45	1.98	silty sand to sandy silt	-30.0	1.00	41	6,180	3,403	3,403	2.14	1.53	144.41	0.755	0.808	0.401	0.360	0.866	YES	2.8	34.3	1,500	42.8	N/A	0.000	0.00	0.43
52.50	147.72	1.14	0.77	sand	-31.0	1.00	30	6,300	3,461	3,461	1.81	1.11	124.71	0.747	0.823	0.398	0.260	0.643	YES	0.0	22.5	1,434	22.5	N/A	1.283	0.15	0.28
53.50	170.99	0.82	0.48	sand	-32.0	1.00	34	6,420	3,518	3,518	1.63	1.00	128.92	0.739	0.806	0.394	0.279	0.682	YES	0.0	25.8	1,500	25.8	N/A	0.997	0.12	0.16
54.50	182.02	0.98	0.54	sand	-33.0	1.00	36	6,540	3,576	3,576	1.65	1.00	136.15	0.730	0.797	0.391	0.315	0.765	YES	0.0	27.2	1,500	27.2	N/A	0.527	0.06	0.09
55.50	186.88	0.96	0.52	sand	-34.0	1.00	37	6,660	3,634	3,634	1.63	1.00	138.65	0.722	0.790	0.387	0.328	0.798	YES	0.0	27.7	1,500	27.7	N/A	0.394	0.05	0.05
56.50	192.66	1.06	0.55	sand	-35.0	1.00	39	6,780	3,691	3,691	1.64	1.00	141.81	0.714	0.783	0.384	0.345	0.840	YES	0.0	28.4	1,500	28.4	N/A	0.240	0.03	0.02
57.50	228.77	1.08	0.47	sand	-36.0	1.00	46	6,900	3,749	3,749	1.54	1.00	167.10	0.706	0.778	0.380	N/A	N/A	NO	N/A	N/A	N/A	33.4	N/A	0.064	0.01	0.01
58.50	259.00	1.21	0.47	gravelly sand to sand	-37.0	1.00	43	7,020	3,806	3,806	1.49	1.00	187.74	0.698	0.773	0.376	N/A	N/A	NO	N/A	N/A	N/A	31.3	N/A	0.084	0.01	0.00
59.50	333.79	1.16	0.35	gravelly sand to sand	-38.0	1.00	56	7,140	3,864	3,864	1.33	1.00	240.15	0.690	0.768	0.373	N/A	N/A	NO	N/A	N/A	N/A	40.0	N/A	0.000	0.00	0.00

	max=	1,500
	min=	1,434
	avg=	1,496

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	West County Connector - 405/22 HOV Segment
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-09-127

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	21.00 ft
GWT Elev. During Test	12.00 ft
GWT Elev. For Design	12.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.46 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\, A_{max}\, (\sigma_v/\sigma_v')\, r_d$

+++ $FS = (CRR_{7.5}/CSR)\, MSF\, K_\sigma\, K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw = 9.00 ft below ground surface

GWT Depth For Design, Zwd = 9.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils = 14.00 feet

Earthquake-Induced Settlements:

- Liquefaction-Induced Settlement = 0.59 inches <--- Saturated Sands
- Seismic Compaction Settlement = 0.00 inches <--- Dry or Unsaturated Sands

Total: 0.59 inches

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{1ANs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60s}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_t (in.)	Cumulative Settlement Profile (in.)
0.50	249.99	2.39	0.95	sand	20.0	1.00	50	60	60	60	1.24	1.00	1,443.33	0.999	N/A	0.299	N/A	N/A	NO	N/A	N/A	N/A	85.0	0.013	0.000	0.00	0.59
1.50	272.78	1.78	0.65	sand	19.0	1.66	90	180	180	180	0.87	1.00	1,505.49	0.997	N/A	0.298	N/A	N/A	NO	N/A	N/A	N/A	153.6	0.019	0.000	0.00	0.59
2.50	130.77	1.64	1.26	sand to silty sand	18.0	1.00	33	300	300	300	1.62	1.00	337.64	0.994	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	60.7	0.033	0.000	0.00	0.59
3.50	69.65	2.56	3.66	clayey silt to silty clay	17.0	1.00	35	420	420	420	2.20	1.67	254.04	0.992	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.59
4.50	56.02	1.20	2.14	sandy silt to clayey silt	16.0	1.66	37	540	540	540	1.81	1.11	198.43	0.990	N/A	0.296	N/A	N/A	NO	N/A	N/A	N/A	80.7	N/A	N/A	N/A	0.59
5.50	10.73	0.44	4.11	clay	15.0	1.00	11	660	660	660	2.78	N/A	N/A	0.987	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.59
6.50	10.31	0.53	5.07	clay	14.0	1.00	10	780	780	780	2.90	N/A	N/A	0.985	N/A	0.294	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.59
7.50	11.68	0.73	6.21	clay	13.0	1.00	12	900	900	900	2.95	N/A	N/A	0.983	N/A	0.294	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.59
8.50	24.07	0.65	2.70	clayey silt to silty clay	12.0	1.00	12	1,020	1,020	1,020	2.56	3.06	103.23	0.980	N/A	0.293	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.59
9.50	26.57	0.64	2.40	sandy silt to clayey silt	11.0	1.66	18	1,140	1,109	1,109	2.19	1.65	97.47	0.978	1.000	0.301	0.166	0.659	YES	2.8	26.4	1,500	33.4	N/A	0.047	0.01	0.58
10.50	8.96	0.43	4.74	clay	10.0	1.00	9	1,260	1,166	1,166	3.04	N/A	N/A	0.976	N/A	0.315	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
11.50	9.33	0.38	4.06	clay	9.0	1.00	9	1,380	1,224	1,224	2.99	N/A	N/A	0.973	N/A	0.328	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
12.50	7.95	0.36	4.45	clay	8.0	1.00	8	1,500	1,282	1,282	3.09	N/A	N/A	0.971	N/A	0.340	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
13.50	9.73	0.45	4.55	clay	7.0	1.00	10	1,620	1,339	1,339	3.03	N/A	N/A	0.969	N/A	0.350	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
14.50	6.03	0.27	4.41	clay	6.0	1.00	6	1,740	1,397	1,397	3.22	N/A	N/A	0.966	N/A	0.360	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
15.50	7.58	0.37	4.79	clay	5.0	1.00	8	1,860	1,454	1,454	3.17	N/A	N/A	0.964	N/A	0.369	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
16.50	13.58	0.73	5.28	clay	4.0	1.00	14	1,980	1,512	1,512	3.00	N/A	N/A	0.962	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
17.50	12.61	0.62	4.81	clay	3.0	1.00	13	2,100	1,570	1,570	3.01	N/A	N/A	0.959	N/A	0.384	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
18.50	10.36	0.38	3.62	clay	2.0	1.00	10	2,220	1,627	1,627	3.01	N/A	N/A	0.957	N/A	0.390	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
19.50	13.04	0.39	2.92	clayey silt to silty clay	1.0	1.00	7	2,340	1,685	1,685	2.88	N/A	N/A	0.955	N/A	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
20.50	27.88	0.90	3.21	clayey silt to silty clay	0.0	1.00	14	2,460	1,742	1,742	2.64	N/A	N/A	0.952	N/A	0.402	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
21.50	28.63	0.88	3.06	clayey silt to silty clay	-1.0	1.00	14	2,580	1,800	1,800	2.63	N/A	N/A	0.950	N/A	0.407	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
22.50	19.47	0.87	4.42	clay	-2.0	1.00	19	2,700	1,858	1,858	2.88	N/A	N/A	0.948	N/A	0.412	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.58
23.50	51.73	0.95	1.83	silty sand to sandy silt	-3.0	1.00	17	2,820	1,915	1,915	2.30	1.94	102.79	0.945	1.000	0.416	0.181	0.519	YES	2.8	20.4	1,230	26.1	N/A	1.009	0.12	0.46
24.50	38.36	1.04	2.71	sandy silt to clayey silt	-4.0	1.66	25	2,940	1,973	1,973	2.20	1.68	107.19	0.943	1.000	0.420	0.195	0.552	YES	2.8	28.4	1,500	35.7	N/A	0.050	0.01	0.46
25.50	14.10	0.54	3.71	silty clay to clay	-5.0	1.00	9	3,060	2,030	2,030	2.97	N/A	N/A	0.941	N/A	0.424	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.46
26.50	29.80	0.84	2.77	sandy silt to clayey silt	-6.0	1.66	20	3,180	2,088	2,088	2.31	1.98	95.46	0.938	0.986	0.427	0.161	0.443	YES	2.8	22.1	1,401	28.2	N/A	0.603	0.07	0.38
27.50	14.81	0.62	4.16	clay	-7.0	1.00	15	3,300	2,146	2,146	3.00	N/A	N/A	0.936	N/A	0.430	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.38
28.50	11.23	0.49	4.14	clay	-8.0	1.00	11	3,420	2,203	2,203	3.12	N/A	N/A	0.934	N/A	0.433	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.38
29.50	35.34	0.82	2.31	sandy silt to clayey silt	-9.0	1.00	14	3,540	2,261	2,261	2.53	2.91	96.65	0.931	0.967	0.436	0.164	0.434	YES	2.8	16.1	783	21.0	N/A	1.444	0.17	0.21
30.50	53.08	0.85	1.60	silty sand to sandy silt	-10.0	1.66	29	3,660	2,318	2,318	1.98	1.27	103.56	0.926	0.944	0.437	0.183	0.472	YES	2.8	30.0	1,500	37.7	N/A	0.029	0.00	0.21
31.50	15.40	0.49	3.11	clayey silt to silty clay	-11.0	1.00	8	3,780	2,376	2,376	2.94	N/A	N/A	0.918	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.21
32.50	21.57	0.86	3.91	silty clay to clay	-12.0	1.00	14	3,900	2,434	2,434	2.88	N/A	N/A	0.909	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.21
33.50	69.80	1.76	2.52	sandy silt to clayey silt	-13.0	1.00	28	4,020	2,491	2,491	2.34	2.08	130.19	0.901	0.921	0.435	0.285	0.720	YES	2.8	27.8	1,500	35.0	N/A	0.060	0.01	0.20
34.50	48.93	1.19	2.42	sandy silt to clayey silt	-14.0	1.66	32	4,140	2,549	2,549	2.13	1.52	109.11	0.893	0.908	0.434	0.201	0.501	YES	2.8	31.5	1,500	39.4	N/A	0.007	0.00	0.20
35.50	13.49	0.54	3.93	clay	-15.0	1.00	13	4,260	2,606	2,606	3.08	N/A	N/A	0.885	N/A	0.433	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.20
36.50	77.48	1.08	1.40	silty sand to sandy silt	-16.0	1.00	26	4,380	2,664	2,664	2.14	1.54	103.48	0.877	0.903	0.431	0.183	0.458	YES	2.8	25.2	1,500	31.9	N/A	0.098	0.01	0.19
37.50	98.58	1.35	1.37	sand to silty sand	-17.0	1.66	41	4,500	2,722	2,722	1.75	1.07	149.82	0.869	0.884	0.429	0.393	0.964	YES	1.3	36.3	1,500	39.2	N/A	0.010	0.00	0.19
38.50	27.97	1.22	4.31	silty clay to clay	-18.0	1.00	19	4,620	2,779	2,779	2.85	N/A	N/A	0.861	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
39.50	17.69	0.76	4.31	clay	-19.0	1.00	18	4,740	2,837	2,837	3.02	N/A	N/A	0.852	N/A	0.426	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
40.50	20.02	0.73	3.61	silty clay to clay	-20.0	1.00	13	4,860	2,894	2,894	2.94	N/A	N/A	0.844	N/A	0.424	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
41.50	23.62	1.13	4.69	clay	-21.0	1.00	24	4,980	2,952	2,952	2.96	N/A	N/A	0.836	N/A	0.422	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
42.50	24.29	0.97	3.92	silty clay to clay	-22.0	1.00	16	5,100	3,010	3,010	2.90	N/A	N/A	0.828	N/A	0.420	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
43.50	43.29	1.37	3.11	sandy silt to clayey silt	-23.0	1.00	17	5,220	3,067	3,067	2.64	N/A	N/A	0.820	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
44.50	128.39	4.66	3.62	sandy silt to clayey silt	-24.0	1.00	51	5,340	3,125	3,125	2.31	1.98	202.88	0.812	0.837	0.415	N/A	N/A	NO	N/A	N/A	N/A	54.3	N/A	0.000	0.00	0.19
45.50	176.08	5.59	3.18	sandy silt to clayey silt	-25.0	1.66	117	5,460	3,182	3,182	1.87	1.16	268.40	0.804	0.830	0.412	N/A	N/A	NO	N/A	N/A	N/A	115.9	N/A	0.000	0.00	0.19
46.50	64.47	2.55	3.96	clayey silt to silty clay	-26.0	1.00	32	5,580	3,240	3,240	2.58	3.23	145.07	0.795	0.834	0.410	0.364	0.883	YES	2.8	28.1	1,500	N/A	N/A	0.000	0.00	0.19
47.50	38.08	1.76	4.62	silty clay to clay	-27.0	1.00	25	5,700	3,298	3,298	2.81	N/A	N/A	0.787	N/A	0.407	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
48.50	26.05	1.10	4.22	silty clay to clay	-28.0	1.00	17	5,820	3,355	3,355	2.92	N/A	N/A	0.779	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
49.50	29.11	0.95	3.24	clayey silt to silty clay	-29.0	1.00	15	5,940	3,413	3,413	2.81	N/A	N/A	0.771	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
50.50	49.20	2.15	4.35	silty clay to clay	-30.0	1.00	33	6,060	3,470	3,470	2.72	N/A	N/A	0.763	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
51.50	59.72	1.94	3.25	sandy silt to clayey silt	-31.0	1.00	24	6,180	3,528	3,528	2.57	3.16	123.10	0.755	0.835	0.395	0.253	0.638	YES	2.8	20.8	1,268	26.6	N/A	0.766	0.09	0.09
52.50	61.78	1.45	2.33	sandy silt to clayey silt	-32.0	1.00	25	6,300	3,586	3,586	2.42	2.40	110.70	0.747	0.829	0.392	0.206	0.519	YES	2.8	21.3	1,316	27.1	N/A	0.567	0.07	0.03
53.50	48.43	1.78	3.66	clayey silt to silty clay	-33.0	1.00	24	6,420	3,643	3,643	2.69	N/A	N/A	0.739	N/A	0.389	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03
54.50	80.59	1.91	2.37	silty sand to sandy silt	-34.0	1.00	27	6,540	3,701	3,701	2.34	2.09	123.84	0.730	0.815	0.386	0.257	0.646	YES	2.8	22.5	1,443	28.7	N/A	0.198	0.02	0.00
55.50	50.35	2.10	4.15	clayey silt to silty clay	-35.0	1.00	25	6,660	3,758	3,758	2.72	N/A	N/A	0.722	N/A	0.383	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
56.50	26.41	1.20	4.44	silty clay to clay	-36.0	1.00	18	6,780	3,816	3,816	2.98	N/A	N/A	0.714	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	28.81	1.20	4.01	silty clay to clay	-37.0	1.00	19	6,900	3,874	3,874	2.92	N/A	N/A	0.706	N/A	0.376	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	292.09	2.42	0.83	sand	-38.0	1.00	58	7,020	3,931	3,931	1.62	1.00	208.34	0.698	0.763	0.373	N/A	N/A	NO	N/A	N/A	N/A	41.7	N/A	0.000	0.00	0.00
59.50	318.15	2.18	0.68	gravelly sand to sand	-39.0	1.00	53	7,140	3,989	3,989	1.54	1.00	225.28	0.690	0.759	0.369	N/A	N/A	NO	N/A	N/A	N/A	37.5	N/A	0.023	0.00	0.00

	max=	1,500
	min=	783
	avg=	1,389

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	West County Connector - 405/22 HOV Segment
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-09-128

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	20.00 ft
GWT Elev. During Test	12.00 ft
GWT Elev. For Design	12.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.46 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\ A_{max}\ (\sigma_v/\sigma_v')\ r_d$

+++ $FS = (CRR_{7.5}/CSR)\ MSF\ K_\sigma\ K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw = 8.00 ft below ground surface

GWT Depth For Design, Zwd = 8.00 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils = 9.00 feet

Earthquake-Induced Settlements:

- Liquefaction-Induced Settlement = 0.04 inches <--- Saturated Sands
- Seismic Compaction Settlement = 0.00 inches <--- Dry or Unsaturated Sands

Total: 0.04 inches

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{c1Ncs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60s}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_l (in.)	Cumulative Settlement Profile (in.)
0.50	242.77	8.12	3.34	sand to clayey sand (*)	19.0	1.00	121	60	60	60	1.77	1.09	1,525.31	0.999	N/A	0.299	N/A	N/A	NO	N/A	N/A	N/A	218.8	0.010	0.000	0.00	0.04
1.50	323.24	8.17	2.53	silty sand to sandy silt	18.0	1.66	178	180	180	180	1.42	1.00	1,784.00	0.997	N/A	0.298	N/A	N/A	NO	N/A	N/A	N/A	368.9	0.014	0.000	0.00	0.04
2.50	151.91	2.58	1.70	sand to silty sand	17.0	1.66	63	300	300	300	1.40	1.00	649.42	0.994	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	114.5	0.027	0.000	0.00	0.04
3.50	50.74	1.33	2.62	sandy silt to clayey silt	16.0	1.66	34	420	420	420	1.86	1.16	212.08	0.992	N/A	0.297	N/A	N/A	NO	N/A	N/A	N/A	73.5	N/A	N/A	N/A	0.04
4.50	18.38	0.46	2.48	clayey silt to silty clay	15.0	1.00	9	540	540	540	2.51	2.84	100.43	0.990	N/A	0.296	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
5.50	11.23	0.42	3.75	clay	14.0	1.00	11	660	660	660	2.74	N/A	N/A	0.987	N/A	0.295	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
6.50	8.63	0.41	4.78	clay	13.0	1.00	9	780	780	780	2.94	N/A	N/A	0.985	N/A	0.294	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
7.50	12.98	0.36	2.77	clayey silt to silty clay	12.0	1.00	6	900	900	900	2.69	N/A	N/A	0.983	N/A	0.294	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
8.50	30.54	0.53	1.75	sandy silt to clayey silt	11.0	1.66	20	1,020	989	989	2.04	1.35	97.42	0.980	1.000	0.302	0.166	0.655	YES	2.8	31.6	1,500	39.5	N/A	0.003	0.00	0.04
9.50	8.90	0.33	3.71	clay	10.0	1.00	9	1,140	1,046	1,046	2.94	N/A	N/A	0.978	N/A	0.319	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
10.50	16.80	0.65	3.89	silty clay to clay	9.0	1.00	11	1,260	1,104	1,104	2.75	N/A	N/A	0.976	N/A	0.333	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
11.50	33.32	0.74	2.22	sandy silt to clayey silt	8.0	1.66	22	1,380	1,162	1,162	2.10	1.46	105.69	0.973	1.000	0.346	0.190	0.655	YES	2.8	31.8	1,500	39.7	N/A	0.002	0.00	0.04
12.50	13.92	0.68	4.85	clay	7.0	1.00	14	1,500	1,219	1,219	2.90	N/A	N/A	0.971	N/A	0.357	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
13.50	9.45	0.40	4.24	clay	6.0	1.00	9	1,620	1,277	1,277	3.01	N/A	N/A	0.969	N/A	0.367	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
14.50	11.16	0.42	3.73	clay	5.0	1.00	11	1,740	1,334	1,334	2.93	N/A	N/A	0.966	N/A	0.377	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
15.50	13.26	0.60	4.54	clay	4.0	1.00	13	1,860	1,392	1,392	2.94	N/A	N/A	0.964	N/A	0.385	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
16.50	10.04	0.44	4.36	clay	3.0	1.00	10	1,980	1,450	1,450	3.04	N/A	N/A	0.962	N/A	0.393	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
17.50	12.74	0.42	3.30	silty clay to clay	2.0	1.00	8	2,100	1,507	1,507	2.88	N/A	N/A	0.959	N/A	0.400	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
18.50	12.35	0.44	3.52	silty clay to clay	1.0	1.00	8	2,220	1,565	1,565	2.93	N/A	N/A	0.957	N/A	0.406	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
19.50	14.45	0.44	3.07	clayey silt to silty clay	0.0	1.00	7	2,340	1,622	1,622	2.84	N/A	N/A	0.955	N/A	0.412	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
20.50	30.50	1.24	4.06	silty clay to clay	-1.0	1.00	20	2,460	1,680	1,680	2.67	N/A	N/A	0.952	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
21.50	45.53	1.52	3.33	clayey silt to silty clay	-2.0	1.66	38	2,580	1,738	1,738	2.19	1.64	132.32	0.950	1.000	0.422	0.295	0.836	YES	2.8	43.2	1,500	N/A	N/A	0.000	0.00	0.04
22.50	20.57	0.88	4.25	silty clay to clay	-3.0	1.00	14	2,700	1,795	1,795	2.83	N/A	N/A	0.948	N/A	0.426	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
23.50	16.18	0.87	5.34	clay	-4.0	1.00	16	2,820	1,853	1,853	2.99	N/A	N/A	0.945	N/A	0.430	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
24.50	14.55	0.50	3.38	silty clay to clay	-5.0	1.00	10	2,940	1,910	1,910	2.91	N/A	N/A	0.943	N/A	0.434	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
25.50	19.03	0.74	3.86	silty clay to clay	-6.0	1.00	13	3,060	1,968	1,968	2.86	N/A	N/A	0.941	N/A	0.437	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
26.50	42.02	1.00	2.38	sandy silt to clayey silt	-7.0	1.66	28	3,180	2,026	2,026	2.14	1.53	106.07	0.938	0.995	0.440	0.191	0.515	YES	2.8	30.5	1,500	38.2	N/A	0.022	0.00	0.04
27.50	11.92	0.45	3.79	clay	-8.0	1.00	12	3,300	2,083	2,083	3.05	N/A	N/A	0.936	N/A	0.443	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
28.50	21.81	0.61	2.80	clayey silt to silty clay	-9.0	1.00	11	3,420	2,141	2,141	2.75	N/A	N/A	0.934	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
29.50	76.65	1.42	1.85	silty sand to sandy silt	-10.0	1.00	26	3,540	2,198	2,198	2.20	1.66	121.17	0.931	0.966	0.448	0.245	0.631	YES	2.8	27.2	1,500	34.2	N/A	0.073	0.01	0.03
30.50	44.17	1.14	2.59	sandy silt to clayey silt	-11.0	1.66	29	3,660	2,256	2,256	2.17	1.59	109.43	0.926	0.954	0.449	0.202	0.511	YES	2.8	30.3	1,500	38.1	N/A	0.025	0.00	0.02
31.50	19.13	0.89	4.61	clay	-12.0	1.00	19	3,780	2,314	2,314	2.96	N/A	N/A	0.918	N/A	0.448	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
32.50	17.90	0.73	4.00	silty clay to clay	-13.0	1.00	12	3,900	2,371	2,371	2.95	N/A	N/A	0.909	N/A	0.447	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
33.50	12.61	0.44	3.41	silty clay to clay	-14.0	1.00	8	4,020	2,429	2,429	3.05	N/A	N/A	0.901	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
34.50	11.56	0.55	4.61	clay	-15.0	1.00	12	4,140	2,486	2,486	3.17	N/A	N/A	0.893	N/A	0.445	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
35.50	13.04	0.70	5.25	clay	-16.0	1.00	13	4,260	2,544	2,544	3.17	N/A	N/A	0.885	N/A	0.443	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
36.50	72.60	1.24	1.70	silty sand to sandy silt	-17.0	1.00	24	4,380	2,602	2,602	2.22	1.71	109.13	0.877	0.913	0.441	0.201	0.496	YES	2.8	24.0	1,500	30.5	N/A	0.196	0.02	0.00
37.50	41.64	1.94	4.62	silty clay to clay	-18.0	1.00	28	4,500	2,659	2,659	2.73	N/A	N/A	0.869	N/A	0.440	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
38.50	125.22	2.53	2.02	silty sand to sandy silt	-19.0	1.00	42	4,620	2,717	2,717	2.10	1.46	156.88	0.861	0.885	0.438	0.439	1.059	YES	2.8	38.6	1,500	48.0	N/A	0.000	0.00	0.00
39.50	132.89	2.33	1.75	silty sand to sandy silt	-20.0	1.00	44	4,740	2,774	2,774	2.04	1.36	153.53	0.852	0.877	0.435	0.417	1.001	YES	2.8	40.4	1,500	50.1	N/A	0.000	0.00	0.00
40.50	91.29	3.96	4.32	clayey silt to silty clay	-21.0	1.00	46	4,860	2,832	2,832	2.45	2.53	194.16	0.844	0.870	0.433	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.00
41.50	52.85	3.29	6.18	clay	-22.0	1.00	53	4,980	2,890	2,890	2.76	N/A	N/A	0.836	N/A	0.431	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
42.50	26.89	1.58	5.82	clay	-23.0	1.00	27	5,100	2,947	2,947	2.97	N/A	N/A	0.828	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
43.50	18.60	0.82	4.31	clay	-24.0	1.00	19	5,220	3,005	3,005	3.03	N/A	N/A	0.820	N/A	0.426	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
44.50	17.58	0.79	4.37	clay	-25.0	1.00	18	5,340	3,062	3,062	3.06	N/A	N/A	0.812	N/A	0.423	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
45.50	29.13	1.91	6.46	clay	-26.0	1.00	29	5,460	3,120	3,120	2.99	N/A	N/A	0.804	N/A	0.420	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
46.50	16.65	0.90	5.26	clay	-27.0	1.00	17	5,580	3,178	3,178	3.14	N/A	N/A	0.795	N/A	0.418	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
47.50	19.61	0.78	3.88	silty clay to clay	-28.0	1.00	13	5,700	3,235	3,235	3.00	N/A	N/A	0.787	N/A	0.415	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	31.90	1.87	5.77	clay	-29.0	1.00	32	5,820	3,293	3,293	2.94	N/A	N/A	0.779	N/A	0.412	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	58.40	3.62	6.18	clay	-30.0	1.00	58	5,940	3,350	3,350	2.76	N/A	N/A	0.771	N/A	0.409	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
50.50	51.77	3.56	6.87	clay	-31.0	1.66	86	6,060	3,408	3,408	2.48	2.69	176.49	0.763	0.808	0.406	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	0.000	0.00	0.00
51.50	22.81	1.24	5.40	clay	-32.0	1.00	23	6,180	3,466	3,466	3.05	N/A	N/A	0.755	N/A	0.402	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	30.91	1.74	5.61	clay	-33.0	1.00	31	6,300	3,523	3,523	2.96	N/A	N/A	0.747	N/A	0.399	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
53.50	30.68	1.69	5.50	clay	-34.0	1.00	31	6,420	3,581	3,581	2.96	N/A	N/A	0.739	N/A	0.396	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
54.50	20.03	0.95	4.71	clay	-35.0	1.00	20	6,540	3,638	3,638	3.08	N/A	N/A	0.730	N/A	0.393	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	22.16	0.80	3.55	clayey silt to silty clay	-36.0	1.00	11	6,660	3,696	3,696	2.97	N/A	N/A	0.722	N/A	0.389	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
56.50	27.53	1.37	4.93	clay	-37.0	1.00	28	6,780	3,754	3,754	2.98	N/A	N/A	0.714	N/A	0.386	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	26.57	1.24	4.59	clay	-38.0	1.00	27	6,900	3,811	3,811	2.98	N/A	N/A	0.706	N/A	0.382	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	24.58	1.17	4.66	clay	-39.0	1.00	25	7,020	3,869	3,869	3.02	N/A	N/A	0.698	N/A	0.379	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	26.06	1.04	3.94	silty clay to clay	-40.0	1.00	17	7,140	3,926	3,926	2.95	N/A	N/A	0.690	N/A	0.375	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

max= 1,500
min= 1,500
avg= 1,500

EVALUATION OF LIQUEFACTION POTENTIAL AND EARTHQUAKE-INDUCED SETTLEMENTS USING CPT DATA (METHOD 2)

(Engineer: Curt Scheyhing)

PROJECT INFORMATION	
Project Name	West County Connector - 405/22 HOV Segment
Project No.	I-436
Location	Orange County, CA
Exploration No.	CPT-09-129

GENERAL INPUT DATA	
Ground Surf. Elev. During Test	20.50 ft
GWT Elev. During Test	12.00 ft
GWT Elev. For Design	12.00 ft
Total Soil Unit Weight, γ_t	120.00 pcf
Earthquake Magnitude, M_{eq}	7.00
Peak Ground Acceleration, A_{max}	0.47 g
Required Factor of Safety	1.10

REFERENCES

+ Liquefaction Resistance of Soils: Summary Report From the 1996 NCEER and 1998 NCEER/NSF Workshops (Edited by: T.L. Youd and I.M. Idriss, 2001)

++ $CSR = 0.65\, A_{max}\, (\sigma_v/\sigma_v')\, r_d$

+++ $FS = (CRR_{7.5}/CSR)\, MSF\, K_\sigma\, K_{\alpha \rightarrow 0}$ where $CRR_{7.5}$ is evaluated from direct CPT data, K_α =1.0 and MSF = 1.19

* Residual strength values of liquefied soils are evaluated from converted SPT blow counts using the median curve by Seed & Harder (1990)

** Ground settlements are evaluated from converted SPT blow counts using the method developed by Tokimatsu and Seed (1987).

Note: This analysis assumes level ground condition and depth of liquefiable soils does not change.

GWT Depth During Test, Zw =	8.50 ft below ground surface
GWT Depth For Design, Zwd =	8.50 ft below ground surface

***** SUMMARY OF RESULTS *****

Total Thickness of Liquefiable Soils =	11.00 feet	
Earthquake-Induced Settlements:		
- Liquefaction-Induced Settlement =	0.66 inches	<--- Saturated Sands
- Seismic Compaction Settlement =	0.00 inches	<--- Dry or Unsaturated Sands
Total:	0.66 inches	

INPUT SOIL PROFILE (CPT DATA)					SOIL LIQUEFACTION POTENTIAL ANALYSIS (1996 NCEER & 1998 NCEER/NSF WORKSHOPS) +														RESIDUAL STRENGTH *			GROUND SETTLEMENT **				
Soil Depth During Test (ft)	Average Cone Tip Resistance $q_{t\text{-}avg}$ (tsf)	Average Sleeve Friction $f_{s\text{-}avg}$ (tsf)	Average Friction Ratio $R_{f\text{-}avg}$ (%)	Soil Behavior Type (Robertson et al., 1983)	Bottom of Layer Elevation (ft)	Thin Layer Correction Factor (Lunne, et al., 1997)	Equiv. SPT Blow Count N_{60}(blows/ft)	Total Vert. Stress σ_v (psf)	Effective Vert. Stress (Design) σ_v' (psf)	Effective Vert. Stress (Test) σ_v' (psf)	Soil Behavior Type Index I_c	Fines Correction Factor K_c	Corrected Tip Resistance q_{cINcs}	Shear Stress Reduction Coeff. r_d	Correction for High Overburden Stress K_σ	Cyclic Stress Ratio ++ CSR	Cyclic Res. Ratio $CRR_{7.5}$	Factor of Safety Against Liqefaction +++ FS	Liquefy ?	SPT Blow Count Correction $N_{corr.}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Residual Shear Strength S_r (psf)	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Cyclic Shear Strain γ_c (%)	Vol. Strain ε_v (%)	Layer Settlement S_t (in.)	Cumulative Settlement Profile (in.)
0.50	234.04	1.27	0.54	sand	19.5	1.00	47	60	60	60	1.01	1.00	1,351.22	0.999	N/A	0.305	N/A	N/A	NO	N/A	N/A	N/A	79.6	0.014	0.000	0.00	0.66
1.50	237.79	1.46	0.62	sand	18.5	1.66	79	180	180	180	0.86	1.00	1,312.41	0.997	N/A	0.304	N/A	N/A	NO	N/A	N/A	N/A	133.9	0.021	0.000	0.00	0.66
2.50	63.96	1.40	2.19	sandy silt to clayey silt	17.5	1.00	26	300	300	300	2.00	1.30	215.18	0.994	N/A	0.304	N/A	N/A	NO	N/A	N/A	N/A	57.2	N/A	N/A	N/A	0.66
3.50	46.31	1.47	3.16	clayey silt to silty clay	16.5	1.00	23	420	420	420	2.26	1.83	185.31	0.992	N/A	0.303	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.66
4.50	124.57	2.86	2.30	silty sand to sandy silt	15.5	1.66	69	540	540	540	1.62	1.00	396.93	0.990	N/A	0.302	N/A	N/A	NO	N/A	N/A	N/A	145.3	0.034	0.000	0.00	0.66
5.50	36.86	0.85	2.30	sandy silt to clayey silt	14.5	1.66	24	660	660	660	1.99	1.28	136.29	0.987	N/A	0.302	N/A	N/A	NO	N/A	N/A	N/A	54.8	N/A	N/A	N/A	0.66
6.50	6.40	0.25	3.87	clay	13.5	1.00	6	780	780	780	2.99	N/A	N/A	0.985	N/A	0.301	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.66
7.50	6.58	0.25	3.75	clay	12.5	1.00	7	900	900	900	3.01	N/A	N/A	0.983	N/A	0.300	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.66
8.50	8.96	0.30	3.37	clay	11.5	1.00	9	1,020	1,020	1,020	2.90	N/A	N/A	0.980	N/A	0.299	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.66
9.50	24.32	0.48	1.98	sandy silt to clayey silt	10.5	1.00	10	1,140	1,078	1,078	2.48	2.65	87.93	0.978	1.000	0.316	0.143	0.541	YES	2.8	16.1	779	20.9	N/A	1.193	0.14	0.51
10.50	13.32	0.48	3.62	silty clay to clay	9.5	1.00	9	1,260	1,135	1,135	2.81	N/A	N/A	0.976	N/A	0.331	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.51
11.50	6.75	0.27	3.95	clay	8.5	1.00	7	1,380	1,193	1,193	3.10	N/A	N/A	0.973	N/A	0.344	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.51
12.50	11.26	0.38	3.37	silty clay to clay	7.5	1.00	8	1,500	1,250	1,250	2.88	N/A	N/A	0.971	N/A	0.356	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.51
13.50	33.14	0.90	2.71	sandy silt to clayey silt	6.5	1.00	13	1,620	1,308	1,308	2.49	2.74	112.19	0.969	1.000	0.366	0.211	0.688	YES	2.8	19.2	1,101	24.7	N/A	1.022	0.12	0.39
14.50	34.04	0.73	2.14	sandy silt to clayey silt	5.5	1.66	23	1,740	1,366	1,366	2.11	1.48	100.93	0.966	1.000	0.376	0.176	0.557	YES	2.8	30.1	1,500	37.7	N/A	0.022	0.00	0.39
15.50	9.87	0.51	5.16	clay	4.5	1.00	10	1,860	1,423	1,423	3.08	N/A	N/A	0.964	N/A	0.385	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
16.50	10.82	0.57	5.29	clay	3.5	1.00	11	1,980	1,481	1,481	3.07	N/A	N/A	0.962	N/A	0.393	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
17.50	12.07	0.64	5.27	clay	2.5	1.00	12	2,100	1,538	1,538	3.04	N/A	N/A	0.959	N/A	0.400	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
18.50	10.79	0.55	5.05	clay	1.5	1.00	11	2,220	1,596	1,596	3.08	N/A	N/A	0.957	N/A	0.407	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
19.50	12.90	0.55	4.21	clay	0.5	1.00	13	2,340	1,654	1,654	2.98	N/A	N/A	0.955	N/A	0.413	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
20.50	16.09	0.66	4.02	silty clay to clay	-0.5	1.00	11	2,460	1,711	1,711	2.89	N/A	N/A	0.952	N/A	0.418	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
21.50	21.25	1.04	4.81	clay	-1.5	1.00	21	2,580	1,769	1,769	2.86	N/A	N/A	0.950	N/A	0.423	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
22.50	12.86	0.46	3.43	silty clay to clay	-2.5	1.00	9	2,700	1,826	1,826	2.96	N/A	N/A	0.948	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
23.50	12.93	0.45	3.33	silty clay to clay	-3.5	1.00	9	2,820	1,884	1,884	2.96	N/A	N/A	0.945	N/A	0.432	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
24.50	13.87	0.80	5.54	clay	-4.5	1.00	14	2,940	1,942	1,942	3.08	N/A	N/A	0.943	N/A	0.436	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
25.50	11.99	0.60	4.81	clay	-5.5	1.00	12	3,060	1,999	1,999	3.10	N/A	N/A	0.941	N/A	0.440	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
26.50	12.24	0.55	4.29	clay	-6.5	1.00	12	3,180	2,057	2,057	3.07	N/A	N/A	0.938	N/A	0.443	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
27.50	12.71	0.62	4.72	clay	-7.5	1.00	13	3,300	2,114	2,114	3.09	N/A	N/A	0.936	N/A	0.446	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
28.50	12.64	0.68	5.18	clay	-8.5	1.00	13	3,420	2,172	2,172	3.13	N/A	N/A	0.934	N/A	0.449	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.39
29.50	65.37	1.01	1.54	silty sand to sandy silt	-9.5	1.00	22	3,540	2,230	2,230	2.20	1.67	103.16	0.931	0.964	0.452	0.182	0.463	YES	2.8	23.4	1,500	29.8	N/A	0.427	0.05	0.34
30.50	95.16	1.30	1.36	sand to silty sand	-10.5	1.66	39	3,660	2,287	2,287	1.73	1.06	155.93	0.926	0.948	0.453	0.433	1.081	YES	1.3	38.2	1,500	41.1	N/A	0.000	0.00	0.34
31.50	42.49	1.13	2.65	sandy silt to clayey silt	-11.5	1.66	28	3,780	2,345	2,345	2.19	1.65	107.18	0.918	0.941	0.452	0.195	0.483	YES	2.8	28.8	1,500	36.2	N/A	0.049	0.01	0.33
32.50	14.08	0.57	4.02	clay	-12.5	1.00	14	3,900	2,402	2,402	3.04	N/A	N/A	0.909	N/A	0.451	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
33.50	18.29	0.72	3.92	silty clay to clay	-13.5	1.00	12	4,020	2,460	2,460	2.94	N/A	N/A	0.901	N/A	0.450	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
34.50	32.85	1.01	3.07	clayey silt to silty clay	-14.5	1.00	16	4,140	2,518	2,518	2.67	N/A	N/A	0.893	N/A	0.449	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
35.50	18.51	0.61	3.27	clayey silt to silty clay	-15.5	1.00	9	4,260	2,575	2,575	2.90	N/A	N/A	0.885	N/A	0.447	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.33
36.50	53.90	0.89	1.64	silty sand to sandy silt	-16.5	1.00	18	4,380	2,633	2,633	2.31	1.99	93.39	0.877	0.922	0.446	0.156	0.384	YES	2.8	18.5	1,024	23.8	N/A	1.232	0.15	0.18
37.50	34.70	1.18	3.40	clayey silt to silty clay	-17.5	1.00	17	4,500	2,690	2,690	2.70	N/A	N/A	0.869	N/A	0.444	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.18
38.50	67.29	1.16	1.73	silty sand to sandy silt	-18.5	1.00	22	4,620	2,748	2,748	2.26	1.82	104.51	0.861	0.901	0.442	0.186	0.453	YES	2.8	21.9	1,384	28.0	N/A	0.748	0.09	0.09
39.50	116.93	1.65	1.41	sand to silty sand	-19.5	1.00	29	4,740	2,806	2,806	2.02	1.33	130.96	0.852	0.882	0.440	0.289	0.690	YES	1.3	26.0	1,500	28.4	N/A	0.652	0.08	0.01
40.50	81.73	1.55	1.90	silty sand to sandy silt	-20.5	1.00	27	4,860	2,863	2,863	2.23	1.74	118.57	0.844	0.879	0.438	0.235	0.563	YES	2.8	25.6	1,500	32.3	N/A	0.094	0.01	0.00
41.50	81.85	2.08	2.54	sandy silt to clayey silt	-21.5	1.00	33	4,980	2,921	2,921	2.32	2.00	135.75	0.836	0.863	0.436	0.313	0.739	YES	2.8	29.9	1,500	37.5	N/A	0.030	0.00	0.00
42.50	48.07	2.92	6.08	clay	-22.5	1.66	80	5,100	2,978	2,978	2.45	2.51	163.44	0.828	0.853	0.433	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
43.50	21.14	1.22	5.79	clay	-23.5	1.00	21	5,220	3,036	3,036	3.06	N/A	N/A	0.820	N/A	0.431	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
44.50	13.44	0.51	3.75	silty clay to clay	-24.5	1.00	9	5,340	3,094	3,094	3.12	N/A	N/A	0.812	N/A	0.428	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
45.50	17.96	0.68	3.75	silty clay to clay	-25.5	1.00	12	5,460	3,151	3,151	3.01	N/A	N/A	0.804	N/A	0.425	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
46.50	28.29	1.15	4.06	silty clay to clay	-26.5	1.00	19	5,580	3,209	3,209	2.87	N/A	N/A	0.795	N/A	0.423	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
47.50	23.92	1.15	4.75	clay	-27.5	1.00	24	5,700	3,266	3,266	2.98	N/A	N/A	0.787	N/A	0.420	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
48.50	21.99	1.06	4.79	clay	-28.5	1.00	22	5,820	3,324	3,324	3.02	N/A	N/A	0.779	N/A	0.417	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
49.50	24.56	1.20	4.85	clay	-29.5	1.00	25	5,940	3,382	3,382	2.99	N/A	N/A	0.771	N/A	0.414	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
50.50	23.15	1.10	4.69	clay	-30.5	1.00	23	6,060	3,439	3,439	3.01	N/A	N/A	0.763	N/A	0.411	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
51.50	13.93	0.86	6.10	clay	-31.5	1.00	14	6,180	3,497	3,497	3.28	N/A	N/A	0.755	N/A	0.408	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
52.50	15.18	0.68	4.41	clay	-32.5	1.00	15	6,300	3,554	3,554	3.16	N/A	N/A	0.747	N/A	0.404	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
53.50	20.84	1.16	5.45	clay	-33.5	1.00	21	6,420	3,612	3,612	3.10	N/A	N/A	0.739	N/A	0.401	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
54.50	37.43	1.83	4.87	clay	-34.5	1.00	37	6,540	3,670	3,670	2.86	N/A	N/A	0.730	N/A	0.398	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
55.50	23.99	1.21	5.04	clay	-35.5	1.00	24	6,660	3,727	3,727	3.03	N/A	N/A	0.722	N/A	0.394	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
56.50	28.30	1.32	4.62	clay	-36.5	1.00	28	6,780	3,785	3,785	2.95	N/A	N/A	0.714	N/A	0.391	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
57.50	28.89	1.47	5.08	clay	-37.5	1.00	29	6,900	3,842	3,842	2.98	N/A	N/A	0.706	N/A	0.387	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
58.50	21.15	1.16	5.46	clay	-38.5	1.00	21	7,020	3,900	3,900	3.12	N/A	N/A	0.698	N/A	0.384	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00
59.50	21.82	0.96	4.37	clay	-39.5	1.00	22	7,140	3,958	3,958	3.05	N/A	N/A	0.690	N/A	0.380	N/A	N/A	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00

	max=	1,500
	min=	779
	avg=	1,344

APPENDIX E
CALTRANS COMMENTS AND RESPONSES

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

April 24, 2009

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: Mohsen Mohseni

Subject: **Response to Caltrans Comments dated March 27, 2009**
(1st Submittal)
Foundation Report
Overhead Sign Foundations
West County Connector Project
I-405/SR22 HOV Connector Segment
12-ORA-22-PM20.91, EA: 071621
ORANGE COUNTY, CALIFORNIA
Report Dated February 12, 2009
GDC Project No. I-436

Dear Mohsen:

Group Delta Consultants, Inc. is pleased to present our responses to Caltrans comments on the subject report. The comments are included as Attachment 1, and are addressed in order below.

1. Include the number and PM for each sign structure in the title of the subject report.

The requested information has been provided in the revised report.

2. Provide lateral capacity calculation for the proposed pile foundations.

LPILE calculations have been performed to check that the site conditions meet the minimum requirements of the standard foundation designs. The approach is as follows:

- We developed site specific soil profiles for each sign based on CPT data, including groundwater, ground slope, soil layering, and liquefiable soils as appropriate:
    - P-Y curves in LPILE for cohesive soils were based on "Soft Clay" or "Stiff Clay without Free Water" models as appropriate using undrained shear strength interpreted from CPT;

  - P-Y curves in LPILE for cohesionless soils were based on "Reese Sand" model with 30 degree friction angle for loose, 32 to 33 degree friction angle for medium dense, and 35 degree friction angle for dense soils;
  - P-Y curves in LPILE for liquefiable soils were based on "liquefiable sand" model in LPILE;
- We then performed LPILE lateral load analysis for: 1) the recommended foundation depth and soil profile at each location, and 2) the corresponding standard sign foundation length and standard soil condition (ϕ=30 degrees and level ground, with no groundwater);
- A range of lateral loads was input in LPILE for the site specific and standard signs, along with a moment based on 25 ft moment arm, up to a value causing deflection of 1 inch for the standard sign (maximum allowed deflection), to determine the highest potential deflections for the site signs;
- Most project signs were stiffer (less deflection) than the standard sign up to 1 inch displacement, with the exception of Signs #41, 103, and 143 (121 similar to 143). For these signs, actual loads were provided by the structural engineer (see Attachment 2);
- Results of the actual load analysis show:
  - The standard signs have a deflection of about ½ inch at the maximum design load;
  - The softest site signs have deflections of about ¼ inch at the maximum design load;
- We conclude the proposed pile lengths accounting for actual site conditions exceed the standard design sign foundation requirements, and are adequate as recommended.

Discussion is provided in Section 4.4.4 of the revised report, and supporting data are presented in Attachment 2 to this response.

3. Revise section 4.4.3 of the subject report to include the relevant reference(s) for the sign structures. Take out the web link. Refer to Caltrans Standard Plans.

The requested revision has been made.

4. Justify why section 4.5 is included in the subject report. If not justified, take it out.

Unstable slopes could affect sign foundations. Since slopes are stable, there is no impact. Therefore we feel it is relevant.

5. R values should not be included in the subject report. Revise accordingly.

R-Value data are removed from the final report

6. Explain why consolidation tests were performed for the subject submittal.

Consolidation test result of overall project was provided for general information. This will be removed from the final report.

7. Explain how the values of the direct shear tests were used for pile foundation design?

Pile design utilizes undrained shear strength for cohesive soil and friction angle for granular soil. No generally applicable methods are available lateral analysis of piles in c-ϕ soils. Lab data for the entire project area, including drained direct shear tests, was provided for general reference as to the strength properties of site soils.

The following are attached and complete our response:

Attachment 1	Caltrans Comments dated March 27, 2009
Attachment 2	Lateral Load Analysis

We appreciate the opportunity to be a part of your design team for this project. If you have any questions or require additional information, please give us a call at (949) 450-2100.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 6-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Kul Bhushan

REGISTERED PROFESSIONAL ENGINEER
KUL BHUSHAN
No. 144
Exp. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

Kul Bhushan, Ph.D., G.E
Sr. Consulting Principal

GROUP DELTA CONSULTANTS

ATTACHMENT 1
CALTRANS COMMENTS DATED March 27, 2009

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

Flex your power!
Be energy efficient!

To: MS. LISA ALVISO
D-12

Date: March 27, 2009

File: 12-ORA-22-Various
OH Sign Structures

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 1

Subject: Foundation Report, Overhead Sign Foundations

The Office of Geotechnical Design South 1 (OGDS1) has reviewed the subject submittal titled: "Foundation Report, Overhead Sign Foundations, West County Connector Project, I-405/SR-22 HOV Connector Segment, 12-ORA-22-PM20.91, EA 071621, Orange County, California", prepared by Group Delta Consultants, Inc., dated February 12, 2009, submitted to our office on February 26, 2009.

We have the following comments:

1. Include the number and PM for each sign structure in the title of the subject report.
2. Provide lateral capacity calculation for the proposed pile foundations.
3. Revise section 4.4.3 of the subject report to include the relevant reference(s) for the sign structures. Take out the web link. Refer to Caltrans Standard Plans.
4. Justify why section 4.5 is included in the subject report. If not justified, take it out.
5. R values should not be included in the subject report. Revise accordingly.
6. Explain why consolidation tests were performed for the subject submittal.
7. Explain how the values of the direct shear tests were used for pile foundation design?

Any questions, please call me at (949) 724-2599.

SHARID K. AMIRI, Ph.D.; P.E.
Senior Transportation Engineer
Office of Geotechnical Design South-1

cc. Sudhakar Vatti, OSFP

ATTACHMENT 2
LATERAL LOAD ANALYSIS

ANALYSIS OF STANDARD AND SITE SPECIFIC FOUNDATIONS FOR RANGE OF LATERAL LOADS AND 25 FOOT MOMENT ARM TO DETERMINE SITE SIGNS WITH HIGHEST DEFLECTIONS

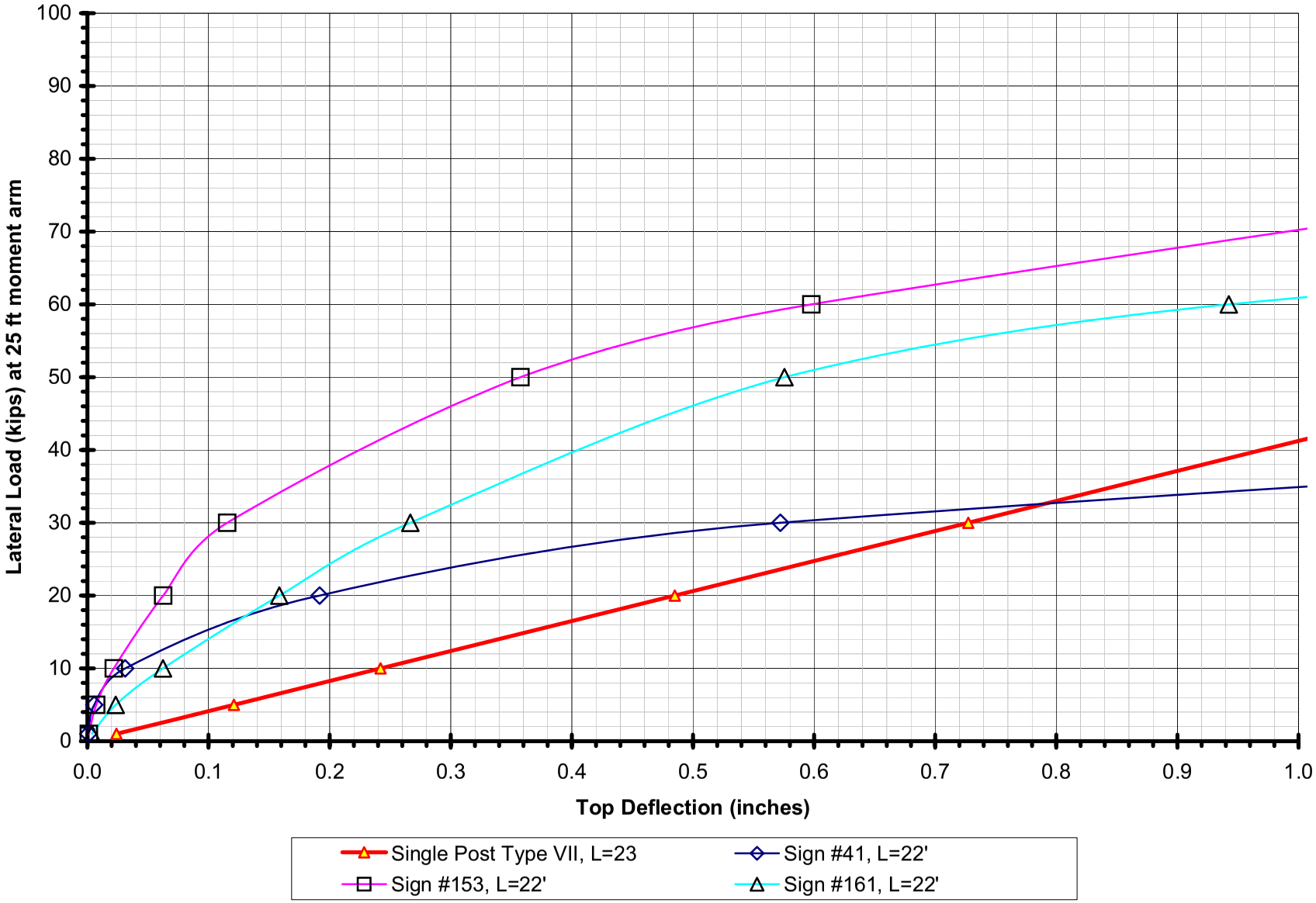
Foundation and Load Data				Deflection (in)													
Post Type	Standard Foundation Depth (ft)	V (kips)	M (k.ft)	Standard Pile*	Sign** #143 L=18'	Sign** #41 L=22' Level	Sign** #153 L=22' Level	Sign** #161 L=22' Level	Sign** #31 L=21' 2h:1v	Sign** #72 L=25' Level	Sign** #104 L=25' Level	Sign** #152 L=25' Level	Sign** #83 L=25' Level	Sign** #82 L=33' 2h:1v	Sign** #103 L=26' 2h:1v	Sign** #121 L=26' 2h:1v
VI	22	1	25	0.027	0.0014											
		5	125	0.135	0.0101											
		10	250	0.27	0.0497											
		20	500	0.539	0.2107											
		25	625	0.6738	0.4179											
		30	750	0.8086	0.7063											
		50	1250	1.35	2.617											
VII	23	1	25	0.024		0.0008	0.0012	0.0037								
		5	125	0.121		0.0056	0.0073	0.0234								
		10	250	0.242		0.0311	0.0218	0.0624								
		20	500	0.485		0.1917	0.0626	0.1585								
		30	750	0.727		0.5722	0.1154	0.2666								
		50	1250	1.213		2.487	0.3576	0.5755								
		60	1500	1.461			0.5978	0.9424								
		90	2250	2.300			1.8118	3.5226								
VIII, IX	25	1	25	0.020					0.0004	0.0004	0.0012	0.0013	0.0012			
		5	125	0.100					0.0021	0.0021	0.007	0.0076	0.0077			
		10	250	0.200					0.0065	0.0064	0.0212	0.0203	0.0208			
		20	500	0.401					0.0239	0.0241	0.0716	0.0708	0.0581			
		30	750	0.601					0.0669	0.0538	0.1824	0.1682	0.1161			
		40	1000	0.802					0.1656	0.1111	0.4891	0.2986	0.2589			
		50	1250	1.002					0.3504	0.2232	1.091	0.5268	0.5445			
		60	1500	1.203					0.6565	0.4212	2.085	0.9491	1.027			
		100	2500	2.071					4.129	2.927		5.686	6.515			
VI-S	27'10"	1	25	0.016										0.0004	0.0007	0.0007
		5	125	0.080										0.0023	0.0042	0.004
		10	250	0.160										0.0075	0.0142	0.014
		20	500	0.320										0.0323	0.0574	0.0533
		30	750	0.480										0.0812	0.2029	0.1677
		40	1000	0.640										0.1554	0.5426	0.4481
		50	1250	0.800										0.2841	1.1517	0.9944
		60	1500	0.960										0.4836	2.08	1.894
		75	1875	1.200										0.9295		
		100	2500	1.610										2.0495		

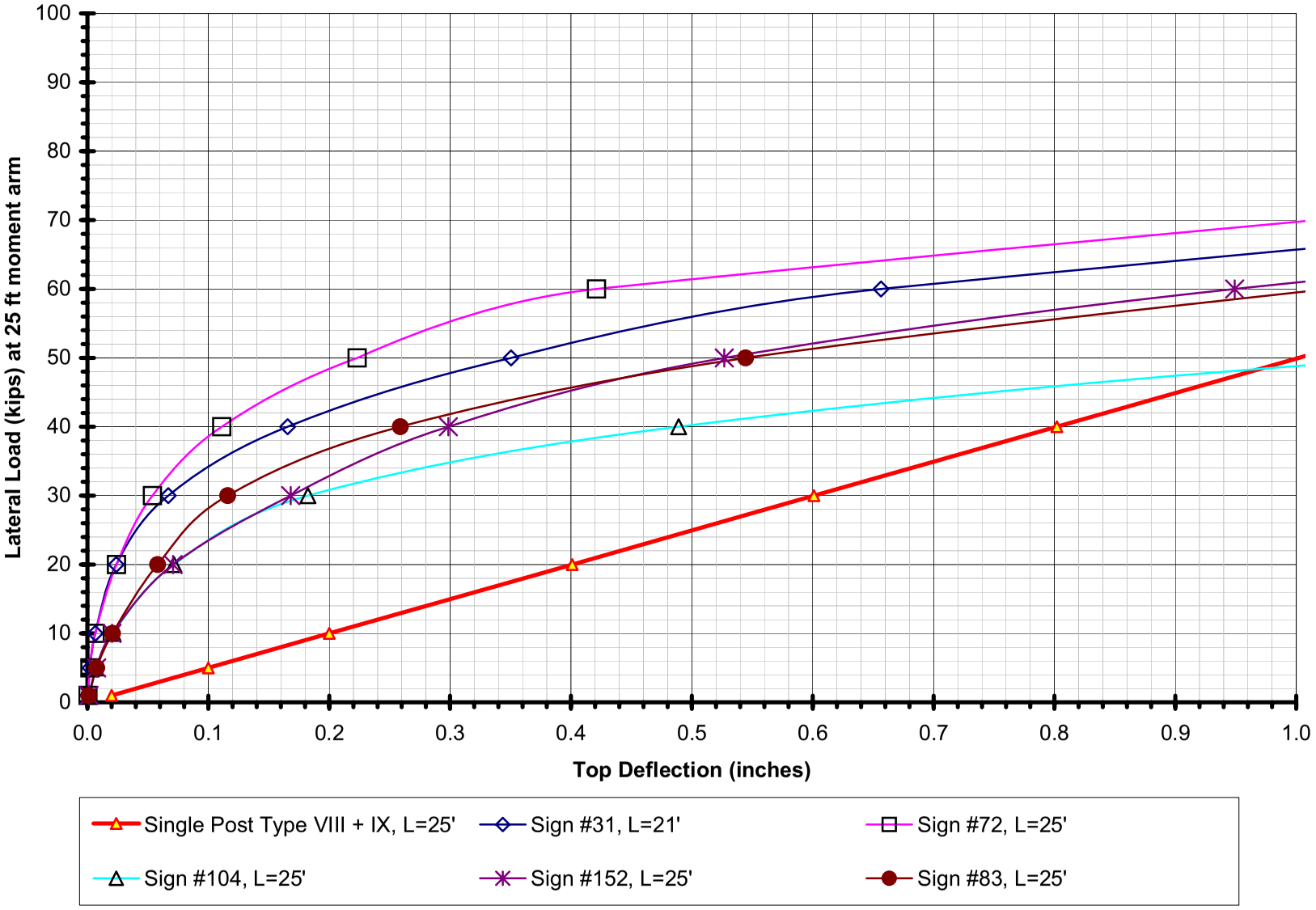
Notes: * Using LPILE Sand model with 30 degrees friction angle, unit wt. 120 pcf, K=25 pci, and level ground

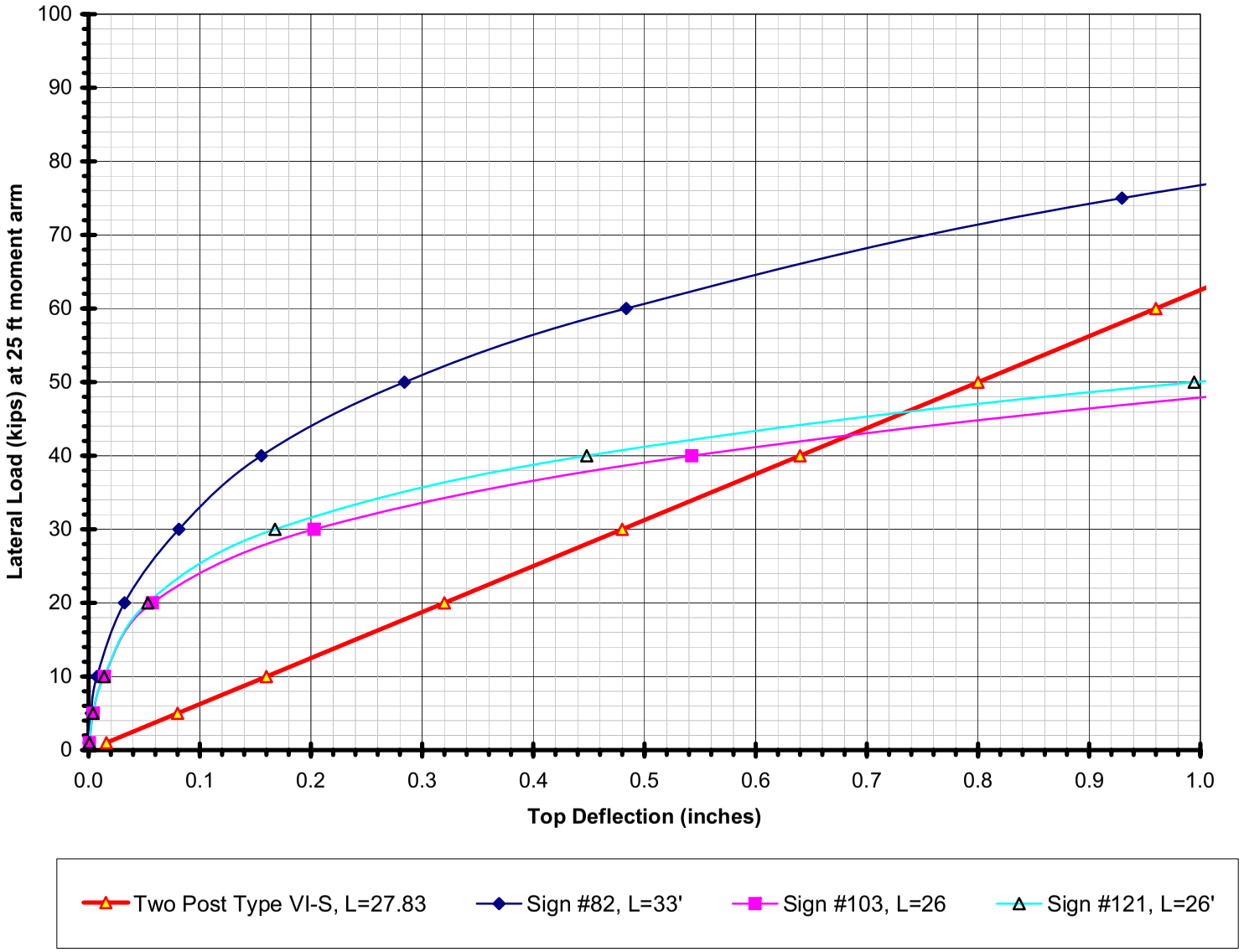
** Using LPILE and site specific soil and groundwater profile, liquefied soil layers, and sloping ground as appropriate

NOTE: Applied moment based on indicated lateral load with a moment arm of 25 feet.

Lateral Load (kips) at 25 ft moment arm
100
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Top Deflection (inches)
Single Post Type VI, L=22'
Sign #143, L=18'


Lateral Load (kips) at 25 ft moment arm
100
90
80
70
60
50
40
30
20
10
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Top Deflection (inches)
Single Post Type VII, L=23
Sign #41, L=22'
Sign #153, L=22'
Sign #161, L=22'


Lateral Load (kips) at 25 ft moment arm
100
90
80
70
60
50
40
30
20
10
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Top Deflection (inches)
Single Post Type VIII + IX, L=25'
Sign #31, L=21'
Sign #72, L=25'
Sign #104, L=25'
Sign #152, L=25'
Sign #83, L=25'


Lateral Load (kips) at 25 ft moment arm
100
90
80
70
60
50
40
30
20
10
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Top Deflection (inches)
Two Post Type VI-S, L=27.83
Sign #82, L=33'
Sign #103, L=26
Sign #121, L=26'

ANALYSIS OF SIGN #41, 103, AND 143 AND STANDARD SIGNS FOR SPECIFIC DESIGN LOADS

PARSONS

SUBJECT Overhead Sign Loads
Signs #41, #103 and #143
JOB NO.
SHEET NO. A-1 OF
MADE BY Y.M DATE 4/23/09 CHECKED BY DATE

Introduction

The purpose of the calculations is to determine the loads imparted from the sign structures #41, #103 and #143 to their respective foundations in order to verify that the soil conditions meet the standard design requirements. See attached email correspondences for details.

- Design Code

AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 4th Edition, LTS-4.

The above mentioned reference will be used in design along with Caltrans Standard Plan dated May 2006.

- Summary of Sign Foundation Loads

Sign #	Lateral Load: Actual		Lateral Load: Allowable	Moment: Actual		Moment: Allowable	Comment
41	16 K	<	35 K	553 k'	<	875 k'	(OK)
103	35 K	<	48 K	841 k'	<	1200 k'	(OK)
143	16 K	<	33 K	553 k'	<	825 k'	(OK)

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.39)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

                       (c) 1985-2007 by Ensoft, Inc.
                            All Rights Reserved

================================================================================


This program is licensed to:

Nava
Group Delta Consultants, Inc.

Path to file locations:      N:\Projects\_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign
Foundations\LPILE for Stnd Signs\
Name of input data file:     Sign #41 Fdn Depth =22 ft Actual Load.lpd
Name of output file:         Sign #41 Fdn Depth =22 ft Actual Load.lpo
Name of plot output file:    Sign #41 Fdn Depth =22 ft Actual Load.lpp
Name of runtime file:        Sign #41 Fdn Depth =22 ft Actual Load.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  April 24, 2009     Time:  15:01:05


--------------------------------------------------------------------------------
                                Problem Title
--------------------------------------------------------------------------------

Sign No. 153


--------------------------------------------------------------------------------
                                Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments           =          132
- Maximum number of iterations allowed =         100
- Deflection tolerance for convergence =   1.0000E-05 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  2


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     264.00 in

Depth of ground surface below top of pile =        .00 in

Slope angle of ground surface               =        .00 deg.

Structural properties of pile defined using  4 points

Point     Depth          Pile       Moment of       Pile       Modulus of
            X          Diameter      Inertia        Area       Elasticity
           in            in          in**4        Sq.in       lbs/Sq.in
-----  ---------   -----------   ----------   ----------   -----------
  1       0.0000   69.00000000     1890000.   4761.0000      3100000.
  2      99.0000   69.00000000     1890000.   4761.0000      3100000.
  3      99.0000   60.00000000   636000.0000  2827.0000      3100000.
  4     264.0000   60.00000000   636000.0000  2827.0000      3100000.


--------------------------------------------------------------------------------
                        Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using  8 layers

Layer  1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =         .000 in
Distance from top of pile to bottom of layer =       24.000 in
p-y subgrade modulus k for top of soil layer =      225.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =      225.000 lbs/in**3

Layer  2 is stiff clay without free water
Distance from top of pile to top of layer    =       24.000 in
Distance from top of pile to bottom of layer =      120.000 in

Layer  3 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer    =      120.000 in
Distance from top of pile to bottom of layer =      168.000 in

Layer  4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =      168.000 in
Distance from top of pile to bottom of layer =      180.000 in
p-y subgrade modulus k for top of soil layer =       20.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =       20.000 lbs/in**3

Layer  5 is liquefiable sand, by Rollins et al, 2004
Distance from top of pile to top of layer    =      180.000 in
Distance from top of pile to bottom of layer =      204.000 in

Layer  6 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer    =      204.000 in
Distance from top of pile to bottom of layer =      240.000 in

Layer  7 is liquefiable sand, by Rollins et al, 2004
Distance from top of pile to top of layer    =      240.000 in
Distance from top of pile to bottom of layer =      252.000 in

Warning : The depth of this layer is deeper than the recommended depth limit
for using the p-y criteria for liquefied sand.
Please consult the LPile Technical Manual for additional background
information regarding limitations on the use of the liquefied sand criteria.

Layer  8 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer    =      252.000 in
Distance from top of pile to bottom of layer =      264.000 in


(Depth of lowest layer extends     .00 in below pile tip)


--------------------------------------------------------------------------------
                    Effective Unit Weight of Soil vs. Depth
--------------------------------------------------------------------------------

Effective unit weight of soil with depth defined using 16 points
```

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	.00	.07200
2	24.00	.07200
3	24.00	.07200
4	120.00	.07200
5	120.00	.03300
6	168.00	.03300
7	168.00	.03300
8	180.00	.03300
9	180.00	.00000
10	204.00	.00000
11	204.00	.03300
12	240.00	.03300
13	240.00	.03300
14	252.00	.03300
15	252.00	.03300
16	264.00	.03300

**** WARNING - POSSIBLE INPUT DATA ERROR ****

Values entered for effective unit weights of soil were outside
the limits of 0.011574 pci (20 pcf) or 0.0810019 pci (140 pcf)
This data may be erroneous. Please check your data.

Shear Strength of Soils

Shear strength parameters with depth defined using 16 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	.000	.00000	35.00	------	------
2	24.000	.00000	35.00	------	------
3	24.000	12.50000	.00	------	------
4	120.000	12.50000	.00	------	------
5	120.000	2.77778	.00	------	------
6	168.000	2.77778	.00	------	------
7	168.000	.00000	30.00	------	------
8	180.000	.00000	30.00	------	------
9	180.000	.00000	.00	------	------
10	204.000	.00000	.00	------	------
11	204.000	5.55556	.00	------	------
12	240.000	5.55556	.00	------	------
13	240.000	.00000	.00	------	------
14	252.000	.00000	.00	------	------
15	252.000	5.55556	.00	------	------
16	264.000	5.55556	.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head   =   16000.000 lbs
Bending moment at pile head =   6636000.000 in-lbs
Axial load at pile head   =   14500.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head
may rotate under the applied pile-head loading, but is not a free-head
(zero moment) condition.

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head =   16000.000 lbs
Specified moment at pile head   =   6636000.000 in-lbs
Specified axial load at pile head   =   14500.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under
the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	.199374	6636000.	16000.0000	-.0018995	124.1789	0.0000	0.0000
4.000	.191786	6699923.	15812.4582	-.0018949	125.3458	-94.1600	981.9294
8.000	.184215	6762337.	15242.7088	-.0018903	126.4851	-190.9942	2073.6001
12.000	.176663	6821693.	14281.8089	-.0018857	127.5685	-289.6254	3278.8444
16.000	.169130	6876413.	12924.3295	-.0018810	128.5674	-389.1740	4602.0777
20.000	.161615	6924907.	11168.3637	-.0018763	129.4526	-488.7581	6048.4236
24.000	.154119	6965581.	8809.8436	-.0018716	130.1951	-793.1875	10293.1609
28.000	.146643	6994576.	5630.0341	-.0018668	130.7243	-796.6329	10864.9560
32.000	.139185	7010825.	2437.8291	-.0018620	131.0210	-799.3791	11486.5675
36.000	.131747	7014285.	-763.8710	-.0018572	131.0841	-801.3733	12165.3759
40.000	.124327	7004923.	-3971.9381	-.0018524	130.9132	-802.5545	12910.3541
44.000	.116927	6982721.	-7182.9826	-.0018477	130.5080	-802.8525	13732.5318
48.000	.109546	6947675.	-10393.3104	-.0018429	129.8682	-802.1851	14645.6328
52.000	.102184	6899794.	-13598.8707	-.0018382	128.9942	-800.4556	15666.9702
56.000	.094841	6839106.	-16795.1895	-.0018335	127.8864	-797.5486	16818.7284
60.000	.087516	6765659.	-19977.2855	-.0018288	126.5457	-793.3250	18129.8461
64.000	.080210	6679520.	-23139.5598	-.0018243	124.9733	-787.6141	19638.8591
68.000	.072922	6580780.	-26275.6497	-.0018197	123.1709	-780.2030	21398.3347
72.000	.065652	6469559.	-29378.2298	-.0018153	121.1407	-770.8209	23482.0586
76.000	.058400	6346007.	-32438.7332	-.0018109	118.8854	-759.1140	25997.2228
80.000	.051165	6210311.	-35446.9460	-.0018066	116.4084	-744.6063	29106.2686
84.000	.043947	6062705.	-38390.3931	-.0018024	113.7140	-726.6321	33068.8120
88.000	.036745	5903478.	-41253.3520	-.0017983	110.8075	-704.2129	38329.4847
92.000	.029560	5732988.	-44015.1527	-.0017944	107.6954	-675.8097	45724.7467
96.000	.022390	5551694.	-46646.9290	-.0017905	104.3860	-638.7571	57056.7331
100.000	.015236	5360193.	-49057.4964	-.0017850	257.9684	-540.7900	70989.6743
104.000	.008117	5159865.	-51085.3712	-.0017743	248.5190	-468.3302	115390.
108.000	.001041	4952119.	-52625.9798	-.0017640	238.7196	-255.2202	490388.
112.000	-.005995	4742116.	-51725.5480	-.0017542	228.8138	445.6214	148654.
116.000	-.012993	4539111.	-49725.6254	-.0017448	219.2381	547.7930	84319.7540
120.000	-.019954	4344841.	-47656.6674	-.0017358	210.0744	351.0202	35182.5755
124.000	-.026880	4156191.	-46944.7595	-.0017272	201.1759	124.4653	9260.8384
128.000	-.033772	3969531.	-46423.8651	-.0017189	192.3712	135.8158	8043.1227
132.000	-.040632	3785043.	-45859.8889	-.0017111	183.6689	146.0577	7189.3514
136.000	-.047461	3602890.	-45256.5805	-.0017036	175.0768	155.5126	6553.3168
140.000	-.054261	3423224.	-44616.6679	-.0016964	166.6020	164.3797	6058.9041
144.000	-.061033	3246188.	-43942.2245	-.0016897	158.2512	172.7917	5662.2781
148.000	-.067778	3071916.	-43234.8767	-.0016833	150.0308	180.8417	5336.2739
152.000	-.074499	2900536.	-42495.9317	-.0016772	141.9468	188.5976	5063.0914
156.000	-.081196	2732173.	-41726.4593	-.0016715	134.0052	196.1109	4830.5434
160.000	-.087871	2566948.	-40927.3484	-.0016661	126.2115	203.4212	4629.9833
164.000	-.094525	2404976.	-40099.3466	-.0016611	118.5714	210.5599	4455.0943
168.000	-.101160	2246374.	-39163.6964	-.0016564	111.0901	296.9441	5870.7719

172.000	-.107777	2092246.	-37920.0836	-.0016520	103.8200	324.9881	6030.7719
176.000	-.114376	1943319.	-36562.2826	-.0016479	96.7951	354.0381	6190.7719
180.000	-.120960	1800057.	-35382.9063	-.0016441	90.0375	87.4574	1446.0573
184.000	-.127529	1659332.	-35021.7695	-.0016406	83.3995	93.1164	1460.3189
188.000	-.134085	1520096.	-34637.9110	-.0016373	76.8318	98.8181	1473.9667
192.000	-.140628	1382441.	-34231.1634	-.0016344	70.3386	104.5608	1487.0572
196.000	-.147160	1246459.	-33801.3649	-.0016317	63.9244	110.3434	1499.6395
200.000	-.153682	1112243.	-33348.3582	-.0016293	57.5934	116.1647	1511.7565
204.000	-.160195	979885.	-32471.2015	-.0016272	51.3501	522.8125	6527.2118
208.000	-.166700	854300.	-30356.8170	-.0016253	45.4263	534.3705	6411.1748
212.000	-.173198	737265.	-28196.3409	-.0016237	39.9058	545.8594	6303.3074
216.000	-.179690	628964.	-25990.0337	-.0016223	34.7972	557.2871	6202.7679
220.000	-.186177	529579.	-23738.1251	-.0016212	30.1092	568.6609	6108.8283
224.000	-.192659	439292.	-21440.8179	-.0016202	25.8504	579.9872	6020.8557
228.000	-.199138	358285.	-19098.2906	-.0016194	22.0294	591.2716	5938.2971
232.000	-.205615	286739.	-16710.7000	-.0016187	18.6545	602.5194	5860.6678
236.000	-.212088	224832.	-14278.1834	-.0016182	15.7344	613.7351	5787.5402
240.000	-.218560	172746.	-12149.8690	-.0016178	13.2775	275.9148	2524.8375
244.000	-.225031	126493.	-11000.2289	-.0016175	11.0958	299.0787	2658.1112
248.000	-.231501	85026.9409	-9755.1138	-.0016173	9.1398	323.6597	2796.1894
252.000	-.237969	48740.9244	-8100.0999	-.0016172	7.4282	658.3535	5533.0935
256.000	-.244438	21723.3719	-5444.4633	-.0016171	6.1538	669.4630	5477.5718
260.000	-.250906	5417.2125	-2744.4146	-.0016171	5.3846	680.5599	5424.8158
264.000	-.257374	0.0000	0.0000	-.0016171	5.1291	691.6463	2687.3156

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.19937442 in
Computed slope at pile head	=	-.00189947
Maximum bending moment	=	7014285. lbs-in
Maximum shear force	=	-52625.97984 lbs
Depth of maximum bending moment	=	36.00000000 in
Depth of maximum shear force	=	108.00000 in
Number of iterations	=	26
Number of zero deflection points	=	1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 16000.	M= 6.64E+06	14500.0000	.1993744	7014285.	-52625.9798

The analysis ended normally.

Summary of Warning Messages

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.39)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

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================================================================================


This program is licensed to:

Nava
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Path to file locations:      N:\Projects\_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign
Foundations\LPILE for Stnd Signs\
Name of input data file:     Sign Fdn Depth =23 ft_Actual Load.lpd
Name of output file:         Sign Fdn Depth =23 ft_Actual Load.lpo
Name of plot output file:    Sign Fdn Depth =23 ft_Actual Load.lpp
Name of runtime file:        Sign Fdn Depth =23 ft_Actual Load.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  April 24, 2009     Time:  15:06:06


--------------------------------------------------------------------------------
                                Problem Title
--------------------------------------------------------------------------------

Sign No. 153


--------------------------------------------------------------------------------
                                Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments            =          138
- Maximum number of iterations allowed =          100
- Deflection tolerance for convergence =   1.0000E-05 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  2


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     276.00 in

Depth of ground surface below top of pile =        .00 in

Slope angle of ground surface               =        .00 deg.

Structural properties of pile defined using  4 points

Point     Depth          Pile       Moment of        Pile       Modulus of
            X          Diameter      Inertia         Area       Elasticity
           in            in          in**4         Sq.in       lbs/Sq.in
-----  ---------   -----------   -----------   -----------   -----------
  1       0.0000   69.00000000     1890000.    4761.0000      3100000.
  2      99.0000   69.00000000     1890000.    4761.0000      3100000.
  3      99.0000   60.00000000   636000.0000   2827.0000      3100000.
  4     276.0000   60.00000000   636000.0000   2827.0000      3100000.


--------------------------------------------------------------------------------
                        Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using  1 layers

Layer  1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =          .000 in
Distance from top of pile to bottom of layer =      276.000 in
p-y subgrade modulus k for top of soil layer =       25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =       25.000 lbs/in**3


(Depth of lowest layer extends     .00 in below pile tip)


--------------------------------------------------------------------------------
                      Effective Unit Weight of Soil vs. Depth
--------------------------------------------------------------------------------

Effective unit weight of soil with depth defined using  2 points

Point        Depth X    Eff. Unit Weight
 No.           in          lbs/in**3
-----      ----------   ---------------
  1             .00          .06944
  2          276.00          .06944



--------------------------------------------------------------------------------
                              Shear Strength of Soils
--------------------------------------------------------------------------------

Shear strength parameters with depth defined using  2 points

Point    Depth X     Cohesion c     Angle of Friction     E50 or      RQD
 No.       in         lbs/in**2           Deg.            k_rm         %
-----   --------     ----------     -----------------    ------    ------
  1        .000         .00000           30.00           ------    ------
  2     276.000         .00000           30.00           ------    ------

Notes:

(1)  Cohesion = uniaxial compressive strength for rock materials.
(2)  Values of E50 are reported for clay strata.
(3)  Default values will be generated for E50 when input values are 0.
(4)  RQD and k_rm are reported only for weak rock strata.



--------------------------------------------------------------------------------
                                   Loading Type
--------------------------------------------------------------------------------

Static loading criteria was used for computation of p-y curves.
```

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 16000.000 lbs
Bending moment at pile head = 6636000.000 in-lbs
Axial load at pile head = 14500.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 16000.000 lbs
Specified moment at pile head = 6636000.000 in-lbs
Specified axial load at pile head = 14500.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	.476869	6636000.	16000.0000	-.0026675	124.1789	0.0000	0.0000
4.000	.466208	6700060.	15906.2257	-.0026630	125.3483	-46.6208	200.0000
8.000	.455565	6763377.	15630.2265	-.0026584	126.5040	-91.1130	400.0000
12.000	.444941	6825237.	15180.5060	-.0026538	127.6332	-133.4823	600.0000
16.000	.434335	6884963.	14565.5446	-.0026491	128.7235	-173.7341	800.0000
20.000	.423748	6941912.	13793.8008	-.0026444	129.7630	-211.8742	1000.0000
24.000	.413180	6995472.	12873.7103	-.0026396	130.7407	-247.9083	1200.0000
28.000	.402632	7045068.	11813.6849	-.0026348	131.6460	-281.8422	1400.0000
32.000	.392102	7090156.	10622.1145	-.0026300	132.4691	-313.6817	1600.0000
36.000	.381592	7130226.	9307.3643	-.0026251	133.2005	-343.4327	1800.0000
40.000	.371101	7164804.	7877.7767	-.0026202	133.8317	-371.1012	2000.0000
44.000	.360630	7193446.	6341.6698	-.0026153	134.3545	-396.6930	2200.0000
48.000	.350178	7215743.	4707.3386	-.0026104	134.7615	-420.2142	2400.0000
52.000	.339747	7231318.	2983.0536	-.0026055	135.0458	-441.6706	2600.0000
56.000	.329335	7239828.	1177.0616	-.0026005	135.2012	-461.0684	2800.0000
60.000	.318942	7240962.	-702.4145	-.0025956	135.2219	-478.4134	3000.0000
64.000	.308570	7234444.	-2647.1752	-.0025907	135.1029	-493.7116	3200.0000
68.000	.298217	7220028.	-4649.0454	-.0025857	134.8397	-506.9688	3400.0000
72.000	.287884	7197503.	-6699.8731	-.0025808	134.4286	-518.1910	3600.0000
76.000	.277570	7166688.	-8791.5295	-.0025759	133.8661	-527.3839	3800.0000
80.000	.267277	7127437.	-10915.9091	-.0025710	133.1496	-534.5533	4000.0000
84.000	.257002	7079634.	-13064.9289	-.0025662	132.2770	-539.7048	4200.0000
88.000	.246747	7023198.	-15230.5285	-.0025614	131.2468	-542.8439	4400.0000
92.000	.236511	6958079.	-17404.6696	-.0025566	130.0581	-543.9761	4600.0000
96.000	.226294	6884257.	-19579.3351	-.0025519	128.7106	-543.1068	4800.0000
100.000	.216096	6801747.	-21746.5292	-.0025449	325.9662	-540.2410	5000.0000
104.000	.205944	6710595.	-23898.3945	-.0025312	321.6666	-535.4553	5200.0000
108.000	.195847	6610877.	-26027.3462	-.0025177	316.9629	-528.7861	5400.0000
112.000	.185803	6502699.	-28125.8791	-.0025044	311.8602	-520.2476	5600.0000
116.000	.175811	6386198.	-30186.5432	-.0024913	306.3649	-509.8533	5800.0000
120.000	.165872	6261541.	-32201.9414	-.0024785	300.4848	-497.6162	6000.0000
124.000	.155983	6128923.	-34164.7276	-.0024659	294.2292	-483.5488	6200.0000
128.000	.146145	5988569.	-36067.6041	-.0024536	287.6088	-467.6628	6400.0000
132.000	.136354	5840734.	-37903.3191	-.0024416	280.6354	-449.9694	6600.0000
136.000	.126611	5685700.	-39664.6640	-.0024299	273.3225	-430.4791	6800.0000
140.000	.116915	5523780.	-41344.4712	-.0024185	265.6848	-409.2017	7000.0000
144.000	.107263	5355313.	-42935.6106	-.0024075	257.7382	-386.1463	7200.0000
148.000	.097654	5180670.	-44430.9872	-.0023968	249.5003	-361.3213	7400.0000
152.000	.088088	5000246.	-45823.5382	-.0023865	240.9898	-334.7344	7600.0000
156.000	.078562	4814468.	-47106.2298	-.0023765	232.2267	-306.3924	7800.0000
160.000	.069075	4623789.	-48272.0543	-.0023670	223.2324	-276.3016	8000.0000
164.000	.059626	4428690.	-49314.0271	-.0023578	214.0296	-244.4672	8200.0000
168.000	.050213	4229681.	-50225.1835	-.0023490	204.6424	-210.8939	8400.0000
172.000	.040834	4027299.	-50998.5758	-.0023406	195.0960	-175.5856	8600.0000
176.000	.031488	3822109.	-51627.2700	-.0023326	185.4173	-138.5452	8800.0000
180.000	.022172	3614703.	-52104.3429	-.0023251	175.6340	-99.7752	9000.0000
184.000	.012886	3405702.	-52422.8791	-.0023180	165.7754	-59.2770	9200.0000
188.000	.003628	3195754.	-52575.9679	-.0023113	155.8722	-17.0515	9400.0000
192.000	-.005604	2985535.	-52556.7005	-.0023050	145.9562	26.9011	9600.0000
196.000	-.014813	2775747.	-52358.1673	-.0022992	136.0606	72.5815	9800.0000
200.000	-.023998	2567123.	-51973.4548	-.0022938	126.2198	119.9909	10000.0000
204.000	-.033163	2360419.	-51395.6436	-.0022888	116.4696	169.1312	10200.0000
208.000	-.042309	2156423.	-50617.8052	-.0022842	106.8472	220.0048	10400.0000
212.000	-.051437	1955948.	-49633.0005	-.0022800	97.3908	272.6148	10600.0000
216.000	-.060549	1759837.	-48434.2770	-.0022762	88.1403	326.9647	10800.0000
220.000	-.069647	1568959.	-47014.6672	-.0022729	79.1366	383.0585	11000.0000
224.000	-.078732	1384212.	-45367.1869	-.0022699	70.4221	440.9005	11200.0000
228.000	-.087806	1206520.	-43484.8336	-.0022672	62.0404	500.4956	11400.0000
232.000	-.096870	1036838.	-41360.5853	-.0022650	54.0366	561.8486	11600.0000
236.000	-.105926	876147.	-38987.3999	-.0022630	46.4568	624.9648	11800.0000
240.000	-.114975	725457.	-36358.2141	-.0022614	39.3488	689.8495	12000.0000
244.000	-.124018	585807.	-33465.9432	-.0022601	32.7615	756.5080	12200.0000
248.000	-.133056	458262.	-30303.4817	-.0022590	26.7452	824.9455	12400.0000
252.000	-.142090	343918.	-26863.7032	-.0022582	21.3517	895.1671	12600.0000
256.000	-.151122	243899.	-23139.4613	-.0022576	16.6338	967.1777	12800.0000
260.000	-.160151	159356.	-19123.5914	-.0022572	12.6459	1040.9817	13000.0000
264.000	-.169179	91470.5920	-14808.9118	-.0022569	9.4438	1116.5830	13200.0000
268.000	-.178207	41452.4098	-10188.2265	-.0022568	7.0844	1193.9849	13400.0000
272.000	-.187234	10539.7838	-5254.3280	-.0022568	5.6263	1273.1899	13600.0000
276.000	-.196261	0.0000	0.0000	-.0022568	5.1291	1354.1997	6900.0000

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = .47686904 in
Computed slope at pile head = -.00266754
Maximum bending moment = 7241335. lbs-in
Maximum shear force = -52588.31051 lbs
Depth of maximum bending moment = 58.00000000 in
Depth of maximum shear force = 190.00000 in
Number of iterations = 5
Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 16000.	M= 6.64E+06	14500.0000	.4768690	7241335.	-52588.3105

The analysis ended normally.

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.39)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

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================================================================================


This program is licensed to:

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Path to file locations:      N:\Projects\_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign
Foundations\LPILE for Stnd Signs\
Name of input data file:     Sign #103 Fdn Depth =26 ft_Actual Load.lpd
Name of output file:         Sign #103 Fdn Depth =26 ft_Actual Load.lpo
Name of plot output file:    Sign #103 Fdn Depth =26 ft_Actual Load.lpp
Name of runtime file:        Sign #103 Fdn Depth =26 ft_Actual Load.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  April 24, 2009     Time:  15:07:25


--------------------------------------------------------------------------------
                                Problem Title
--------------------------------------------------------------------------------

Sign No. 153


--------------------------------------------------------------------------------
                                Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments            =          156
- Maximum number of iterations allowed =          100
- Deflection tolerance for convergence =   1.0000E-05 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  2


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     312.00 in

Depth of ground surface below top of pile =        .00 in

Slope angle of ground surface               =      26.60 deg.

Structural properties of pile defined using  4 points

Point     Depth          Pile       Moment of        Pile      Modulus of
            X          Diameter      Inertia         Area      Elasticity
           in             in          in**4         Sq.in      lbs/Sq.in
-----  ---------   -----------   ----------   ----------   -----------
  1       0.0000   70.00000000     2000833.    4900.0000      3100000.
  2      99.0000   70.00000000     2000833.    4900.0000      3100000.
  3      99.0000   60.00000000   636000.0000   2827.0000      3100000.
  4     312.0000   60.00000000   636000.0000   2827.0000      3100000.


--------------------------------------------------------------------------------
                        Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using  5 layers

Layer  1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =         .000 in
Distance from top of pile to bottom of layer =       24.000 in
p-y subgrade modulus k for top of soil layer =      225.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =      225.000 lbs/in**3

Layer  2 is stiff clay without free water
Distance from top of pile to top of layer    =       24.000 in
Distance from top of pile to bottom of layer =       60.000 in

Layer  3 is stiff clay without free water
Distance from top of pile to top of layer    =       60.000 in
Distance from top of pile to bottom of layer =       96.000 in

Layer  4 is stiff clay without free water
Distance from top of pile to top of layer    =       96.000 in
Distance from top of pile to bottom of layer =      288.000 in

Layer  5 is liquefiable sand, by Rollins et al, 2004
Distance from top of pile to top of layer    =      288.000 in
Distance from top of pile to bottom of layer =      312.000 in

Warning : The depth of this layer is deeper than the recommended depth limit
for using the p-y criteria for liquefied sand.
Please consult the LPile Technical Manual for additional background
information regarding limitations on the use of the liquefied sand criteria.


(Depth of lowest layer extends     .00 in below pile tip)


--------------------------------------------------------------------------------
                    Effective Unit Weight of Soil vs. Depth
--------------------------------------------------------------------------------

Effective unit weight of soil with depth defined using 10 points

Point        Depth X    Eff. Unit Weight
 No.           in          lbs/in**3
-----      ----------   ---------------
  1             .00          .07200
  2           24.00          .07200
  3           24.00          .07200
  4           60.00          .07200
  5           60.00          .07200
  6           96.00          .07200
  7           96.00          .03300
  8          288.00          .03300
  9          288.00          .00000
 10          312.00          .00000
```

**** WARNING - POSSIBLE INPUT DATA ERROR ****

Values entered for effective unit weights of soil were outside
the limits of 0.011574 pci (20 pcf) or 0.0810019 pci (140 pcf)
This data may be erroneous. Please check your data.

Shear Strength of Soils

Shear strength parameters with depth defined using 10 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	.000	.00000	35.00	------	------
2	24.000	.00000	35.00	------	------
3	24.000	20.83333	.00	------	------
4	60.000	20.83333	.00	------	------
5	60.000	8.33333	.00	------	------
6	96.000	8.33333	.00	------	------
7	96.000	10.41667	.00	------	------
8	288.000	10.41667	.00	------	------
9	288.000	.00000	.00	------	------
10	312.000	.00000	.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head   =   35000.000 lbs
Bending moment at pile head =   10092000.000 in-lbs
Axial load at pile head   =   14500.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head
may rotate under the applied pile-head loading, but is not a free-head
(zero moment) condition.

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head =   35000.000 lbs
Specified moment at pile head   =   10092000.000 in-lbs
Specified axial load at pile head   =   14500.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under
the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	.317563	1.0092E+07	35000.0000	-.0017410	179.4956	0.0000	0.0000
4.000	.310613	1.0232E+07	34906.4067	-.0017344	181.9447	-46.9818	302.5107
8.000	.303688	1.0371E+07	34622.1464	-.0017278	184.3807	-95.2964	627.5934
12.000	.296791	1.0509E+07	34142.4806	-.0017210	186.7899	-144.6478	974.7466
16.000	.289920	1.0644E+07	33463.8495	-.0017142	189.1586	-194.7423	1343.4207
20.000	.283077	1.0777E+07	32583.8653	-.0017073	191.4729	-245.2881	1733.0137
24.000	.276262	1.0905E+07	30698.7272	-.0017003	193.7184	-1098.5705	7953.1150
28.000	.269475	1.1019E+07	26287.3031	-.0016932	195.7141	-1107.1053	8216.7708
32.000	.262716	1.1116E+07	21842.3273	-.0016861	197.3999	-1115.3452	8490.8876
36.000	.255986	1.1194E+07	17364.9960	-.0016789	198.7736	-1123.2820	8776.1290
40.000	.249285	1.1255E+07	12856.5391	-.0016717	199.8329	-1130.9068	9073.2190
44.000	.242612	1.1297E+07	8318.2237	-.0016644	200.5756	-1138.2101	9382.9491
48.000	.235969	1.1321E+07	3751.3561	-.0016571	200.9998	-1145.1816	9706.1867
52.000	.229356	1.1327E+07	-842.7155	-.0016498	201.1035	-1151.8107	10043.8848
56.000	.222771	1.1315E+07	-5462.5979	-.0016425	200.8848	-1158.0855	10397.0929
60.000	.216216	1.1284E+07	-9767.0882	-.0016352	200.3420	-824.2324	7624.1711
64.000	.209689	1.1240E+07	-11949.9070	-.0016279	199.5709	-454.3328	4333.3899
68.000	.203192	1.1188E+07	-13775.8245	-.0016207	198.6727	-458.6019	4513.9765
72.000	.196724	1.1130E+07	-15618.4282	-.0016135	197.6461	-462.6749	4703.8084
76.000	.190284	1.1064E+07	-17476.9179	-.0016064	196.4900	-466.5439	4903.6644
80.000	.183873	1.0990E+07	-19350.4611	-.0015993	195.2033	-470.2006	5114.4175
84.000	.177490	1.0909E+07	-21238.1904	-.0015922	193.7851	-473.6358	5337.0497
88.000	.171135	1.0820E+07	-23139.1999	-.0015852	192.2342	-476.8395	5572.6699
92.000	.164808	1.0724E+07	-25052.5425	-.0015782	190.5499	-479.8008	5822.5359
96.000	.158509	1.0620E+07	-27033.0331	-.0015714	188.7313	-538.3159	6792.2418
100.000	.152237	1.0507E+07	-29289.3378	-.0015609	500.7621	-537.8457	7065.8855
104.000	.146036	1.0386E+07	-31442.1143	-.0015397	495.0370	-538.5103	7375.0254
108.000	.139919	1.0256E+07	-33597.0290	-.0015188	488.9055	-538.9141	7703.2089
112.000	.133886	1.0117E+07	-35753.0248	-.0014981	482.3672	-539.0498	8052.3840
116.000	.127934	9970209.	-37909.0123	-.0014777	475.4220	-538.9088	8424.7761
120.000	.122064	9814347.	-40063.8639	-.0014577	468.0700	-538.4804	8822.9427
124.000	.116273	9649869.	-42216.4056	-.0014379	460.3116	-537.7521	9249.8419
128.000	.110560	9476786.	-44365.4091	-.0014185	452.1473	-536.7093	9708.9177
132.000	.104924	9295115.	-46509.5827	-.0013995	443.5779	-535.3349	10204.2086
136.000	.099364	9104878.	-48647.5608	-.0013808	434.6045	-533.6089	10740.4864
140.000	.093878	8906103.	-50777.8921	-.0013625	425.2283	-531.5084	11323.4357
144.000	.088463	8698822.	-52899.0256	-.0013447	415.4509	-529.0064	11959.8903
148.000	.083120	8483077.	-55009.2940	-.0013272	405.2743	-526.0716	12658.1465
152.000	.077845	8258915.	-57106.8938	-.0013102	394.7006	-522.6671	13428.3872
156.000	.072637	8026389.	-59189.8614	-.0012937	383.7324	-518.7495	14283.2638
160.000	.067495	7785562.	-61256.0427	-.0012777	372.3726	-514.2669	15238.7103
164.000	.062415	7536508.	-63303.0560	-.0012621	360.6248	-509.1570	16315.1076
168.000	.057397	7279306.	-65328.2443	-.0012471	348.4926	-503.3439	17538.9876
172.000	.052438	7014051.	-67328.6133	-.0012326	335.9806	-496.7343	18945.5980
176.000	.047536	6740849.	-69300.7492	-.0012187	323.0937	-489.2110	20582.8874
180.000	.042688	6459819.	-71240.7076	-.0012053	309.8375	-480.6243	22517.9340
184.000	.037893	6171099.	-73143.8570	-.0011925	296.2187	-470.7785	24847.7861
188.000	.033148	5874848.	-75004.6538	-.0011802	282.2446	-459.4096	27718.7580
192.000	.028451	5571248.	-76816.3011	-.0011686	267.9238	-446.1489	31363.1424
196.000	.023798	5260511.	-78570.2048	-.0011576	253.2664	-430.4555	36175.2634
200.000	.019189	4942890.	-80255.0438	-.0011473	238.2843	-411.4832	42887.7814
204.000	.014619	4618688.	-81855.0132	-.0011376	222.9918	-387.7805	53049.9912
208.000	.010088	4288289.	-83345.9920	-.0011285	207.4069	-356.4749	70676.4204
212.000	.005590	3952200.	-84684.8271	-.0011202	191.5537	-310.2004	110976.
216.000	.001125	3611188.	-85743.0373	-.0011125	175.4682	-199.6752	354866.
220.000	-.003310	3269371.	-84331.6708	-.0011055	159.3447	666.4346	402633.
224.000	-.007720	2937803.	-81327.1581	-.0010992	143.7047	823.5636	213370.
228.000	-.012105	2619359.	-77828.5001	-.0010936	128.6838	921.5995	152268.
232.000	-.016469	2315638.	-73990.3022	-.0010886	114.3573	995.3366	120874.
236.000	-.020814	2027827.	-69886.2497	-.0010842	100.7813	1055.3447	101406.
240.000	-.025143	1756894.	-65560.9241	-.0010804	88.0015	1106.3925	88007.4124
244.000	-.029458	1503656.	-61044.6250	-.0010771	76.0563	1151.0771	78151.1127
248.000	-.033760	1268830.	-56359.4584	-.0010742	64.9796	1190.9835	70555.7323
252.000	-.038052	1053057.	-51522.3479	-.0010719	54.8016	1227.1562	64498.6983
256.000	-.042336	856914.	-46546.7121	-.0010700	45.5496	1260.3227	59539.6015
260.000	-.046612	680934.	-41443.4785	-.0010684	37.2487	1291.0117	55393.8052
264.000	-.050883	525609.	-36221.7360	-.0010672	29.9220	1319.6204	51868.6871
268.000	-.055150	391395.	-30889.1752	-.0010662	23.5911	1346.4546	48828.9651
272.000	-.059413	278723.	-25452.3972	-.0010656	18.2764	1371.7558	46176.6787

```
 276.000  -.063675     187998. -19917.1376   -.0010651     13.9969   1395.7172  43839.0496
 280.000  -.067934     119603. -14288.4324   -.0010648     10.7708   1418.4964  41760.8159
 284.000  -.072193   73902.9676  -8570.7445   -.0010646      8.6151   1440.2233  39899.2203
 288.000  -.076451   51245.5325  -4085.3516   -.0010645      7.5464    143.7161   3759.6845
 292.000  -.080709   36133.1172  -3492.9509   -.0010644      6.8335    152.4897   3778.7579
 296.000  -.084966   23460.5748  -2865.3702   -.0010643      6.2357    161.3059   3796.9388
 300.000  -.089224   13368.9650  -2202.4423   -.0010643      5.7597    170.1631   3814.3111
 304.000  -.093481    6000.0026  -1504.0065   -.0010643      5.4121    179.0596   3830.9470
 308.000  -.097738    1496.0313   -769.9085   -.0010643      5.1997    187.9940   3846.9095
 312.000  -.101995       0.0000      0.0000   -.0010643      5.1291    196.9647   1931.1268

Output Verification:

Computed forces and moments are within specified convergence limits.


Output Summary for Load Case No.  1:

Pile-head deflection             =      .31756336 in
Computed slope at pile head      =     -.00174096
Maximum bending moment           =      11327250. lbs-in
Maximum shear force              =   -85743.03731 lbs
Depth of maximum bending moment  =    52.00000000 in
Depth of maximum shear force     =      216.00000 in
Number of iterations             =             35
Number of zero deflection points =              1




--------------------------------------------------------------------------------
                          Summary of Pile Response(s)
--------------------------------------------------------------------------------

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment,          y = pile-head displacment in
Type 2 = Shear and Slope,           M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness,  V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment,     S = Pile-head Slope, radians
Type 5 = Deflection and Slope,      R = Rot. Stiffness of Pile-head in-lbs/rad

Load  Pile-Head    Pile-Head       Axial    Pile-Head    Maximum     Maximum
Type  Condition    Condition       Load     Deflection    Moment      Shear
         1            2            lbs         in        in-lbs       lbs
---- ------------ ------------ ---------- ---------- ---------- ----------
  1  V=    35000. M=  1.01E+07  14500.0000    .3175634  1.1327E+07 -85743.0373

The analysis ended normally.



--------------------------------------------------------------------------------
                          Summary of Warning Messages
--------------------------------------------------------------------------------
```

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.39)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

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================================================================================


This program is licensed to:

Nava
Group Delta Consultants, Inc.

Path to file locations:      N:\Projects\_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign
Foundations\LPILE for Stnd Signs\
Name of input data file:     Sign Fdn Depth =27 ft 10 in_Actual Load.lpd
Name of output file:         Sign Fdn Depth =27 ft 10 in_Actual Load.lpo
Name of plot output file:    Sign Fdn Depth =27 ft 10 in_Actual Load.lpp
Name of runtime file:        Sign Fdn Depth =27 ft 10 in_Actual Load.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  April 24, 2009     Time:  15:08:45


--------------------------------------------------------------------------------
                                Problem Title
--------------------------------------------------------------------------------

Sign No. 153


--------------------------------------------------------------------------------
                                Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments            =          167
- Maximum number of iterations allowed =          100
- Deflection tolerance for convergence =   1.0000E-05 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  2


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     334.00 in

Depth of ground surface below top of pile =        .00 in

Slope angle of ground surface               =        .00 deg.

Structural properties of pile defined using  4 points

Point     Depth          Pile       Moment of        Pile      Modulus of
            X          Diameter      Inertia        Area       Elasticity
           in            in          in**4        Sq.in       lbs/Sq.in
-----  ---------   -----------   ----------   ----------   -----------
  1       0.0000   70.00000000     2000833.    4900.0000      3100000.
  2      99.0000   70.00000000     2000833.    4900.0000      3100000.
  3      99.0000   60.00000000   636000.0000   2827.0000      3100000.
  4     334.0000   60.00000000   636000.0000   2827.0000      3100000.


--------------------------------------------------------------------------------
                        Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using  1 layers

Layer  1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =          .000 in
Distance from top of pile to bottom of layer =      334.000 in
p-y subgrade modulus k for top of soil layer =       25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =       25.000 lbs/in**3


(Depth of lowest layer extends     .00 in below pile tip)


--------------------------------------------------------------------------------
                      Effective Unit Weight of Soil vs. Depth
--------------------------------------------------------------------------------

Effective unit weight of soil with depth defined using  2 points

Point        Depth X    Eff. Unit Weight
 No.           in          lbs/in**3
-----      ----------   ---------------
  1             .00          .06944
  2          334.00          .06944


--------------------------------------------------------------------------------
                              Shear Strength of Soils
--------------------------------------------------------------------------------

Shear strength parameters with depth defined using  2 points

Point    Depth X     Cohesion c     Angle of Friction     E50 or      RQD
 No.       in         lbs/in**2           Deg.            k_rm         %
-----   --------     ----------     -----------------    ------    ------
  1         .000         .00000           30.00          ------    ------
  2      334.000         .00000           30.00          ------    ------

Notes:

(1)  Cohesion = uniaxial compressive strength for rock materials.
(2)  Values of E50 are reported for clay strata.
(3)  Default values will be generated for E50 when input values are 0.
(4)  RQD and k_rm are reported only for weak rock strata.



--------------------------------------------------------------------------------
                                    Loading Type
--------------------------------------------------------------------------------

Static loading criteria was used for computation of p-y curves.
```

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 35000.000 lbs
Bending moment at pile head = 10092000.000 in-lbs
Axial load at pile head = 14500.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 35000.000 lbs
Specified moment at pile head = 10092000.000 in-lbs
Specified axial load at pile head = 14500.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	.547379	1.0092E+07	35000.0000	-.0027155	179.4956	0.0000	0.0000
4.000	.536530	1.0232E+07	34892.1518	-.0027089	181.9455	-53.6530	200.0000
8.000	.525708	1.0371E+07	34574.0225	-.0027023	184.3803	-105.1416	400.0000
12.000	.514912	1.0509E+07	34054.2537	-.0026955	186.7858	-154.4737	600.0000
16.000	.504144	1.0644E+07	33341.4551	-.0026887	189.1480	-201.6576	800.0000
20.000	.493403	1.0776E+07	32444.2032	-.0026818	191.4539	-246.7014	1000.0000
24.000	.482690	1.0903E+07	31371.0412	-.0026748	193.6907	-289.6137	1200.0000
28.000	.472004	1.1027E+07	30130.4780	-.0026677	195.8465	-330.4031	1400.0000
32.000	.461348	1.1145E+07	28730.9881	-.0026606	197.9098	-369.0781	1600.0000
36.000	.450720	1.1257E+07	27181.0112	-.0026534	199.8699	-405.6477	1800.0000
40.000	.440121	1.1362E+07	25488.9512	-.0026461	201.7165	-440.1208	2000.0000
44.000	.429551	1.1461E+07	23663.1765	-.0026387	203.4399	-472.5062	2200.0000
48.000	.419011	1.1552E+07	21712.0188	-.0026313	205.0311	-502.8133	2400.0000
52.000	.408501	1.1635E+07	19643.7739	-.0026238	206.4816	-531.0511	2600.0000
56.000	.398021	1.1709E+07	17466.7004	-.0026163	207.7835	-557.2288	2800.0000
60.000	.387571	1.1775E+07	15189.0197	-.0026087	208.9295	-581.3558	3000.0000
64.000	.377151	1.1831E+07	12818.9164	-.0026011	209.9128	-603.4413	3200.0000
68.000	.366762	1.1877E+07	10364.5372	-.0025935	210.7272	-623.4949	3400.0000
72.000	.356403	1.1914E+07	7833.9914	-.0025858	211.3671	-641.5257	3600.0000
76.000	.346075	1.1940E+07	5235.3515	-.0025781	211.8275	-657.5432	3800.0000
80.000	.335778	1.1956E+07	2576.6516	-.0025704	212.1039	-671.5568	4000.0000
84.000	.325512	1.1961E+07	-134.1108	-.0025627	212.1924	-683.5757	4200.0000
88.000	.315277	1.1955E+07	-2888.9760	-.0025550	212.0896	-693.6093	4400.0000
92.000	.305072	1.1938E+07	-5680.0207	-.0025473	211.7927	-701.6667	4600.0000
96.000	.294899	1.1910E+07	-8499.3590	-.0025396	211.2994	-707.7571	4800.0000
100.000	.284756	1.1871E+07	-11339.1410	-.0025278	565.0628	-711.8897	5000.0000
104.000	.274693	1.1820E+07	-14191.7646	-.0025038	562.6613	-714.2012	5200.0000
108.000	.264726	1.1757E+07	-17050.1204	-.0024798	559.7209	-714.7592	5400.0000
112.000	.254854	1.1684E+07	-19907.2487	-.0024561	556.2410	-713.5908	5600.0000
116.000	.245077	1.1598E+07	-22756.2980	-.0024324	552.2225	-710.7231	5800.0000
120.000	.235394	1.1502E+07	-25590.5238	-.0024090	547.6677	-706.1823	6000.0000
124.000	.225805	1.1394E+07	-28403.2856	-.0023858	542.5799	-699.9943	6200.0000
128.000	.216308	1.1275E+07	-31188.0450	-.0023628	536.9638	-692.1842	6400.0000
132.000	.206902	1.1145E+07	-33938.3632	-.0023400	530.8254	-682.7767	6600.0000
136.000	.197587	1.1004E+07	-36647.8983	-.0023176	524.1716	-671.7956	6800.0000
140.000	.188361	1.0852E+07	-39310.4020	-.0022954	517.0109	-659.2639	7000.0000
144.000	.179223	1.0690E+07	-41919.7173	-.0022736	509.3526	-645.2041	7200.0000
148.000	.170172	1.0517E+07	-44469.7750	-.0022520	501.2074	-629.6377	7400.0000
152.000	.161207	1.0334E+07	-46954.5902	-.0022309	492.5869	-612.5854	7600.0000
156.000	.152325	1.0142E+07	-49368.2593	-.0022101	483.5042	-594.0670	7800.0000
160.000	.143525	9939493.	-51704.9558	-.0021897	473.9731	-574.1015	8000.0000
164.000	.134807	9728249.	-53958.9273	-.0021698	464.0088	-552.7067	8200.0000
168.000	.126167	9508162.	-56124.4912	-.0021503	453.6273	-529.8997	8400.0000
172.000	.117604	9279597.	-58196.0308	-.0021312	442.8459	-505.6965	8600.0000
176.000	.109116	9042941.	-60167.9916	-.0021126	431.6829	-480.1121	8800.0000
180.000	.100702	8798603.	-62034.8769	-.0020945	420.1576	-453.1604	9000.0000
184.000	.092360	8547015.	-63791.2436	-.0020769	408.2902	-424.8544	9200.0000
188.000	.084086	8288630.	-65431.6981	-.0020599	396.1022	-395.2058	9400.0000
192.000	.075880	8023922.	-66950.8919	-.0020433	383.6160	-364.2253	9600.0000
196.000	.067739	7753386.	-68343.5174	-.0020273	370.8549	-331.9227	9800.0000
200.000	.059661	7477541.	-69604.3034	-.0020119	357.8433	-298.3066	10000.0000
204.000	.051644	7196922.	-70728.0107	-.0019970	344.6066	-263.3842	10200.0000
208.000	.043685	6912090.	-71709.4276	-.0019827	331.1711	-227.1621	10400.0000
212.000	.035782	6623624.	-72543.3660	-.0019689	317.5642	-189.6455	10600.0000
216.000	.027933	6332125.	-73224.6564	-.0019558	303.8142	-150.8386	10800.0000
220.000	.020135	6038212.	-73748.1440	-.0019432	289.9504	-110.7445	11000.0000
224.000	.012387	5742528.	-74108.6846	-.0019313	276.0031	-69.3652	11200.0000
228.000	.004685	5445735.	-74301.1397	-.0019199	262.0034	-26.7019	11400.0000
232.000	-.002973	5148515.	-74320.3733	-.0019092	247.9836	17.2456	11600.0000
236.000	-.010590	4851571.	-74161.2472	-.0018990	233.9768	62.4782	11800.0000
240.000	-.018166	4555628.	-73818.6175	-.0018895	220.0172	108.9977	12000.0000
244.000	-.025706	4261430.	-73287.3308	-.0018806	206.1400	156.8071	12200.0000
248.000	-.033211	3969742.	-72562.2206	-.0018722	192.3811	205.9100	12400.0000
252.000	-.040684	3681349.	-71638.1037	-.0018644	178.7776	256.3110	12600.0000
256.000	-.048127	3397057.	-70509.7777	-.0018573	165.3677	308.0154	12800.0000
260.000	-.055543	3117695.	-69172.0168	-.0018507	152.1902	361.0291	13000.0000
264.000	-.062933	2844111.	-67619.5704	-.0018446	139.2853	415.3590	13200.0000
268.000	-.070300	2577173.	-65847.1595	-.0018391	126.6939	471.0123	13400.0000
272.000	-.077647	2317772.	-63849.4752	-.0018341	114.4580	527.9968	13600.0000
276.000	-.084974	2066820.	-61621.1762	-.0018297	102.6206	586.3207	13800.0000
280.000	-.092285	1825251.	-59156.8878	-.0018258	91.2258	645.9926	14000.0000
284.000	-.099580	1594018.	-56451.1999	-.0018223	80.3187	707.0215	14200.0000
288.000	-.106863	1374099.	-53498.6669	-.0018193	69.9451	769.4163	14400.0000
292.000	-.114135	1166492.	-50293.8066	-.0018167	60.1523	833.1863	14600.0000
296.000	-.121397	972218.	-46831.1000	-.0018145	50.9884	898.3405	14800.0000
300.000	-.128652	792318.	-43104.9923	-.0018127	42.5026	964.8880	15000.0000
304.000	-.135900	627857.	-39109.8931	-.0018113	34.7450	1032.8374	15200.0000
308.000	-.143142	479923.	-34840.1777	-.0018102	27.7670	1102.1971	15400.0000
312.000	-.150381	349626.	-30290.1892	-.0018093	21.6209	1172.9749	15600.0000
316.000	-.157617	238097.	-25454.2407	-.0018087	16.3601	1245.1780	15800.0000
320.000	-.164852	146493.	-20326.6179	-.0018084	12.0392	1318.8127	16000.0000
324.000	-.172085	75991.6764	-14901.5830	-.0018081	8.7136	1393.8846	16200.0000
328.000	-.179317	27793.5949	-9173.3786	-.0018080	6.4401	1470.3979	16400.0000
332.000	-.186549	3123.3216	-3136.2326	-.0018080	5.2764	1548.3557	16600.0000

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = .54737925 in
Computed slope at pile head = -.00271546
Maximum bending moment = 11961167. lbs-in
Maximum shear force = -74332.73024 lbs
Depth of maximum bending moment = 84.00000000 in
Depth of maximum shear force = 230.00000 in
Number of iterations = 5
Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in

Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 35000.	M= 1.01E+07	14500.0000	.5473792	1.1961E+07	-74332.7302

The analysis ended normally.

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.39)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

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================================================================================


This program is licensed to:

Nava
Group Delta Consultants, Inc.

Path to file locations:      N:\Projects\_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign
Foundations\LPILE for Stnd Signs\
Name of input data file:     Sign #143 Fdn Depth =18 ft_Actual Load.lpd
Name of output file:         Sign #143 Fdn Depth =18 ft_Actual Load.lpo
Name of plot output file:    Sign #143 Fdn Depth =18 ft_Actual Load.lpp
Name of runtime file:        Sign #143 Fdn Depth =18 ft_Actual Load.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  April 24, 2009     Time:  15:10:05


--------------------------------------------------------------------------------
                                Problem Title
--------------------------------------------------------------------------------

Sign No. 153


--------------------------------------------------------------------------------
                                Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments            =          108
- Maximum number of iterations allowed =          100
- Deflection tolerance for convergence =   1.0000E-05 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  2


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     216.00 in

Depth of ground surface below top of pile =        .00 in

Slope angle of ground surface               =        .00 deg.

Structural properties of pile defined using  4 points

Point     Depth          Pile       Moment of        Pile      Modulus of
            X          Diameter      Inertia        Area       Elasticity
           in            in          in**4        Sq.in       lbs/Sq.in
-----  ---------   -----------   ----------   ----------   -----------
  1       0.0000   69.00000000     1890000.   4761.0000       3100000.
  2      99.0000   69.00000000     1890000.   4761.0000       3100000.
  3      99.0000   60.00000000   636000.0000  2827.0000       3100000.
  4     216.0000   60.00000000   636000.0000  2827.0000       3100000.


--------------------------------------------------------------------------------
                        Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using  6 layers

Layer  1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =         .000 in
Distance from top of pile to bottom of layer =       60.000 in
p-y subgrade modulus k for top of soil layer =      225.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =      225.000 lbs/in**3

Layer  2 is stiff clay without free water
Distance from top of pile to top of layer    =       60.000 in
Distance from top of pile to bottom of layer =      132.000 in

Layer  3 is liquefiable sand, by Rollins et al, 2004
Distance from top of pile to top of layer    =      132.000 in
Distance from top of pile to bottom of layer =      144.000 in

Layer  4 is soft clay, p-y criteria by Matlock, 1970
Distance from top of pile to top of layer    =      144.000 in
Distance from top of pile to bottom of layer =      168.000 in

Layer  5 is stiff clay without free water
Distance from top of pile to top of layer    =      168.000 in
Distance from top of pile to bottom of layer =      192.000 in

Layer  6 is liquefiable sand, by Rollins et al, 2004
Distance from top of pile to top of layer    =      192.000 in
Distance from top of pile to bottom of layer =      216.000 in


(Depth of lowest layer extends     .00 in below pile tip)


--------------------------------------------------------------------------------
                    Effective Unit Weight of Soil vs. Depth
--------------------------------------------------------------------------------

Effective unit weight of soil with depth defined using 12 points

Point        Depth X    Eff. Unit Weight
 No.           in          lbs/in**3
-----      ----------   ---------------
  1             .00          .07200
  2           60.00          .07200
  3           60.00          .07200
  4          132.00          .07200
  5          132.00          .03300
  6          144.00          .03300
  7          144.00          .03300
  8          168.00          .03300
  9          168.00          .03300
 10          192.00          .03300
 11          192.00          .03300
 12          216.00          .03300
```

Shear Strength of Soils

Shear strength parameters with depth defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	.000	.00000	35.00	------	------
2	60.000	.00000	35.00	------	------
3	60.000	13.88889	.00	------	------
4	132.000	13.88889	.00	------	------
5	132.000	.00000	.00	------	------
6	144.000	.00000	.00	------	------
7	144.000	2.08333	.00	------	------
8	168.000	2.08333	.00	------	------
9	168.000	13.88889	.00	------	------
10	192.000	13.88889	.00	------	------
11	192.000	.00000	.00	------	------
12	216.000	.00000	.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 16000.000 lbs
Bending moment at pile head = 6636000.000 in-lbs
Axial load at pile head = 14500.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 16000.000 lbs
Specified moment at pile head = 6636000.000 in-lbs
Specified axial load at pile head = 14500.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	.222127	6636000.	16000.0000	-.0020551	124.1789	0.0000	0.0000
4.000	.213916	6699927.	15807.0721	-.0020505	125.3458	-96.8785	905.7625
8.000	.205723	6762301.	15220.6621	-.0020459	126.4844	-196.6304	1911.6042
12.000	.197548	6821526.	14231.0484	-.0020413	127.5655	-298.3694	3020.7234
16.000	.189392	6875976.	12832.0577	-.0020366	128.5594	-401.2077	4236.7873
20.000	.181255	6924007.	11021.0732	-.0020319	129.4362	-504.2549	5564.0289
24.000	.173137	6963969.	8799.0448	-.0020272	130.1657	-606.6178	7007.3701
28.000	.165038	6994227.	6170.5014	-.0020224	130.7180	-707.4001	8572.5781
32.000	.156958	7013169.	3143.5660	-.0020176	131.0637	-805.7009	10266.4667
36.000	.148897	7019223.	-272.1196	-.0020128	131.1743	-902.7088	12125.2919
40.000	.140855	7010833.	-4078.4325	-.0020081	131.0211	-1000.0686	14199.9691
44.000	.132832	6986446.	-8267.5170	-.0020033	130.5759	-1093.9938	16471.7918
48.000	.124829	6944558.	-12824.0060	-.0019985	129.8113	-1183.6673	18964.6481
52.000	.116844	6883736.	-17729.2151	-.0019938	128.7011	-1268.2465	21708.3328
56.000	.108878	6802629.	-22961.0220	-.0019891	127.2205	-1346.8540	24740.5187
60.000	.100931	6700037.	-28011.0232	-.0019845	125.3478	-965.1927	19125.7633
64.000	.093002	6580397.	-31860.4494	-.0019800	123.1639	-959.3046	20629.7157
68.000	.085091	6445410.	-35682.6956	-.0019755	120.6999	-951.5726	22365.9377
72.000	.077198	6295199.	-39469.8586	-.0019712	117.9579	-941.7248	24397.6966
76.000	.069322	6129924.	-43212.8017	-.0019669	114.9410	-929.4132	26814.5118
80.000	.061462	5949780.	-46900.7864	-.0019628	111.6527	-914.1798	29747.7071
84.000	.053619	5755013.	-50520.9325	-.0019588	108.0974	-895.4030	33398.7249
88.000	.045791	5545923.	-54057.3887	-.0019550	104.2807	-872.2034	38094.5586
92.000	.037979	5322884.	-57489.9801	-.0019513	100.2093	-843.2687	44406.9415
96.000	.030181	5086360.	-60791.8220	-.0019477	95.8918	-806.4917	53443.1040
100.000	.022397	4836943.	-63863.4247	-.0019427	233.2868	-696.9176	62232.0438
104.000	.014646	4576138.	-66533.4951	-.0019331	220.9847	-635.1292	86730.5973
108.000	.006932	4305206.	-68886.9131	-.0019241	208.2049	-533.7926	154013.
112.000	-.000748	4025879.	-70081.3571	-.0019157	195.0291	217.2761	581331.
116.000	-.008394	3748496.	-68308.4587	-.0019078	181.9449	574.5780	136900.
120.000	-.016010	3480210.	-65780.0594	-.0019005	169.2900	683.8560	85426.7665
124.000	-.023598	3222839.	-62881.6645	-.0018937	157.1498	762.9947	64665.2294
128.000	-.031160	2977661.	-59696.9492	-.0018874	145.5848	828.0751	53149.7188
132.000	-.038698	2745724.	-57141.0910	-.0018816	134.6444	13.1752	680.9269
136.000	-.046213	2517382.	-57079.8585	-.0018762	123.8736	17.5148	758.0024
140.000	-.053708	2289321.	-57000.0669	-.0018713	113.1160	22.4583	836.3109
144.000	-.061184	2061620.	-56774.4088	-.0018669	102.3753	152.8682	4996.9727
148.000	-.068644	1835869.	-56148.3428	-.0018630	91.7267	159.6958	4652.8775
152.000	-.076089	1612673.	-55498.3086	-.0018595	81.1986	165.2721	4344.2018
156.000	-.083520	1392120.	-54826.7078	-.0018564	70.7951	170.4867	4082.5244
160.000	-.090941	1174294.	-54134.8770	-.0018538	60.5204	175.3931	3857.3138
164.000	-.098351	959275.	-53423.9617	-.0018517	50.3779	180.0336	3661.0299
168.000	-.105754	747136.	-51697.2134	-.0018499	40.3714	1182.1850	22357.1945
172.000	-.113151	552990.	-44638.8037	-.0018486	31.2136	1972.4906	34864.6731
176.000	-.120544	390403.	-36667.8309	-.0018477	23.5444	2012.8554	33396.2856
180.000	-.127933	260021.	-28537.5394	-.0018470	17.3943	2052.1672	32081.9290
184.000	-.135320	162473.	-20251.8831	-.0018466	12.7929	2090.5521	30897.9003
188.000	-.142706	98372.1796	-11814.3535	-.0018463	9.7693	2128.1159	29825.2225
192.000	-.150091	68320.7844	-5234.0405	-.0018462	8.3518	158.9605	2118.1921
196.000	-.157475	48798.1071	-4563.1561	-.0018460	7.4309	176.6395	2243.3956
200.000	-.164859	32102.9487	-3818.9859	-.0018460	6.6434	195.6108	2373.0656
204.000	-.172243	18538.9112	-2996.2416	-.0018459	6.0036	215.9342	2507.3214
208.000	-.179626	8431.2315	-2089.3923	-.0018459	5.5268	237.6711	2646.2814
212.000	-.187010	2127.7654	-1092.6574	-.0018459	5.2295	260.8850	2790.0640
216.000	-.194394	0.0000	0.0000	-.0018459	5.1291	285.6406	1469.3938

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = .22212716 in
Computed slope at pile head = -.00205509
Maximum bending moment = 7019223. lbs-in
Maximum shear force = -70081.35709 lbs
Depth of maximum bending moment = 36.00000000 in
Depth of maximum shear force = 112.00000 in
Number of iterations = 25
Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 16000.	M= 6.64E+06	14500.0000	.2221272	7019223.	-70081.3571

The analysis ended normally.

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.39)

              Analysis of Individual Piles and Drilled Shafts
             Subjected to Lateral Loading Using the p-y Method

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                            All Rights Reserved

================================================================================


This program is licensed to:

Nava
Group Delta Consultants, Inc.

Path to file locations:      N:\Projects\_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign
Foundations\LPILE for Stnd Signs\
Name of input data file:     Sign Fdn Depth =22 ft_Actual Load.lpd
Name of output file:         Sign Fdn Depth =22 ft_Actual Load.lpo
Name of plot output file:    Sign Fdn Depth =22 ft_Actual Load.lpp
Name of runtime file:        Sign Fdn Depth =22 ft_Actual Load.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  April 24, 2009     Time:  15:11:03


--------------------------------------------------------------------------------
                                Problem Title
--------------------------------------------------------------------------------

Sign No. 153


--------------------------------------------------------------------------------
                                Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments            =          132
- Maximum number of iterations allowed =          100
- Deflection tolerance for convergence =   1.0000E-05 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  2


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     264.00 in

Depth of ground surface below top of pile =        .00 in

Slope angle of ground surface               =        .00 deg.

Structural properties of pile defined using  4 points

Point     Depth          Pile       Moment of        Pile       Modulus of
            X          Diameter      Inertia         Area       Elasticity
           in            in          in**4         Sq.in       lbs/Sq.in
-----  ---------   -----------   ----------   ----------   -----------
  1       0.0000   69.00000000     1890000.    4761.0000      3100000.
  2      99.0000   69.00000000     1890000.    4761.0000      3100000.
  3      99.0000   60.00000000   636000.0000   2827.0000      3100000.
  4     264.0000   60.00000000   636000.0000   2827.0000      3100000.


--------------------------------------------------------------------------------
                        Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using  1 layers

Layer  1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =          .000 in
Distance from top of pile to bottom of layer =      264.000 in
p-y subgrade modulus k for top of soil layer =       25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =       25.000 lbs/in**3


(Depth of lowest layer extends     .00 in below pile tip)


--------------------------------------------------------------------------------
                      Effective Unit Weight of Soil vs. Depth
--------------------------------------------------------------------------------

Effective unit weight of soil with depth defined using  2 points

Point        Depth X    Eff. Unit Weight
 No.           in          lbs/in**3
-----      ----------   ---------------
  1             .00         .06944
  2          264.00         .06944



--------------------------------------------------------------------------------
                              Shear Strength of Soils
--------------------------------------------------------------------------------

Shear strength parameters with depth defined using  2 points

Point     Depth X      Cohesion c      Angle of Friction      E50 or       RQD
 No.        in          lbs/in**2            Deg.             k_rm          %
-----   --------      ----------      ------------------    ------     ------
  1         .000          .00000           30.00            ------     ------
  2      264.000          .00000           30.00            ------     ------

Notes:

(1)  Cohesion = uniaxial compressive strength for rock materials.
(2)  Values of E50 are reported for clay strata.
(3)  Default values will be generated for E50 when input values are 0.
(4)  RQD and k_rm are reported only for weak rock strata.



--------------------------------------------------------------------------------
                                    Loading Type
--------------------------------------------------------------------------------

Static loading criteria was used for computation of p-y curves.
```

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 16000.000 lbs
Bending moment at pile head = 6636000.000 in-lbs
Axial load at pile head = 14500.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 16000.000 lbs
Specified moment at pile head = 6636000.000 in-lbs
Specified axial load at pile head = 14500.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	.531621	6636000.	16000.0000	-.0030708	124.1789	0.0000	0.0000
4.000	.519347	6700073.	15895.5173	-.0030662	125.3485	-51.9347	200.0000
8.000	.507091	6763317.	15588.1992	-.0030616	126.5030	-101.4183	400.0000
12.000	.494854	6824941.	15087.8395	-.0030570	127.6278	-148.4562	600.0000
16.000	.482636	6884191.	14404.2093	-.0030523	128.7094	-193.0542	800.0000
20.000	.470436	6940355.	13547.0570	-.0030476	129.7346	-235.2179	1000.0000
24.000	.458255	6992757.	12526.1086	-.0030428	130.6911	-274.9531	1200.0000
28.000	.446093	7040763.	11351.0669	-.0030380	131.5674	-312.2654	1400.0000
32.000	.433951	7083774.	10031.6110	-.0030332	132.3526	-347.1608	1600.0000
36.000	.421828	7121233.	8577.3973	-.0030284	133.0363	-379.6450	1800.0000
40.000	.409724	7152619.	6998.0583	-.0030235	133.6093	-409.7242	2000.0000
44.000	.397640	7177452.	5303.2028	-.0030186	134.0626	-437.4040	2200.0000
48.000	.385575	7195289.	3502.4162	-.0030137	134.3882	-462.6906	2400.0000
52.000	.373531	7205725.	1605.2594	-.0030088	134.5786	-485.5898	2600.0000
56.000	.361505	7208393.	-378.7298	-.0030038	134.6274	-506.1075	2800.0000
60.000	.349500	7202966.	-2440.0375	-.0029989	134.5283	-524.2498	3000.0000
64.000	.337514	7189153.	-4569.1734	-.0029940	134.2761	-540.0224	3200.0000
68.000	.325548	7166702.	-6756.6708	-.0029891	133.8663	-553.4312	3400.0000
72.000	.313601	7135397.	-8993.0860	-.0029842	133.2949	-564.4820	3600.0000
76.000	.301674	7095064.	-11268.9982	-.0029794	132.5586	-573.1804	3800.0000
80.000	.289766	7045561.	-13575.0095	-.0029745	131.6550	-579.5322	4000.0000
84.000	.277878	6986788.	-15901.7443	-.0029698	130.5822	-583.5429	4200.0000
88.000	.266008	6918680.	-18239.8487	-.0029650	129.3389	-585.2177	4400.0000
92.000	.254157	6841211.	-20579.9906	-.0029603	127.9248	-584.5622	4600.0000
96.000	.242326	6754391.	-22912.8583	-.0029557	126.3400	-581.5813	4800.0000
100.000	.230512	6658267.	-25229.1609	-.0029488	319.1983	-576.2802	5000.0000
104.000	.218744	6552925.	-27519.7424	-.0029354	314.2294	-568.7334	5200.0000
108.000	.207028	6438485.	-29775.7130	-.0029223	308.8312	-558.9765	5400.0000
112.000	.195365	6315102.	-31988.2590	-.0029093	303.0113	-547.0228	5600.0000
116.000	.183753	6182968.	-34148.6191	-.0028966	296.7786	-532.8851	5800.0000
120.000	.172192	6042310.	-36248.0817	-.0028842	290.1437	-516.5755	6000.0000
124.000	.160679	5893388.	-38277.9826	-.0028721	283.1191	-498.1056	6200.0000
128.000	.149214	5736497.	-40229.7023	-.0028603	275.7186	-477.4862	6400.0000
132.000	.137796	5571969.	-42094.6634	-.0028489	267.9578	-454.7275	6600.0000
136.000	.126423	5400166.	-43864.3275	-.0028377	259.8539	-429.8389	6800.0000
140.000	.115094	5221487.	-45530.1924	-.0028270	251.4257	-402.8290	7000.0000
144.000	.103807	5036365.	-47083.7894	-.0028166	242.6935	-373.7058	7200.0000
148.000	.092561	4845264.	-48516.6796	-.0028065	233.6793	-342.4765	7400.0000
152.000	.081355	4648686.	-49820.4515	-.0027969	224.4067	-309.1473	7600.0000
156.000	.070186	4447163.	-50986.7171	-.0027877	214.9009	-273.7240	7800.0000
160.000	.059053	4241261.	-52007.1095	-.0027789	205.1886	-236.2113	8000.0000
164.000	.047954	4031582.	-52873.2790	-.0027705	195.2981	-196.6130	8200.0000
168.000	.036889	3818759.	-53576.8904	-.0027625	185.2593	-154.9325	8400.0000
172.000	.025854	3603458.	-54109.6195	-.0027550	175.1036	-111.1722	8600.0000
176.000	.014849	3386381.	-54463.1502	-.0027479	164.8641	-65.3335	8800.0000
180.000	.003871	3168260.	-54629.1712	-.0027412	154.5753	-17.4174	9000.0000
184.000	-.007082	2949861.	-54599.3734	-.0027350	144.2735	32.5760	9200.0000
188.000	-.018010	2731986.	-54365.4462	-.0027293	133.9964	84.6474	9400.0000
192.000	-.028916	2515467.	-53919.0754	-.0027239	123.7832	138.7980	9600.0000
196.000	-.039802	2301170.	-53251.9404	-.0027190	113.6749	195.0298	9800.0000
200.000	-.050669	2089996.	-52355.7114	-.0027146	103.7138	253.3454	10000.0000
204.000	-.061519	1882877.	-51222.0471	-.0027106	93.9441	313.7479	10200.0000
208.000	-.072354	1680780.	-49842.5927	-.0027070	84.4112	376.2409	10400.0000
212.000	-.083175	1484704.	-48208.9780	-.0027037	75.1623	440.8286	10600.0000
216.000	-.093984	1295684.	-46312.8153	-.0027009	66.2463	507.5154	10800.0000
220.000	-.104783	1114786.	-44145.6986	-.0026985	57.7134	576.3063	11000.0000
224.000	-.115573	943111.	-41699.2017	-.0026964	49.6155	647.2061	11200.0000
228.000	-.126354	781793.	-38964.8783	-.0026946	42.0061	720.2202	11400.0000
232.000	-.137130	632001.	-35934.2606	-.0026932	34.9405	795.3539	11600.0000
236.000	-.147900	494936.	-32598.8600	-.0026921	28.4752	872.6124	11800.0000
240.000	-.158667	371835.	-28950.1668	-.0026912	22.6685	952.0008	12000.0000
244.000	-.169430	263969.	-24979.6515	-.0026905	17.5805	1033.5240	12200.0000
248.000	-.180191	172641.	-20678.7656	-.0026901	13.2725	1117.1866	12400.0000
252.000	-.190951	99189.5486	-16038.9435	-.0026898	9.8079	1202.9926	12600.0000
256.000	-.201710	44988.5517	-11051.6050	-.0026897	7.2512	1290.9452	12800.0000
260.000	-.212469	11444.8227	-5708.1575	-.0026896	5.6690	1381.0473	13000.0000
264.000	-.223227	0.0000	0.0000	-.0026896	5.1291	1473.3004	6600.0000

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = .53162088 in
Computed slope at pile head = -.00307075
Maximum bending moment = 7208393. lbs-in
Maximum shear force = -54639.26901 lbs
Depth of maximum bending moment = 56.00000000 in
Depth of maximum shear force = 182.00000 in
Number of iterations = 5
Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 16000.	M= 6.64E+06	14500.0000	.5316209	7208393.	-54639.2690

The analysis ended normally.

APPENDIX F
SIGN #153 EVALUATION

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

DESIGN MEMORANDUM

PROJECT: WCC – 405/22 HOV Segment

PROJ NO: I-436

DATE: Friday - March 30, 2009

BY: Curt Scheyhing

SUBJECT: Loads on Retaining Wall from Sign No. 153 and External Stability

An overhead sign foundation (Sign No. 153) supported on a 5 ft diameter CIDH pile is proposed adjacent to an existing Type 5SWB retaining wall (refer to Bridge Standard Detail Sheet xs14-350). Under wind loading the laterally loaded sign foundation will exert lateral earth pressures on the adjacent wall.

The following provides recommended lateral loading on the wall from wind loading on Sign 153 CIDH pile, and provides an external stability evaluation of the wall under the imposed loads. We evaluated two loading conditions from xs14-350:

- Group A [Dead Load + Earth Pressure + Live Load Surcharge]; *and*
- Group B [Dead Load + Earth Pressure + Live Load Surcharge + Wind]

Design soil unit weight, earth pressures, wind load on the soundwall, and live load surcharge were based on English equivalents of Metric xs14-350. Soil properties for lateral load analysis, bearing capacity analysis, and lateral footing resistance were taken from the results of Cone Penetration Testing (CPT) performed at the site.

Supporting calculations and data are attached.

Design information:

- Existing Type 5SWB wall, design height H=12 ft, actual H=10.5 feet, footing width W=10 ft, back of wall stem located 10 feet horizontally from edge of proposed CIDH pile for sign no. 153 (see attached sketch);
- Design load at top of CIDH pile for evaluation of lateral pressure on wall (provided by Parsons): Shear = 3.94 kips, Moment = 55 ft-kips, Axial = 14.5 kips;

Results of LPILE Lateral Load Analysis:

- LPILE (Version 5.0) analysis performed (see attached calcs): Upper 8.75 feet of pile moves toward the Type 5SWB wall, net soil reaction towards the wall is 13.7 kips, resultant at 5.6 ft below ground surface;
- Load from CIDH lateral soil reaction is assumed to spread to the wall stem on a 2:1 distribution horizontally, resulting in 913 lb/ft concentrated load applied at mid height of the 10.5 ft high wall stem;

Recommendations for External / Internal Stability and Structural Checks by PTG:

- **Soil Unit Wt.** = 19 kN/m^3 = 120.9 pcf;
- **Static earth pressure**: Ka=0.295, Equivalent Fluid = 5.6 kN/m^3 = 35.6 pcf (ret. Grade to B.O.F.);
- **Seismic earth pressure** (Mononabe-Okabe, Kh=0.3): 25 pcf equiv. fluid – inverted added to the static pressure;
- **Traffic surcharge**: 11.5 kPa = 240 psf vertical, or 71 psf uniform lateral pressure (ret. Grade to B.O.F.);
- **CIDH concentrated lateral load on wall** = 913 lb/ft with resultant 6.75 ft above B.O.F. (or uniform pressure of 87 psf applied to 10.5 ft high stem);
- **Ultimate sliding friction coefficient** = 0.65 (soil-to-soil in front of key);
- **Passive resistance:** neglect due to presence of adjacent channel
- **Ultimate bearing capacity**: Using Terzaghi's method, submerged cohesionless sand foundation with 34-degree friction angle, bottom of footing embedment 1.5 ft, and effective footing width W'=W-2e, where W=footing width and e is eccentricity of the base resultant (R), ultimate bearing capacity Q'_{ult} is :

$$Q'_{ult} \text{ (ksf)} = 3.066 + 1.140 * W' \text{ (} \textit{with W' in feet} \text{)}$$

- **Bearing capacity check**: Compare Q'_{ult} to $Q'_{equivalent}$ = R / W', where R=resultant vertical force on base of footing. Minimum Factor of Safety (FS) =3.0, where FS = Q'_{ult} / $Q'_{equivalent}$;
- **Sliding Check**: Minimum Factor of Safety = 1.5 (Group A or B loads)
- **Overturning Check**: minimum FS=2.0, resultant in middle $^1/_3$ or 100% base in compression (Group A), resultant in middle ½ or 75% base in compression (Group B)

Results of External Stability Analyses:

- Group A (D+E+SC) loading:
  - Sliding FS=3.2 > 1.5 **OK**
  - Overturning FS=5.1 > 2.0 **OK**
  - Eccentricity e=1.2 feet < W/6 (in middle third **OK**), W'=7.61 feet
  - 100% base in compression **OK**
  - Toe Pressure = 2.94 ksf
  - Heel Pressure = 0.78 ksf
  - Equivalent Bearing Q'_{eq}=2.31 ksf;
  - Ultimate Bearing Q'_{ult}=11.74 ksf
  - Bearing FS = 5.1 > 3.0 **OK**

- Group B (D+E+SC+W) loading without sign load:
  - Sliding FS=2.79 > 1.5 **OK**
  - Overturning FS=3.16 > 2.0 **OK**
  - Eccentricity e=1.77 feet < W/4 (in middle half **OK**), W'=6.46 feet
  - 97% base in compression, >75% **OK**
  - Toe Pressure = 3.52 ksf
  - Heel Pressure = 0 ksf
  - Equivalent Bearing Q'_{eq}=2.65 ksf;
  - Ultimate Bearing Q'_{ult}=10.43 ksf
  - Bearing FS = 3.94 > 3.0 **OK**

- Group B (D+E+SC+W) loading including sign load:
  - Sliding FS=2.26 > 1.5 **OK**
  - Overturning FS=2.53 > 2.0 **OK**
  - Eccentricity e=2.14 feet < W/4 (in middle half **OK**), W'=5.72 feet
  - 86% base in compression, >75% **OK**
  - Toe Pressure = 3.90 ksf
  - Heel Pressure = 0 ksf
  - Equivalent Bearing Q'_{eq}=2.92 ksf;
  - Ultimate Bearing Q'_{ult}=9.59 ksf
  - Bearing FS = 3.28 > 3.0 **OK**

Conclusions:

- For worst case D+E+SC+W loading, including lateral load from CIDH:
  - Sliding factor of safety exceeds 1.5;
  - Overturning factor of safety exceeds 2.0;
  - More than 85% of base is in compression;
  - Bearing capacity is adequate with factor of safety > 3.0
- Based on these results, the adjacent retaining wall is considered externally stable from a geotechnical standpoint;
- Parsons to verify structural capacity.

Attachments:

Sketches & Calculations

- Geometry Sketch / LPILE Profile
- Distribution of CIDH Load to Wall
- Soil Parameters / Earth Pressures
- LPILE Output: soil reaction, deflection, output text
- Force/Moment equilibrium check of LPILE results
- Bearing Capacity Calculation
- Static/Seismic Earth pressure calculation
- Retaining wall external stability calculations
- Retaining Wall Type 5SWB (xs14-350)

Please contact me if there are any questions.

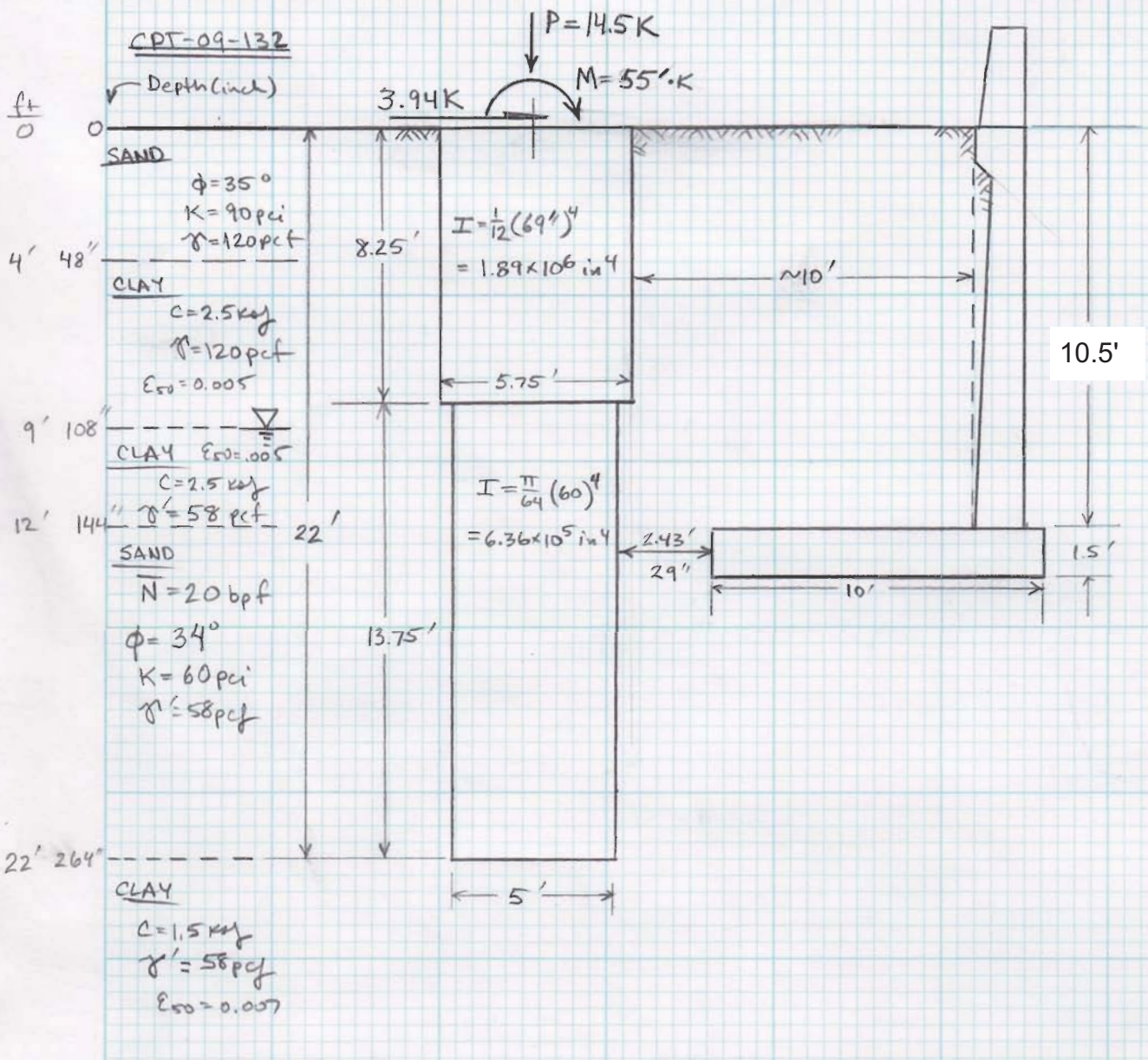
Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing, P.E., G.E.
Senior Geotechnical Engineer

Geometry Sketch / LPILE Profile

SIGN 153
5'9" Square Pedestal
5' CIDH Pile
Post Type VII
Single Post Type
} Foundation Depth = 22'

$E = 57{,}000\sqrt{f'_c} = 3.1 \times 10^6$ psi

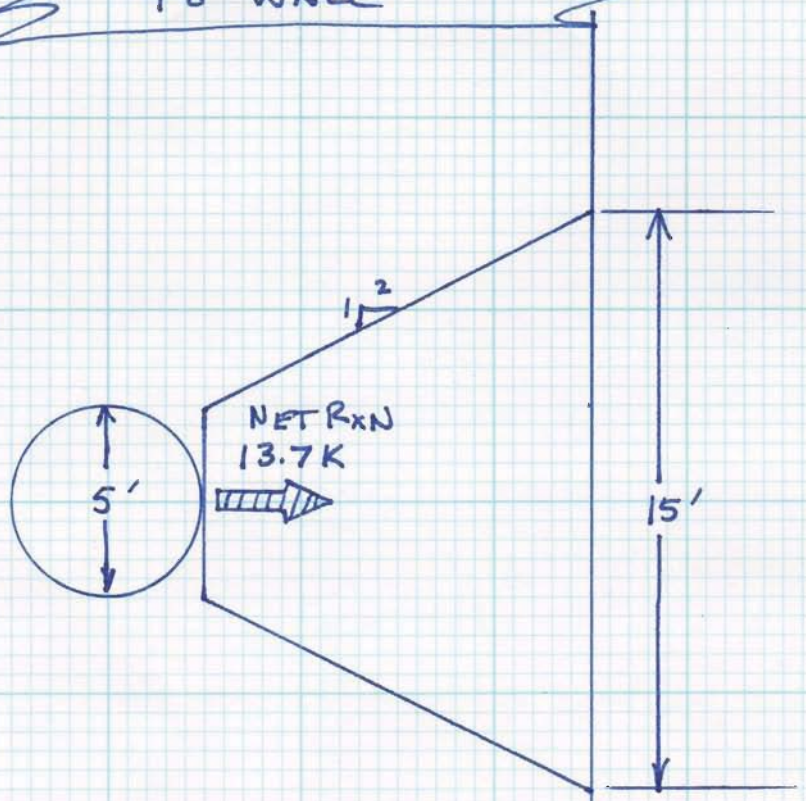


PILE + WALL GEOMETRY
&
LPILE SOIL + PILE PROFILE

GROUP DELTA CONSULTANTS	PROJECT NAME: West County Connector 405/22 HOV Segment	DRAWN BY: CS	
		CHECKED BY:	
	PROJECT NUMBER: I-436	DATE: 3/10/09	PAGE: 1 OF 3

Distribution of CIDH Load to Wall

Pressure Distribution to Wall

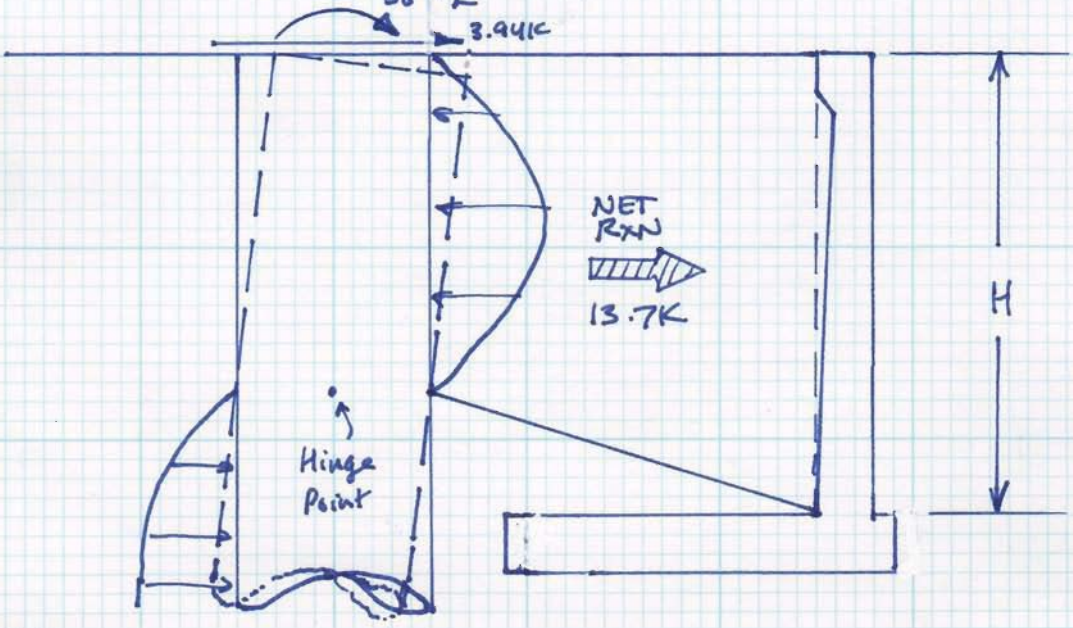


Apply as uniform pressure over height of wall stem

$$p = \frac{13.7K}{15' \times H} = \frac{0.91\ K/ft}{H}$$

H=10' → 91 psf

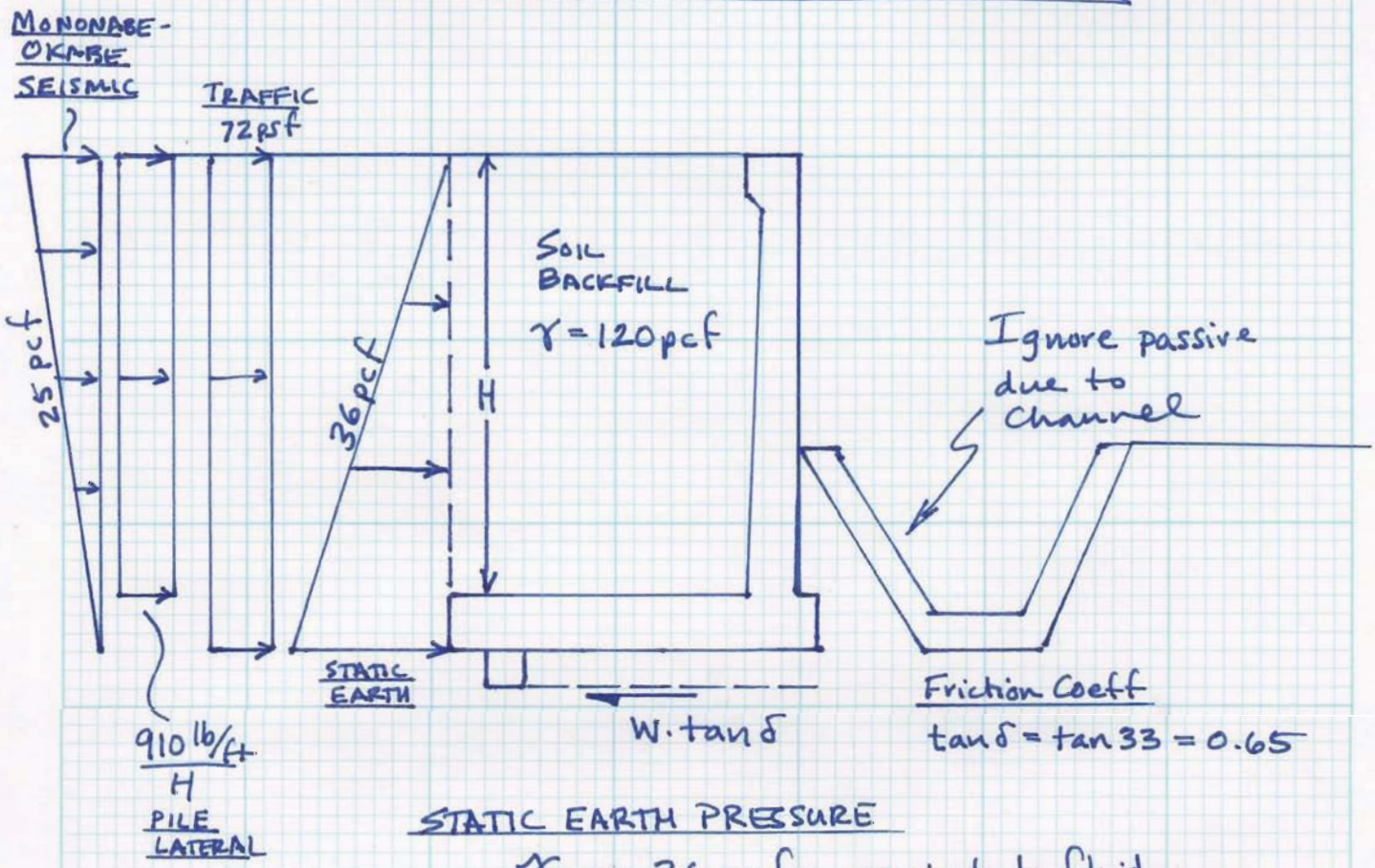
H=12' → 76 psf



PROJECT NAME: WCC: 405/22 HOV		DRAWN BY: CJ	
		CHECKED BY:	
PROJECT NUMBER: I-436	DATE: 3/12/09	PAGE: 2	OF 3

Soil Parameters / Earth Pressures

WALL SOIL PARAMETERS FOR SLIDING/OVERTURNING AND STRUCTURAL CHECK



STATIC EARTH PRESSURE

$\gamma_f = 36$ pcf equivalent fluid

TRAFFIC SURCHARGE

Vert. = 240 psf

$K_a = 0.3$

Lateral = $240 \times 0.3 = 72$ psf (retained grade to B.O.F.)

PILE SURCHARGE

Lateral = $\frac{0.91 \text{ K/ft}}{H}$ (retained grade to T.O.F.)

SEISMIC EARTH

$K_h = 0.3g$ $\phi = 34°$ $\gamma = 120$ pcf

$\rightarrow K_{AE} - K_a = 0.212 \rightarrow \gamma_f = .212 \times 120 \cong 25$ pcf

GROUP DELTA CONSULTANTS

PROJECT NAME: WCC: 405/22 HOV

DRAWN BY: CF

CHECKED BY:

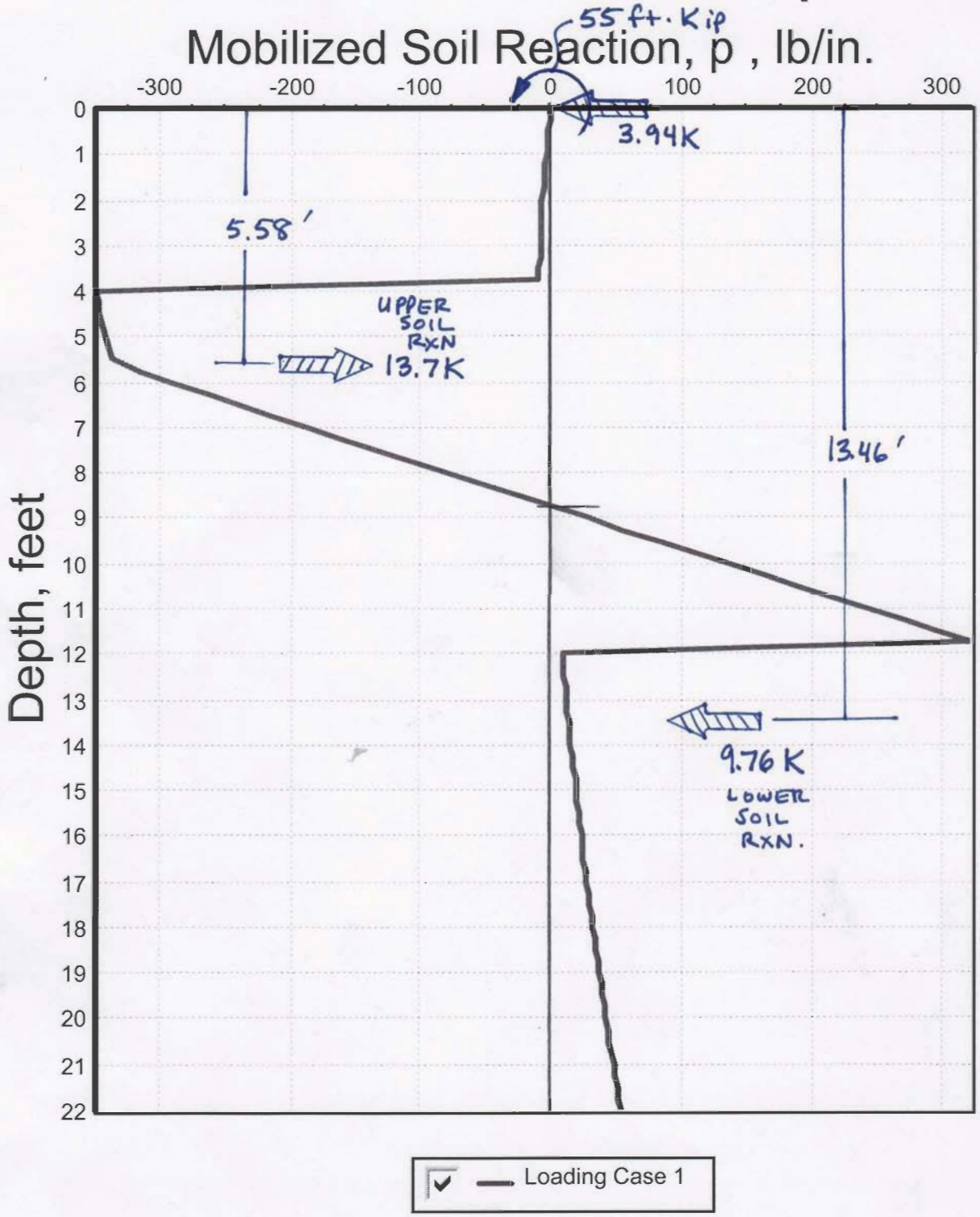
PROJECT NUMBER: I-436

DATE: 3/12/09

PAGE: 3 OF 3

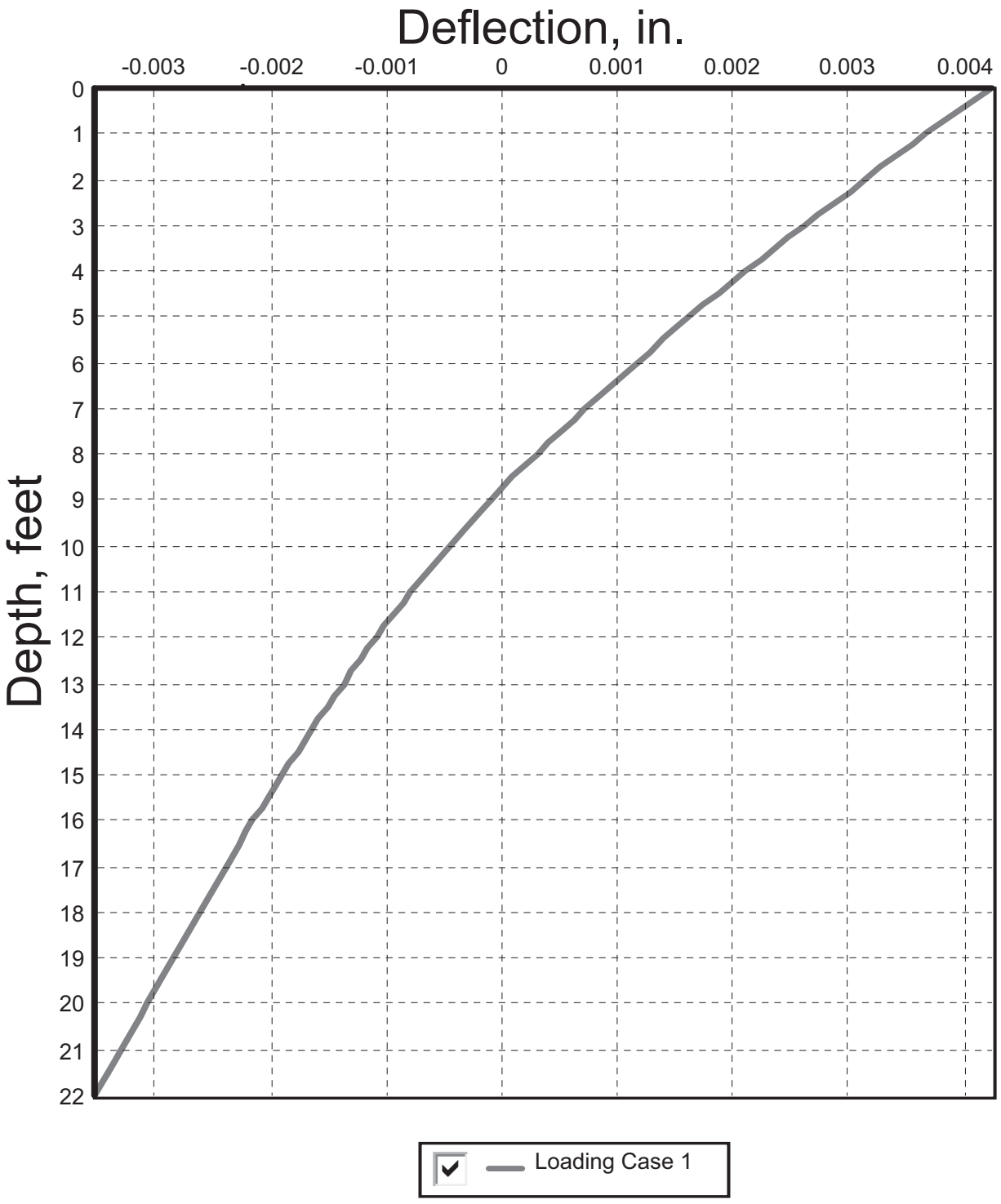
LPILE Output: soil reaction, deflection, output text

Mobilized Soil Reaction vs. Depth



LPILE Plus 5.0, (c) 2007 by Ensoft, Inc.

Lateral Deflection vs. Depth



LPILE Plus 5.0, (c) 2007 by Ensoft, Inc.

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================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.39)

               Analysis of Individual Piles and Drilled Shafts
              Subjected to Lateral Loading Using the p-y Method

                        (c) 1985-2007 by Ensoft, Inc.
                             All Rights Reserved

================================================================================


This program is licensed to:

Nava
Group Delta Consultants, Inc.

Path to file locations:      N:\Projects\_AV\I400\I-436 Garden Grove Freeway (SR-22)\Reports\FR\Sign
Foundations\Sign 153 Evaluation\LPILE\
Name of input data file:     Sign 153_rev.lpd
Name of output file:         Sign 153_rev.lpo
Name of plot output file:    Sign 153_rev.lpp
Name of runtime file:        Sign 153_rev.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  March 11, 2009     Time:  16:42:50


--------------------------------------------------------------------------------
                                 Problem Title
--------------------------------------------------------------------------------

Sign No. 153


--------------------------------------------------------------------------------
                                 Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments            =          88
- Maximum number of iterations allowed =         100
- Deflection tolerance for convergence =   1.0000E-05 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  1


--------------------------------------------------------------------------------
                    Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     264.00 in

Depth of ground surface below top of pile =        .00 in

Slope angle of ground surface             =        .00 deg.

Structural properties of pile defined using  4 points

Point    Depth         Pile      Moment of       Pile      Modulus of
           X         Diameter     Inertia        Area      Elasticity
           in           in         in**4        Sq.in      lbs/Sq.in
-----  ---------   -----------   ----------   ----------   -----------
  1       0.0000   69.00000000     1890000.    4761.0000      3100000.
```

2	99.0000	69.00000000	1890000.	4761.0000	3100000.
3	99.0000	60.00000000	636000.0000	2827.0000	3100000.
4	264.0000	60.00000000	636000.0000	2827.0000	3100000.

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = .000 in
Distance from top of pile to bottom of layer = 48.000 in
p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 48.000 in
Distance from top of pile to bottom of layer = 108.000 in

Layer 3 is stiff clay without free water
Distance from top of pile to top of layer = 108.000 in
Distance from top of pile to bottom of layer = 144.000 in

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 144.000 in
Distance from top of pile to bottom of layer = 264.000 in
p-y subgrade modulus k for top of soil layer = 60.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 60.000 lbs/in**3

Layer 5 is stiff clay without free water
Distance from top of pile to top of layer = 264.000 in
Distance from top of pile to bottom of layer = 300.000 in

(Depth of lowest layer extends 36.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 10 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	.00	.06944
2	48.00	.06944
3	48.00	.06944
4	108.00	.06944
5	108.00	.03356
6	144.00	.03356
7	144.00	.03356
8	264.00	.03356
9	264.00	.03300
10	300.00	.03300

Shear Strength of Soils

Shear strength parameters with depth defined using 10 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	.000	.00000	35.00	------	------
2	48.000	.00000	35.00	------	------
3	48.000	13.88889	.00	.00500	.0
4	108.000	13.88889	.00	.00500	.0
5	108.000	13.88889	.00	.00500	.0
6	144.000	13.88889	.00	.00500	.0
7	144.000	.00000	34.00	------	------
8	264.000	.00000	34.00	------	------
9	264.000	10.41667	.00	.00700	.0
10	300.000	10.41667	.00	.00700	.0

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 3940.000 lbs
Bending moment at pile head = 660000.000 in-lbs
Axial load at pile head = 14500.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computed Values of Load Distribution and Deflection for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 3940.000 lbs
Specified moment at pile head = 660000.000 in-lbs
Specified axial load at pile head = 14500.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res. p lbs/in	Es*h F/L lbs/in
0.000	.004240	660000.	3940.0000	-4.7268E-05	15.0932	0.0000	0.0000
3.000	.004099	671822.	3938.3400	-4.6927E-05	15.3090	-1.1066	810.0000
6.000	.003958	683634.	3933.4738	-4.6580E-05	15.5246	-2.1375	1620.0000
9.000	.003819	695427.	3925.6273	-4.6227E-05	15.7399	-3.0935	2430.0000
12.000	.003681	707192.	3915.0238	-4.5868E-05	15.9546	-3.9755	3240.0000
15.000	.003544	718921.	3901.8840	-4.5503E-05	16.1687	-4.7843	4050.0000
18.000	.003408	730607.	3886.4261	-4.5132E-05	16.3821	-5.5210	4860.0000
21.000	.003273	742244.	3868.8653	-4.4755E-05	16.5945	-6.1863	5670.0000
24.000	.003139	753824.	3849.4140	-4.4372E-05	16.8059	-6.7812	6480.0000
27.000	.003007	765344.	3828.2818	-4.3983E-05	17.0161	-7.3068	7290.0000
30.000	.002876	776798.	3805.6755	-4.3588E-05	17.2252	-7.7640	8100.0000
33.000	.002745	788182.	3781.7987	-4.3187E-05	17.4330	-8.1539	8910.0000
36.000	.002616	799492.	3756.8519	-4.2781E-05	17.6395	-8.4773	9720.0000
39.000	.002489	810727.	3731.0329	-4.2368E-05	17.8446	-8.7354	10530.0000
42.000	.002362	821882.	3704.5359	-4.1950E-05	18.0482	-8.9293	11340.0000
45.000	.002237	832957.	3677.5521	-4.1527E-05	18.2504	-9.0599	12150.0000
48.000	.002113	843951.	3141.0144	-4.1097E-05	18.4510	-348.6318	494963.
51.000	.001990	851807.	2097.0773	-4.0663E-05	18.5944	-347.3262	523493.
54.000	.001869	856537.	1057.5156	-4.0226E-05	18.6808	-345.7149	554890.
57.000	.001749	858156.	23.2856	-3.9787E-05	18.7103	-343.7717	589633.
60.000	.001630	856680.	-1004.5706	-3.9348E-05	18.6834	-341.4658	628319.
63.000	.001513	852132.	-2024.9096	-3.8910E-05	18.6004	-338.7603	671703.
66.000	.001397	844534.	-3036.4666	-3.8476E-05	18.4617	-335.6110	720755.
69.000	.001282	833916.	-4010.6611	-3.8046E-05	18.2679	-313.8520	734366.
72.000	.001169	820474.	-4915.0147	-3.7623E-05	18.0225	-289.0504	742020.
75.000	.001056	804429.	-5744.5673	-3.7207E-05	17.7296	-263.9847	749674.
78.000	.000945	786009.	-6498.5315	-3.6800E-05	17.3934	-238.6581	757328.
81.000	.000836	765441.	-7176.1282	-3.6402E-05	17.0179	-213.0730	764982.
84.000	.000727	742956.	-7776.5836	-3.6016E-05	16.6075	-187.2306	772636.
87.000	.000620	718785.	-8299.1254	-3.5642E-05	16.1663	-161.1306	780290.
90.000	.000513	693164.	-8742.9798	-3.5281E-05	15.6986	-134.7723	787944.
93.000	.000408	666330.	-9107.3687	-3.4932E-05	15.2088	-108.1536	795598.
96.000	.000304	638523.	-9391.5063	-3.4598E-05	14.7012	-81.2715	803251.
99.000	.000200	609984.	-9596.2492	-3.3971E-05	33.9020	-55.2238	827406.
102.000	9.97E-05	580948.	-9720.7503	-3.3065E-05	32.5323	-27.7770	835739.
105.000	1.84E-06	551663.	-9763.1928	-3.2203E-05	31.1509	-.5179676	844073.
108.000	-9.35E-05	522372.	-9723.0520	-3.1386E-05	29.7693	27.2785	875161.
111.000	-.000186	493327.	-9599.8857	-3.0613E-05	28.3993	54.8323	882140.
114.000	-.000277	464775.	-9394.4122	-2.9884E-05	27.0525	82.1500	889106.
117.000	-.000366	436963.	-9107.3066	-2.9198E-05	25.7406	109.2537	896060.
120.000	-.000452	410134.	-8739.1770	-2.8554E-05	24.4751	136.1660	903001.
123.000	-.000537	384531.	-8290.5644	-2.7949E-05	23.2673	162.9091	909932.
126.000	-.000620	360393.	-7761.9429	-2.7382E-05	22.1288	189.5052	916853.
129.000	-.000701	337961.	-7153.7221	-2.6851E-05	21.0707	215.9753	923764.
132.000	-.000781	317473.	-6466.2502	-2.6352E-05	20.1043	242.3393	930666.

135.000	-.000860	299166.	-5699.8186	-2.5883E-05	19.2407	268.6151	937561.
138.000	-.000936	283277.	-4854.6680	-2.5440E-05	18.4912	294.8187	944447.
141.000	-.001012	270040.	-3930.9953	-2.5019E-05	17.8669	320.9631	951327.
144.000	-.001087	259693.	-3436.6383	-2.4616E-05	17.3788	8.6082	23766.6153
147.000	-.001160	249423.	-3409.6300	-2.4229E-05	16.8943	9.3974	24306.6153
150.000	-.001232	239237.	-3380.2288	-2.3857E-05	16.4139	10.2034	24846.6153
153.000	-.001303	229143.	-3348.3844	-2.3501E-05	15.9378	11.0262	25386.6153
156.000	-.001373	219149.	-3314.0468	-2.3160E-05	15.4663	11.8655	25926.6153
159.000	-.001442	209261.	-3277.1667	-2.2834E-05	14.9999	12.7212	26466.6153
162.000	-.001510	199488.	-3237.6952	-2.2523E-05	14.5389	13.5931	27006.6153
165.000	-.001577	189837.	-3195.5838	-2.2227E-05	14.0837	14.4812	27546.6153
168.000	-.001643	180316.	-3150.7842	-2.1945E-05	13.6346	15.3852	28086.6153
171.000	-.001709	170934.	-3103.2484	-2.1678E-05	13.1920	16.3053	28626.6153
174.000	-.001773	161699.	-3052.9283	-2.1425E-05	12.7564	17.2414	29166.6153
177.000	-.001837	152618.	-2999.7761	-2.1186E-05	12.3281	18.1934	29706.6153
180.000	-.001901	143702.	-2943.7440	-2.0960E-05	11.9075	19.1614	30246.6153
183.000	-.001963	134958.	-2884.7838	-2.0748E-05	11.4950	20.1454	30786.6153
186.000	-.002025	126395.	-2822.8474	-2.0549E-05	11.0911	21.1455	31326.6153
189.000	-.002086	118022.	-2757.8865	-2.0363E-05	10.6962	22.1618	31866.6153
192.000	-.002147	109849.	-2689.8523	-2.0190E-05	10.3107	23.1943	32406.6153
195.000	-.002208	101885.	-2618.6960	-2.0029E-05	9.9350	24.2433	32946.6153
198.000	-.002267	94138.9221	-2544.3680	-1.9880E-05	9.5696	25.3087	33486.6153
201.000	-.002327	86620.5689	-2466.8187	-1.9742E-05	9.2150	26.3908	34026.6153
204.000	-.002386	79339.7274	-2385.9978	-1.9616E-05	8.8716	27.4898	34566.6153
207.000	-.002444	72306.2888	-2301.8544	-1.9501E-05	8.5398	28.6058	35106.6153
210.000	-.002503	65530.2973	-2214.3374	-1.9396E-05	8.2202	29.7389	35646.6153
213.000	-.002561	59021.9521	-2123.3947	-1.9301E-05	7.9132	30.8895	36186.6153
216.000	-.002619	52791.6085	-2028.9739	-1.9216E-05	7.6193	32.0577	36726.6153
219.000	-.002676	46849.7806	-1931.0219	-1.9140E-05	7.3390	33.2436	37266.6153
222.000	-.002733	41207.1422	-1829.4850	-1.9073E-05	7.0728	34.4476	37806.6153
225.000	-.002791	35874.5298	-1724.3089	-1.9014E-05	6.8213	35.6698	38346.6153
228.000	-.002848	30862.9434	-1615.4384	-1.8964E-05	6.5849	36.9105	38886.6153
231.000	-.002904	26183.5493	-1502.8180	-1.8920E-05	6.3642	38.1698	39426.6153
234.000	-.002961	21847.6814	-1386.3914	-1.8884E-05	6.1597	39.4480	39966.6153
237.000	-.003018	17866.8437	-1266.1017	-1.8853E-05	5.9719	40.7452	40506.6153
240.000	-.003074	14252.7115	-1141.8914	-1.8829E-05	5.8014	42.0617	41046.6153
243.000	-.003131	11017.1335	-1013.7025	-1.8810E-05	5.6488	43.3976	41586.6153
246.000	-.003187	8172.1332	-881.4763	-1.8795E-05	5.5146	44.7532	42126.6153
249.000	-.003243	5729.9111	-745.1537	-1.8785E-05	5.3994	46.1285	42666.6153
252.000	-.003300	3702.8451	-604.6753	-1.8777E-05	5.3038	47.5238	43206.6153
255.000	-.003356	2103.4927	-459.9811	-1.8773E-05	5.2283	48.9390	43746.6153
258.000	-.003412	944.5915	-311.0109	-1.8771E-05	5.1737	50.3745	44286.6153
261.000	-.003469	239.0604	-157.7041	-1.8770E-05	5.1404	51.8301	44826.6153
264.000	-.003525	0.0000	0.0000	-1.8770E-05	5.1291	53.3060	22683.3077

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      .00423993 in
Computed slope at pile head      =     -.00004727
Maximum bending moment           =   858155.70304 lbs-in
Maximum shear force              =    -9763.19281 lbs
Depth of maximum bending moment  =    57.00000000 in
Depth of maximum shear force     =      105.00000 in
Number of iterations             =              6
Number of zero deflection points =              1
```

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

```
Type 1 = Shear and Moment,          y = pile-head displacment in
Type 2 = Shear and Slope,           M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness,  V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment,     S = Pile-head Slope, radians
Type 5 = Deflection and Slope,      R = Rot. Stiffness of Pile-head in-lbs/rad
```

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 3940.000	M= 6.60E+05	14500.0000	.0042399	858156.	-9763.1928

The analysis ended normally.

Force/Moment equilibrium check of LPILE results

Upper Block of Pressure

Area No.	Depth (ft) Top	Bottom	Soil Rxn (lbs/in) Top	Bottom	Shape	Force (lbs)	Zcgi (ft)	F x Zcgi (lb-ft)
1	0	0.25	0.0	1.1	tri-d	2	0.17	0
2	0.25	0.5	1.1	2.1	trap-d	5	0.39	2
3	0.5	0.75	2.1	3.1	trap-d	8	0.63	5
4	0.75	1	3.1	4	trap-d	11	0.88	9
5	1	1.25	4.0	4.8	trap-d	13	1.13	15
6	1.25	1.5	4.8	5.5	trap-d	15	1.38	21
7	1.5	1.75	5.5	6.2	trap-d	18	1.63	29
8	1.75	2	6.2	6.8	trap-d	19	1.88	37
9	2	2.25	6.8	7.3	trap-d	21	2.13	45
10	2.25	2.5	7.3	7.8	trap-d	23	2.38	54
11	2.5	2.75	7.8	8.2	trap-d	24	2.63	63
12	2.75	3	8.2	8.5	trap-d	25	2.88	72
13	3	3.25	8.5	8.7	trap-d	26	3.13	81
14	3.25	3.5	8.7	8.9	trap-d	27	3.38	89
15	3.5	3.75	8.9	9.1	trap-d	27	3.63	98
16	3.75	4	9.1	348.6	trap-d	536	3.91	2,100
17	4	4.25	348.6	347.3	trap-u	1,044	4.12	4,306
18	4.25	4.5	347.3	345.7	trap-u	1,040	4.37	4,548
19	4.5	4.75	345.7	343.8	trap-u	1,034	4.62	4,783
20	4.75	5	343.8	341.5	trap-u	1,028	4.87	5,011
21	5	5.25	341.5	338.8	trap-u	1,020	5.12	5,230
22	5.25	5.5	338.8	335.6	trap-u	1,012	5.37	5,437
23	5.5	5.75	335.6	313.9	trap-u	974	5.62	5,479
24	5.75	6	313.9	289.1	trap-u	905	5.87	5,312
25	6	6.25	289.1	264.0	trap-u	830	6.12	5,080
26	6.25	6.5	264.0	238.7	trap-u	754	6.37	4,805
27	6.5	6.75	238.7	213.1	trap-u	678	6.62	4,488
28	6.75	7	213.1	187.2	trap-u	600	6.87	4,126
29	7	7.25	187.2	161.1	trap-u	522	7.12	3,721
30	7.25	7.5	161.1	134.8	trap-u	444	7.37	3,272
31	7.5	7.75	134.8	108.2	trap-u	365	7.62	2,778
32	7.75	8	108.2	81.3	trap-u	284	7.87	2,237
33	8	8.25	81.3	55.2	trap-u	205	8.12	1,662
34	8.25	8.5	55.2	27.8	trap-u	125	8.36	1,041
35	8.5	8.75	27.8	0.0	tri-u	42	8.58	358
					Σ=	13,703		76,393
					Zcg=	5.575		

Force/Moment Equilibrium

applied axial moment (ft-lb)=	5
applied moment (ft-lb)=	55,000
upper block moment (ft-lb)=	76,393
lower block moment (ft-lb)=	-131,396
Σ=	2.1
applied force (lb)=	3,940
upper block force (lb)=	-13,703.22
lower block force (lb)=	9,763.65
Σ=	0.4

Lower Block of Pressure

Area No.	Depth (ft) Top	Bottom	Soil Rxn (lbs/in) Top	Bottom	Shape	Force (lbs)	Zcgi (ft)	F x Zcgi (lb-ft)
36	8.75	9	0.0	27.3	tri-d	41	8.92	365
37	9	9.25	27.3	54.8	trap-d	123	9.14	1,125
37	9.25	9.5	54.8	82.2	trap-d	206	9.38	1,928
37	9.5	9.75	82.2	109.3	trap-d	287	9.63	2,766
37	9.75	10	109.3	136.2	trap-d	368	9.88	3,638
37	10	10.25	136.2	162.9	trap-d	449	10.13	4,544
37	10.25	10.5	162.9	189.5	trap-d	529	10.38	5,486
37	10.5	10.75	189.5	216.0	trap-d	608	10.63	6,464
37	10.75	11	216.0	242.3	trap-d	687	10.88	7,478
37	11	11.25	242.3	268.6	trap-d	766	11.13	8,527
37	11.25	11.5	268.6	294.8	trap-d	845	11.38	9,615
37	11.5	11.75	294.8	321.0	trap-d	924	11.63	10,740
37	11.75	12	321.0	8.6	trap-u	494	11.84	5,851
37	12	12.25	8.6	9.4	trap-d	27	12.13	327
37	12.25	12.5	9.4	10.2	trap-d	29	12.38	364
37	12.5	12.75	10.2	11.0	trap-d	32	12.63	402
37	12.75	13	11.0	11.9	trap-d	34	12.88	442
37	13	13.25	11.9	12.7	trap-d	37	13.13	484
37	13.25	13.5	12.7	13.6	trap-d	39	13.38	528
37	13.5	13.75	13.6	14.5	trap-d	42	13.63	574
37	13.75	14	14.5	15.4	trap-d	45	13.88	622
37	14	14.25	15.4	16.3	trap-d	48	14.13	672
37	14.25	14.5	16.3	17.2	trap-d	50	14.38	722
37	14.5	14.75	17.2	18.2	trap-d	53	14.63	777
37	14.75	15	18.2	19.2	trap-d	56	14.88	835
37	15	15.25	19.2	20.1	trap-d	59	15.13	892
37	15.25	15.5	20.1	21.1	trap-d	62	15.38	950
37	15.5	15.75	21.1	22.2	trap-d	65	15.63	1,015
37	15.75	16	22.2	23.2	trap-d	68	15.88	1,081
37	16	16.25	23.2	24.2	trap-d	71	16.13	1,147
37	16.25	16.5	24.2	25.3	trap-d	74	16.38	1,216
37	16.5	16.75	25.3	26.4	trap-d	78	16.63	1,289
37	16.75	17	26.4	27.5	trap-d	81	16.88	1,364
37	17	17.25	27.5	28.6	trap-d	84	17.13	1,441
37	17.25	17.5	28.6	29.7	trap-d	87	17.38	1,520
37	17.5	17.75	29.7	30.9	trap-d	91	17.63	1,602
37	17.75	18	30.9	32.1	trap-d	95	17.88	1,689
37	18	18.25	32.1	33.2	trap-d	98	18.13	1,775
37	18.25	18.5	33.2	34.4	trap-d	101	18.38	1,863
37	18.5	18.75	34.4	35.7	trap-d	105	18.63	1,959
37	18.75	19	35.7	36.9	trap-d	109	18.88	2,056
37	19	19.25	36.9	38.2	trap-d	113	19.13	2,155
37	19.25	19.5	38.2	39.4	trap-d	116	19.38	2,255
37	19.5	19.75	39.4	40.7	trap-d	120	19.63	2,358
37	19.75	20	40.7	42.1	trap-d	124	19.88	2,469
37	20	20.25	42.1	43.4	trap-d	128	20.13	2,581
37	20.25	20.5	43.4	44.8	trap-d	132	20.38	2,696
37	20.5	20.75	44.8	46.1	trap-d	136	20.63	2,812
37	20.75	21	46.1	47.5	trap-d	140	20.88	2,931
37	21	21.25	47.5	48.9	trap-d	145	21.13	3,055
37	21.25	21.5	48.9	50.4	trap-d	149	21.38	3,184
37	21.5	21.75	50.4	51.8	trap-d	153	21.63	3,315
37	21.75	22	51.8	53.3	trap-d	158	21.88	3,449
					Σ=	9,764		131,396
					Zcg=	13.458		

Bearing Capacity Calculation

BEARING CAPACITY ANALYSIS
TERZAGHI'S METHOD

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>						
Footing Type	CN	S=square, CN=continuous, CR=circular				
Footing Width	2.317	m	7.60	ft		
Footing Depth	0.457	m	1.50	ft		
Soil Cohesion	0.0	kPa	0.0	psf		
Soil Friction Angle	34.00	deg	34.00	deg	0.593412	radians
Soil Unit Weight	18.85	kN/m^3	120.00	pcf		
Water Depth	0.00	m	0.00	ft		
Safety Factor	1.00		1.000			

<<<<<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
Bearing Capacity Factors					
Nc		Nq		Nγ	
Nc= 52.6		Nq= 36.5		Nγ= 39.6	
Effective Unit Weight (kN/m3)			Effective Stress at Depth D		
γ'=	9.04	57.6	4.13	kPa	86 psf
Net Allowable Bearing Capacity (kPa)			Net Allowable Bearing Capacity (ksf)		
q'_{all}=	562		q'_{all}=	11.73	

ENGLISH

SQUARE	q'all=	0.00	+	2.044 *D	+	0.912 *B
CONTINUOUS	q'all=	0.00	+	2.044 *D	+	1.140 *B
CIRCULAR	q'all=	0.00	+	2.044 *D	+	0.684 *B
	q'all in ksf			*D in feet*		*B in feet*

METRIC

SQUARE	q'all=	0.0	+	321.0 *D	+	143.2 *B
CONTINUOUS	q'all=	0.0	+	321.0 *D	+	179.0 *B
CIRCULAR	q'all=	0.0	+	321.0 *D	+	107.40 *B
	q'all in kPa			*D in meters*		*B in meters*

GROUP DELTA CONSULTANTS

BEARING CAPACITY ANALYSIS
TERZAGHI'S METHOD

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>						
Footing Type	CN	S=square, CN=continuous, CR=circular				
Footing Width	1.969	m	6.46	ft		
Footing Depth	0.457	m	1.50	ft		
Soil Cohesion	0.0	kPa	0.0	psf		
Soil Friction Angle	34.00	deg	34.00	deg	0.593412	radians
Soil Unit Weight	18.85	kN/m^3	120.00	pcf		
Water Depth	0.00	m	0.00	ft		
Safety Factor	1.00		1.000			

<<<<<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
Bearing Capacity Factors					
Nc		Nq		Nγ	
Nc= 52.6		Nq= 36.5		Nγ= 39.6	
Effective Unit Weight (kN/m3)			Effective Stress at Depth D		
γ'=	9.04	57.6	4.13	kPa	86 psf
Net Allowable Bearing Capacity (kPa)			Net Allowable Bearing Capacity (ksf)		
q'_{all}=	499		q'_{all}=	10.43	

ENGLISH

SQUARE	q'all=	0.00	+	2.044 *D	+	0.912 *B
CONTINUOUS	q'all=	0.00	+	2.044 *D	+	1.140 *B
CIRCULAR	q'all=	0.00	+	2.044 *D	+	0.684 *B
	q'all in ksf			*D in feet*		*B in feet*

METRIC

SQUARE	q'all=	0.0	+	321.0 *D	+	143.2 *B
CONTINUOUS	q'all=	0.0	+	321.0 *D	+	179.0 *B
CIRCULAR	q'all=	0.0	+	321.0 *D	+	107.40 *B
	q'all in kPa			*D in meters*		*B in meters*

GROUP DELTA CONSULTANTS

BEARING CAPACITY ANALYSIS
TERZAGHI'S METHOD

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>						
Footing Type	CN	S=square, CN=continuous, CR=circular				
Footing Width	2.146	m	7.04	ft		
Footing Depth	0.457	m	1.50	ft		
Soil Cohesion	0.0	kPa	0.0	psf		
Soil Friction Angle	34.00	deg	34.00	deg	0.593412	radians
Soil Unit Weight	18.85	kN/m^3	120.00	pcf		
Water Depth	0.00	m	0.00	ft		
Safety Factor	1.00		1.000			

<<<<<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
Bearing Capacity Factors					
Nc		Nq		Nγ	
Nc= 52.6		Nq= 36.5		Nγ= 39.6	
Effective Unit Weight (kN/m3)			Effective Stress at Depth D		
γ'= 9.04	57.6		4.13 kPa	86	psf
Net Allowable Bearing Capacity (kPa)			Net Allowable Bearing Capacity (ksf)		
q'_{all}= 531			q'_{all}= 11.09		

ENGLISH

SQUARE	q'all=	0.00	+	2.044 *D	+	0.912 *B
CONTINUOUS	q'all=	0.00	+	2.044 *D	+	1.140 *B
CIRCULAR	q'all=	0.00	+	2.044 *D	+	0.684 *B
	q'all in ksf			*D in feet*		*B in feet*

METRIC

SQUARE	q'all=	0.0	+	321.0 *D	+	143.2 *B
CONTINUOUS	q'all=	0.0	+	321.0 *D	+	179.0 *B
CIRCULAR	q'all=	0.0	+	321.0 *D	+	107.40 *B
	q'all in kPa			*D in meters*		*B in meters*

GROUP DELTA CONSULTANTS

BEARING CAPACITY ANALYSIS
TERZAGHI'S METHOD

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>						
Footing Type	CN	S=square, CN=continuous, CR=circular				
Footing Width	1.743	m	5.72	ft		
Footing Depth	0.457	m	1.50	ft		
Soil Cohesion	0.0	kPa	0.0	psf		
Soil Friction Angle	34.00	deg	34.00	deg	0.593412	radians
Soil Unit Weight	18.85	kN/m^3	120.00	pcf		
Water Depth	0.00	m	0.00	ft		
Safety Factor	1.00		1.000			

<<<<<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
Bearing Capacity Factors					
Nc		Nq		Nγ	
Nc= 52.6		Nq= 36.5		Nγ= 39.6	
Effective Unit Weight (kN/m3)			Effective Stress at Depth D		
γ'= 9.04	57.6		4.13 kPa	86	psf
Net Allowable Bearing Capacity (kPa)			Net Allowable Bearing Capacity (ksf)		
q'_{all}= 459			q'_{all}= 9.59		

ENGLISH

SQUARE	q'all=	0.00	+	2.044 *D	+	0.912 *B
CONTINUOUS	q'all=	0.00	+	2.044 *D	+	1.140 *B
CIRCULAR	q'all=	0.00	+	2.044 *D	+	0.684 *B
	q'all in ksf			*D in feet*		*B in feet*

METRIC

SQUARE	q'all=	0.0	+	321.0 *D	+	143.2 *B
CONTINUOUS	q'all=	0.0	+	321.0 *D	+	179.0 *B
CIRCULAR	q'all=	0.0	+	321.0 *D	+	107.40 *B
	q'all in kPa			*D in meters*		*B in meters*

GROUP DELTA CONSULTANTS

BEARING CAPACITY ANALYSIS
TERZAGHI'S METHOD

<<<<<<<<<<<<<<<<<<<<INPUT>>>>>>>>>>>>>>>>>>>>						
Footing Type	CN	S=square, CN=continuous, CR=circular				
Footing Width	1.939	m	6.36	ft		
Footing Depth	0.457	m	1.50	ft		
Soil Cohesion	0.0	kPa	0.0	psf		
Soil Friction Angle	34.00	deg	34.00	deg	0.593412	radians
Soil Unit Weight	18.85	kN/m^3	120.00	pcf		
Water Depth	0.00	m	0.00	ft		
Safety Factor	1.00		1.000			

<<<<<<<<<<<<<<<<<<<<<<<<<<<<OUTPUT>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
Bearing Capacity Factors					
Nc		Nq		Nγ	
Nc= 52.6		Nq= 36.5		Nγ= 39.6	
Effective Unit Weight (kN/m3)			Effective Stress at Depth D		
γ'= 9.04	57.6		4.13 kPa	86	psf
Net Allowable Bearing Capacity (kPa)			Net Allowable Bearing Capacity (ksf)		
q'_{all}= 494			q'_{all}= 10.32		

ENGLISH

SQUARE	q'all=	0.00	+	2.044 *D	+	0.912 *B
CONTINUOUS	q'all=	0.00	+	2.044 *D	+	1.140 *B
CIRCULAR	q'all=	0.00	+	2.044 *D	+	0.684 *B
	q'all in ksf			*D in feet*		*B in feet*

METRIC

SQUARE	q'all=	0.0	+	321.0 *D	+	143.2 *B
CONTINUOUS	q'all=	0.0	+	321.0 *D	+	179.0 *B
CIRCULAR	q'all=	0.0	+	321.0 *D	+	107.40 *B
	q'all in kPa			*D in meters*		*B in meters*

GROUP DELTA CONSULTANTS

Static/Seismic Earth pressure calculation

COULOMB AND MONONABE-OKABE EARTH PRESSURE CALCULATIONS

			<INPUT>			
Unit Weight =	γ	=	120	pcf =	18.9	kN/m^3
Friction Angle =	ϕ	=	34	degrees =	0.593412	radians
Wall Friction Angle =	ϕ_w	=	0.0	degrees =	0	radians
Wall Inclination =	α	=	0	degrees =	0	radians
Slope Inclination =	β	=	0.000	degrees =	0	radians
Horiz. EQ Coeff. =	K_h	=	0.300			
Vert. EQ Coeff. =	K_v	=	0			

<<OUTPUT>>

COULOMB STATIC				SEISMIC INCREMENT			
	EFP		i_A		EFP		i_{AE}
K_A	pcf	kN/m3	deg	K_{AE}-K_A	pcf	kN/m3	deg
0.283	33.93	5.33	62.0	0.212	25	4.0	46.64
RANKINE STATIC				max K_h=	0.674508516842427		
0.283	33.9	5.3	62.0	max β=	17.30075576600640		deg

<< COULOMB CALCULATION>>

STATIC ACTIVE EARTH PRESSURE / STATIC CRITICAL INCLINATION

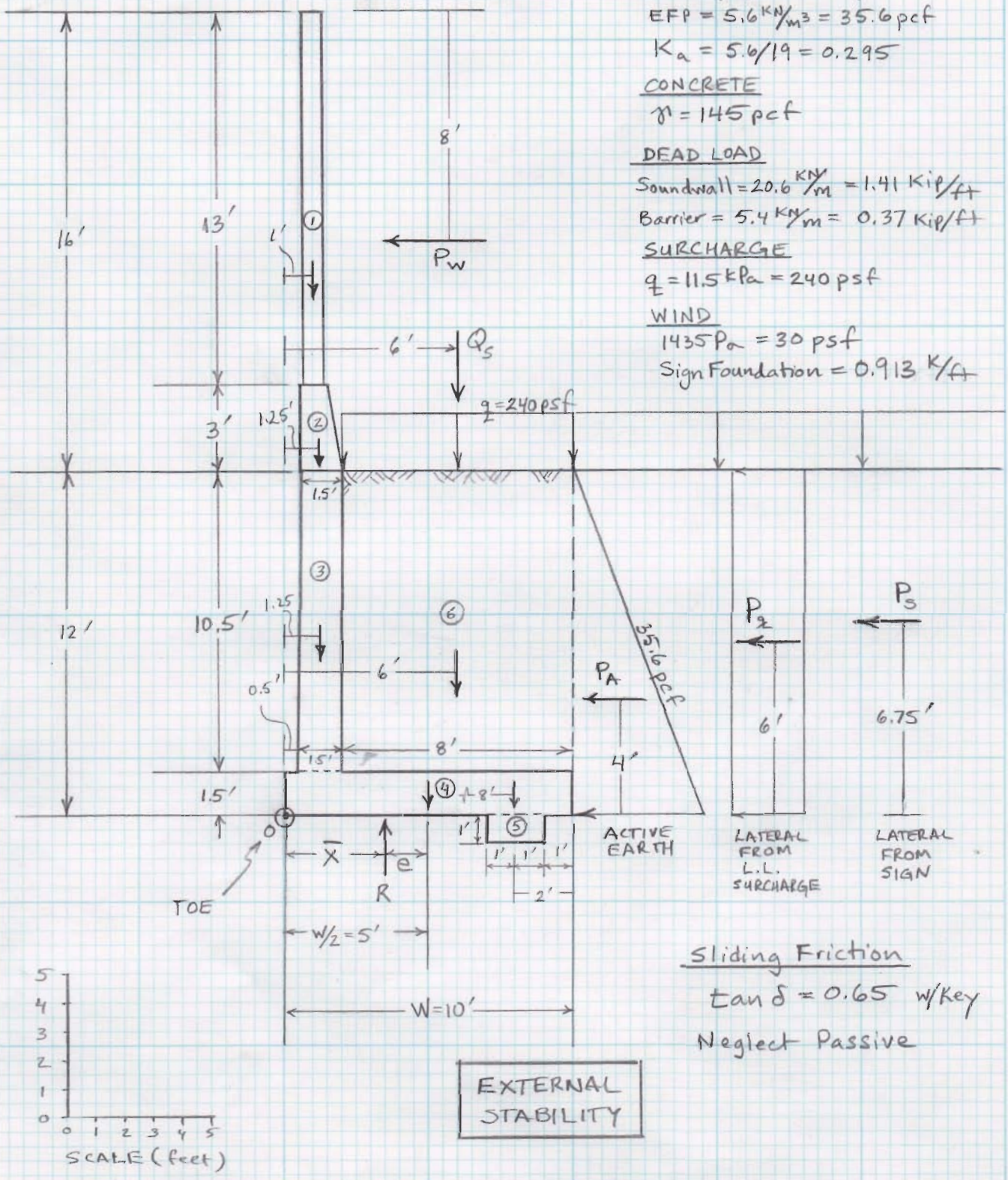
	A	B	C	D	E	K_A	C1	C2	i_A
degrees	34.0	0.0	34.0	34.0	0.0				62.00
radians	0.593	0.000	0.593	0.593	0.000	0.283	1.206	1.000	1.082104

SEISMIC ACTIVE EARTH PRESSURE / SEISMIC CRITICAL INCLINATION

	θ	A'	B'	C'	D'	E'	K_{AE}	C1E	C2E	i_{AE}
degrees	16.7	17.3	16.7	34.0	17.3	0				46.64
radians	0.291	0.302	0.291	0.593	0.302	0.000	0.495	1.468	2.057	0.814052

Retaining wall external stability calculations

RETAINING WALL TYPE 5 SWB (XS14-350)



ACTUAL H = 10.5'

SOIL

$\gamma = 19\ KN/m^3 = 120.9$ pcf

EFP $= 5.6\ KN/m^3 = 35.6$ pcf

$K_a = 5.6/19 = 0.295$

CONCRETE

$\gamma = 145$ pcf

DEAD LOAD

Soundwall $= 20.6\ KN/m = 1.41$ Kip/ft

Barrier $= 5.4\ KN/m = 0.37$ Kip/ft

SURCHARGE

$q = 11.5$ kPa $= 240$ psf

WIND

1435 $P_a = 30$ psf

Sign Foundation $= 0.913$ K/ft

Sliding Friction

$\tan\delta = 0.65$ w/Key

Neglect Passive

EXTERNAL STABILITY

GROUP DELTA CONSULTANTS

PROJECT NAME: WCC : 405/22 HOV Conn. Seg.

PROJECT NUMBER: I-436

DATE: 3/20/09

DRAWN BY: CR

CHECKED BY:

PAGE: 1 OF 5

COMPUTE FORCES + MOMENTS ABOUT TOE

VERTICAL

		FORCE (K/ft)	ARM (ft)	MOMENT (K·ft/ft)
① SOUNDWALL		1.41	1	1.41
② BARRIER		0.37	1.25	0.46
③ STEM	$0.145 \times 1.5' \times 10.5' =$	2.28	1.25	2.85
④ FOOTING	$0.145 \times 1.5' \times 10' =$	2.18	5	10.88
⑤ KEY	$0.145 \times 1' \times 2' =$	0.29	8	2.32
⑥ SOIL ON FOOTING	$0.1209 \times 8' \times 10.5' =$	10.16	6	60.93
SURCHARGE ABOVE FOOTING Q_S	$0.24\ ksf \times 8' =$	1.92	6	11.52
INCLUDING Q_S	$\Sigma F_V =$	18.61	INCL. Q_S $\Sigma M_R =$	90.37
WITHOUT Q_S	$\Sigma F_V =$	16.69	WITHOUT Q_S $\Sigma M_R =$	78.85

HORIZONTAL

		FORCE (K/ft)	ARM (ft)	MOMENT (ft·K/ft)
ACTIVE EARTH	$P_A = \frac{1}{2}(.0356)(12')^2 =$	2.56	4	10.25
LATERAL FROM LL. SURCHARGE	$P_{q_t} = 0.295(.24)(12) =$	0.85	6	5.10
LATERAL FROM SIGN	$P_S = 0.913 =$	0.913	6.75	6.17
WIND ON SW + B	$P_W = 0.03 \times 16 =$	0.48	20	9.60
GROUP A: D+E+SC	$\Sigma F_H =$	3.41		$\Sigma M_{OT} = 15.35$
GROUP B: D+E+SC+W w/o sign	$\Sigma F_H =$	3.89		$\Sigma M_{OT} = 24.95$
w/sign	$\Sigma F_H =$	4.80		$\Sigma M_{OT} = 31.12$

EVALUATE SLIDING + OVERTURNING

① LOAD CASE – GROUP A, Ignore Surcharge Load on Footing

SLIDING $FS = \dfrac{\Sigma F_V \cdot \tan\delta}{\Sigma F_H} = \dfrac{16.69(0.65)}{3.41} = 3.2$

> 1.5 O.K.

OVERTURNING $FS = \dfrac{\Sigma M_R}{\Sigma M_{OT}} = \dfrac{78.85}{15.35} = 5.14 > 2$ O.K.

eccentricity $\Sigma M_R - \Sigma M_{OT} - \bar{X} \cdot \Sigma F_V = 0$

$\rightarrow \bar{X} = \dfrac{\Sigma M_R - \Sigma M_{OT}}{\Sigma F_V} = \dfrac{78.85 - 15.35}{16.69} = 3.80$

$e = \dfrac{W}{2} - \bar{X} = 5 - 3.80 = 1.2 < \dfrac{W}{6} = 1.67$

O.K. resultant in middle 1/3
100% base in compression

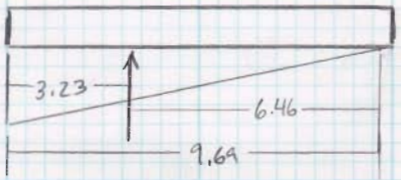
② GROUP B – W/o Sign, Ignore Qs over footing

SLIDING $FS = \dfrac{16.69(0.65)}{3.89} = 2.79 > 1.5$ O.K.

OVERTURNING $FS = \dfrac{78.85}{24.95} = 3.16 > 2$ O.K.

$\bar{X} = \dfrac{78.85 - 24.95}{16.69} = 3.23'$

$e = 5 - 3.23 = 1.77' > B/6$ but $< B/4$



≈97% of base in compression > 75%

MEETS USACOE CRITERIA O.K.

SLIDING + OVERTURNING (CONT'D)

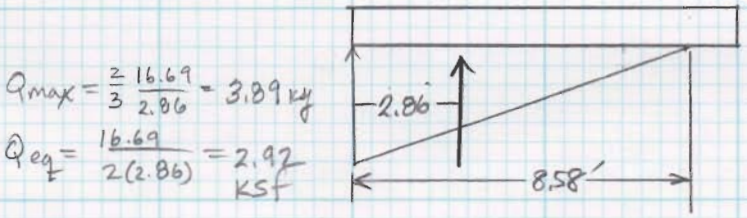
③ Group B – Including Sign Load, ignoring Q_S

SLIDING $FS = \frac{16.69(0.65)}{4.80} = 2.26 > 1.5$ O.K.

OVERTURNING $FS = \frac{78.85}{31.12} = 2.53 > 2$ O.K.

$$\bar{X} = \frac{78.85 - 31.12}{16.69} = 2.86'$$

$e = 5 - 2.86 = 2.14 < B/4$



86% of base in compression > 75%

MEETS USACOE CRITERIA O.K.

EVALUATE BEARING PRESSURE

Include Q_S over footing, Group B w/o Sign

$$\bar{X} = \frac{\Sigma M_R - \Sigma M_{OT}}{\Sigma F_V} = \frac{90.37 - 24.95}{18.61} = 3.52$$

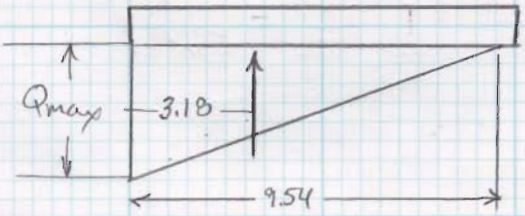
$e = 5 - 3.52 = 1.48 < W/6$, 100% Base in Comp.

$$Q_{max,min} = \frac{\Sigma F_V}{W}\left(1 \pm \frac{6e}{W}\right) = \frac{18.61}{10}\left(1 \pm \frac{6(1.48)}{10}\right) = \begin{matrix} 3.51 \text{ ksf MAX} \\ 0.21 \text{ ksf MIN} \end{matrix}$$

$$Q_{eq.} = \frac{\Sigma F_V}{W - 2e} = \frac{18.61}{7.04} = 2.64 \text{ ksf}$$

GROUP B WITH SIGN

$$\bar{X} = \frac{90.37 - 31.12}{18.61} = 3.18 \rightarrow e = 1.82 > B/6$$ 95% base in comp.



$\frac{1}{2} Q_{max} \times 3 \cdot \bar{X} = \Sigma F_V$

$Q_{max} = \frac{2}{3}\frac{\Sigma F_V}{\bar{X}} = \frac{2}{3}\frac{(18.61)}{3.18} = 3.90$ ksf

$Q_{eq} = \frac{\Sigma F_V}{2 \cdot \bar{X}} = \frac{18.61}{2(3.18)} = 2.93$ ksf O.K.

USING TERZAGHI'S FORMULA $\phi = 34°$, $\gamma = 120$ pcf, $D_w = 0$ submerged sand, $D = 15'$

FOR LARGEST $e = 2.14$, Effective Footing Width is

$$W' = W - 2e = 10' - 2(2.14) = 5.72'$$

$$\rightarrow Q'_{ult} = 9.59 \text{ ksf} \quad \text{minimum}$$

FOR WORST CASE LOADING

$$Q'_e = 2.93 \text{ ksf}$$

SAFETY FACTOR

$$FS = \frac{9.59}{2.93} = 3.27 > 3 \quad \underline{\text{O.K.}}$$

SUMMARY OF EXTERNAL STABILITY ANALYSES

	LOAD CASE	Q_s ON FOOTING ?	FS SLIDING	FS OVERTURN	e (ft)	% Base in COMP	W' (ft)	Q'_{ult} (ksf)	Q'_{eq} (ksf)	FS BEARING
Group A	D+E+SC	No	3.2	5.1	1.20	100	7.6	11.7	2.2	5.3
Group B (No Sign)	D+E+SC +W	No	2.8	3.2	1.77	97	6.46	10.4	2.6	4.0
		Yes	N/A	N/A	1.48	100	7.04	11.1	2.6	4.3
Group B (+Sign)	D+E+SC +W+Sign	No	2.3	2.5	2.14	86	5.72	9.6	2.9	3.3
		Yes	N/A	N/A	1.82	95	6.36	10.3	2.9	3.6

↑ LOAD CASES FOR EXT. STABILITY (XS14-350)

↑ LL Surcharge not considered as stabilizing force for slide/overturning, considered only for bearing

↑ Eccentricity

↑ USACOE requires: 100% ($e < W/6$) for "usual" loads; 75% ($e < W/4$) for "unusual" loads

↑ Eff. Width = W-2e

↑ Ult. Bearing Capacity using W' (Terzaghi)

↑ Equiv. Applied Bearing on W'

GROUP DELTA CONSULTANTS

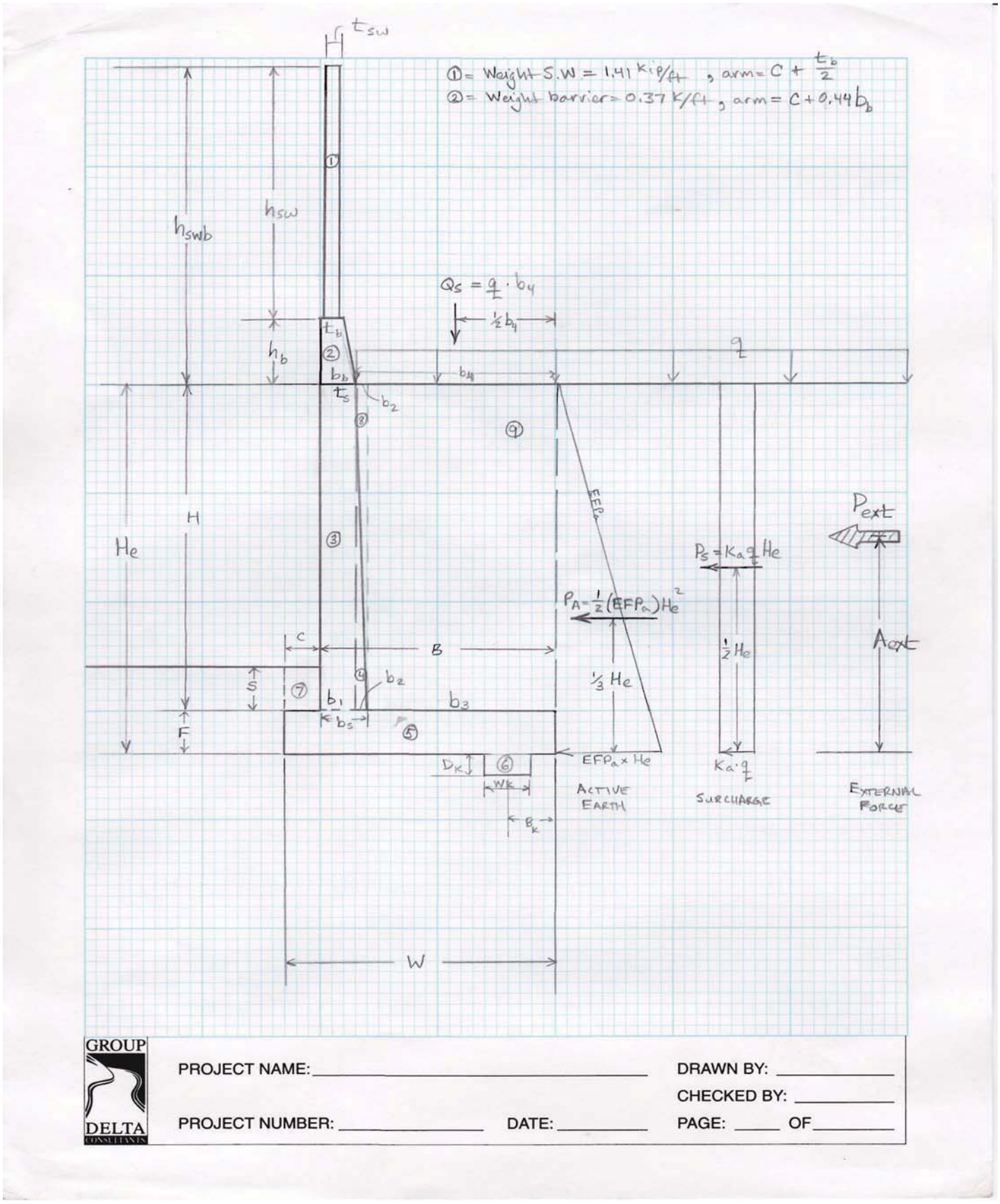
PROJECT NAME: WCC: 405/22 HOV Conn. Segment

PROJECT NUMBER: I-436

DATE: 3/20/09

DRAWN BY: CL

CHECKED BY:



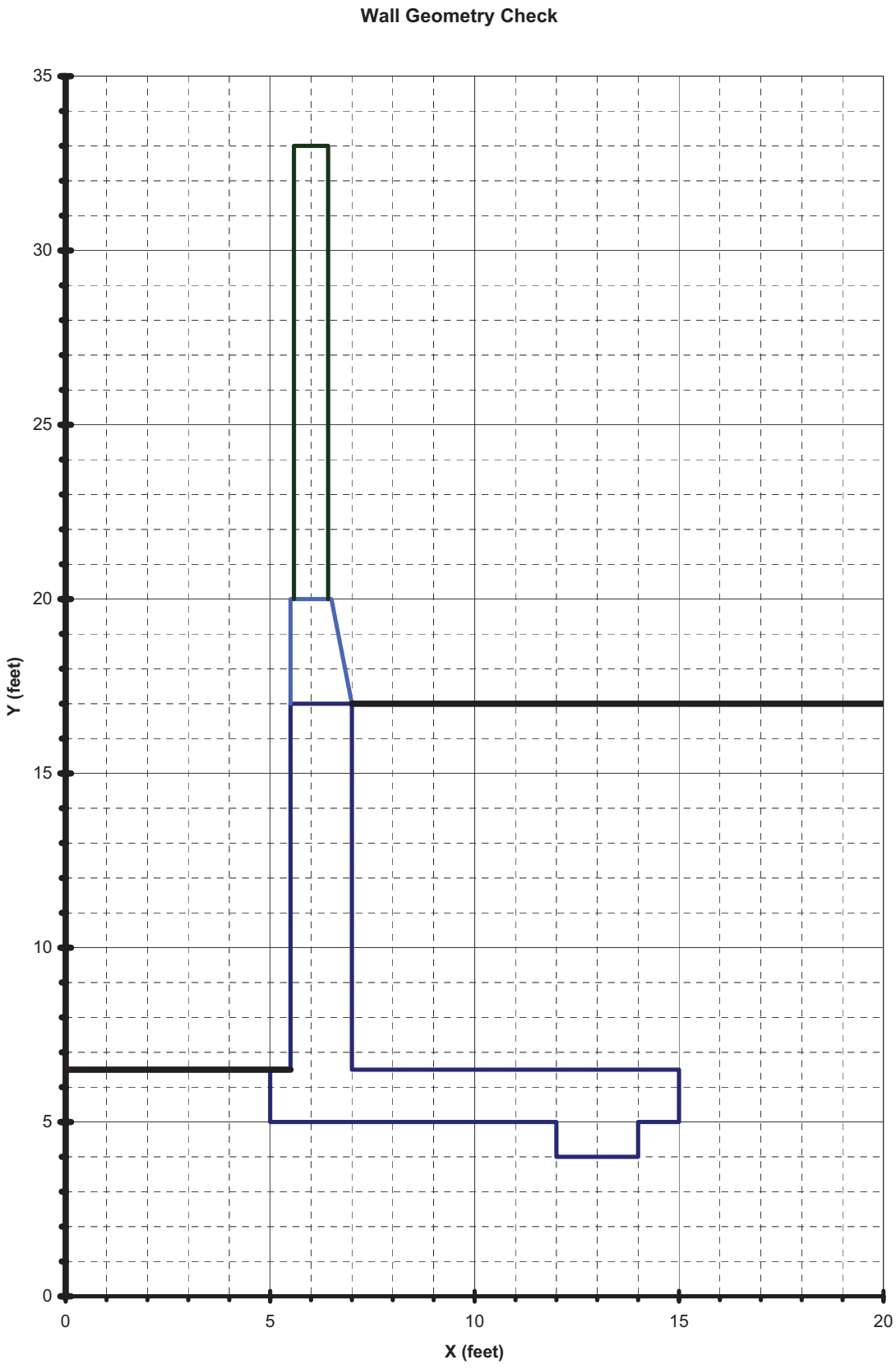
GROUP DELTA CONSULTANTS

PROJECT NAME: _____ DRAWN BY: _____

CHECKED BY: _____

PROJECT NUMBER: _____ DATE: _____ PAGE: _____ OF _____

DEFINITION SKETCH


Wall Geometry Check
35
30
25
20
15
10
5
0
Y (feet)
0
5
10
15
20
X (feet)

ANALYSIS OF TYPE 5SWB RETAINING WALL

SOIL DATA INPUT

γ =	120.9	pcf	19.0	kcm
ϕ =	34.0	deg	0.5934	rad
tan ϕ_b =	0.65			
γ conc =	145	pcf	22.8	kcm

EARTH PRESSURE INPUT

Ka =	0.2947	EFPa =	35.6	pcf	5.6	kcm
Kp=	0.00	EFPp =	0	pcf	0.0	kcm

WALL GEOMETRY AND DATA INPUT

H =	10.5	ft	3.200	m
W =	10	ft	3.048	m
C =	0.5	ft	0.152	m
B =	9.5	ft	2.896	m
F =	1.5	ft	0.457	m
S =	0	ft	0.000	m
Dk =	1	ft	0.305	m
Wk =	2	ft	0.610	m
Bk =	2	ft	0.610	m
Weight SW=	1410	lb/ft	20.6	kN/m
Weight barrier=	370	lb/ft	5.4	kN/m
Hsw=	13	ft	3.962	m
Hb=	3	ft	0.914	m
ts =	1.500	ft	0.457	m
bs =	1.5	ft	0.457	m
tsw =	0.833333	ft	0.254	m
tb =	1	ft	0.305	m
bb =	1.5	ft	0.457	m
Ext. Horiz. Pe =	0	lb/ft	0.0	kN/m
arm on Pe =	0	ft	0.000	m
Wind Pressure=	0	psf	0.000	kPa
qs=	240	psf	11.5	kPa

WALL GEOMETRY CALC

b1 =	1.500	ft	0.457	m
b2 =	0.000	ft	0.000	m
b3 =	8.000	ft	2.438	m
b4 =	8.000	ft	2.438	m
Hsw+Hb=	16.000	ft	4.877	m
He =	12.000	ft	3.658	m

GEOMETRY PLOT DATA

X	Y	X	Y
0.0	6.5	5.5	17.0
5.5	6.5	5.5	20.0
5.5	6.5	6.5	20.0
5.0	6.5	7.0	17.0
5.0	5.0	5.6	20.0
12.0	5.0	5.6	33.0
12.0	4.0	6.4	33.0
14.0	4.0	6.4	20.0
14.0	5.0	7.0	17.0
15.0	5.0	25.0	17.0
15.0	6.5		
7.0	6.5		
7.0	17.0		
5.5	17.0		
5.5	6.5		

FORCES AND MOMENTS

VERTICAL

Force	(lbs/ft)	Arm (ft)	Moment (lb-ft/ft)
W1 =	1,410	1.00	1,410
W2 =	370	1.13	419
W3 =	2,284	1.25	2,855
W4 =	0	2.00	0
W5 =	2,175	5.00	10,875
W6 =	290	8.00	2,320
W7 =	0	0.25	0
W8 =	0	2.00	0
W9=	10,156	6.00	60,934
Qs=	1,920	6.00	11,520
ΣFv =	16,684 **lbs**	ignore Qs	**ΣM_R =** 78,813 **lb-ft** ignore Qs
ΣFv =	18,604 **lbs**	include Qs	**ΣM_R =** 90,333 **lb-ft** include Qs

DRIVING HORIZONTAL

Force	(lbs/ft)	Arm (ft)	Moment (lb-ft/ft)
P_A=	2,565	4.00	10,261
P_S=	849	6.00	5,092
P_W=	0	20.00	0
Pext=	0	0.00	0
ΣFh =	3,431		**ΣM_{OT} =** 15,354

PASSIVE (on footing only)

Pp = 0 lb/ft

PASSIVE (ground to bottom of key)

Pp = 0 lb/ft

FACTORS OF SAFETY

SLIDING (don't include Qs on footing)

FS =	3.16	**passive ftg only**
FS =	3.16	**neglecting passive**
FS =	3.16	**full passive**

OVERTURNING (don't include Qs on footing)

FS = 5.13

LOCATION OF RESULTANT AND ECCENTRICITY (with surcharge over footing)

Xbar =	4.030	**feet**	**% base in compression=**	100.0%	
e =	0.970	**feet**			
W/6 =	1.67	**feet**	**W/4 =**	2.50	**feet**
e≤W/6?	**YES**		**e≤W/4?**	**YES**	

LOCATION OF RESULTANT AND ECCENTRICITY (without surcharge over footing)

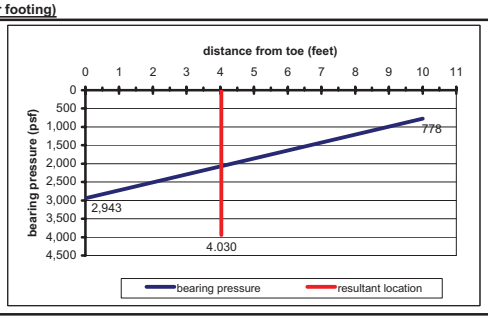
Xbar =	3.804	**feet**	**% base in compression=**	100.0%	
e =	1.196	**feet**			
W/6 =	1.67	**feet**	**W/4 =**	2.50	**feet**
e≤W/6?	**YES**		**e≤W/4?**	**YES**	

BEARING PRESSURE DISTRIBUTION (with surcharge over footing)

Q'equiv =	2,308	psf	111	**kPa**
Qmax =	2,943	psf	141	**kPa**
Qmin =	778	psf	37	**kPa**

Plot Data

0	2,943
10.00	778
4.030	0
4.030	3,943

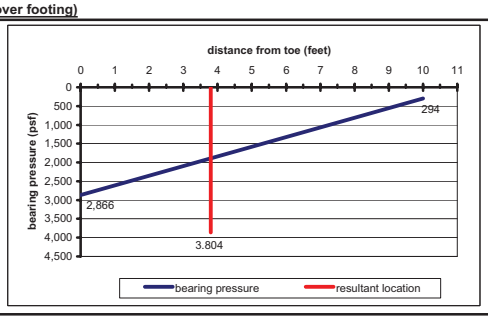


BEARING PRESSURE DISTRIBUTION (without surcharge over footing)

Q'equiv =	2,193	psf	105	**kPa**
Qmax =	2,866	psf	137	**kPa**
Qmin =	294	psf	14	**kPa**

Plot Data

0	2,866
10.00	294
3.804	0
3.804	3,866



ANALYSIS OF TYPE 5SWB RETAINING WALL

SOIL DATA INPUT

γ =	120.9	pcf	19.0	kcm
ϕ =	34.0	deg	0.5934	rad
tan ϕ_b =	0.65			
γ conc =	145	pcf	22.8	kcm

EARTH PRESSURE INPUT

Ka =	0.2947	EFPa =	35.6	pcf	5.6	kcm
Kp=	0.00	EFPp =	0	pcf	0.0	kcm

WALL GEOMETRY AND DATA INPUT

H =	10.5	ft	3.200	m
W =	10	ft	3.048	m
C =	0.5	ft	0.152	m
B =	9.5	ft	2.896	m
F =	1.5	ft	0.457	m
S =	0	ft	0.000	m
Dk =	1	ft	0.305	m
Wk =	2	ft	0.610	m
Bk =	2	ft	0.610	m
Weight SW=	1410	lb/ft	20.6	kN/m
Weight barrier=	370	lb/ft	5.4	kN/m
Hsw=	13	ft	3.962	m
Hb=	3	ft	0.914	m
ts =	1.500	ft	0.457	m
bs =	1.5	ft	0.457	m
tsw =	0.833333	ft	0.254	m
tb =	1	ft	0.305	m
bb =	1.5	ft	0.457	m
Ext. Horiz. Pe =	0	lb/ft	0.0	kN/m
arm on Pe =	0	ft	0.000	m
Wind Pressure=	30	psf	1.436	kPa
qs=	240	psf	11.5	kPa

WALL GEOMETRY CALC

b1 =	1.500	ft	0.457	m
b2 =	0.000	ft	0.000	m
b3 =	8.000	ft	2.438	m
b4 =	8.000	ft	2.438	m
Hsw+Hb=	16.000	ft	4.877	m
He =	12.000	ft	3.658	m

GEOMETRY PLOT DATA

X	Y	X	Y
0.0	6.5	5.5	17.0
5.5	6.5	5.5	20.0
5.5	6.5	6.5	20.0
5.0	6.5	7.0	17.0
5.0	5.0	5.6	20.0
12.0	5.0	5.6	33.0
12.0	4.0	6.4	33.0
14.0	4.0	6.4	20.0
14.0	5.0	7.0	17.0
15.0	5.0	25.0	17.0
15.0	6.5		
7.0	6.5		
7.0	17.0		
5.5	17.0		
5.5	6.5		

FORCES AND MOMENTS

VERTICAL

Force	(lbs/ft)	Arm (ft)	Moment (lb-ft/ft)
W1 =	1,410	1.00	1,410
W2 =	370	1.13	419
W3 =	2,284	1.25	2,855
W4 =	0	2.00	0
W5 =	2,175	5.00	10,875
W6 =	290	8.00	2,320
W7 =	0	0.25	0
W8 =	0	2.00	0
W9=	10,156	6.00	60,934
Qs=	1,920	6.00	11,520
ΣFv =	16,684 **lbs**	ignore Qs	**ΣM$_R$ =** 78,813 **lb-ft** ignore Qs
ΣFv =	18,604 **lbs**	include Qs	**ΣM$_R$ =** 90,333 **lb-ft** include Qs

DRIVING HORIZONTAL

Force	(lbs/ft)	Arm (ft)	Moment (lb-ft/ft)
P_A=	2,565	4.00	10,261
P_S=	849	6.00	5,092
P_W=	480	20.00	9,600
Pext=	0	0.00	0
ΣFh =	3,911		**ΣM$_{OT}$ =** 24,954

PASSIVE (on footing only)

Pp = 0 lb/ft

PASSIVE (ground to bottom of key)

Pp = 0 lb/ft

FACTORS OF SAFETY

SLIDING (don't include Qs on footing)

FS =	2.77	**passive ftg only**
FS =	2.77	**neglecting passive**
FS =	2.77	**full passive**

OVERTURNING (don't include Qs on footing)

FS = 3.16

LOCATION OF RESULTANT AND ECCENTRICITY (with surcharge over footing)

Xbar =	3.514	**feet**	**% base in compression=**	100.0%	
e =	1.486	**feet**			
W/6 =	1.67	**feet**	**W/4 =**	2.50	**feet**
e≤W/6?	**YES**		**e≤W/4?**	**YES**	

LOCATION OF RESULTANT AND ECCENTRICITY (without surcharge over footing)

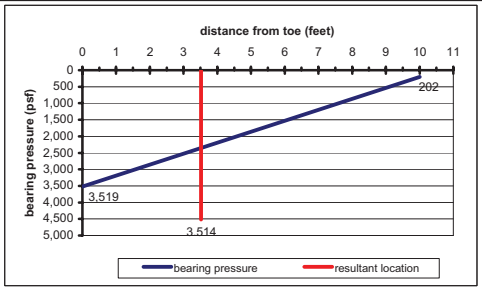
Xbar =	3.228	**feet**	**% base in compression=**	96.8%	
e =	1.772	**feet**			
W/6 =	1.67	**feet**	**W/4 =**	2.50	**feet**
e≤W/6?	**NO**		**e≤W/4?**	**YES**	

BEARING PRESSURE DISTRIBUTION (with surcharge over footing)

Q'equiv =	2,647	psf	127	**kPa**
Qmax =	3,519	psf	168	**kPa**
Qmin =	202	psf	10	**kPa**

Plot Data

0	3,519
10.00	202
3.514	0
3.514	4,519

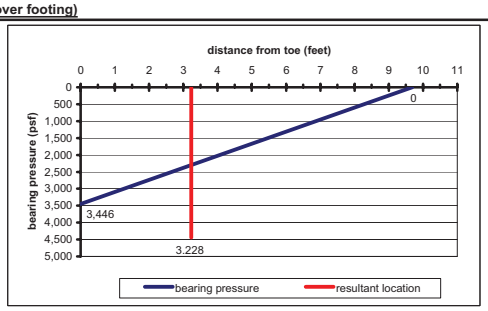


BEARING PRESSURE DISTRIBUTION (without surcharge over footing)

Q'equiv =	2,584	psf	124	**kPa**
Qmax =	3,446	psf	165	**kPa**
Qmin =	0	psf	0	**kPa**

Plot Data

0	3,446
9.68	0
3.228	0
3.228	4,446



ANALYSIS OF TYPE 5SWB RETAINING WALL

SOIL DATA INPUT

γ =	120.9	pcf	19.0	kcm
ϕ =	34.0	deg	0.5934	rad
tan ϕ_b =	0.65			
γ conc =	145	pcf	22.8	kcm

EARTH PRESSURE INPUT

Ka =	0.2947	EFPa =	35.6	pcf	5.6	kcm
Kp=	0.00	EFPp =	0	pcf	0.0	kcm

WALL GEOMETRY AND DATA INPUT

H =	10.5	ft	3.200	m
W =	10	ft	3.048	m
C =	0.5	ft	0.152	m
B =	9.5	ft	2.896	m
F =	1.5	ft	0.457	m
S =	0	ft	0.000	m
Dk =	1	ft	0.305	m
Wk =	2	ft	0.610	m
Bk =	2	ft	0.610	m
Weight SW=	1410	lb/ft	20.6	kN/m
Weight barrier=	370	lb/ft	5.4	kN/m
Hsw=	13	ft	3.962	m
Hb=	3	ft	0.914	m
ts =	1.500	ft	0.457	m
bs =	1.5	ft	0.457	m
tsw =	0.833333	ft	0.254	m
tb =	1	ft	0.305	m
bb =	1.5	ft	0.457	m
Ext. Horiz. Pe =	913	lb/ft	13.3	kN/m
arm on Pe =	6.75	ft	2.057	m
Wind Pressure=	30	psf	1.436	kPa
qs=	240	psf	11.5	kPa

WALL GEOMETRY CALC

b1 =	1.500	ft	0.457	m
b2 =	0.000	ft	0.000	m
b3 =	8.000	ft	2.438	m
b4 =	8.000	ft	2.438	m
Hsw+Hb=	16.000	ft	4.877	m
He =	12.000	ft	3.658	m

GEOMETRY PLOT DATA

X	Y	X	Y
0.0	6.5	5.5	17.0
5.5	6.5	5.5	20.0
5.5	6.5	6.5	20.0
5.0	6.5	7.0	17.0
5.0	5.0	5.6	20.0
12.0	5.0	5.6	33.0
12.0	4.0	6.4	33.0
14.0	4.0	6.4	20.0
14.0	5.0	7.0	17.0
15.0	5.0	25.0	17.0
15.0	6.5		
7.0	6.5		
7.0	17.0		
5.5	17.0		
5.5	6.5		

FORCES AND MOMENTS

VERTICAL

Force	(lbs/ft)	Arm (ft)	Moment (lb-ft/ft)
W1 =	1,410	1.00	1,410
W2 =	370	1.13	419
W3 =	2,284	1.25	2,855
W4 =	0	2.00	0
W5 =	2,175	5.00	10,875
W6 =	290	8.00	2,320
W7 =	0	0.25	0
W8 =	0	2.00	0
W9=	10,156	6.00	60,934
Qs=	1,920	6.00	11,520
ΣFv =	16,684 **lbs**	ignore Qs	**ΣM_R =** 78,813 **lb-ft** ignore Qs
ΣFv =	18,604 **lbs**	include Qs	**ΣM_R =** 90,333 **lb-ft** include Qs

DRIVING HORIZONTAL

Force	(lbs/ft)	Arm (ft)	Moment (lb-ft/ft)
P_A=	2,565	4.00	10,261
P_S=	849	6.00	5,092
P_W=	480	20.00	9,600
Pext=	913	6.75	6,163
ΣFh =	4,824	**ΣM_{OT} =**	31,116

PASSIVE (on footing only)

Pp = 0 lb/ft

PASSIVE (ground to bottom of key)

Pp = 0 lb/ft

FACTORS OF SAFETY

SLIDING (don't include Qs on footing)

FS =	2.25	**passive ftg only**
FS =	2.25	**neglecting passive**
FS =	2.25	**full passive**

OVERTURNING (don't include Qs on footing)

FS = 2.53

LOCATION OF RESULTANT AND ECCENTRICITY (with surcharge over footing)

Xbar =	3.183	**feet**	**% base in compression=**	95.5%	
e =	1.817	**feet**			
W/6 =	1.67	**feet**	**W/4 =**	2.50	**feet**
e≤W/6?	**NO**		**e≤W/4?**	**YES**	

LOCATION OF RESULTANT AND ECCENTRICITY (without surcharge over footing)

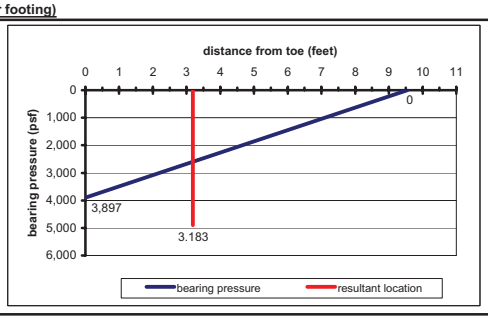
Xbar =	2.859	**feet**	**% base in compression=**	85.8%	
e =	2.141	**feet**			
W/6 =	1.67	**feet**	**W/4 =**	2.50	**feet**
e≤W/6?	**NO**		**e≤W/4?**	**YES**	

BEARING PRESSURE DISTRIBUTION (with surcharge over footing)

Q'equiv =	2,923	psf	140	**kPa**
Qmax =	3,897	psf	187	**kPa**
Qmin =	0	psf	0	**kPa**

Plot Data

0	3,897
9.55	0
3.183	0
3.183	4,897

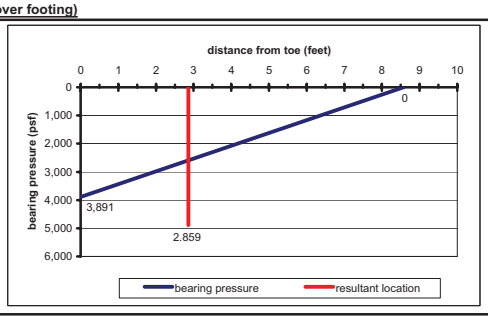


BEARING PRESSURE DISTRIBUTION (without surcharge over footing)

Q'equiv =	2,918	psf	140	**kPa**
Qmax =	3,891	psf	186	**kPa**
Qmin =	0	psf	0	**kPa**

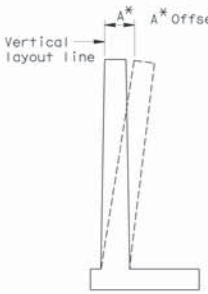
Plot Data

0	3,891
8.58	0
2.859	0
2.859	4,891



Retaining Wall Type 5SWB (xs14-350)

RELEASED 7-29-03

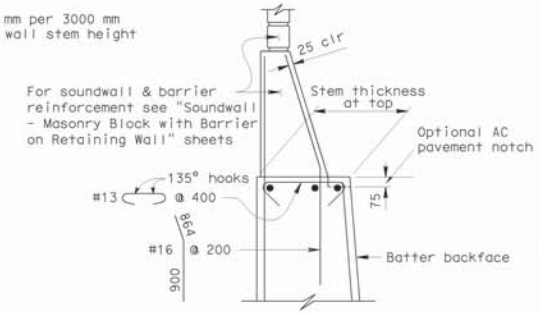


A* Offset = 12 mm per 3000 mm of wall stem height

WALL OFFSET

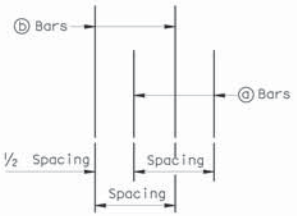
NO SCALE

Values for offsetting forms to be determined by the engineer



DETAIL A WITHOUT HAUNCH

NO SCALE



DETAIL B

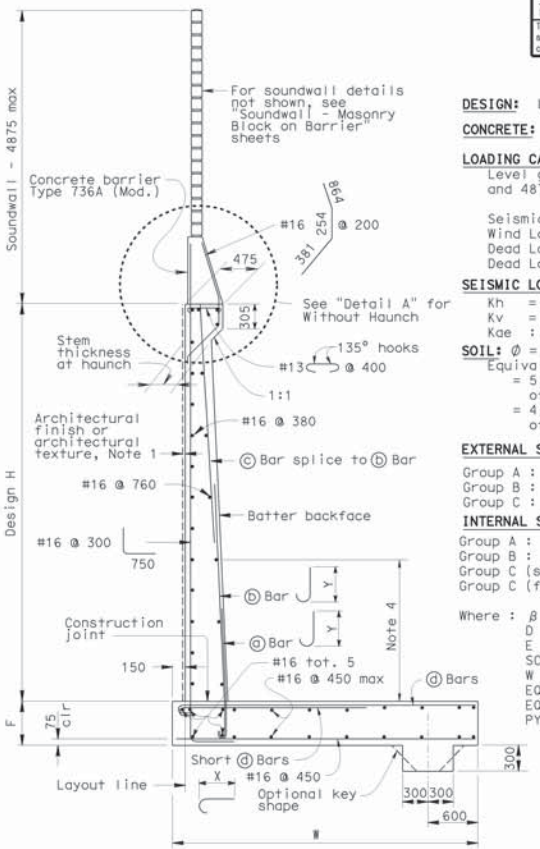
NO SCALE

ALTERNATIVE A: (CONSTANT TOP OF WALL THICKNESS) TABLE OF REINFORCING STEEL DIMENSIONS AND DATA

STEM WITH HAUNCH													
Design H	1800	2400	3000	3600	4200	4800	5500	6100	6700	7300	7900	8500	9100	9800
W	2600	2600	2800	3050	3450	3750	4050	4400	4800	5200	5650	6100	6500	6950
F Spread Ftg.	400	400	400	450	450	550	600	600	700	750	900	1000	1150	1200
Batter	100:0	100:4	100:4	100:4	100:4	100:4	100:4	100:4	100:4	100:5	100:6	100:7	100:8	100:8
Stem Thickness @ Haunch	305	305	305	305	305	305	305	305	305	305	305	305	305	305
ⓐ Bars				#19 @ 450**	#22 @ 450**	#25 @ 450**	#29 @ 450**	#32 @ 450**	#25 @ 225*	#25 @ 225*	#22 @ 150*	#32 @ 300**	#29 @ 225*	#36 @ 300**
Y				2450	2000	2300	2450	2750	2900	3350	3500	4000	4300	4750
ⓑ Bars	#16 @ 300	#16 @ 300	#16 @ 225	#19 @ 450**	#22 @ 450**	#25 @ 450**	#29 @ 450**	#32 @ 450**	#25 @ 225*	#25 @ 225*	#22 @ 150*	#32 @ 300**	#29 @ 225*	#36 @ 300**
Y	Cont	Cont	Cont	Cont	3200	4000	4600	5350	5950	6400	5650	5800	7800	7200
ⓒ Bars					#19 @ 450	#19 @ 450	#19 @ 450	#19 @ 450	#19 @ 450	#19 @ 450	#19 @ 300	#22 @ 300	#22 @ 450	#22 @ 300
SHORT ⓓ BARS	#16 @ 300	#16 @ 225	#19 @ 225	#22 @ 450**	#25 @ 450**	#25 @ 450**	#29 @ 450**	#32 @ 450**	#25 @ 225*	#25 @ 225*	#22 @ 150*	#32 @ 300*	#29 @ 225*	#36 @ 300**
X	Cont	Cont	Cont	1700	2000	2300	2450	2600	2900	3200	3500	3800	4100	4600
ⓓ Bars				#22 @ 450**	#25 @ 450**	#25 @ 450**	#29 @ 450**	#32 @ 450**	#25 @ 225*	#25 @ 225*	#22 @ 150*	#32 @ 300*	#29 @ 225*	#36 @ 300**
X				Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont
Ultimate Bearing Capacity req'd KPa	300	375	420	495	545	630	720	775	850	930	1010	1075	1170	1235

ALTERNATIVE B: (VARIABLE TOP OF WALL THICKNESS) TABLE OF REINFORCING STEEL DIMENSIONS AND DATA

	STEM WITH HAUNCH						STEM WITHOUT HAUNCH						
Design H	2400	3000	3600	4200	4800	5500	6100	6700	7300	7900	8500	9100	9800
W	2600	2750	2950	3200	3800	4050	4350	4950	5200	5700	6150	6500	6850
F Spread Ftg.	400	400	400	400	450	450	550	700	700	850	1000	1150	1150
Batter	0	0	0	0	0	0	0	0	0	100:2	100:4	100:4	100:4
Stem thickness @ Top							475	610	610	610	610	610	610
Stem thickness @ Haunch	305	305	305	305	380	380							
ⓐ Bars			#19 @ 300**	#16 @ 150*	#25 @ 300**	#25 @ 225*	#29 @ 300**	#29 @ 300**	#22 @ 150*	#22 @ 150*	#22 @ 150*	#29 @ 225*	#36 @ 300**
Y			1700	1700	1850	2000	2450	2600	2900	3350	3800	4100	4400
ⓑ Bars	#16 @ 225	#19 @ 225	#19 @ 300**	#16 @ 150*	#25 @ 300**	#25 @ 225*	#29 @ 300**	#29 @ 300**	#22 @ 150*	#22 @ 150*	#22 @ 150*	#29 @ 225*	#36 @ 300**
Y	Cont	Cont	Cont	Cont	2600	3350	3350	3500	5200	5950	6550	7300	7300
ⓒ Bars					#19 @ 300	#22 @ 450	#22 @ 300	#22 @ 300	#19 @ 300	#19 @ 300	#19 @ 300	#22 @ 450	#22 @ 300
SHORT ⓓ BARS	#16 @ 225	#19 @ 225	#22 @ 450**	#16 @ 150*	#25 @ 300**	#25 @ 225*	#29 @ 300**	#29 @ 300**	#22 @ 150*	#29 @ 150*	#29 @ 150*	#29 @ 225*	#25 @ 150*
X	Cont	Cont	1850	1700	2150	2600	2750	3050	3350	3650	3950	4250	4600
ⓓ Bars			#22 @ 450**	#16 @ 150*	#25 @ 300**	#25 @ 225*	#29 @ 300**	#29 @ 300**	#22 @ 150*	#29 @ 150*	#29 @ 150*	#29 @ 225*	#25 @ 150*
X			Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont	Cont
Ultimate Bearing Capacity req'd KPa	375	430	495	565	605	685	775	830	915	985	1070	1175	1235



SPREAD FOOTING SECTION

NO SCALE

Cont = Continuous

* = ⓐ&ⓑ, Short ⓓ&ⓓ bars are bundled together.

** = Alternate ⓐ&ⓑ bars as shown in "Detail B". Alternate Short ⓑ&ⓑ bars

DESIGN DATA

DESIGN: Load Factor Design (LFD)

CONCRETE: Reinforced Concrete, f'c = 25 MPa
fy = 420 MPa

LOADING CASE:
Level ground with 11.5 KPa Live Load Surcharge and 4875 mm Soundwall

Seismic Load = 0.3 Dead Load
Wind Load = 1435 Pa
Dead Load of Soundwall = 20.6 kN/m
Dead Load of Barrier = 5.4 kN/m

SEISMIC LOAD: SOIL
Kh = 0.3g
Kv = 0.0
Kae : Mononobe-Okabe Method

SOIL: Ø = 34° γ = 19 kN/m³
Equivalent fluid pressure:
= 5.6 KPa/m for determination of toe pressure
= 4.2 KPa/m for determination of heel pressure

EXTERNAL STABILITY:
Group A : D + E + SC
Group B : D + E + SC + W
Group C : D + PYM

INTERNAL STABILITY (LFD):
Group A : βD + 1.7 E + 1.7 SC
Group B : βD + 1.7 E + 1.3 W
Group C (stem) : 1.0 D + 1.0 E + 1.0 EQD + 1.0 EQE
Group C (footing) : D + PYM

Where : β = 1.0 or 1.3 whichever controls design
D = Dead Load
E = Lateral Earth Pressure
SC = Live Load Surcharge
W = Wind Load
EQD = Seismic Dead Load
EQE = Seismic Lateral Earth Pressure
PYM = Probable Yield Moment (1.3 x Nominal Yield Moment of Stem)

GENERAL NOTES

1. For soundwall and retaining wall architectural finish or texture, see details elsewhere in project plans.
2. For details not shown and drainage notes, see B3-8
3. Footing cover, 450 mm minimum.
4. Limit of no splicing rebars = H/3
5. Increasing stem thickness not permitted.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

Caltrans Metric

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED ENGINEER - CIVIL

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

STANDARD DRAWING

FILE NO. xs14-350 | DESIGN BY Madon Sah | CHECKED Overcomer Hor | APPROVAL RECOMMENDED BY

DRAWING DATE 12/00 | DETAILS BY R Yee | CHECKED J.C. Moose

SUBMITTED BY Overcomer Hor | DESIGN SUPERVISOR

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN

BRIDGE NO.

KILOMETER POST

RETAINING WALL TYPE 5SWB

DS 050 214TA (METRIC) (REV. 2/25/97)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU
EA

DISREGARD PRINTS BEARING EARLIER REVISION DATES

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February 5, 2009

Parsons Transportation Group, Inc.
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mohsen Mohseni

Subject: Pile Driveability Studies and Load Test
West County Connector Project
I-405/SR-22 HOV Connector Segment
405-22 HOV Connector Separation
S405-E22 Connector Separation
Orange County, California
GDC Project No. I-436

Dear Mohsen:

As discussed in our meeting on January 28, 2009 in your office and as requested by Caltrans, we performed pile driveability studies for the 48-in. diameter CISS piles for S405-E22 Connector Separation and 405-22 HOV Connector Separation Bridges. The two bridges are shown in Figures 1A and 1B. The driveability analysis utilized a wave equation analysis using the computer program GRLWEAP (2005). As requested by Caltrans, we have also prepared a plan for performing a load test on each of the two typical piles used in the design. As discussed in the meeting, it is anticipated that the load test will be performed by Caltrans Testing Group.

The results of our evaluations and our recommendations are summarized in the following sections.

1.0 PILE FOUNDATIONS

The project will include driving 14-in. square prestressed concrete piles at the abutments of the two bridges. We used a typical Delmag D36 diesel hammer for evaluating the driveability of 14-in. square piles. The 14-in. square concrete piles have a nominal capacity of 400 kips. As per Caltrans policy, no load test will be required on 14-in. square concrete piles and PDA results will be acceptable to verify the pile capacity. The pile driveability of the 14-in. square piles is discussed in the Structure Foundation reports.

The two bridges also have a total of 108, 48-in. diameter CISS piles; 36 piles have a length of about 75 feet and 72 piles have a design length of about 100 feet. The 75-ft piles have a nominal capacity of 1,150 kips and 100 ft piles have a maximum nominal capacity of 2,000 kips. For assessing the driveability

of these piles, we used three potential hammers: Delmag D80-23 and D100-13 Diesel hammers, and IHC S-120 hydraulic hammer. The maximum nominal uplift resistance capacity of the piles for S405-E22 Connector Separation is 560 kips. No tensile demand is present on the 405-22 HOV Connector Bridge. Tables 1 and 2 provide the pile data and other pertinent information for the piles at each bridge support. As per Caltrans policy, PDA results for piles with diameters greater than 3 ft are unreliable and the capacity must be verified by load test. This report discusses the pile driveability of the 48-inch diameter CISS piles and outlines the requirements for a load test program as directed by Caltrans.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 Site Conditions

The bridge sites are sites are located at the SR-22 /I-405 Interchange (Figures 1A and 1B). Original site grades were relatively level near El. 24 to 30 feet. Current freeway grades are between El. 28 and 30 feet, and existing abutment approaches are near El. 56 feet on the east abutment and El. 50 feet on the west abutment of the existing 22/405 Separation Bridge. An unpaved area and drainage ditch are present between SR-22 and I-405 with a low elevation of about El. +20 feet between proposed Abutment 1 and Bent 3 of the 405-22 HOV Connector Separation.

2.2 Subsurface Conditions

2.2.1 Generalized Soil Profile

The soils profile and general engineering characteristics of the subsurface soils are illustrated in the Geotechnical Cross-Section in Figure 2. Subsurface conditions are discussed for the 405-22 HOV Connector. However, the two bridges are quite close to each other and the subsurface conditions are generally equivalent from the standpoint of axial pile design. The soil profile is divided into 5 general layers.

2.2.1.1 Layer 1 – Fill and Stiff Native (El. 16+ ft)

Road fill, abutment approach fill, and stiff native soils are present above about El. +16 feet. The upper native alluvial material is similar in engineering properties to the compacted fill. Fill and stiff native alluvial soils encountered in the test borings and CPTs consist primarily of very stiff to hard lean sandy clays

and sandy clayey silts (CL, ML), with less frequent layers of medium dense silty sands (SM) and clayey sands (SC).

2.2.1.2 Layer 2 – Firm to Stiff CL (El. +16 ft to +2 ft)

This layer is mostly below the water table, and is present throughout the project area. It is typically about 12 to 15 feet thick, and classifies as locally firm but predominantly stiff lean clay or lean sandy clay (CL) with typical undrained shear strengths of 1.0 to 1.4 ksf based on CPT correlations and pocket penetrometer readings. Thin seams of sand to silty sand to sandy silt are present in this layer (see Figure 2). Layer 2 is generally overconsolidated with respect to the freeway grades, but is close to normally consolidated where present under the 25 to 30 feet of abutment fill. Since it is fairly shallow below the freeway grades and is generally the weakest and most compressible layer at the site, it typically controls the magnitude and time rate of settlement and global stability of slopes at the site.

2.2.1.3 Layer 3 – Very Stiff CL, ML (El. +2 ft to -14 ft)

Layer 3 is predominantly composed of very stiff clay, sandy clay, and silty clay (CL) and clayey to sandy silts (ML), with thin interbeds of medium dense to dense silty sands (SM) and sandy silts (ML). Pocket penetrometer readings in the fine grained materials generally range from 2.0 to 4.5 ksf, and CPT correlations indicate average undrained shear strengths in this layer on average are generally more than 3.0 ksf. These clays are over consolidated. This layer is as deep as El. -25 ft in the vicinity of Bent 4.

2.2.1.4 Layer 4 – Dense to V. Dense SM/ML/SP (El. varies)

Layer 4 is a predominantly granular layer up to about 25 feet thick on the east end (near Abutment 1 to Bent 3). The layer appears to thin to less than 5 feet thick near Bent 4 (CPT-7). The sandy materials are interbedded with very stiff to hard clayey silt and clay (ML, CL). The sandy layers are primarily dense to very dense sand (SP), sand with silt (SM-SM, SW-SM), and silty sand to sandy silt (SM, ML). CPT tip resistance is generally between 150 and 450 tsf, and Standard Penetration Test (SPT) blowcounts of 35 to more than 50 blows per foot. Based on CPT correlations and pocket penetrometer readings, the clayey interbeds have undrained shear strength of 3 to more than 4 ksf. The layer appears to have thicker sand layers on the east end (near Abutment 1), becoming increasingly interbedded with clay layers and siltier materials moving toward the west. As shown in Figure 2, this layer pinches out and is only 5 ft thick near CPT -7.

2.2.1.5 Layer 5 – V. Dense SP & Hard CL/ML (below El. -30/-40 ft)

This layer is composed of alternating beds of dense to very dense sands and very stiff to hard clays and silts. The sands typically have SPT blowcounts of more than 50 and CPT tip resistance of more than 250 tsf (up to as high as 600 tsf), and the cohesive materials generally have undrained shear strengths greater than 3 ksf.

3.0 SOIL AND HAMMER PARAMETERS

The following soil and hammer parameters were used in the GRLWEAP wave equation analysis program.

3.1 Soil Parameters

Dynamic skin friction distribution:	Triangular
Ratio of shaft resistance to ultimate Compression capacity:	80% for 48-inch piles
Soil plug assumptions:	No plugging, plug keeps moving up as the pile is driven.
Skin quake:	0.100 in
Toe quake:	0.100 in
Skin damping coefficient:	0.050 sec/ft
Toe damping coefficient:	0.150 sec/ft

3.2 Hammer Operation Parameters

	Delmag D-80	Delmag D-100	IHC SC-120
Fuel Settings:	Max.	Max.	n/a
Maximum Stroke:	12.0 feet	12.0 feet	6.6 feet (fixed stroke)
Hammer efficiency:	0.80	0.80	0.95
Ram Weight:	17.6 kips	22.1 kips	13.5 kips
Max. Rated Energy:	212.5 kip-ft	265.7 kip-ft	89.4 kip-ft
Helmet:	8.9 kips	8.9 kips	8.9 kips

We have assumed that drilling of the plug inside the pile will not be required to drive the pile to the design penetration.

3.3 Pile Setup

The soil resistance during continuous driving may be 25 to 50% of the long-term skin friction (API RP2A). In general, the blow count at the end of driving would likely represent substantially less than the long-term ultimate capacity. In that case, a restrike after a minimum of 15 days would likely show the improvement of the pile capacity as the soil friction increases due to dissipation of pore pressures. This process is known as "set-up". The setup factor (ratio of long-term friction to friction at the end of driving) may range up to 2.0 depending on the presence of clays and silts within the profile and the time. For the profile at the SR-22 project site, we estimate that 90% of the set up should be completed within two to four weeks.

4.0 WAVE EQUATION RESULTS

We performed the WEAP analyses for 48" CISS Piles using the computer program GRLWEAP (2005). The results of our analyses are summarized in Figures 3A, 3B, 4A, 4B, 5A, and 5B. The Delmag D-80 and D-100 hammers can drive the 48-in. CISS piles to the design depth with reasonable blow counts. In order to overcome a dynamic resistance of 2,000 kips blow counts of 64 and 45 blows per foot are required for the D-80 and D-100 hammers, respectively. However, the dynamic resistance during continuous driving is likely to be 50% or less or about 1,000 kips and the required blow counts will be 25 and 18 blows per foot for the D-80 and D-100, respectively. The corresponding blow counts for the IHC S-120 hydraulic hammer are 62 and 30 blows per foot to overcome 2,000 kip and 1,000 kip dynamic resistance, respectively. The maximum steel stress is 28 to 31 ksi and is less than 90% of the yield stress for 36 ksi steel (0.9 x 36 = 32 ksi). The wave equation analyses assume that the hammer is striking the pile symmetrically. Higher stresses may be generated in the pile if uneven hammer blows occur due to pile misalignment.

5.0 PILE LOAD TESTS

Pile load tests should be in general accordance with ASTM D 1143 (Appendix A) and any applicable Caltrans Special Provisions. The abutment piles are about 60-ft long and the bent piles are 75- and 100-ft long. The 14-in. square concrete piles have a nominal capacity of 400 kips. As per Caltrans policy, no load test will be required on 14-in. square concrete piles and PDA results will be acceptable to verify the pile capacity. Since Caltrans policy states that the PDA data for piles greater than 3-ft diameter is not reliable, and as directed by Caltrans, we propose that two compression load tests be performed: one on a

75-ft long pile and one on a 100-ft long pile. Bent piles on one of the S405-E22 Connector Separation bridge have nominal tensile load of 560 kips. No tension is present on the other bridge. The estimated outside frictional capacity of the 100-ft long piles is about 1,300 kips and as such, it is our opinion that there is no need to perform a specific uplift test. The reaction piles should be monitored for uplift load and deflection during the compression load test.

We recommend that the load tests be carried out on production piles in the center row of Bent 2 footing of the 405-22 HOV Connector Separation. It is our opinion that the data from these tests will be applicable to both bridges due to the close proximity of the two bridges and similar soil conditions. The location of the Bent 2 footing proposed for load test is shown in Figures 6A and 6B and the footing detail plan is shown in Figure 7. Bent 2 footing has 75-ft long piles. In order to perform tests on both 75-ft and 100-ft long piles at one location using production piles, five of the piles will be driven to lengths greater than 75-ft and will have actual capacity greater than the required value. Actual length and location of reaction piles will depend on the configuration of the load test frame and beams. Suggested locations of the test piles are shown in Figure 7, and various arrangements for reaction piles (2 reaction pile and 4 reaction pile setups) for each test pile are illustrated in Figures 7A through 7D.

The details of the methodology to perform two pile load tests and PDA (Dynamic Pile Driving Analyzer) measurements on two selected piles at Bent 2 location are discussed in the following sections. The load test results will be correlated with the PDA measurements on the test piles and CPT data. If the pile load tests indicate that the piles meet the design requirements, PDA alone or in conjunction with CPT data may be used to confirm the capacity of the remaining production piles. If the tests do not achieve the design capacity, a redesign and an additional load test may be needed to verify the revised design.

5.1 Proposed Test Procedure

We propose the following procedure for the two compressive load tests on Bent 2 middle row of piles. The locations of 75-ft long and 100-ft long test piles (Piles C and D, respectively) and the two reaction piles for 75-ft test pile (Piles A and E) and two reaction piles for 100-ft test pile (Piles B and F) are shown in Figure 7. In order to provide adequate compressive load on 75-ft test pile (1,150 kips) and on 100-ft test pile (2,000 kips), the lengths of the reaction piles are estimated to be 100 ft (Piles A & E) and 120 ft (Piles B & F), respectively. In this manner no additional piles will be required and only the production piles which are used for reaction will be driven to increased lengths of 100 ft and 120 feet.

As an alternate, four reaction piles may be used for each test; Piles G, H, I, J (75 ft long) for 75-ft pile test and Piles K, L, M, N (100-ft long) for the 100-ft pile test. Four cases of 75-ft test pile with two reaction piles, 75-ft test pile with four reaction piles, 100-ft test pile with two reaction piles, and 100-ft test pile with four reaction piles are shown in Figures 7A, 7B, 7C, and 7D, respectively.

The procedure in the following section is provided for the 75-ft test pile. The same procedure will be used for 100-ft long pile tests.

1. Install six production piles at Bent 2 at the design locations to the following lengths; A= 100 ft, B= 120 ft, C= 75 ft, D= 100 ft, E=100 ft, and F= 120 ft). With the actual spacing of the production piles in Bent 2, the clear spacing between the test pile and the reaction piles will be 20 ft or 5 pile diameter as required by ASTM D 1183. As an alternate, if four reaction piles are to be used for each test, Piles G, H, I and J can be used as reaction piles for the 75-ft test pile and piles K, L, M, and N can be used as reaction piles for the 100-ft test pile. In this case the lengths of reaction piles for 75-ft test pile (Piles G, H, I, and J) should be 75-ft and lengths of the reaction piles for the 100-ft test pile (Piles K, L, M, and N) should be 100 feet.

2. The test and reaction piles should be monitored with PDA. The hammer driving energy, blow counts, and depth of the soil plug at the end of the driving should be recorded.

3. The reaction piles may be drilled and the rebar and concrete completed before performing the load test, if needed.

4. The grades at the footing location range between El. 20 and El. 28 feet. Assume that the site is leveled to El. 20 feet, the bottom of the pile cap is El. 15.5 ft or 4.5 ft below the ground. If the test is performed from the leveled site grade of El. 20 ft, the test pile will be driven to the design tip elevation (El. –59.5 ft) from the El. 20 ft. The pile should be installed in a 60-inch diameter predrilled hole to the bottom of the pile cap elevation (El. 15.5 ft) to simulate the prototype condition. The test will be performed from the leveled grade of El. 20 feet. The pile penetration below the cutoff will be 75 feet.

5. Wait 15 days and retap the pile prior to drilling out the plug to monitor the setup. Make sure that the pile is driven no more than 20 blows or 1 inch, whichever comes first, recording blows per inch.

6. Drill the plug to 30 feet from the tip in the test pile. Remove any water in the pile and pour a 5 ft thick concrete plug. Retap the pile with PDA to monitor the effect of drilling out the plug. Make sure that the pile is driven no more than 20 blows or 1 inch, whichever comes first, recording blows per inch.

7. Perform CAPWAP analysis on selected blows and determine pile frictional and end bearing capacity of the piles and amount of set up.

8. Load the test pile in compression using the quick load increment method using each load increment as 10% of the maximum load or 120 kips.

9. Monitor the downward movement of the pile by dial gages on the pile. The upward movement of the reaction piles should be monitored for safety so that impending pull out can be seen. The test should be carried out to 1,150 kip compression load or pull out of the reaction piles, whichever occurs first. If the downward movement at the 1,150 kip load is less than 2 inch, load the pile to failure, or the maximum jack load, or until the movement is at least 2 inches.

The same procedure should be used for 100-ft Test Pile. For the 100-ft test pile the maximum load is 2,000 kips and the plug should be drilled out to 50 feet from the tip. If the settlement is less than 2 inches at 2, 000 kips, the test may be carried to failure or 2 inch settlement, provided the frame and the jacks have adequate capacity to load to 2,500 kips. If the testing is performed by Caltrans as currently anticipated, as a minimum Caltrans 2000 kip test frame and preferably 4000 kip test frame should be used for the testing (Appendix B).

5.2 Test Specifications

Load test shall be performed in general accordance with ASTM-D 1143, Standard Test Method for Piles under Static Axial Compressive Load and Caltrans Standard Special Provisions for performing Axial Compression Load Tests.

6.0 LIMITATIONS

This investigation was performed in accordance with generally accepted geotechnical engineering principles and practice. The professional engineering work and judgments presented in this report meet the standard of care of our profession at this time. No other warranty, expressed or implied, is made.

The following Table, Figures and Appendices are attached and complete this letter report.

Table 1	Pile Data Table 405-22 HOV Connector Separation
Table 2	Pile Data Table S405-E22 Connector Separation
Figure 1A	Location Plan
Figure 1B	Location Plan
Figure 2	Geotechnical Cross-section
Figure 3A	GRLWEAP Output D80-32
Figure 3B	Tabular output D80-32
Figure 4A	GRLWEAP Output D100-13
Figure 4B	Tabular output D-100
Figure 5A	GRLWEAP Output IHC-120
Figure 5B	Tabular output IHC-120
Figure 6A	Location of Bent 2 Footing on Aerial Photograph
Figure 6B	Location of Bent 2 Footing on Foundation Plan
Figure 7	Bent 2 Footing Plan, Test Piles
Figure 7A	75-ft Test Pile with 2 Reaction Piles
Figure 7B	75-ft Test Pile with 4 Reaction Piles
Figure 7C	100-ft Test Pile with 2 Reaction Piles
Figure 7D	100-ft Test Pile with 4 Reaction Piles
Appendix A	ASTM D 1143 Axial Load Test Procedure
Appendix B	Pile Load Test (Caltrans Foundation Testing Branch)

We appreciate the opportunity to provide this Pile Driveability and Load Test report. Should you have any questions regarding this report, please feel free to call me at 949-450-2100.

Yours Sincerely,
GROUP DELTA CONSULTANTS, INC.

Kul Bhushan, Ph.D., G.E.
Senior Consulting Principal

Curt Scheyhing, P.E., G.E.
Senior Engineer

Table 1
Pile Data Table
405-22 HOV Connector Separation

Location	Pile Type	Design Loading (kips)	Nominal Resistance (kips)		Design Tip Elevations (feet)	Specified Tip Elevations (feet)
			Compression	Tension		
Abutment 1	Class 200 14" Square PS Conc.	200	400	0	-28 (1)	-28.0
Bent 2	CISS NPS48"x3/4"	N/A	1150	0	-59.5 (1); -44.5 (3)	-59.5
Bent 3 L	CISS NPS48"x3/4"	N/A	1800	0	-85.5(1); -44.5 (3)	-84.5
Bent 3 R	CISS NPS48"x3/4"	N/A	1800	0	-85.5(1); -45.5 (3)	-85.5
Bent 4 L	CISS NPS48"x3/4"	N/A	1800	0	-83.5(1); -43.5 (3)	-83.5
Bent 4 R	CISS NPS48"x3/4"	N/A	1800	0	-82.5(1); -42.5 (3)	-82.5
Bent 5	CISS NPS48"x3/4"	N/A	1150	0	-58(1); -48.0 (3)	-58.0
Abutment 6	Class 200 14" Square PS Conc.	200	400	0	-50 (1)	-50.0

Design Tip Elevation is controlled by the following demands

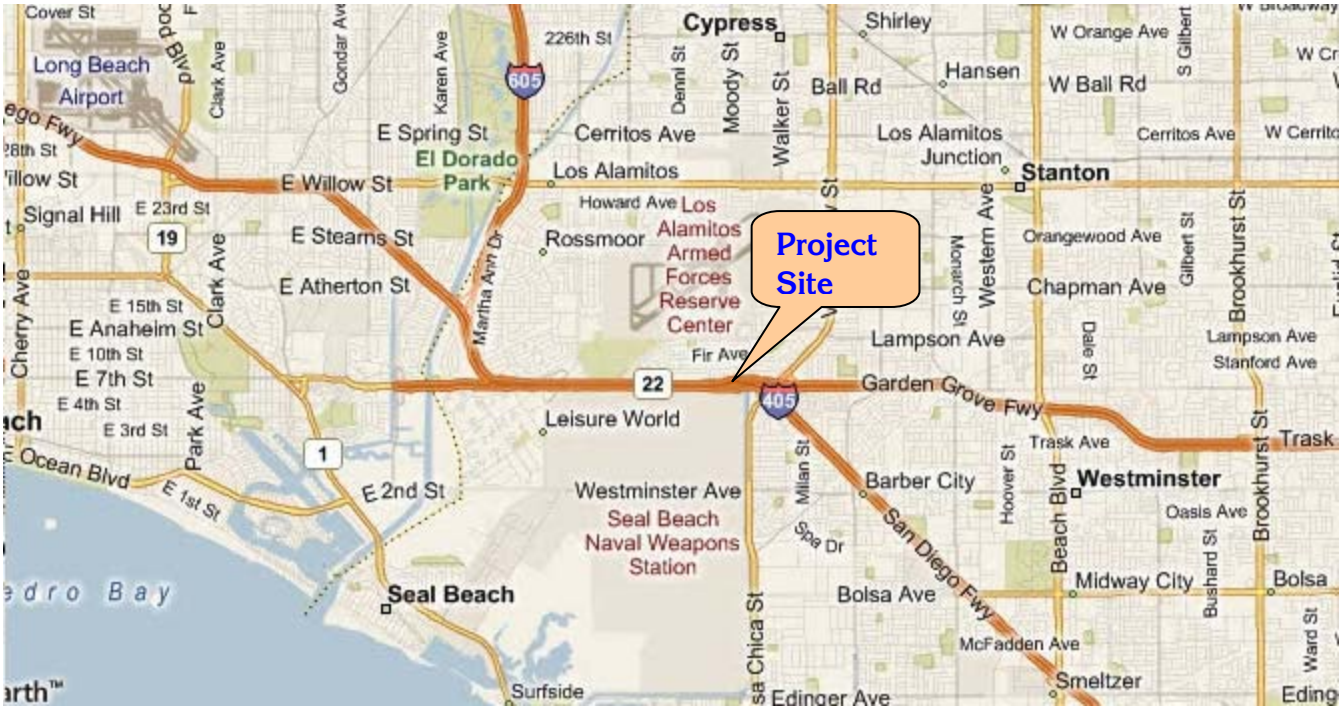
(1) Compression; (2) Tension; (3) Lateral Loads

Table 2
Pile Data Table
S405-E22 Connector Separation

Location	Pile Type	Design Loading (kips)	Nominal Resistance (kips)		Design Tip Elevations (feet)	Specified Tip Elevations (feet)
			Compression	Tension		
Abutment 1	Class 200 14" Square PS Conc.	200	400	0	-44.0 (1)	-44.0
Bent 2	CISS NPS48"x3/4"	N/A	2000	560	-88.8(1); -30 (2); -40 (3)	-88.8
Bent 3	CISS NPS48"x3/4"	N/A	2000	560	-86.5(1), -30 (2); -42 (3)	-86.5
Abutment 4	Class 200 14" Square PS Conc.	200	400	0	-49.0 (1)	-49.0

Design Tip Elevation is controlled by the following demands

(1) Compression; (2) Tension; (3) Lateral Loads



The base maps are from Microsoft Virtual Earth

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GDC Project No. I-436

S405 / E22 Separation OC (Replace) Seal Beach, CA

VICINITY MAP

Figure 1A

The base maps are from Microsoft Virtual Earth

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GDC Project No. I-436

Proposed I-405/SR22 HOV Connector
Garden Grove/Seal Beach, CA

VICINITY MAP

Figure 1B

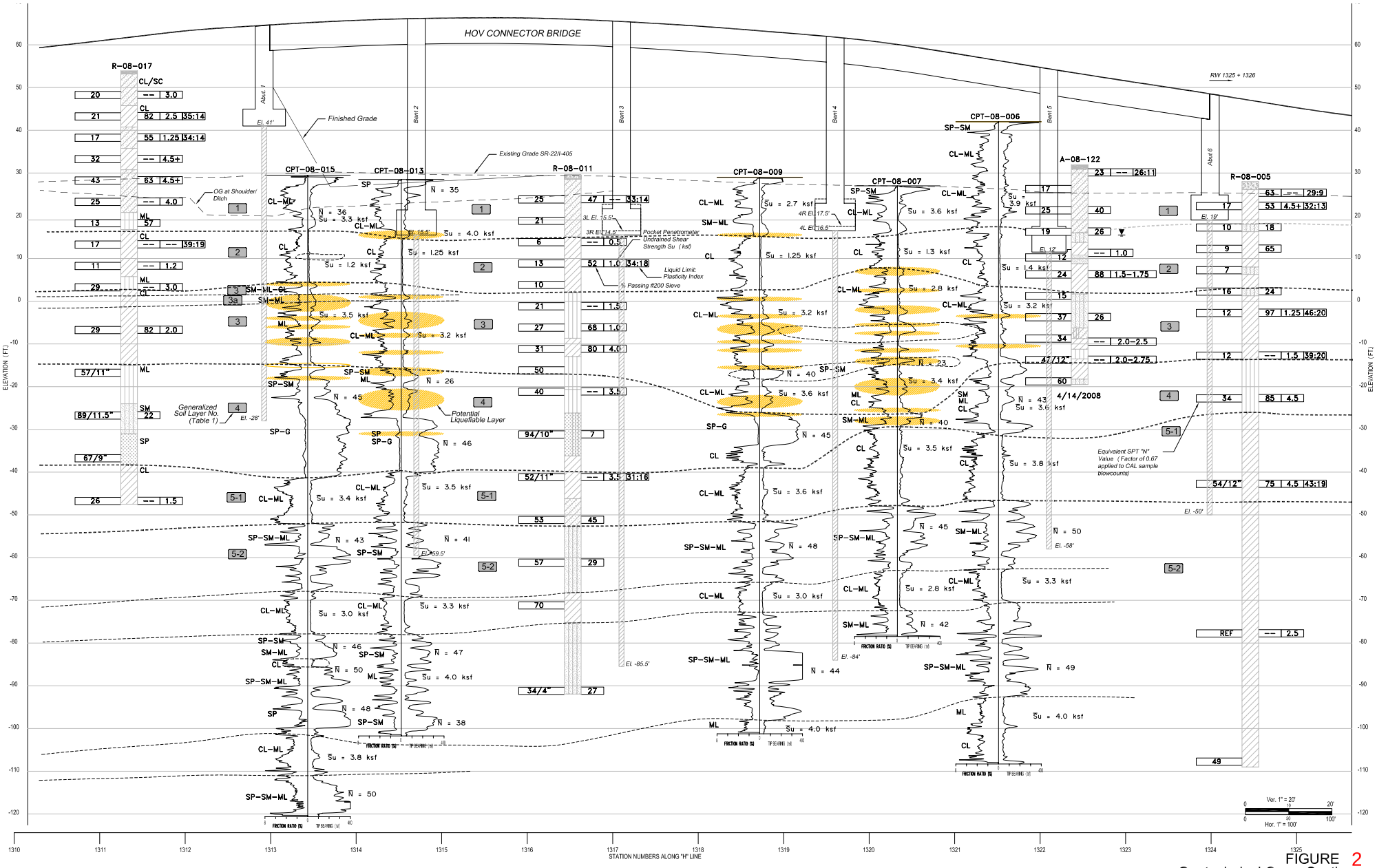
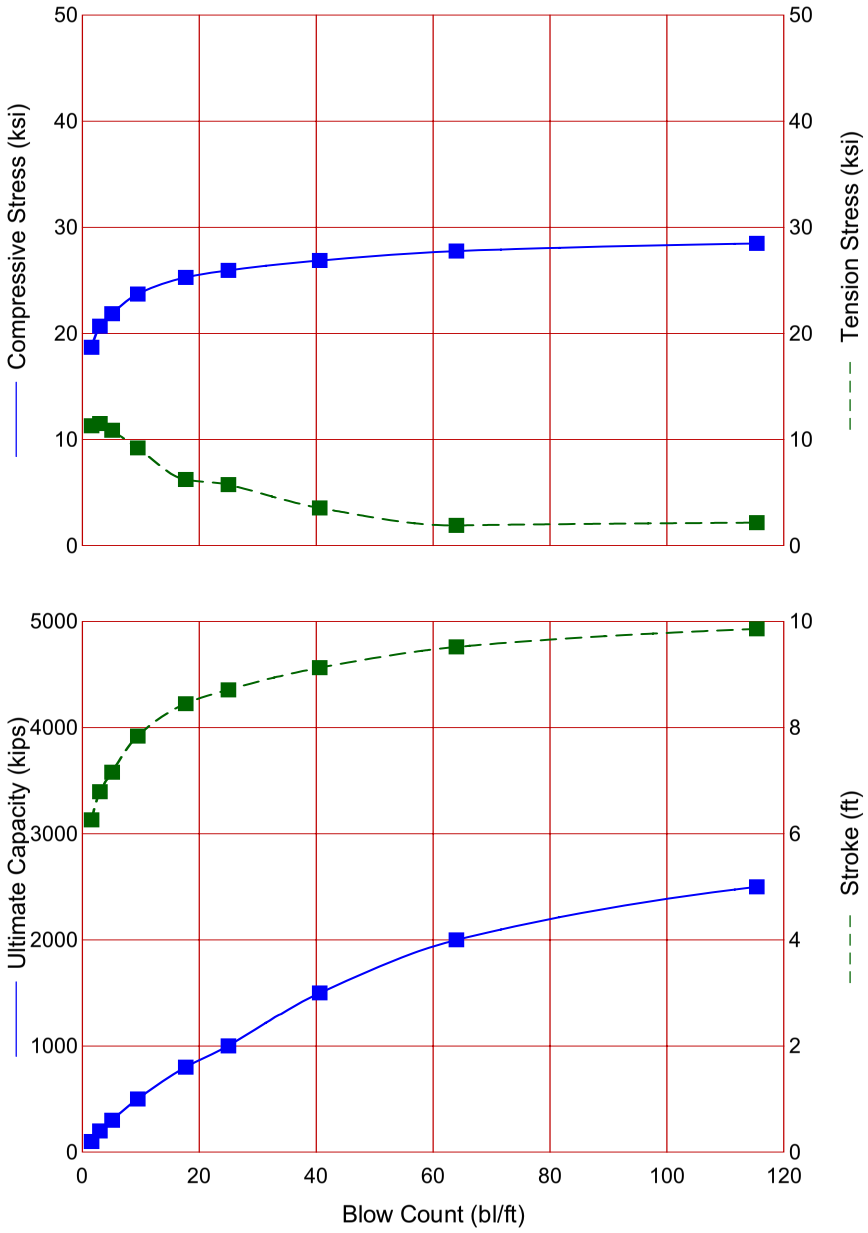
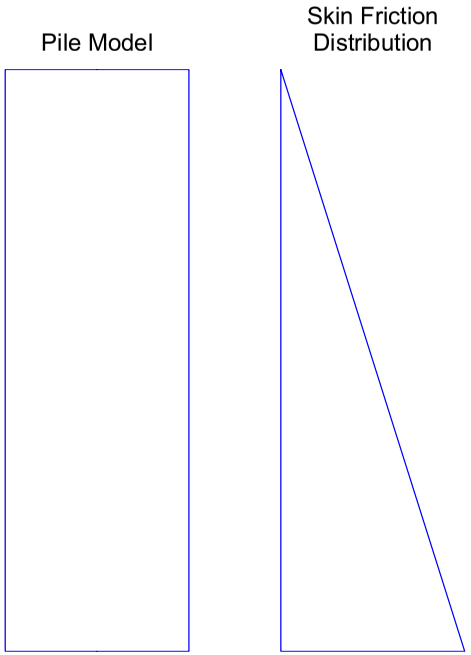


FIGURE 2
Geotechnical Cross Section



DELMAG D 80-23

Efficiency	0.800	
Helmet	8.90	kips
Hammer Cushion	76811	kips/in
Skin Quake	0.100	in
Toe Quake	0.100	in
Skin Damping	0.050	sec/ft
Toe Damping	0.150	sec/ft
Pile Length	100.00	ft
Pile Penetration	100.00	ft
Pile Top Area	113.00	in2

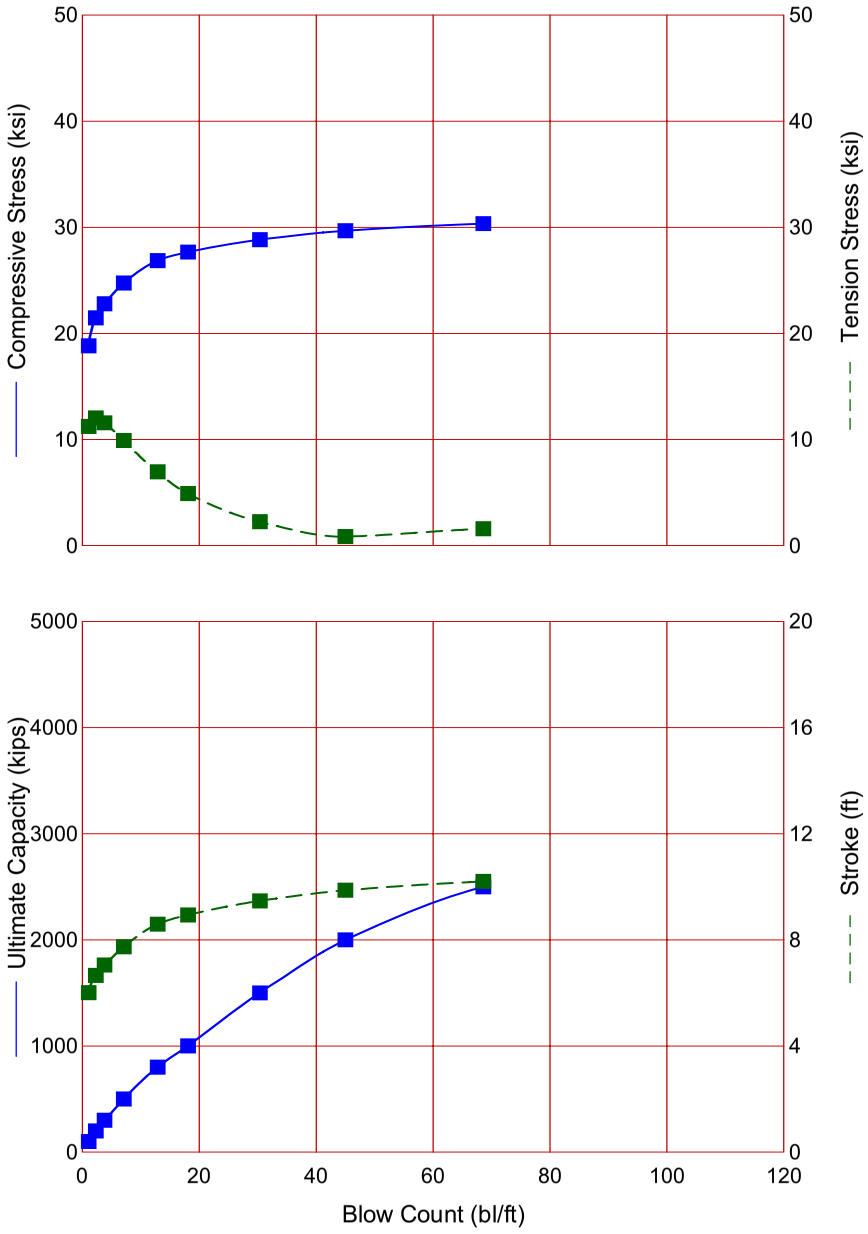


Res. Shaft = 80 %
(Proportional)

Figure 3A

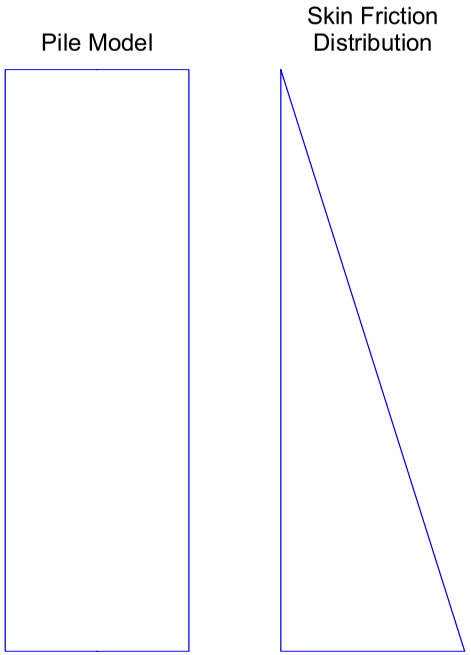
Ultimate Capacity kips	Maximum Compression Stress ksi	Maximum Tension Stress ksi	Blow Count bl/ft	Stroke ft	Energy kips-ft
100.0	18.69	11.31	1.6	6.26	104.93
200.0	20.68	11.52	3.0	6.79	96.92
300.0	21.86	10.88	5.1	7.16	91.76
500.0	23.71	9.21	9.5	7.84	86.16
800.0	25.27	6.23	17.7	8.45	82.98
1000.0	25.94	5.76	25.0	8.71	80.73
1500.0	26.87	3.55	40.6	9.13	79.53
2000.0	27.76	1.92	64.0	9.52	82.61
2500.0	28.48	2.18	115.4	9.86	84.96

Figure 3B



DELMAG D100-13

Efficiency	0.800	
Helmet	8.90	kips
Hammer Cushion	76811	kips/in
Skin Quake	0.100	in
Toe Quake	0.100	in
Skin Damping	0.050	sec/ft
Toe Damping	0.150	sec/ft
Pile Length	100.00	ft
Pile Penetration	100.00	ft
Pile Top Area	113.00	in2

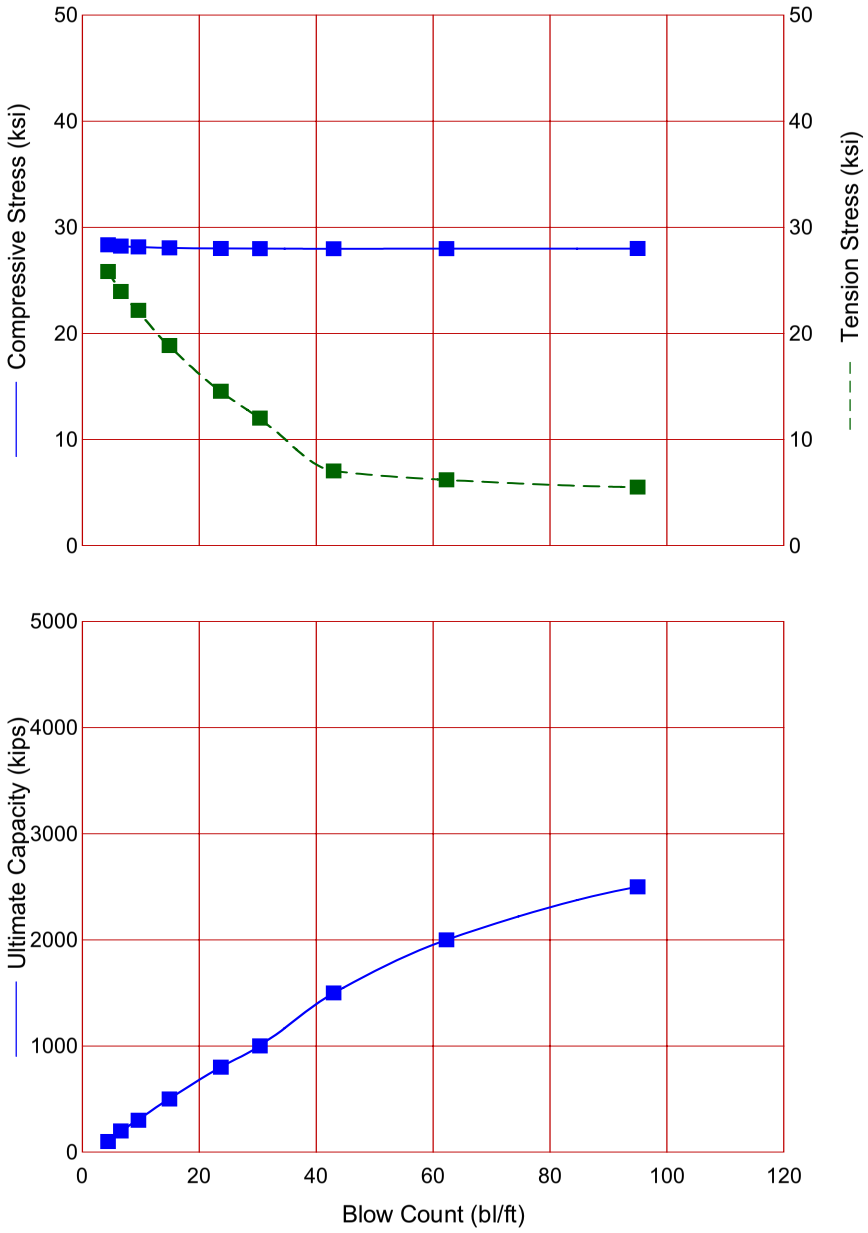


Res. Shaft = 80 %
(Proportional)

Figure 4A

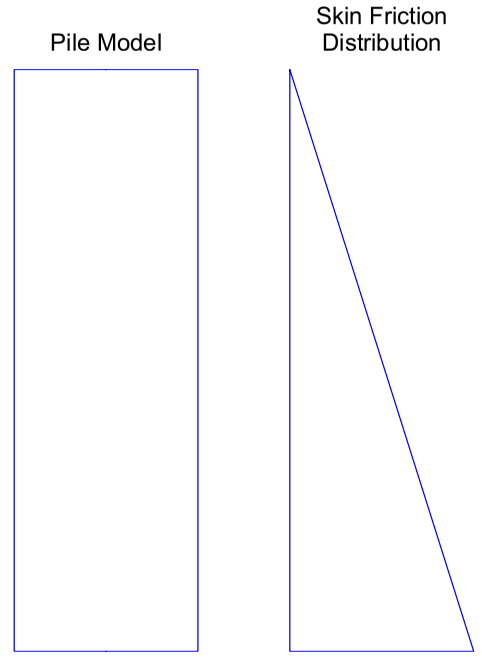
Ultimate Capacity kips	Maximum Compression Stress ksi	Maximum Tension Stress ksi	Blow Count bl/ft	Stroke ft	Energy kips-ft
100.0	18.84	11.24	1.1	6.01	145.68
200.0	21.47	12.04	2.3	6.66	132.78
300.0	22.79	11.57	3.8	7.05	124.44
500.0	24.74	9.91	7.1	7.74	115.44
800.0	26.85	6.96	12.9	8.59	111.00
1000.0	27.67	4.91	18.1	8.94	109.04
1500.0	28.83	2.26	30.4	9.47	104.69
2000.0	29.68	0.86	45.0	9.87	108.47
2500.0	30.34	1.60	68.6	10.20	111.79

Figure 4B



IHC S-120

Stroke	6.63	ft
Efficiency	0.950	
Helmet	8.90	kips
Hammer Cushion	76811	kips/in
Skin Quake	0.100	in
Toe Quake	0.100	in
Skin Damping	0.050	sec/ft
Toe Damping	0.150	sec/ft
Pile Length	100.00	ft
Pile Penetration	100.00	ft
Pile Top Area	113.00	in2



Res. Shaft = 80 %
(Proportional)

Figure 5A

Ultimate Capacity kips	Maximum Compression Stress ksi	Maximum Tension Stress ksi	Blow Count bl/ft	Stroke ft	Energy kips-ft
100.0	28.35	25.83	4.4	6.63	77.64
200.0	28.22	23.95	6.6	6.63	77.57
300.0	28.14	22.17	9.6	6.63	77.46
500.0	28.06	18.86	14.9	6.63	77.26
800.0	28.01	14.55	23.7	6.63	76.95
1000.0	27.99	12.02	30.4	6.63	76.73
1500.0	27.98	7.04	43.0	6.63	76.41
2000.0	27.99	6.21	62.3	6.63	76.34
2500.0	28.00	5.52	95.0	6.63	76.27

Figure 5B

DATUM STATEMENT: Horizontal control datum is based on the California state plane coordinate system, zone VI. 1983 North American datum, 1991.35 EPOCH, Orange County Adjustment (Full descriptions for each control station can be obtained from Orange County Geomatics Office)

BENCHMARKS: Vertical control is the Orange County Surveyor benchmark 1A-144-04. Set in the Southwesterly corner of a 4.4ft by 4.4 ft concrete catch basin. Monument is located in the northeasterly corner of the intersection of Seal Beach Blvd. and St. Cloud Drive, 44 ft easterly of the centerline of Seal Beach Blvd. and 58 ft notherly of the centerline of St. Cloud Dr. monument is set level with the sidewalk. Benchmark elevation is 15.370.

NOTES

1. Contours shown represent existing ground.
2. All piles not shown.

LEGEND

XX.XX Indicates Bottom of Existing Footing

Indicates Existing Structure

Indicates Cast-in-Steel-Shell Pile

UTILITIES

① Exist Bolsa Chica Channel Triple 12'± x 10'± RC Box Culvert

② Exist Garden Grove Storm Channel RC Pipe

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL
12	Ora	22, 405	RO.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER X DATE

REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. C61444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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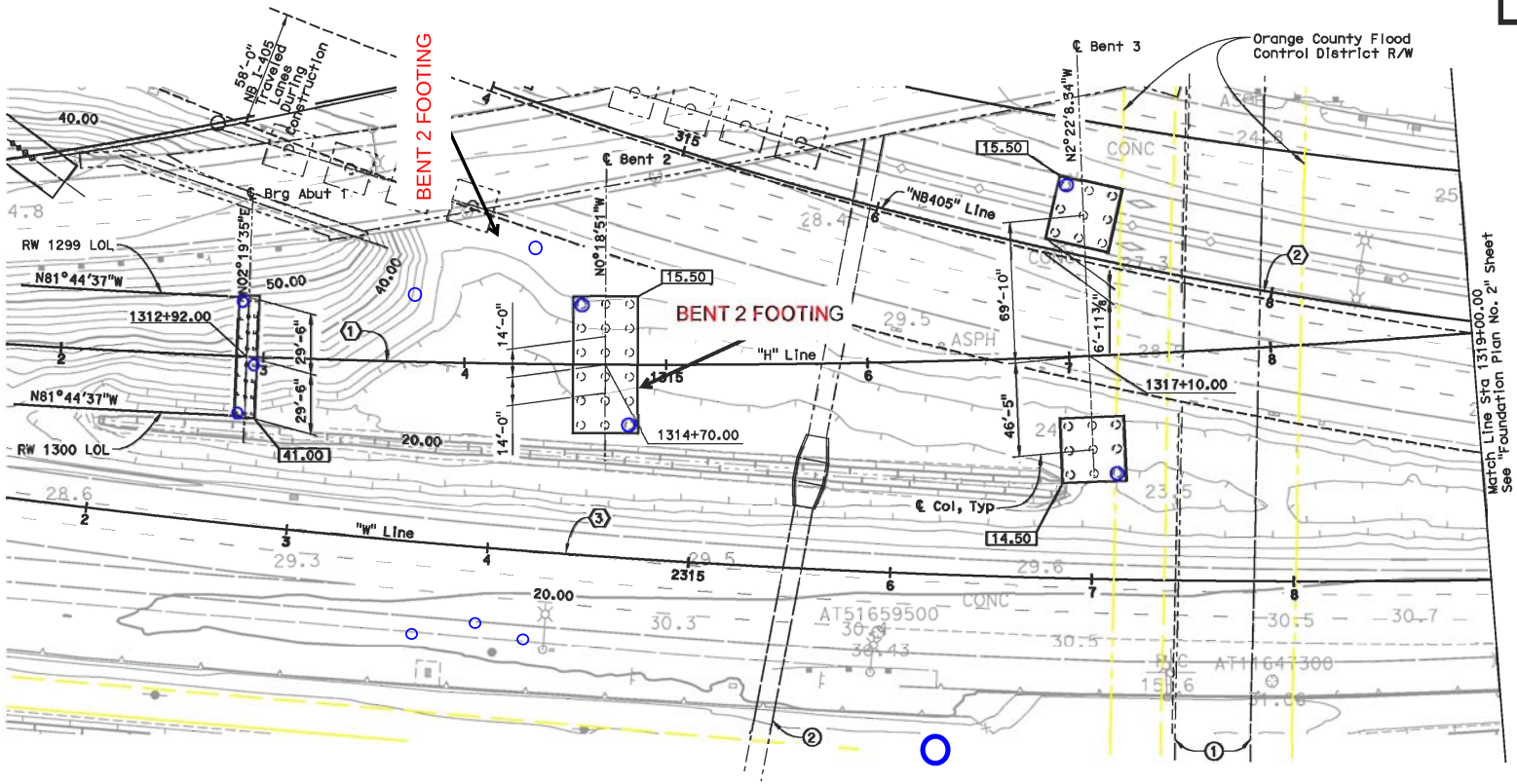
PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863



PLAN
1" = 30'

PDA NOTES:
PDA Test Pile lengths should be at least 10 ft longer than lengths based upon recommended pile tip elevations

CURVE DATA ①
R = 5125.00'
△ = 13°08'50"
L = 1176.01'
T = 590.60'

CURVE DATA ②
R = 2200'
△ = 26°20'20"
L = 1011.34'
T = 514.77'

CURVE DATA ③
R = 5075'
△ = 18°19'20"
L = 1622.90'
T = 818.44'

FIGURE 6A

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

GEOTECHNICAL PROFESSIONAL APPROVAL DATE

X DESIGN OVERSIGHT	SCALE: 1'=30'	VERT.DATUM X	HORZ.DATUM X	DESIGN	BY U. Sandirasegaram	CHECKED X	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	MOHSEN MOHSENI PROJECT ENGINEER	BRIDGE NO. 55-1103E
X SIGN OFF DATE	PHOTOGRAMMETRY AS OF: X	ALIGNMENT TIES X		DETAILS	BY P. Johnson	CHECKED X			POST MILE 20.66
	SURVEYED BY X	DRAFTED BY X		QUANTITIES	BY J. Lee	CHECKED X			
	FIELD CHECKED BY X	CHECKED BY X							

405-22 HOV CONNECTOR SEPARATION
FOUNDATION PLAN NO. 1

FOUNDATION PLAN SHEET (ENGLISH) (REV. 2-25-08)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) — 4/28/08

SHEET 8 OF

FILE => @REQUEST

USERNAME => @USER DATE PLOTTED => @DATE TIME PLOTTED => @TIME

PLAN
1" = 30'

CURVE DATA (1)	CURVE DATA (2)	CURVE DATA (3)
R = 5125.00'	R = 2200'	R = 5075'
Δ = 13°08'50"	Δ = 26°20'20"	Δ = 16°19'20"
L = 1176.01'	L = 1011.34'	L = 1622.90'
T = 590.80'	T = 514.77'	T = 818.44'

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE
PLANS APPROVAL DATE
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PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN OVERSIGHT	SCALE: 1"=30'	VERT.DATUM X	HORZ.DATUM X	DESIGN	BY U. Sandfrosegaran	CHECKED X	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	PHOTOGRAMMETRY AS OF: X	ALIGNMENT TIES X		DETAILS	BY F. Johnson	CHECKED X	
SIGN OFF DATE	SURVEYED BY X	DRAFTED BY X		QUANTITIES	BY J. Lee	CHECKED X	
	FIELD CHECKED BY X	CHECKED BY X					

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	405-22 HOV CONNECTOR SEPARATION
55-1103E	FOUNDATION PLAN NO. 1
POST MILE 20.65	

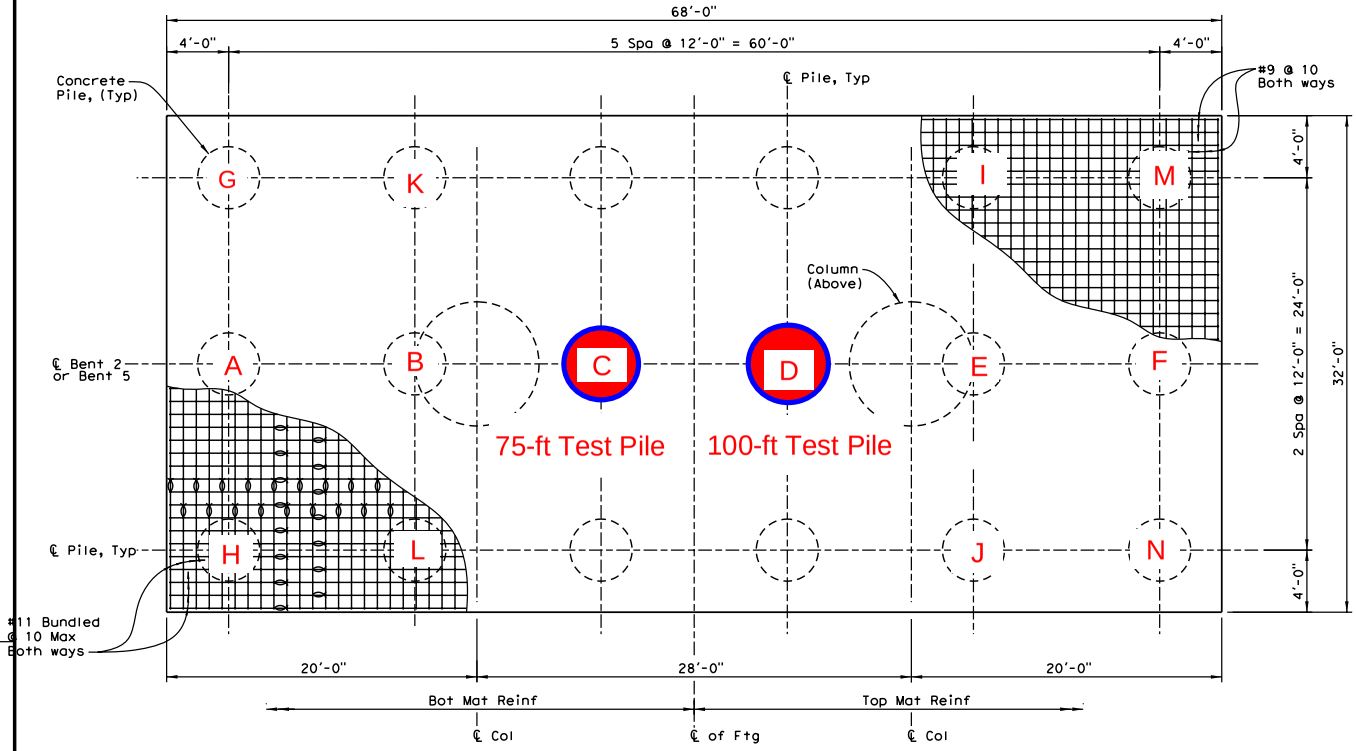
FOUNDATION PLAN SHEET (ENGLISH) (REV. 8-05-03)

ORIGINAL SCALE OF INCHES FOR REDUCED PLANS: 0 1 2 3

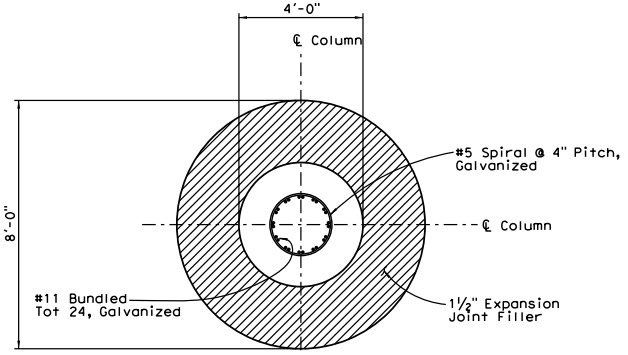
CU 12205
EA 0J160

DESIGNED BY REVISION DATES CHECKED BY STAGE (ALT) — SHEET 8

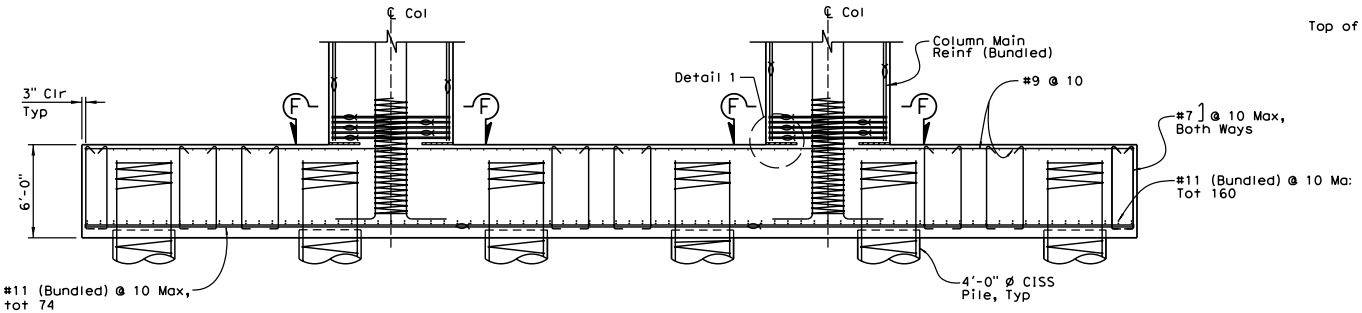
LOAD TEST FOOTING BENT 2
FIGURE 6B



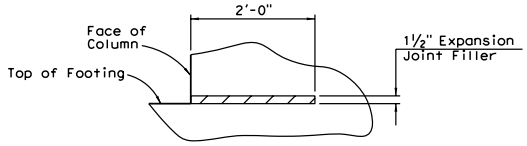
FOOTING PILE LAYOUT
1/4" = 1'-0"



SECTION F-F
½" = 1'-0"



FOOTING REINFORCEMENT
1/4" = 1'-0"



DETAIL 1
No Scale

NOTE:
Not all Reinforcement shown.

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

FIGURE 7

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE
PLANS APPROVAL DATE
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REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. C61444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN	U. Sandirasegaram	CHECKED	X
DETAILS	P. Johnson	CHECKED	X
QUANTITIES	J. Lee	CHECKED	X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	55-1103E
POST MILE	20.66

405-22 HOV CONNECTOR SEPARATION
BENT FOOTING DETAIL NO. 1

CU 12235
EA 071621

FILE => 55-1103Erl-h-b01fdt01.dgn

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

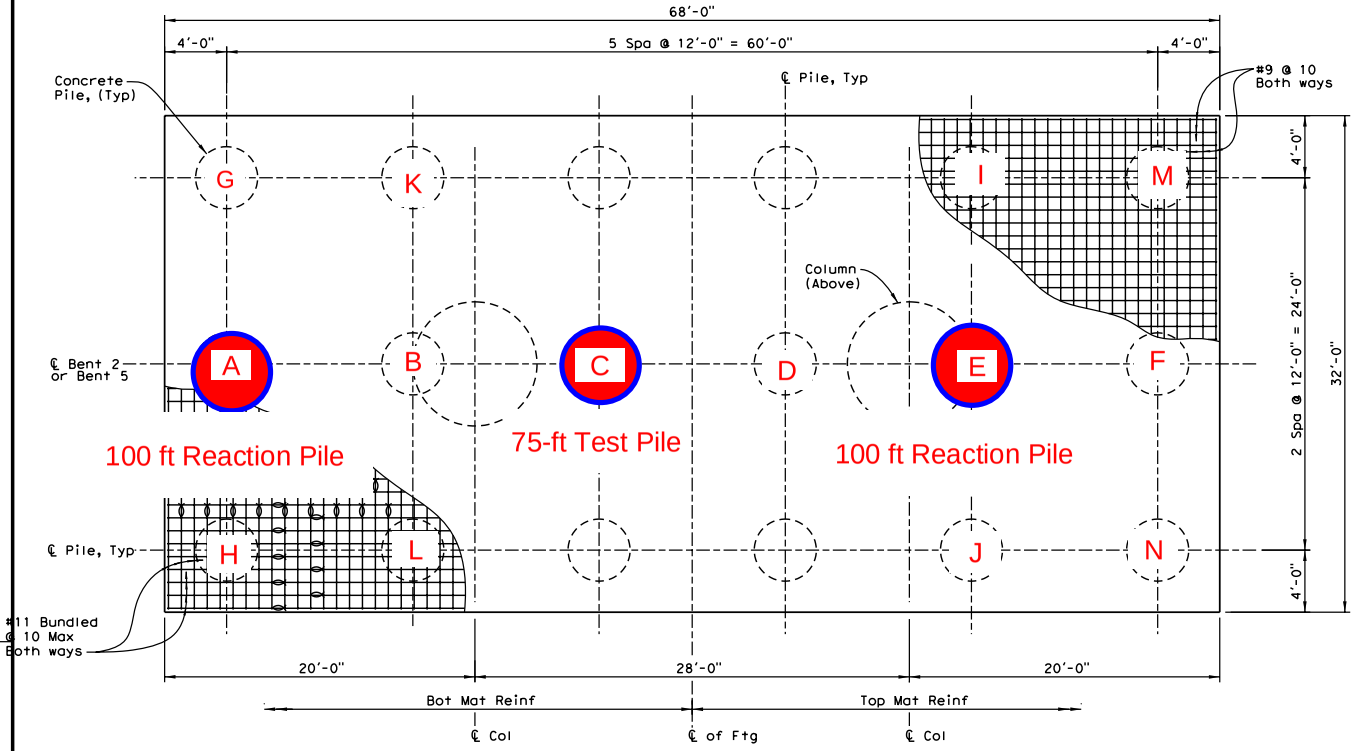
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 4-28-08

REVISION DATES (PRELIMINARY STAGE ONLY)

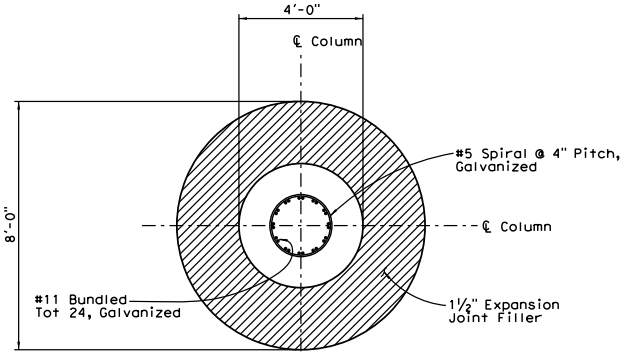
SHEET 23 OF

USERNAME => p001525 DATE PLOTTED => 10/14/2008 TIME PLOTTED => 4:38:53 PM



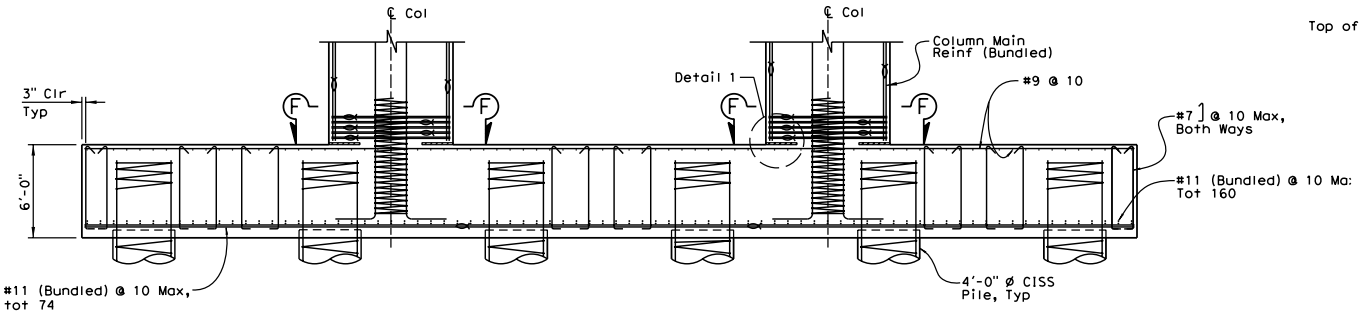
FOOTING PILE LAYOUT

1/4" = 1'-0"



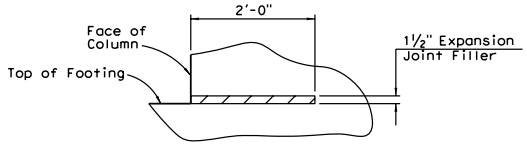
SECTION F-F

1/2" = 1'-0"



FOOTING REINFORCEMENT

1/4" = 1'-0"



DETAIL 1

No Scale

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

FIGURE 7A
75 ft Test Pile
with 2 Reaction Piles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. C61444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN OVERSIGHT			
SIGN OFF DATE			
DESIGN	BY U. Sandirasegaram	CHECKED X	
DETAILS	BY P. Johnson	CHECKED X	
QUANTITIES	BY J. Lee	CHECKED X	

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	55-1103E
POST MILE	20.66

405-22 HOV CONNECTOR SEPARATION
BENT FOOTING DETAIL NO. 1

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

FILE => 55-1103Erl-h-b01fdt01.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 4-28-08

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 23 OF

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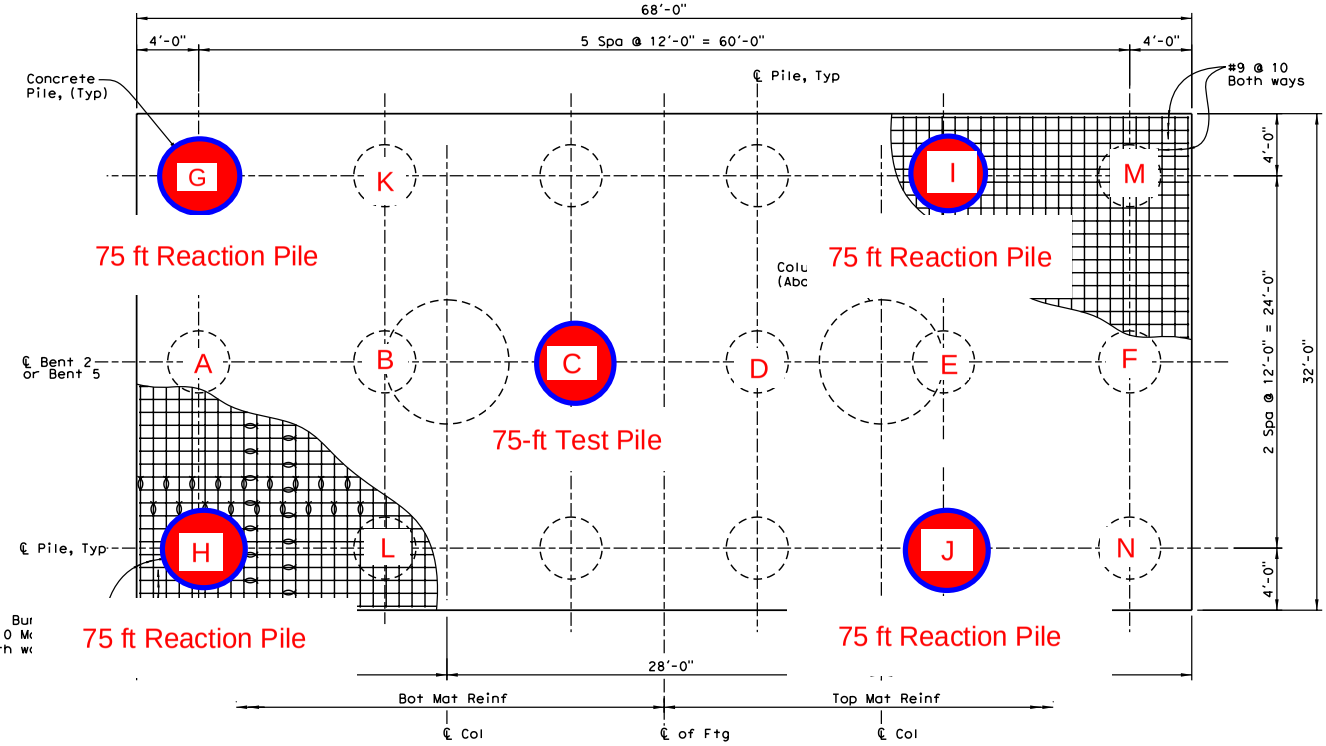
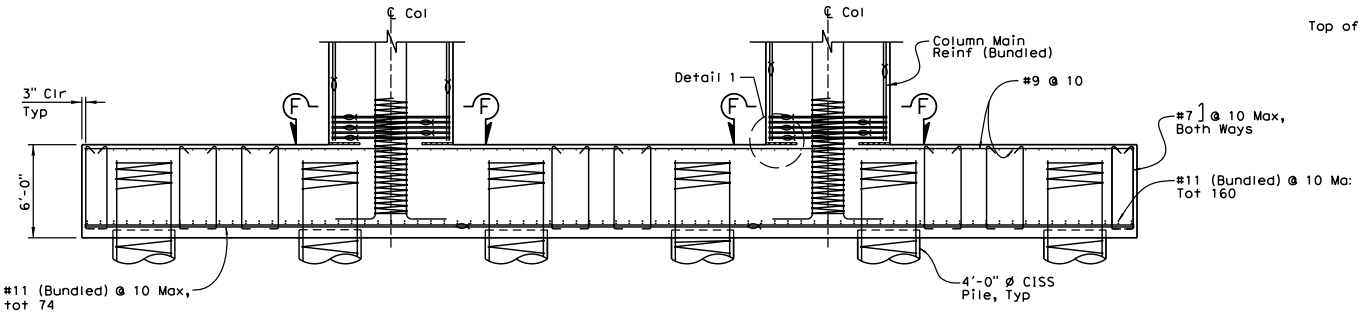
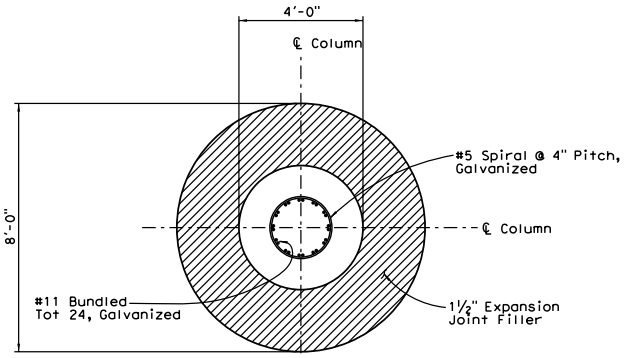


FOOTING PILE LAYOUT
1/4" = 1'-0"

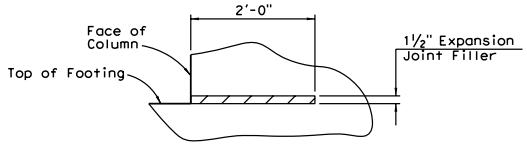


FOOTING REINFORCEMENT
1/4" = 1'-0"

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material



SECTION F-F
1/2" = 1'-0"



DETAIL 1
No Scale

FIGURE 7B
75 ft Test Pile
with 4 Reaction Piles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE
PLANS APPROVAL DATE
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PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN	U. Sandirasegaram	CHECKED X	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
DETAILS	P. Johnson	CHECKED X	
QUANTITIES	J. Lee	CHECKED X	

X DESIGN OVERSIGHT
X SIGN OFF DATE
DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

MOHSEN MOHSENI
PROJECT ENGINEER

CU 12235
EA 071621

FILE => 55-1103Erl-h-b01fdt01.dgn

BRIDGE NO.	405-22 HOV CONNECTOR SEPARATION
55-1103E	
POST MILE	BENT FOOTING DETAIL NO. 1
20.66	

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 4-28-08
REVISION DATES (PRELIMINARY STAGE ONLY)
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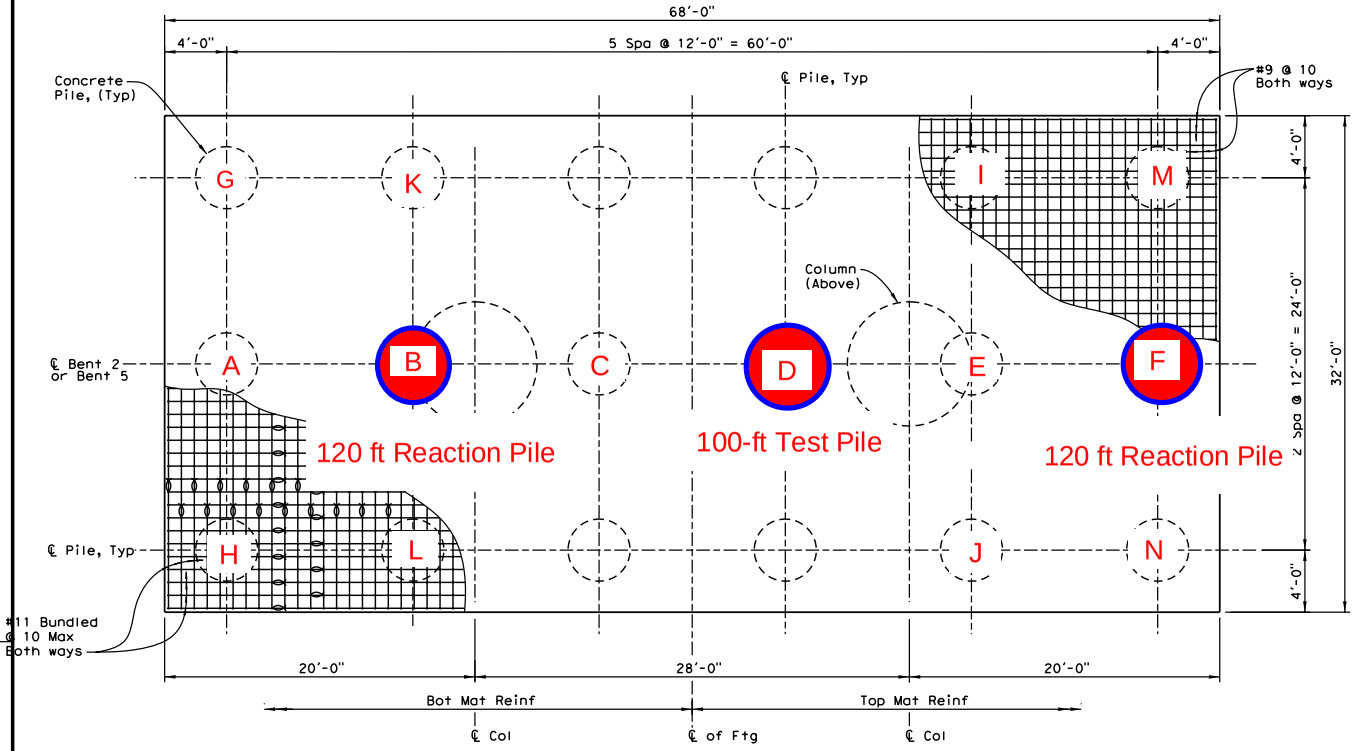
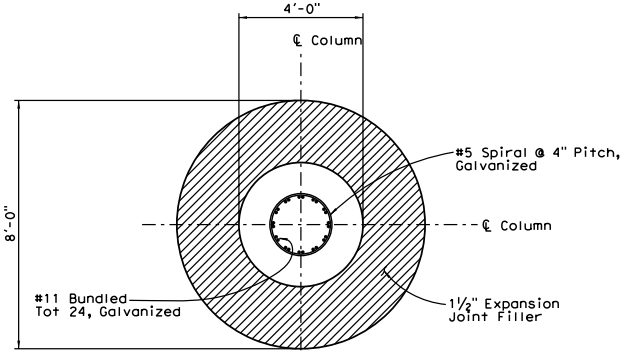


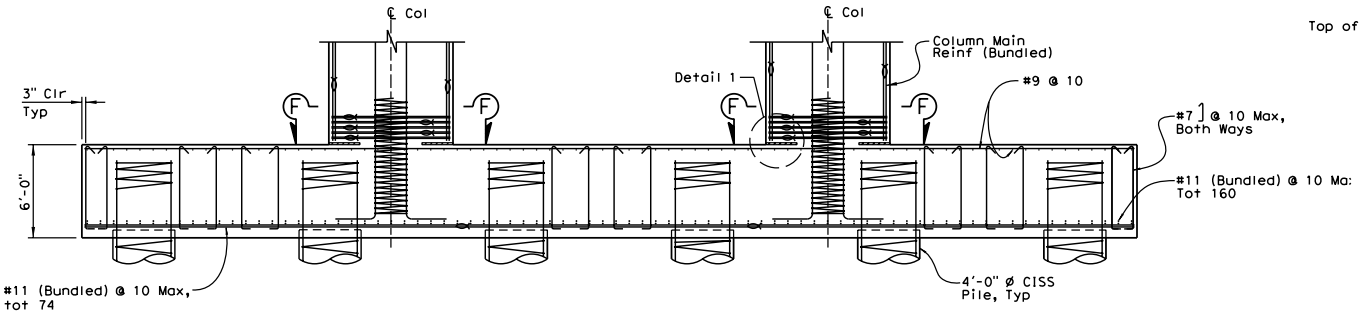
FOOTING PILE LAYOUT

1/4" = 1'-0"



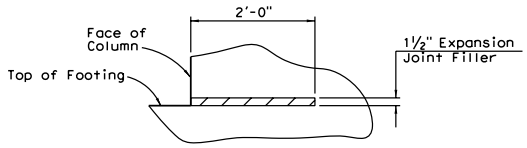
SECTION F-F

1/2" = 1'-0"



FOOTING REINFORCEMENT

1/4" = 1'-0"



DETAIL 1

No Scale

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

FIGURE 7C
100 ft Test Pile
with 2 Reaction Piles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	RO.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. C61444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN	BY U. Sandirasegaram	CHECKED X	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
DETAILS	BY P. Johnson	CHECKED X	
QUANTITIES	BY J. Lee	CHECKED X	

X DESIGN OVERSIGHT
X SIGN OFF DATE

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	405-22 HOV CONNECTOR SEPARATION
55-1103E	
POST MILE	BENT FOOTING DETAIL NO. 1
20.66	

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 12235
EA 071621

FILE => 55-1103Erl-h-b01fdt01.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 4-28-08

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 23 OF

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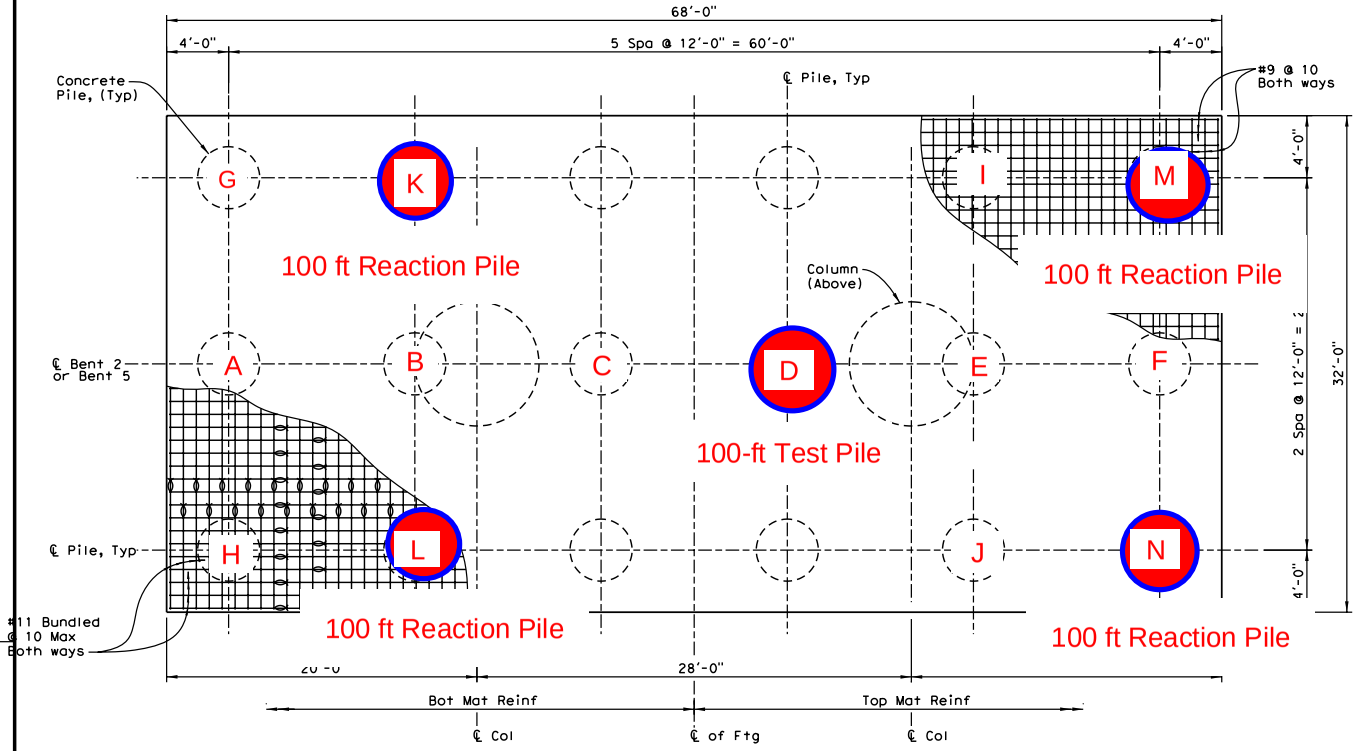
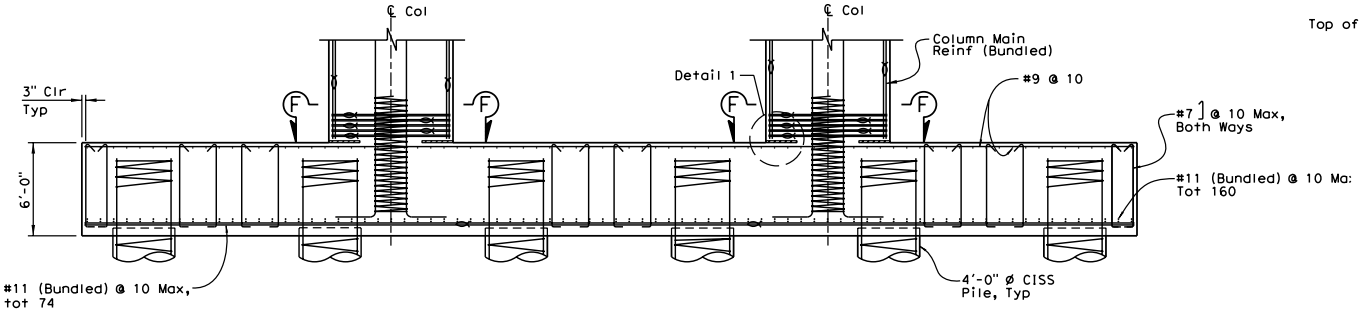
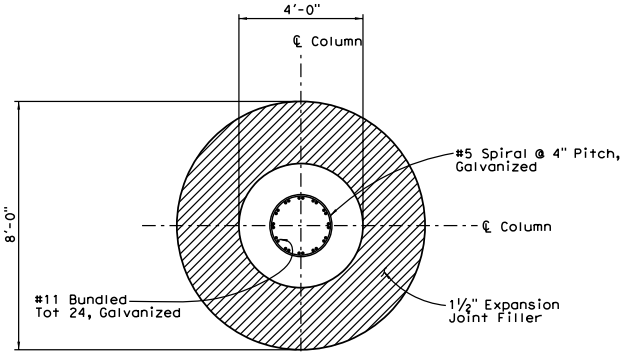


FOOTING PILE LAYOUT
1/4" = 1'-0"

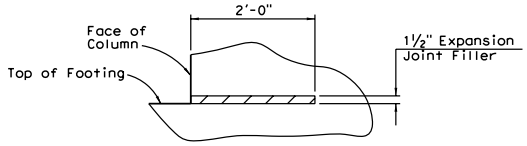


FOOTING REINFORCEMENT
1/4" = 1'-0"

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material



SECTION F-F
1/2" = 1'-0"



DETAIL 1
No Scale

FIGURE 7D
100 ft Test Pile
with 4 Reaction Piles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	22, 405	R0.7E/R1.2 20.5/22.2		

REGISTERED CIVIL ENGINEER — DATE
PLANS APPROVAL DATE
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REGISTERED PROFESSIONAL ENGINEER — UTHAYA SANDIRASEGARAM — No. C61444 — Exp. 06/30/09 — CIVIL — STATE OF CALIFORNIA

PARSONS	2201 DUPONT DRIVE SUITE 200 IRVINE, CA 92612
OCTA	550 SOUTH MAIN STREET ORANGE, CA 92863

DESIGN	U. Sandirasegaram	CHECKED	X
DETAILS	P. Johnson	CHECKED	X
QUANTITIES	J. Lee	CHECKED	X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

MOHSEN MOHSENI
PROJECT ENGINEER

BRIDGE NO.	55-1103E
POST MILE	20.66

405-22 HOV CONNECTOR SEPARATION
BENT FOOTING DETAIL NO. 1

CU 12235
EA 071621

FILE => 55-1103Erl-h-b01fdt01.dgn

DESIGN DETAIL SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 4-28-08

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 23 OF

USERNAME => p003525 DATE PLOTTED => 10/14/2008 TIME PLOTTED => 4:38:53 PM

APPENDIX A

Designation: D 1143 – 81 (Reapproved 1994)$^{\epsilon 1}$

Standard Test Method for Piles Under Static Axial Compressive Load[1]

This standard is issued under the fixed designation D 1143; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

ϵ^1 NOTE—Section 10 was added editorially in May 1994.

INTRODUCTION

This standard has been prepared to cover routine methods of testing to determine if a pile has adequate bearing capacity. The provisions permit the introduction of more detailed requirements and procedures when required to satisfy the objectives of the test program. While the procedures herein produce a relationship between applied load and pile settlement, the results may not represent long-term performance.

1. Scope

1.1 This test method covers procedures for testing vertical or batter piles individually or groups of vertical piles to determine response of the pile or pile group to a static compressive load applied axially to the pile or piles within the group. This test method is applicable to all deep foundation units that function in a manner similar to piles regardless of their method of installation. This test method is divided into the following sections:

	Section
Referenced Documents	2
Apparatus for Applying Loads	3
Apparatus for Measuring Movements	4
Loading Procedures	5
Procedures for Measuring Pile Movements	6
Safety Requirements	7
Report	8
Precision and Bias	9

1.2 The values stated in inch-pound units are to be regarded as the standard.

NOTE 1—Apparatus and procedures designated "optional" are to be required only when included in the project specifications or if not specified, may be used only with the approval of the engineer responsible for the foundation design. The word "shall" indicates a mandatory provision and "should" indicates a recommended or advisory provision. Imperative sentences indicate mandatory provisions. Notes, illustrations, and appendixes included herein are explanatory or advisory.

NOTE 2—This test method does not include the interpretation of test results or the application of test results to foundation design. See Appendix X1 for comments regarding some of the factors influencing the interpretation of test results. A qualified geotechnical engineer should interpret the test results for predicting pile performance and capacity. The term "failure" as used in this method indicates rapid progressive settlement of the pile or pile group under a constant load.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 3689 Method of Testing Individual Piles Under Static Axial Tensile Load[2]

2.2 *American National Standards Institute Standard:*

B30.1 Safety Code for Jacks[3]

3. Apparatus for Applying Loads

3.1 *General:*

3.1.1 The apparatus for applying compressive loads to the test pile or pile group shall be as described in 3.3, 3.4, or 3.5 or as otherwise specified and shall be constructed so that the loads are applied to the central longitudinal axis of the pile or pile group to minimize eccentric loading. Paragraph 3.3 is suitable for applying axial loads to individual vertical or batter piles; 3.4 and 3.5 are suitable for applying vertical loads only.

NOTE 3—When a pile group is subject to vertical test loads, cap rotations and horizontal displacements could occur. The occurrence of such movements and the necessary reactions to resist such movements if they are prohibited should be considered when designing and constructing the loading apparatus for the group test.

NOTE 4—If it is not feasible to apply axial test loads to a batter pile, the results of a test on a similar nearby vertical pile generally may be used to

[1] This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.11 on Deep Foundations.

Current edition approved March 2, 1981. Published May 1981. Originally published as D 1143 – 50 T. Last previous edition D 1143 – 74.

[2] *Annual Book of ASTM Standards*, Vol 04.08.

[3] Available from American National Standards Institute, 1430 Broadway, New York, NY 10018.

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evaluate the axial bearing capacity of the batter pile.

3.1.2 Where feasible, the immediate area of the test pile or pile group shall be excavated to the proposed pile cut-off elevation. The test pile(s) shall be cut off or built up to the proper grade as necessary to permit construction of the load-application apparatus, placement of the necessary testing, and instrumentation equipment, and observation of the instrumentation. Where necessary, the unsupported length of the test pile(s) shall be braced to prevent buckling without influencing the test results.

3.1.3 If the head of the pile has been damaged during driving, the damaged portion shall be removed prior to the test. For tests on piles groups, the piles shall be capped with a reinforced concrete cap designed and constructed in accordance with accepted engineering practice for the anticipated loads.

NOTE 5—Consideration should be given to providing a nominal clear space between the cap and the ground surface to eliminate any support offered by the soil under short-term loading. A properly constructed steel grillage may serve as an adequate pile cap for testing purposes.

3.1.4 In 3.3 and 3.4 and for a test on an individual pile in 3.5, a steel bearing plate(s) (test plate(s)) of sufficient thickness to prevent it from bending under the loads involved (but not less than 2 in. (50 mm)) shall be centered on the pile or pile cap and set perpendicular to the longitudinal axis of the pile or piles within the group, except that for tests on pile groups involving the use of two or more separate loading points, a test plate shall be used at each loading point and such plates shall be arranged symmetrically about the centroid of the group. For tests on individual piles, the size of the test plate shall be not less than the size of the pile butt nor less than the area covered by the base(s) of the hydraulic jack(s); for tests on pile groups, the size of the test plate(s) shall be not less than twice the area covered by the base(s) of the hydraulic jack(s).

3.1.5 For tests on precast or cast-in-place concrete piles or on pile groups, the test plate when used shall be set in high-strength quick-setting grout. For tests on individual steel H-piles, the test plate shall be welded to the pile. For tests on individual timber piles, the test plate may be set directly on the top of the pile which shall be sawed off to provide full bearing for the test plate or, alternatively, the test plate may be set in high-strength quick-setting grout.

3.1.6 In 3.3 and 3.4, the hydraulic jack(s) shall be centered on the test plate(s) with a steel bearing plate of adequate thickness between the top(s) of the jack ram(s) and the bottom(s) of the test beam(s). If a load cell(s) or equivalent device(s) is to be used, it shall be centered on the bearing plate above the ram(s) with another steel bearing plate of sufficient thickness between the load cell(s) or equivalent device(s) and the bottom(s) of the test beam(s). Bearing plates shall be of sufficient size to accommodate the jack ram(s) and the load cell(s) or equivalent device(s) and properly bear against the bottom(s) of the test beam(s).

3.1.7 In 3.5 for tests on pile groups a test plate may be used in accordance with the appropriate provisions of 3.1 or, alternatively, the test beam(s) may be set directly on the pile cap or the loading material applied directly on the cap. Test beam(s) set directly on the cap shall obtain full bearing using high-strength quick-setting grout, if necessary.

3.2 *Testing Equipment*:

3.2.1 Hydraulic jacks including their operation shall conform to ANSI B30.1.

3.2.2 Unless a calibrated load cell(s) is used, the complete jacking system including the hydraulic jack(s), hydraulic pump, and pressure gage shall be calibrated as a unit before each test or series of tests in a test program to an accuracy of not less than 5 % of the applied load. The hydraulic jack(s) shall be calibrated over its complete range of ram travel for increasing and decreasing applied loads. If two or more jacks are to be used to apply the test load, they shall be of the same ram diameter, connected to a common manifold and pressure gage, and operated by a single hydraulic pump.

NOTE 6—If it is not feasible to calibrate the complete jacking system as a unit, the pressure gage may be calibrated independently, in which case the jack piston(s) should be measured to verify the area(s).

3.2.3 When an accuracy greater than that obtainable with the jacking system is required, a properly constructed load cell(s) or equivalent device(s) shall be used in series with the hydraulic jack(s). Load cell(s) or equivalent device(s) shall be calibrated prior to the test to an accuracy of not less than 2 % of the applied load and shall be equipped with a spherical bearing(s).

3.2.4 If the hydraulic jack pump is to be left unattended at any time during the test, it shall be equipped with an automatic regulator to hold the load constant as pile settlement occurs.

3.2.5 Calibration reports shall be furnished for all testing equipment for which calibration is required, and shall show the temperature at which the calibration was done.

NOTE 7—Considerations should be given to employing a dual load-measuring system (gage and load cell) to provide as a check and as a back-up in case one system malfunctions. Hydraulic jack rams should have sufficient travel to provide for anticipated pile settlements, deflections of the test beam, and elongation of connections to anchoring devices with 3.3. The use of a single high-capacity jack is preferred to the use of multiple jack(s). If a multiple jacking system is used, each jack should be fitted with a pressure gage (in addition to the master gage) in order to detect malfunctions.

3.3 *Load Applied to Pile or Pile Group by Hydraulic Jack(s) Acting Against Anchored Reaction Frame* (See Fig. 1 and Fig. 2):

3.3.1 Install a sufficient number of anchor piles or suitable anchoring device(s) so as to provide adequate reactive capacity and a clear distance from the test pile or pile group at least five times the maximum diameter of the largest anchor or test pile(s) but not less than 7 ft (2 m). When testing individual batter piles, the anchor piles shall be battered in the same direction and angle as the test pile.

3.3.2 Center over the test pile or pile group a test beam(s) of sufficient size and strength to avoid excessive deflection under load with sufficient clearance between the bottom flange(s) of the test beam(s) and the top of the test pile or pile group to provide for the necessary bearing plates, hydraulic jack(s) (and load cell(s) if used). When applying axial loads to an individual batter pile, the test beam(s) should be oriented perpendicular to the direction of batter. For test loads of high magnitude requiring several anchors, a steel framework may be required

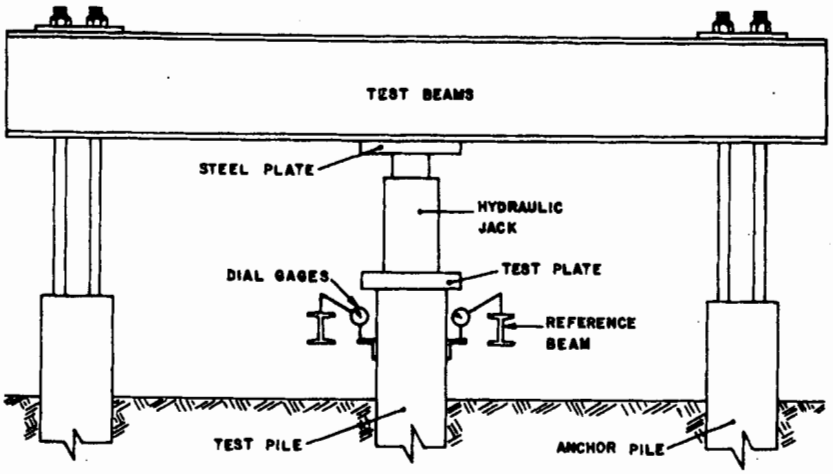
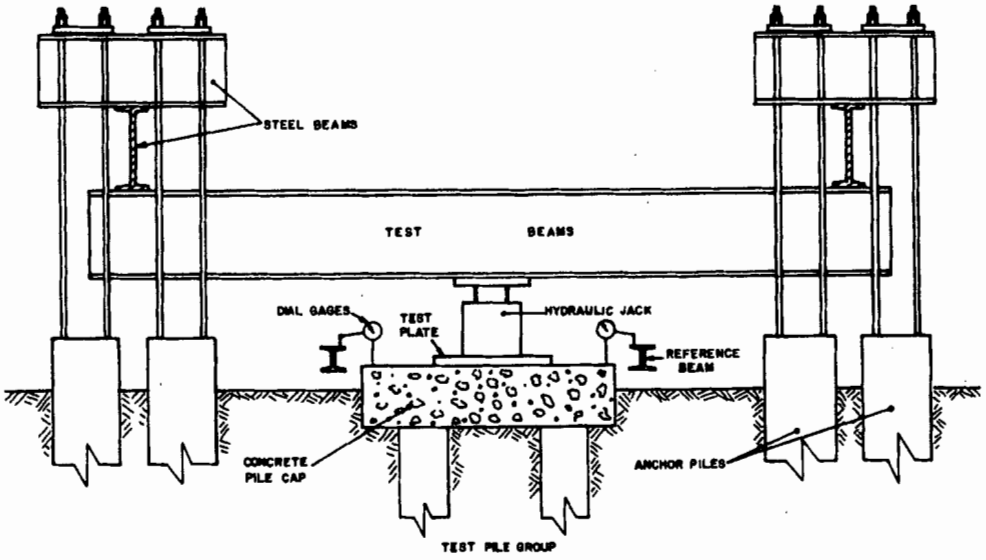


FIG. 1 Schematic Set-Up for Applying Loads to Pile Using Hydraulic Jack Acting Against Anchored Reaction Frame



Methods shown in Fig. 3 and Fig. 4 could be used.

FIG. 2 Typical Arrangement for Applying Load Test to Pile Group Using Method Illustrated in Fig. 1

to transfer the applied loads from the test beam(s) to the anchors.

3.3.3 Attach the test beam(s) (or reaction framework if used) to the anchoring devices with connections designed to adequately transfer the applied loads to the anchors so as to prevent slippage, rupture or excessive elongation of the connections under maximum required test load.

3.3.4 Apply the test load in accordance with the standard loading procedure 5.1 or as otherwise specified to the test pile or pile group with the hydraulic jack(s) reacting against the test beam(s).

3.4 *Load Applied to Pile or Pile Group by Hydraulic Jack(s) Acting Against a Weighted Box or Platform* (See Fig. 3):

3.4.1 Center over the test pile or pile group a test beam(s) of sufficient size and strength to avoid excessive deflection under load allowing sufficient clearance between the top of the test pile or pile cap and the bottom(s) of the beam(s) after deflection under load to accommodate the necessary bearing plates, hydraulic jack(s) (and load cell(s) if used). Support the ends of the test beam(s) on temporary cribbing or other devices.

3.4.2 Center a box or platform on the test beam(s) with the edges of the box or platform parallel to the test beam(s) supported by cribbing or piles placed as far from the test pile or pile group as practicable but in no case less than a clear distance of 5 ft (1.5 m). If cribbing is used, the bearing area of the cribbing at ground surface shall be sufficient to prevent adverse settlement of the weighted box or platform.

3.4.3 Load the box or platform with any suitable material such as soil, rock, concrete, steel, or water-filled tanks with a total weight (including that of the test beam(s) and the box or platform) at least 10 % greater than the anticipated maximum test load.

3.4.4 Apply the test loads to the pile or pile group in accordance with the standard procedure in 5.1 or as otherwise specified with the hydraulic jack(s) reacting against the test beam(s).

3.5 *Load Applied Directly to the Pile or Pile Group with*

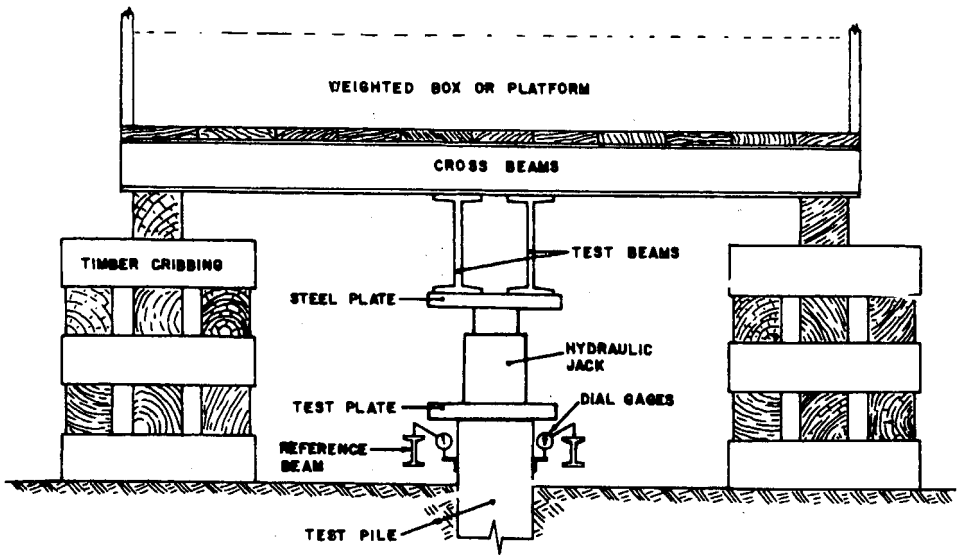


FIG. 3 Schematic Set-Up for Applying Loads to Pile Using Hydraulic Jack Acting Against Weighted Box or Platform

Known Weights (See Fig. 4, Fig. 5, and Fig. 6):

3.5.1 Center on the test plate or pile cap a test beam(s) of known weight and of sufficient size and strength to avoid excessive deflection under load with the ends supported on temporary cribbing if necessary to stabilize the beam(s). Alternatively the known test weights or loading material may be applied directly on the pile or pile cap.

3.5.2 Center and balance a platform of known weight on the test beam(s) or directly on the pile cap with overhanging edges of the platform parallel to the test beam(s) supported by cribbing or by piles capped with timber beams, so that a clear distance of not less than 5 ft. (1.5 m) is maintained between the supports and the test pile or pile group.

3.5.3 Place sufficient pairs of timber wedges between the top of the cribbing or timber cap beams and the bottom edges of the platform so that the platform can be stabilized during loading or unloading.

3.5.4 When ready to load the platform, remove any temporary supports at the ends of the test beam(s) and tighten the wedges along the bottom edges of the platform so that the platform is stable. Load the platform in accordance with the standard loading procedures in 5.1 or as otherwise specified using material such as steel or concrete so that the weight of incremental loads can be determined within 5 %.

NOTE 8—With the loading apparatus described in 3.5, provisions can be made for taking target rod level readings directly on the center of the pile butt or pile cap or center of the test plate to measure pile butt movements in 4.2.3. For tests on concrete piles, or on pile groups, a hole would be required in the center of the test plate through which would extend a steel pin embedded in the top of the pile or pile cap. For tests on steel H or timber piles, readings would be taken on the test plate. To accommodate the target rod, a double test beam must be used with sufficient space between the beams and a hole must be left through the platform. To permit sighting on the target rod it may be necessary to leave a space between the test weights in line with the line of sight.

3.6 *Other Types of Loading Apparatus* (Optional)—Any other type of loading apparatus satisfying the basic requirements of 3.3 or 3.4 may be used.

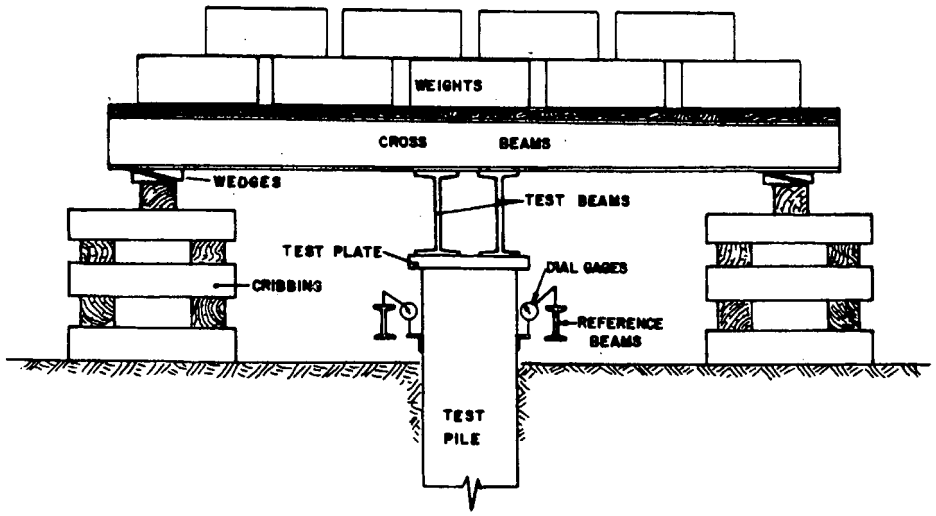


FIG. 4 Schematic Set-Up for Applying Loads Directly to Pile Using Weighted Platform

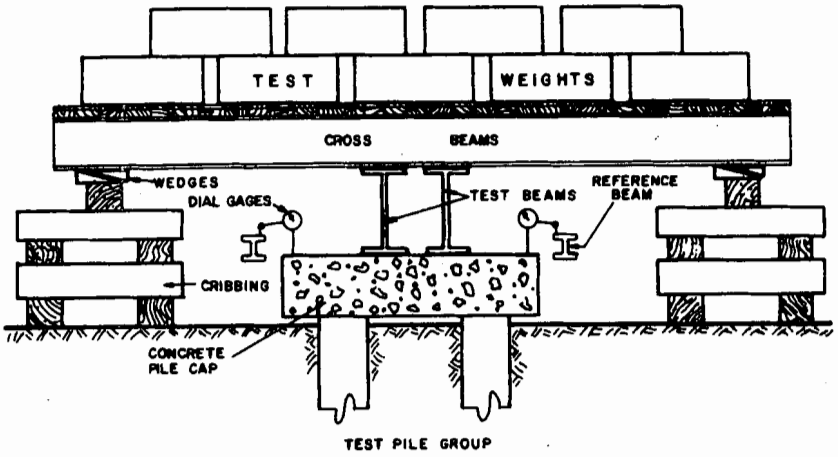


FIG. 5 Possible Arrangement for Applying Load Test to Pile Group Using Weighted Platform

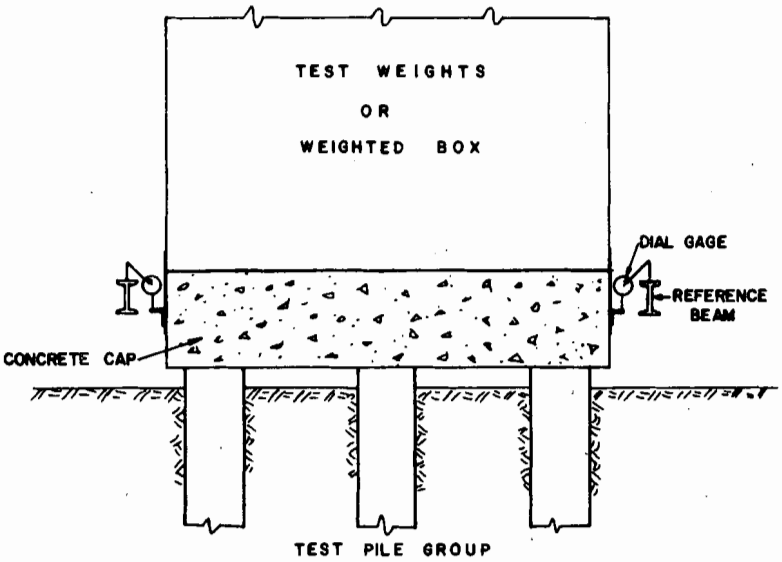


FIG. 6 Arrangement for Applying Tests Loads Directly on Pile Cap for Group Tests

4. Apparatus for Measuring Movement

4.1 *General*:

4.1.1 All reference beams and wires shall be independently supported with supports firmly embedded in the ground at a clear distance of not less than 8 ft (2.5 m) from the test pile or pile group and as far as practical from the anchor piles or cribbing. Reference beams shall be sufficiently stiff to support the instrumentation such that excessive variations in readings do not occur and should be cross connected to provide additional rigidity. If steel reference beams are used, one end of each beam shall be free to move horizontally as the beam length changes with temperature variations.

4.1.2 Dial gages shall have at least a 2-in. (50-mm) travel; longer gage stems or sufficient gage blocks shall be provided to allow for greater travel if anticipated. Except as required in 4.4.2, gages shall have a precision of at least 0.01 in. (0.25 mm). Smooth bearing surfaces (such as glass) perpendicular to the direction of gage-stem travel shall be provided for the gage stems. Scales used to measure pile movements shall read to 1/64th of an inch or to 0.01 in. (0.25 mm). Target rods shall read to 0.001 ft (0.3 mm).

4.1.3 All dial gages, scales and reference points shall be clearly marked with a reference number or letter to assist in recording data accurately. Provisions shall be made to protect the measuring system, reference system, and instrumentation from adverse temperature variations and from disturbance. All gages, scales, or reference points attached to the test pile or pile cap shall be mounted so as to prevent movement relative to the test pile or pile cap during the test.

4.2 *Pile Butt Axial Movements* (See Fig. 7)—The apparatus for measuring axial movement of the butt of the test pile or piles within the group shall consist of a primary and secondary system in accordance with the following methods.

NOTE 9—Two separate measuring systems are required in order to have a check on the observed data, to provide for accidental disturbance of the measuring system, and to permit continuity of data in case it becomes necessary to reset the gages or scales.

4.2.1 *Dial Gages*—Two parallel reference beams, one on each side of the test pile or pile cap, shall be oriented in a direction that permits placing their supports as far as practicable from anchor piles or cribbing. A minimum of two dial gages shall be mounted on the reference beams approximately

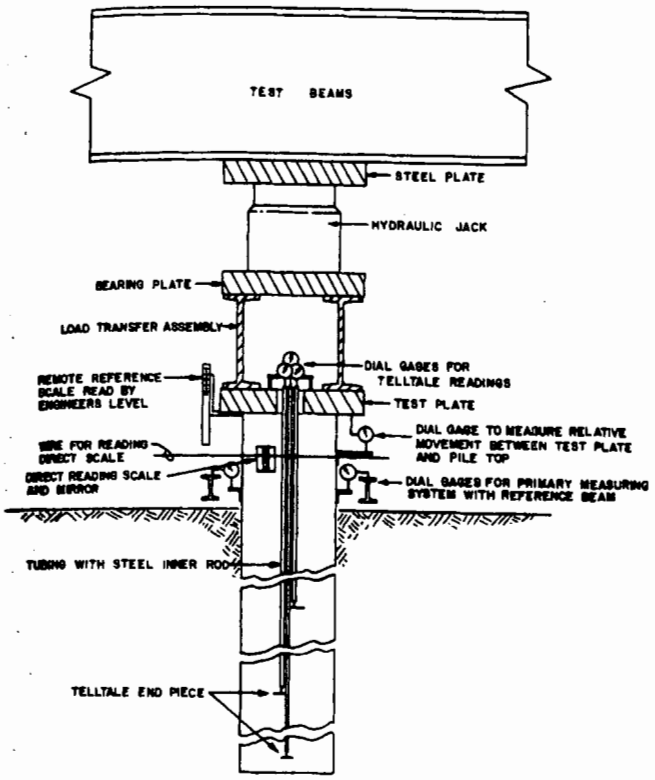


FIG. 7 Possible Arrangement of Instrumentation for Measuring Vertical Movements of Pile

equidistant from the center of and on opposite sides of the test pile or pile cap with stems parallel to the longitudinal axis of the pile(s) and bearing on lugs firmly attached to the sides of the pile or pile cap below the test plate. Alternatively, the two dial gages shall be mounted on opposite sides of the test pile or pile cap below the test plate with stems parallel to the longitudinal axis of the pile(s) and bearing on lugs firmly attached to the reference beams. However, gages may be mounted to bear on the top of the pile cap or on the test plate provided that two additional gages shall be mounted on opposite sides of the test plate to measure relative movements between the test plate and the pile or pile cap (see Fig. 7). For tests on individual batter piles, the dial gages shall be mounted along a line perpendicular to the direction of batter.

NOTE 10—The use of four dial gages mounted 90° apart is recommended to compensate for lateral movement or rotation of the pile butt due to accidental eccentric loading.

NOTE 11—For tests on batter piles, it is recommended that a dial gage be mounted in line with the direction of batter through the center of the test pile with the gage stem perpendicular to the longitudinal axis of the pile and bearing against a lubricated glass plate to measure lateral movements.

4.2.2 *Wire, Mirror, and Scale*—Two parallel wires, one on each side of the test pile or pile cap, shall be oriented in a direction that permits placing the wire supports as far as practicable from anchor piles or cribbing. Each wire shall pass across and be clear of the face of a scale that is mounted parallel to the axis of the test pile or piles within the group and that is attached to a mirror fixed to the test pile or pile cap so that consistent readings of axial movement can be made directly from the scale by lining up the wire and its image in the mirror. The wire shall be not more than 1 in. (25 mm) from the face of the scale. A suitable method shall be used to maintain tension in the wires throughout the test so that when plucked or tapped, the wire will return to its original position. Piano wire or equivalent type shall be used.

4.2.3 *Surveyor's Level or Laser Beam*—Readings using a surveyor's level or laser beam shall be taken on a target rod or a scale and shall be referenced to a permanent bench mark located outside of the immediate test area or, alternatively, the surveyor's level shall be mounted on an object of fixed elevation (for example a driven pile) outside of the immediate test area. Reference points or scales used in taking settlement readings shall be mounted on the sides of the test pile or pile cap and located on opposite sides except that reference points may be on top of the pile cap or readings may be taken on a single fixed point in the center of the test pile top, test plate or pile cap or on scales mounted on the test plate provided that relative movements between the test plate and the top of the pile are measured in accordance with 4.2.1 (see Fig. 7).

4.2.4 *Other Types of Measuring Apparatus* (Optional)—Any other type of measuring device such as electric or optical gages of proven reliability and that yield an accuracy of 0.01 in. (0.25 mm) may be used.

4.3 *Lateral Movements* (Optional) The lateral movements of the top of the test pile or pile group shall be measured to an accuracy of 0.1 in. (2.5 mm) using either of the following methods: (*a*) two dial gages mounted on the reference beam 90° apart with their stems perpendicular to the longitudinal axis of the test pile(s) and bearing against the sides of the test pile or pile cap, or (*b*) an engineer's transit reading from fixed positions scales mounted horizontally on the sides of the test pile or pile cap 90° apart with readings referenced to fixed foresights or backsights. For tests on batter piles, one of the gages or scales shall be oriented in the direction of the batter.

4.4 *Incremental Strain Measurements* (Optional):

4.4.1 The test pile(s) shall be instrumented as specified to determine distribution of load transfer from the pile to the soil. If strain rods or telltales (see Fig. 7, Fig. 8, Fig. 9, and Fig. 10) are used, they shall be installed in or on the test pile terminating at the pile tip and at other points along the pile as required and shall be sheathed or encased to insure free movement of the rods during the test. The influence of the sheathing on the elastic properties of the pile section shall be considered. If electric resistant strain gages are used, the gage type and installation shall be as specified and shall include temperature compensating gages.

NOTE 12—Where feasible, measurement programs involving strain gages should include calibration of the fully instrumented pile and a complete strain history starting before the pile is installed.

4.4.2 Pile butt axial movements shall be measured with dial gages (see 4.2.1). The movements of the top of each strain rod relative to the top of the test pile shall be measured with a dial gage reading to 0.001 in. (0.025 mm). Dial gages shall be referenced to points on the test pile below the test plate except that they may be referenced to the top of the test plate if the plate is welded to the pile or if relative movements between the top of the test pile and the test plate are measured in accordance

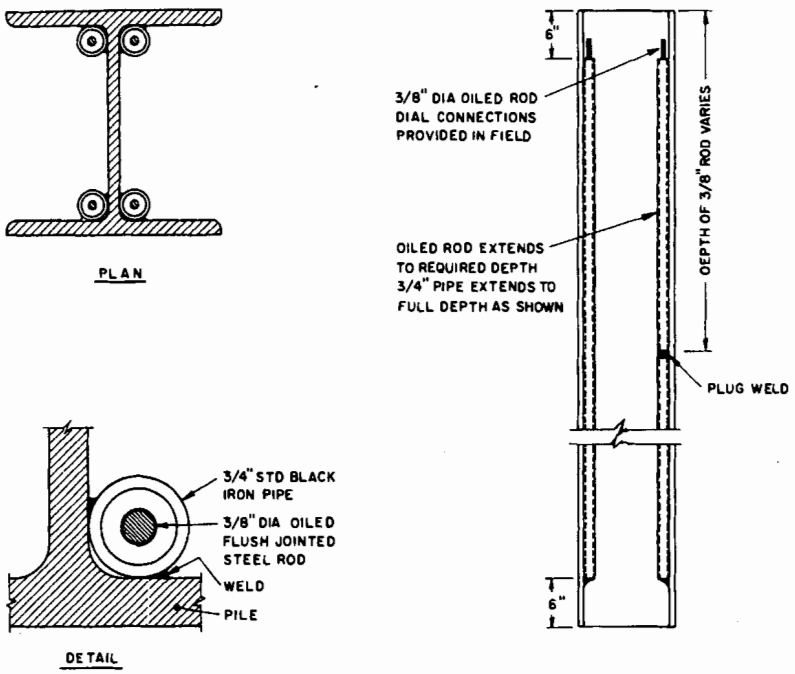


FIG. 8 Possible Installation of Telltales for Steel H-Piles

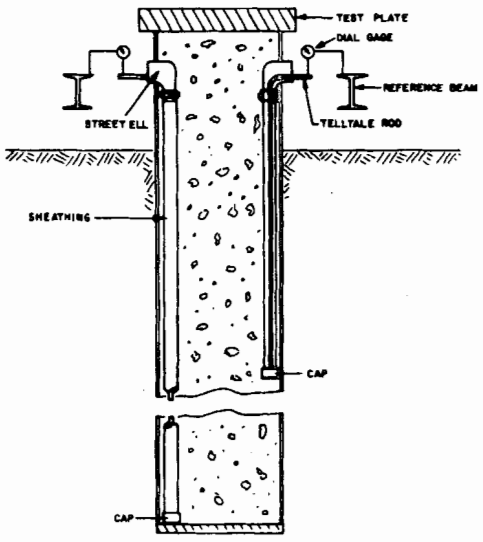


FIG. 9 Possible Installation of Telltales for Pipe Piles

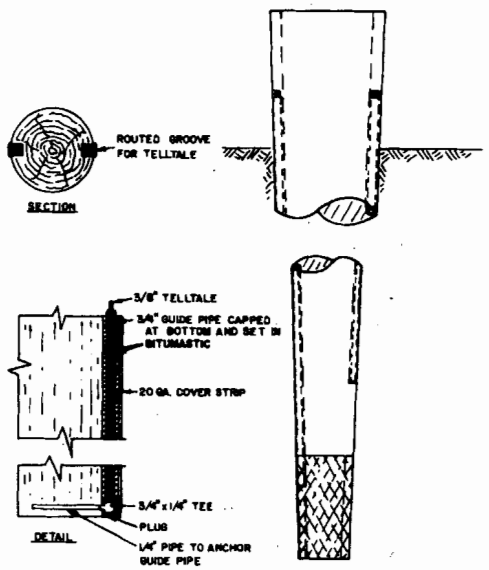


FIG. 10 Possible Installation of Telltales for Timber Piles

with 4.2.1 (see Fig. 7).

5. Loading Procedures

5.1 *Standard Loading Procedure*—Unless failure occurs first, load the pile to 200 % of the anticipated pile design load for tests on individual piles or to 150 % of the group design load for tests on pile groups, applying the load in increments of 25 % of the individual pile or group design load. Maintain each load increment until the rate of settlement is not greater than 0.01 in. (0.25 mm)/h but not longer than 2 h. Provided that the test pile or pile group has not failed, remove the total test load anytime after 12 h if the butt settlement over a one-hour period is not greater than 0.01 in. (0.25 mm); otherwise allow the total load to remain on the pile or pile group for 24 h. After the required holding time, remove the test load in decrements of 25 % of the total test load with 1 h between decrements. If pile failure occurs continue jacking the pile until the settlement equals 15 % of the pile diameter or diagonal dimension.

5.1.1 *Direct Loading Method*—When using the loading method described in 3.5, include in the first load increment the weight of the test beam(s) and the platform. Before adding or removing load increments, tighten the wedges along the platform edges to stabilize the platform. Place or remove load increments in a manner which avoids impact and maintains the load balanced at all times. After each load increment has been added, loosen (but do not remove) the wedges and keep them loose to permit the full load to act on the pile as settlement occurs.

NOTE 13—Testing a pile to failure provides valuable information to the

design engineer and is recommended for pile tests performed prior to the foundation design or to evaluate comparative performances of different type piles. Such testing permits the selection of optimum pile type and design load.

NOTE 14—If the test pile(s) may exhibit or has exhibited negligible settlement at the design load or may approach or has approached incipient failure at the full test load, consideration may be given to increasing the standard loading increments at the start of the test or subsequent tests or to decreasing the standard loading increments during the latter stages of the test or subsequent tests.

5.2 *Cyclic Loading* (Optional)—For the first application of test load increments, apply such increments in accordance with 5.1. After the application of loads equal to 50, 100, and 150 % of the pile design load for tests on individual piles or 50 and 100 % of the group design load for tests on pile groups, maintain the total load in each case for 1 h and remove the applied load in decrements equal to the loading increments, allowing 20 min between decrements. After removing each total applied load, reapply the load to each preceding load level in increments equal to 50 % of the design load, allowing 20 min between increments. Apply additional loads in accordance with 5.1. After the total required test load has been applied, hold and remove the test load in accordance with 5.1.

5.3 *Loading in Excess of Standard Test Load* (Optional)—After the load has been applied and removed in accordance with 5.1, reload the test pile or pile group to the standard test load in increments of 50 % of the pile or pile group design load, allowing 20 min between load increments. Then increase the load in increments of 10 % of the design load for the pile or pile group until the maximum required load has been applied or until failure of the test pile or pile group occurs, allowing 20 min between load increments. If failure does not occur, hold the full load for 2 h and then remove the load in four equal decrements, allowing 20 min between decrements.

5.4 *Constant Time Interval Loading* (Optional)—Follow the procedures of 5.1 except apply load in increments of 20 % of the pile or group design load with 1 h between load increments and unload the piles with 1 h between load decrements.

5.5 *Constant Rate of Penetration Method for Individual Piles* (Optional):

5.5.1 The apparatus for applying loads shall have a capacity as specified and shall be in accordance with either 3.3 or 3.4. The hydraulic jack ram(s) shall have a travel greater than the anticipated total movement of the pile but not less than 25 % of the average pile diameter or diagonal dimension. A mechanical pump equipped with a bleed valve, variable speed device, or other means for providing a smooth variable delivery shall be used. If a video recording system is used to record the test data, a digital clock reading to seconds should be used and the clock as well as all gages shall be easily readable and located within the camera field.

5.5.2 Vary the applied load as necessary to maintain a pile penetration rate of 0.01 to 0.05 in. (0.25 to 1.25 mm)/min for cohesive soil or 0.03 to 0.10 in. (0.75 to 2.5 mm)/min for granular soils, or as otherwise specified. Continue loading the pile until no further increase in the load is necessary for continuous pile penetration at the specified rate unless the specified capacity of the loading apparatus is reached. If pile penetration continues, hold the load required to achieve the specified penetration rate until the total pile penetration is at least 15 % of the average pile diameter or diagonal dimension at which time release the load. If the pile stops penetrating under the maximum applied load, release the load.

5.5.3 The rate of penetration may be controlled by checking the time taken for successive small equal increments of penetration and by adjusting the rate of jacking accordingly. Alternatively, any mechanical or electrical device may be used to monitor and control the penetration rate so that it remains constant.

5.5.4 See 6.3 for measurement procedures.

5.6 *Quick Load Test Method for Individual Piles* (Optional):

5.6.1 The apparatus for applying the load shall have a capacity as specified and shall be in accordance with 3.3 or 3.4.

5.6.2 Apply the load in increments of 10 to 15 % of the proposed design load with a constant time interval between increments of 2½ min or as otherwise specified. Add load increments until continuous jacking is required to maintain the test load or until the specified capacity of the loading apparatus is reached, whichever occurs first, at which time stop the jacking. After a 5-min interval or as otherwise specified, remove the full load from the pile.

5.6.3 See 6.4 for measurement procedures.

NOTE 15—For 5.5 and 5.6 it is recommended that the full test load be removed in four approximately equal decrements with 5 min between decrements so the shape of the rebound curve may be determined.

5.7 *Constant Settlement Increment Loading Method for Individual Piles* (Optional):

5.7.1 The apparatus for applying the load shall have a capacity as specified and shall be in accordance with 3.3 or 3.4.

5.7.2 Apply test loads in increments required to produce pile butt settlement increments equal to approximately 1 % of the average pile diameter or diagonal dimension. Vary the applied load as necessary to maintain each settlement increment, and do not apply additional load until the rate of load variation to hold that settlement increment constant is less than 1 % of the total applied load per hour. Continue loading the pile in such increments until the total butt settlement equals about 10 % of the average pile diameter or diagonal dimensions or until the specified capacity of the loading apparatus is reached.

5.7.3 Remove the full test load in four equal decrements after maintaining the final settlement increment until the rate of load variation is less than 1 % of the total applied load per hour. After removing the first load decrement, do not remove additional decrements until the rate of pile rebound for the preceding load decrement is less than 0.3 % of the average pile diameter or diagonal dimension per hour.

5.7.4 See 6.5 for measurement procedures.

NOTE 16—For piles driven into cohesive soils, the elapsed time between driving and testing should be sufficient to allow dissipation of any excess pore water pressure resulting from pile driving and to permit the regain of the soil strength (known as soil freeze). The waiting period will depend on such things as the amount of excess pore water pressure built up, the degree of soil structure disturbance resulting from pile driving, and the soil properties. It could range from a minimum of 3 days to as long as 30 days or longer and the actual required waiting period may be determined by testing (for example redriving piles) or by prior experience.

NOTE 17—To avoid excessive creep of green concrete in cast-in-place concrete piles, the elapsed time between concrete placement and pile

testing should be sufficient to permit the concrete to cure and harden properly, recognizing that the curing time for the concrete in the pile generally will be longer than that for the sampled concrete in standard test cylinders.

6. Procedures for Measuring Pile Movements

6.1 *General*—For axial movements, take readings on the test pile or pile cap; readings may be taken on the test plate, provided that the requirements of 4.2.1 are satisfied. For lateral movements, taken readings on the sides of the test pile or pile cap. Take required readings at each properly identified gage, scale, or reference point as nearly simultaneously as practicable. When using the loading method described in 3.5, take the no-load reading before the test beam(s) and platform are permitted to bear on the pile(s). Clearly indicate and explain any adjustments made to instrumentation or to data recorded in the field.

6.2 *Standard Measuring Procedures*—Take readings of time, load, and movement, and record them before and after the application of each load increment or the removal of each load decrement. During loading, provided that the test pile or pile group has not failed, take additional readings and record them at intervals not exceeding 10 min during the first ½ h nor 20 min thereafter for each load increment. After the total load has been applied, provided that the test pile or pile group has not failed, take readings and record at intervals not exceeding 20 min during the first 2 h, not exceeding 1 h for the next 10 h, and not exceeding 2 h for the next 12 h. If pile failure occurs, take readings immediately before removing the first load decrement. During unloading, take readings and record at intervals not exceeding 20 min. Take a final rebound reading 12 h after all load has been removed.

NOTE 18—If incremental strain measurements as in 4.4 are made using strain gages, gage readings should be taken and recorded before and after the pile is installed and immediately before the application of test loads so that a complete strain history is obtained and residual stresses can be accounted for.

6.3 *Readings for Constant Rate of Penetration Loading*—Take readings of time, load, and settlement, and record at least every 30 s or at sufficient intervals to determine the rate of penetration being achieved. If automatic monitoring and recording devices are used, operate them continuously during each test. When the test pile has achieved its specified rate of penetration, continue to take and record readings for the duration of the loading, and determine the maximum load applied. Immediately after unloading, take and record readings of time, load, and rebound. Take final readings and record 1 h after all load has been removed.

6.4 *Readings for Quick Load Test Method*—Take readings of time, load, and settlement, and record immediately before and after the application of each load increment and at intermediate time intervals as specified. When the maximum load has been applied, take readings and record when the jacking is stopped. Repeat after 2½ min and again at 5 min thereafter. If a longer holding period than in 5.7.2 is specified, take and record additional readings as specified. Take readings of time and rebound, and record after all load has been removed. Repeat after 2½ min and again at 5 min thereafter.

6.5 *Readings for Constant Settlement Increment Method*—Take readings of time, load, and settlement, and record immediately before and after each settlement increment with sufficient intermediate readings so as to determine the rate of load variation and the actual load required to maintain each settlement increment. During unloading, take readings of time, load, and rebound, and record immediately before and after the removal of each load decrement with sufficient intermediate readings so as to determine the rate of pile rebound. Take final readings and record 12 h after all load has been removed.

NOTE 19—Level readings should be taken on the reference beams and on the reaction system using a surveyor's level or transit and target rod or scale to determine if any excessive movement occurs. Such readings should be taken and recorded before any test load is applied, at the proposed design load, at the maximum test load, and after all load has been removed. Intermediate readings may be required if results during testing appear unusual.

NOTE 20—When testing piles in granular soils in dewatered excavations which will be submerged during service, the groundwater level should be maintained as near to the existing ground surface as possible and the depth to the groundwater level should be measured and recorded during the test. If the groundwater level during the test is more than 5 ft (1.5 m) below the ground surface, a correction to the pile bearing capacity as determined by the test should be made.

7. Safety Requirements

7.1 All operations in connection with pile load testing shall be carried out in such a manner so as to minimize, avoid, or eliminate the exposure of people to hazard. The following safety rules are in addition to general safety requirements applicable to construction operations:

7.1.1 All work areas, walkways, platforms, etc., shall be kept clear of scrap, debris, small tools, and accumulations of snow, ice, mud, grease, oil, or other slippery substances.

7.1.2 All timbers, blocking and cribbing materials shall be of quality material and be in good serviceable condition with flat surfaces and without rounded edges.

7.1.3 Hydraulic jacks shall be equipped with spherical bearing plates or shall be in complete and firm contact with the bearing surfaces and shall be aligned so as to avoid eccentric loading.

7.1.4 Loads shall not be hoisted, swung, or suspended over anyone and shall be controlled by tag lines.

7.1.5 The attachments of the test beam(s) or reaction frame to the anchor piles or other anchoring devices shall be designed and installed to transmit the required loads with an adequate factor of safety.

7.1.6 For tests on batter piles, all inclined jacks, bearing plates, test beam(s), or frame members shall be firmly fixed into place or adequately blocked to prevent slippage upon release of load.

7.1.7 All reaction loads shall be stable and balanced. When using loading method in 3.5, safety wedges shall be in place at all times to prevent the platform from tipping. During testing, movements of the reaction load or system should be monitored to detect impending unstable conditions.

7.1.8 All test beams, reaction frames, platforms, and boxes shall be adequately supported at all times.

7.1.9 Only authorized personnel shall be permitted within the immediate test area.

8. Report

8.1 The report of the load test shall include the following information when applicable:

8.1.1 *General*:

8.1.1.1 Project identification,

8.1.1.2 Project location,

8.1.1.3 Test site location,

8.1.1.4 Owner,

8.1.1.5 Structural engineer,

8.1.1.6 Geotechnical engineer,

8.1.1.7 Pile contractor,

8.1.1.8 Test boring contractor,

8.1.1.9 Designation and location of nearest test boring with reference to test pile or group,

8.1.1.10 Log of nearest test boring,

8.1.1.11 Horizontal control datum, and

8.1.1.12 Vertical control (elevation) datum.

8.1.2 *Pile Installation Equipment*:

8.1.2.1 Make, model, type and size of hammer,

8.1.2.2 Weight of hammer and ram,

8.1.2.3 Stroke or ram,

8.1.2.4 Rated energy of hammer,

8.1.2.5 Rated capacity of boiler or compressor,

8.1.2.6 Type and dimensions of capblock and pile cushion,

8.1.2.7 Weight and dimensions of drive cap and follower,

8.1.2.8 Size of predrilling or jetting equipment,

8.1.2.9 Weight of clamp, follower, adaptor, and oscillator for vibratory driver.

8.1.2.10 Type, size, length, and weight of mandrel,

8.1.2.11 Type, size, and length of auger,

8.1.2.12 Type and size of grout pump, and

8.1.2.13 Type, size, wall thickness, and length of drive casing.

8.1.3 *Test and Anchor Piles*:

8.1.3.1 Identification and location of test and anchor piles,

8.1.3.2 Design load of pile or pile group,

8.1.3.3 Type of pile(s)–test and anchor,

8.1.3.4 Test pile material including basic specifications,

8.1.3.5 Tip and butt dimensions of pile(s),

8.1.3.6 General quality of timber test piles including occurrence of knots, splits, checks and shakes, and straightness of piles,

8.1.3.7 Preservative treatment and conditioning process used for timber test piles including inspection certificates,

8.1.3.8 Wall thickness of pipe test pile,

8.1.3.9 Weight per foot of H test pile,

8.1.3.10 Description of test pile tip reinforcement or protection,

8.1.3.11 Description of banding–timber piles,

8.1.3.12 Description of special coatings used,

8.1.3.13 Test pile (mandrel) weight as driven,

8.1.3.14 Date precast test piles made,

8.1.3.15 Concrete cylinder strengths when test pile driven and when pile tested (approximate),

8.1.3.16 Description of internal reinforcement used in test pile (size, length, number longitudinal bars, arrangement, spiral, or tie steel),

8.1.3.17 Condition of precast piles including spalled areas, cracks, head surface, and straightness of piles.

8.1.3.18 Effective prestress,

8.1.3.19 Which piles vertical or batter,

8.1.3.20 Degree of batter,

8.1.3.21 Length of test pile during driving,

8.1.3.22 Embedded length–test and anchor piles,

8.1.3.23 Tested length of test pile, and

8.1.3.24 Final elevation of test pile butt(s) referenced to fixed datum.

8.1.4 *Pile Installation–Test and Anchor*:

8.1.4.1 Date driven (installed),

8.1.4.2 Date concreted (cast-in-place),

8.1.4.3 Volume of concrete or grout placed in pile,

8.1.4.4 Grout pressure used,

8.1.4.5 Description of pre-excavation or jetting (depth, size, pressure, duration),

8.1.4.6 Operating pressure for double-acting and differential type hammers,

8.1.4.7 Throttle setting–diesel hammer (at final driving),

8.1.4.8 Fuel type–diesel hammer,

8.1.4.9 Horsepower delivered and frequency of vibratory driver during final 10 ft (3 m) of pile penetration,

8.1.4.10 Description of special installation procedures used such as piles cased off,

8.1.4.11 Type and location of pile splices,

8.1.4.12 Driving logs (blows per foot),

8.1.4.13 Final penetration resistance (blows per inch),

8.1.4.14 Rate of pile penetration for last 10 ft (3 m) s/ft, vibratory driving,

8.1.4.15 When capblock replaced (indicate on log),

8.1.4.16 When pile cushion replaced (indicate on log),

8.1.4.17 Cause and duration of interruptions in pile installation, and

8.1.4.18 Notation of any unusual occurrences during installation.

8.1.5 *Pile Testing*:

8.1.5.1 Date tested,

8.1.5.2 Type test,

8.1.5.3 Number of piles in group test,

8.1.5.4 Brief description of load application apparatus, including jack capacity,

8.1.5.5 Description of instrumentation used to measure pile movement including location of gages or other reference points with respect to pile butt (see Note 21),

8.1.5.6 Description of special instrumentation such as strain rods or gages including location of such with reference to pile butt,

8.1.5.7 Special testing procedures used,

8.1.5.8 Tabulation of all time, load, and movement readings,

8.1.5.9 Identification and location sketch of all gages, scales, and reference points (see Note 21),

8.1.5.10 Description and explanation of adjustments made to instrumentation or field data, or both,

8.1.5.11 Notation of any unusual occurrences during testing,

8.1.5.12 Test jack and other required calibration reports,

8.1.5.13 Groundwater level (see Note 20), and

8.1.5.14 Temperature and weather conditions during tests.

NOTE 21—Suitable photographs can be very helpful in showing the

instrumentation set-up, location of gages, scales, and reference points.

NOTE 22—In addition to the above required information to be reported, the results of any in-place and laboratory soil tests should be made available for the proper evaluation of test results.

9. Precision and Bias

9.1 *Precision*—Data are being evaluated to determine the precision of this test method. In addition, Subcommittee D18.11 is seeking pertiment data from users of this test method.

9.2 *Bias*—A statement on bias is not possible because there are no standard reference materials.

10. Keywords

10.1 field testing; load cell; loading procedure; piles; reference beam

APPENDIX

(Nonmandatory Information)

X1. SOME FACTORS INFLUENCING INTERPRETATION OF TEST RESULTS

X1.1 Potential residual loads in the pile which could influence the interpreted distribution of load at the pile tip and along the pile shaft.

X1.2 Possible interaction of friction loads from test pile with upward friction transferred to the soil from anchor piles obtaining part or all of their support in soil at levels above the tip level of the test pile.

X1.3 Changes in pore water pressure in the soil caused by pile driving, construction fill, and other construction operations which may influence the test results for frictional support in relatively impervious soils such as clay and silt.

X1.4 Differences between conditions at time of testing and after final construction such as changes in grade or groundwater level.

X1.5 Potential loss of soil supporting test pile from such things as excavation and scour.

X1.6 Possible differences in the performance of a pile in a group or of a pile group from that of a single isolated pile.

X1.7 Affect on long-term pile performance of factors such as creep, environmental effects on pile material, negative friction loads not previously accounted for, and strength losses.

X1.8 Type of structure to be supported, including sensitivity of structure to settlements and relation between live and dead loads.

X1.9 Special testing procedures which may be required for the application of certain acceptance criteria or methods of interpretation.

X1.10 Requirement that all conditions for nontested piles be basically identical to those for test pile including such things as subsurface conditions, pile type, length, size and stiffness, and pile installation methods and equipment so that application or extrapolation of the test results to such other piles is valid.

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APPENDIX B

Pile Load Testing (PLT)

The Foundation Testing Branch (FTB) is the premier conventional Pile Load Testing (PLT) service, possessing the highest static axial test capacity in the world. FTB provides static pile load testing services for deep foundations throughout the State of California transportation network. PLT accurately provides the actual capacity and load-deflection values that only could be estimated by other means. These values can assist pile designers in calibrating design models, eliminating excess conservatism, shortening pile length, quantifying capacity in difficult soil and rock conditions, and generating data for future research.

The Foundation Testing Branch is highly experienced in the specialized task of performing Pile Load Testing. Pile Load tests have been performed all throughout California, including tests conducted over water and in adverse conditions. All of the PLT systems are flexible, capable of testing both driven piles and drilled shafts. Every test performed exceeds the standards set forth in ASTM D-1143 and D-3689 for static load testing. This valuable information is also shared with the Federal Highway Administration (FHWA) for inclusion in the national pile load test database.

FTB owns four static axial pile load test systems of varying maximum load capacity:

- 1,000,000-pound (4.5 Meganewton) Load Test System
- 2,000,000-pound (9 Meganewton) Load Test System
- 4,000,000-pound (18 Meganewton) Load Test System
- 8,000,000-pound (35 Meganewton) Load Test System

1,000,000-pound (4.5-MN) Pile Load Test System

Foundation Testing owns two pile load test frames capable of testing up to a maximum load of 4.5-MN (1,000,000-pounds). These systems are the oldest in the

Foundation Testing "arsenal," but also the most prolific - having performed hundreds of successful pile load tests.

2,000,000-pound (9-MN) Pile Load Test System

The Foundation Testing 9-MN Load Test System was acquired from the Federal Highway Administration in the 1990's, having previously served as a demonstration project. When acquired, this system shared the title as the largest land-based static pile load test system in the world. As part of the original purchase agreement with the FHWA, this system is available for lease to other State Departments of Transportation.

4,000,000-pound (18-MN) Pile Load Test System

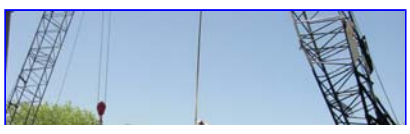
The intermediate-size 4,000,000-pound (18-MN) pile load test system was “created” in 2006 primarily utilizing components of the 8,000,000-pound system. This new system still can test many of the most massive piles installed in California, but is significantly more flexible than the larger system. The first project to utilize the 4,000,000-pound system was the Russian River Bridge at Highway 128, whose accelerated construction was made possible in part by this testing.

8,000,000-pound (35-MN) Pile Load Test System

The Foundation Testing Branch's newest and largest pile load test system has a rated test capacity of 35-MN (8,000,000-pounds). This system is the largest of its kind in the world, allowing for the testing of many of the largest piles installed in California.

The new test system was the outgrowth of the Static Pile Test Quality Team initiative, which identified the potential for an estimated $10,000,000 per year in savings at a capital cost of $1.0-million. The savings are derived from the use of high-capacity piling systems, where a single Cast-in Steel Shell pile with a capacity of 18 to 35 MN (4 to 8 million pounds) is utilized underneath a bridge column, in lieu of multiple piles. The use of large diameter, high-capacity Cast-In-Steel Shell (CISS) piles offers substantial cost savings for many projects, especially where deep scour was identified. The cost savings result from:

· The avoidance of cofferdam construction, which is expensive, has environmental impacts, and requires



longer construction duration.
· The reduction in the number of Cast-In-Drilled Hole (CIDH) piles, which have a very high incidence of contractor claims.
· Optimal bridge design

In the past, High-capacity piles were underutilized because their capacity could not be verified. Additionally, when these large-diameter piles are selected, the result is fewer piles with little or no redundancy -- so verification of capacity is essential. Instances where the use of these piles is now unavoidable have been designed with what is thought to be conservative lengths, but being too conservative has resulted in successful contractor claims of $1,300,000. Traditional dynamic methods have also proved to be unreliable when predicting the capacity of large-diameter piles. Verification of capacity allows designers to rationally and confidently shorten the piles.

For individual structures, significant savings of time and money also occur when cofferdam construction can be replaced by the use of high-capacity piles. Cofferdam construction is often very expensive and time-consuming, especially when utilized for deep excavations. Based on past experience and actual contractor bids, estimates by Structure Construction indicate that 25% of the total structure cost can be saved by eliminating cofferdams in favor of high-capacity piles.

The new 35-MN pile load test system has proven high-capacity piles at multiple job sites and in its first year of use saved construction costs enough to pay for the system 12 times over.

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